

5 CNC machining trends to watch out for in 2021

Economic Outlook Asia-Pacific Q2 2021: Three-Speed Recovery Will Benefit From Faster Global Growth

2021 Healthcare Trends: What Leaders Need to Know from COVID-19 to New Administration Policies

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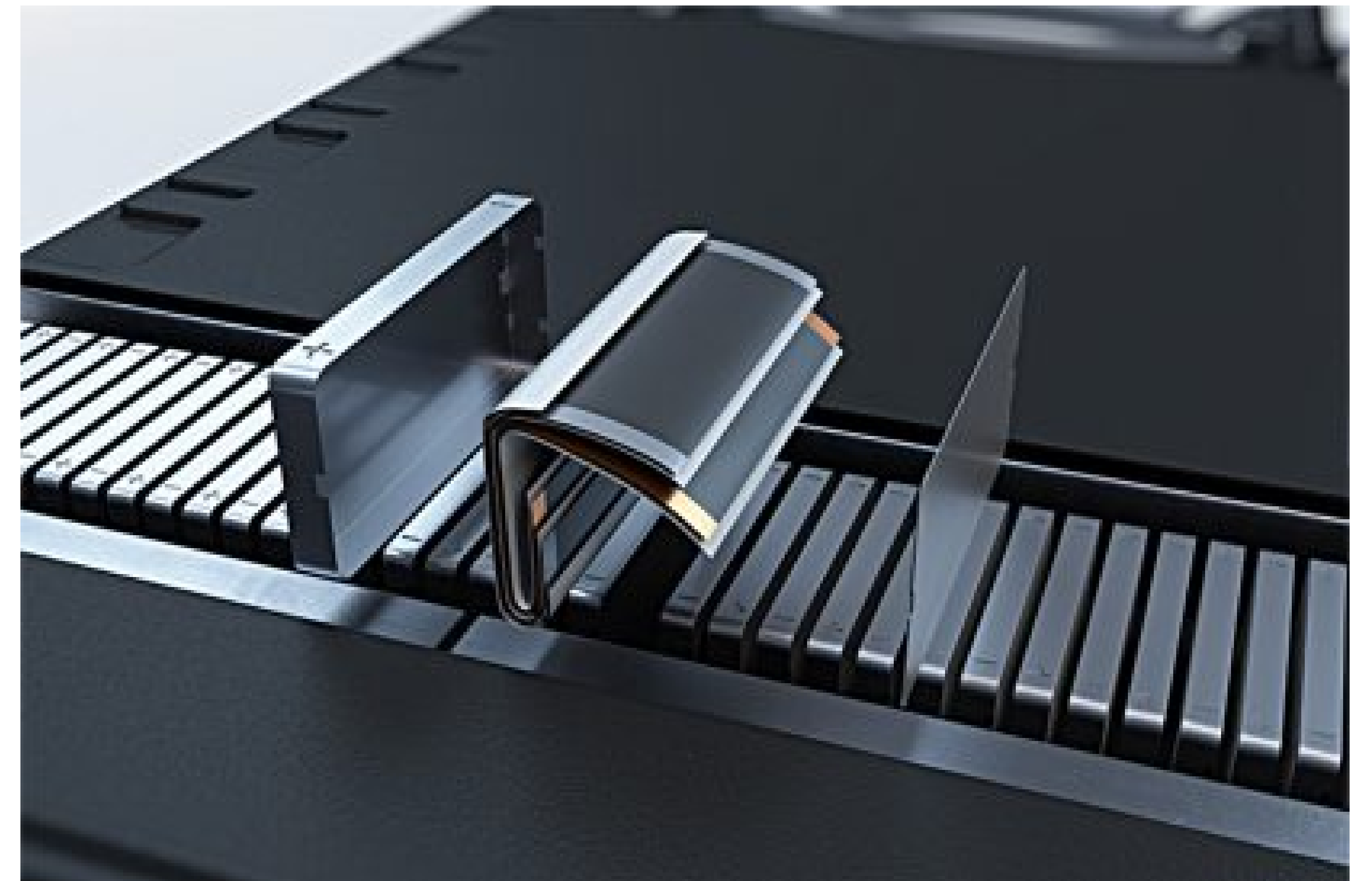
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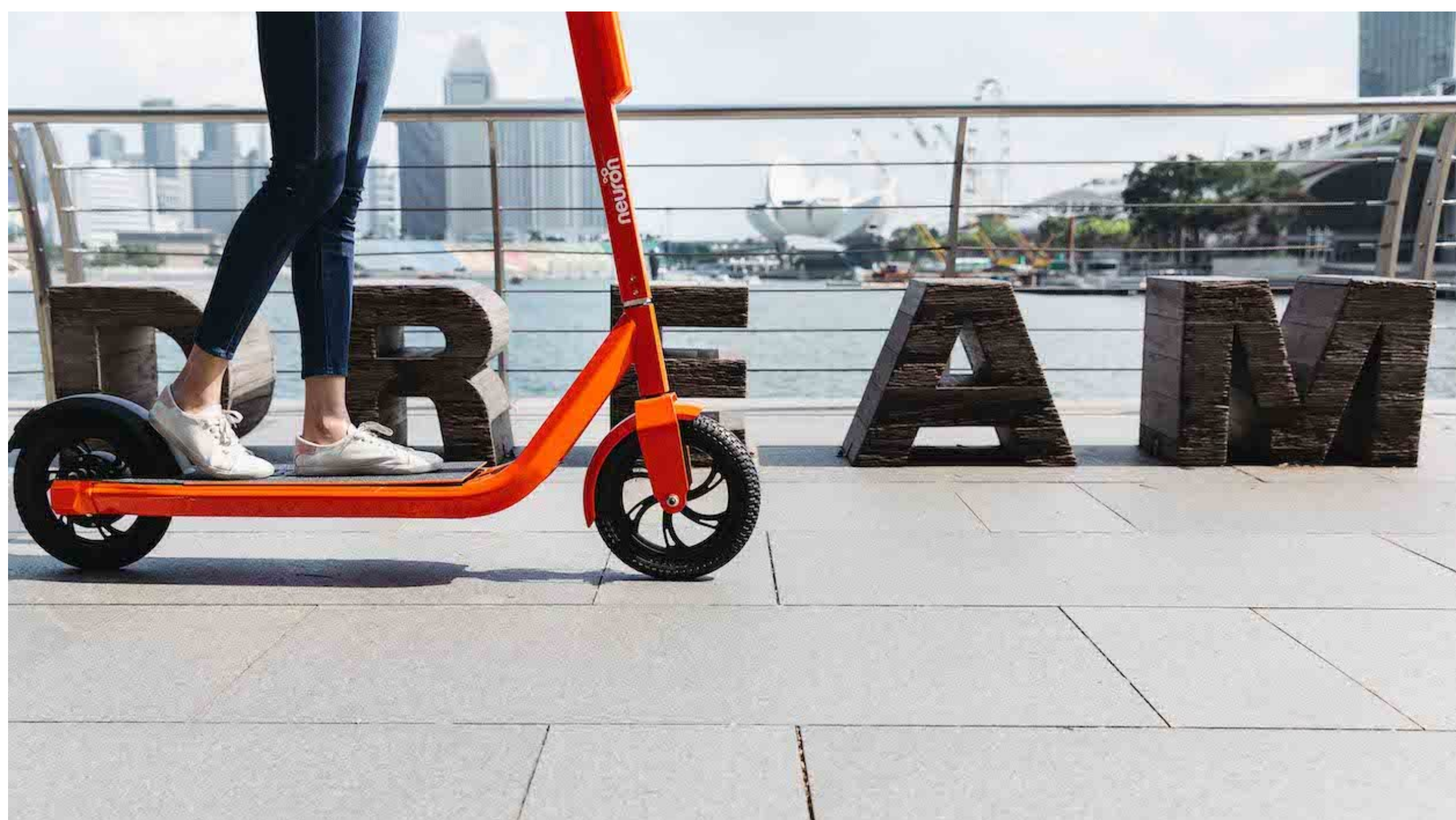
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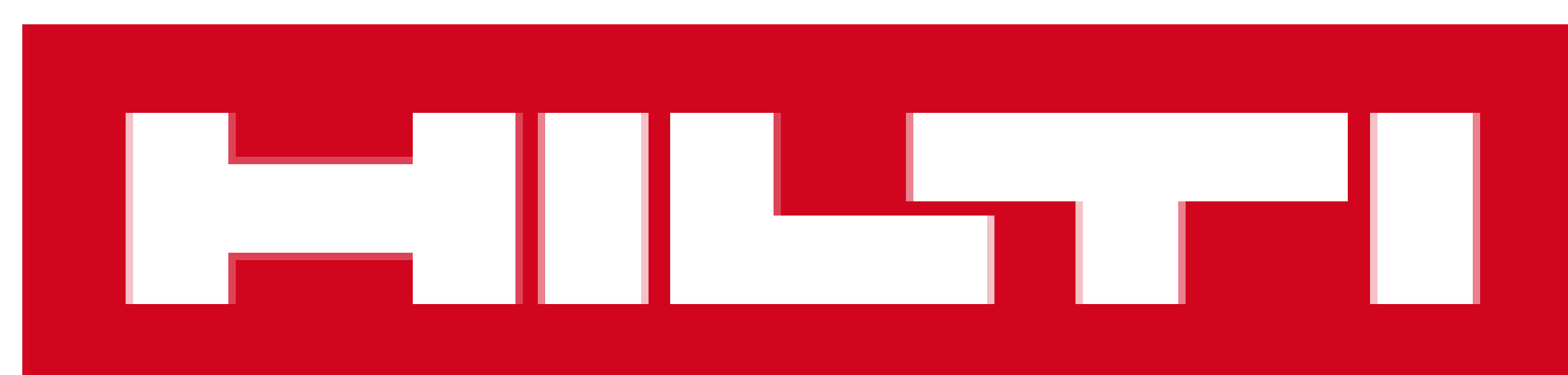


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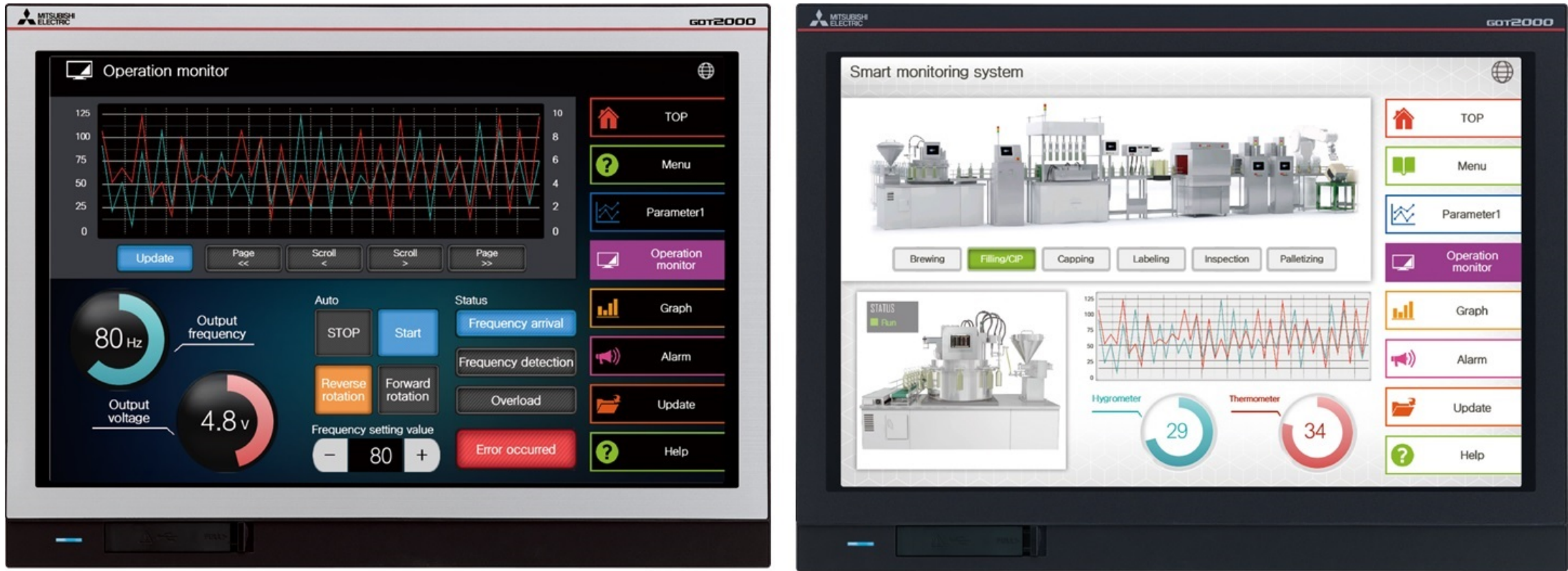
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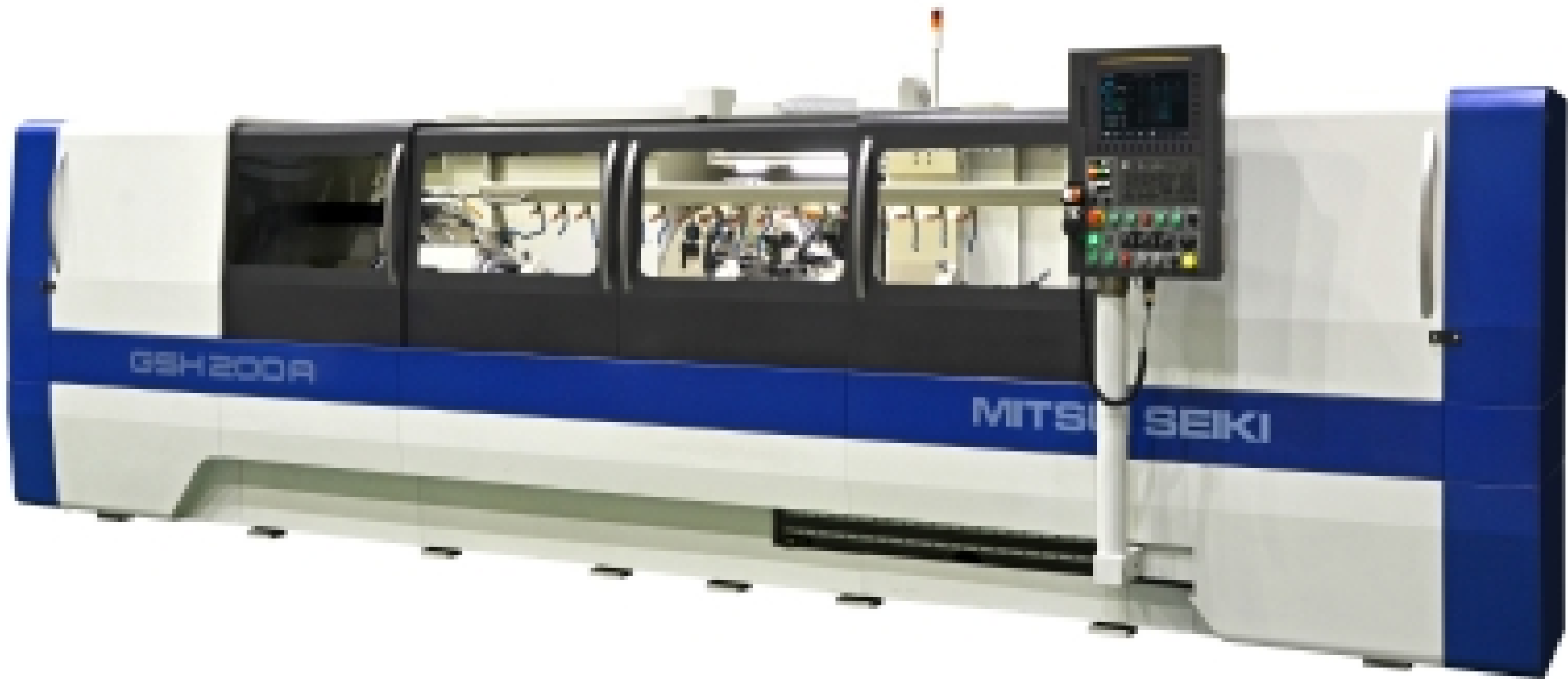


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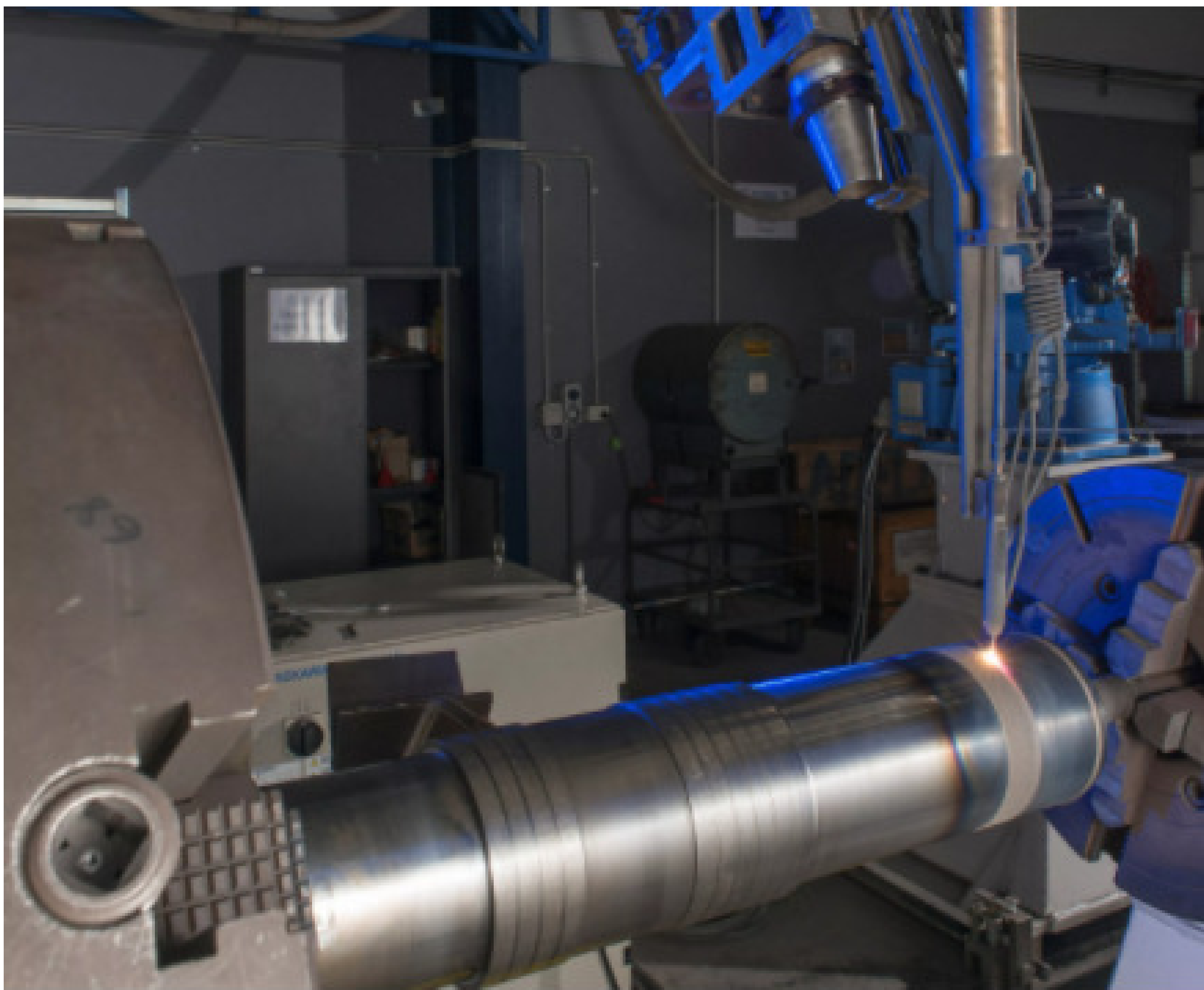
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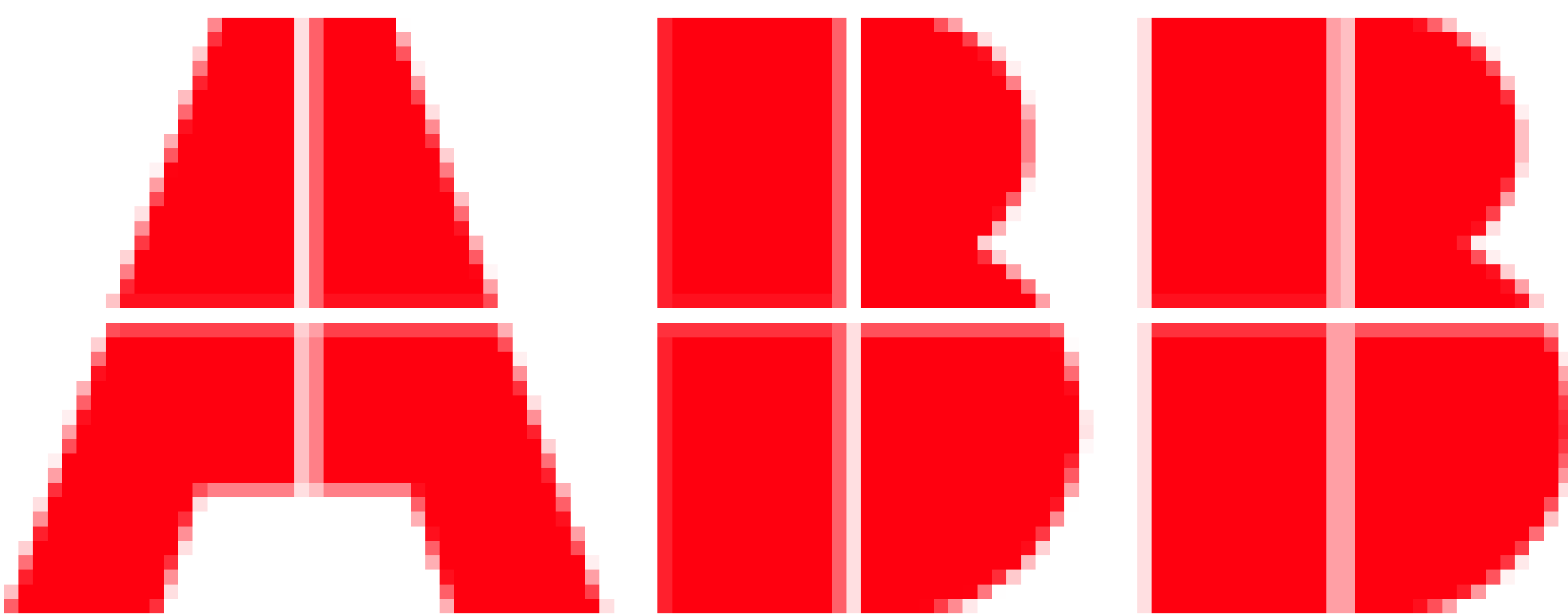
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Hi Folks!

What this is? We are in June already?

How has your months been so far? Are you on the level of an Expert by Working from Home now? It has been rather challenging for us here communicating with our teammates from 6 countries since last year. We pick up many skills from cooking rendang, combining 10 videos into 1, fixing the flat tyres, sharpening our primary school math and keeping the stationaries in a very hidden place in the house. Also, we are on the verge on producing any given notes to a Readable article within 30mins and most of all having zoom calls with new glamorous hairdo in wee hours. We hope you have master all of them by now. It is such unfortunate for our Myanmar office to be closed before it has a chance to go full force speaking Mingalabar. Our hearts and prayers are with them, our teammates, their family, and friends and all our friends and readers in Myanmar. We are now, by far have transform our way of working and life by 90% at home. By now, almost every random person speak about vaccination, herbal tea, and long queuing numbers to the jab. Never in our mind that we are living in such time. This is history. Indeed. At this point of time, we are still unsure if we are ready to make the next travel to any of our offices. Our traveling has been cut off to 100%.

Industrial and manufacturing sectors depend heavily on constant traveling for meetings and co creation. This pandemic sets the i4.0 going insanely across every industry. What is next? This edition, in the 22 mins we have Mr. Shailendra Dubey, Industry Lead for ABB's metals business sharing his insight and strategy for the metal industry in this region. Moving over to the Medical Manufacturing and trends, we have seen some very common pointers – Digitalisation, Cyber Security and Economy Recovery. Also check out the many exciting industrial contests under the Great Opportunity, among the most exciting contest is the 'Abu Dhabi and Singapore expand bilateral cooperation with the launch of a smart city innovation call'. This is going to be a very interesting challenge looking at the overall differences in ecosystems and location, Abu Dhabi sets to be the next big game changers in the world, to be green, sustainable with all the modern invention and facilities.

Some readers have feedback to us about this button  This is a Play Video mode button; we have this feature added to the magazine since 2019.

Here, look at this sample again

Play Video
- Pop up to a new window



Play Video
- Watch and Read at the same time



So , never miss out a good chance to watch something interesting. Here is our next 3 months of editorial coverage. Do send in your interesting articles and videos! Till then, stay safe and keep healthy.

Sending you good vibes.

Team Industrial Guide Asia 2021 EDITORIAL CALENDER

FEBRUARY - Renewable and Alternative Energy

APRIL - i4.0 Covid 19 Effects

JUNE - Precision & Metalworking, Measuring & Control , Medical Manufacturing

AUGUST - Addictive Manufacturing, Plastic & Rubber Technology, Print & Packaging

OCTOBER - Oil , Gas, Marine & Offshore, Shipbuilding and Heavy Equipment

DECEMBER - Manufacturing Automotive, Robotics and Vision Systems



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22 MINUTES WITH

Mr. Shailendra Dubey is Industry Lead for ABB's metals business in South Asia, Middle East and Africa (SAMA) and has more than 15 years of industry experience. He joined ABB in 2006 in India and later moved to Malaysia. In 2014 he took responsibility of the metals and mining business for the South Asia hub, based in Singapore. He is an electrical engineering graduate and prior to ABB, worked with SMS Demag (SMS group) in electrics and automation. Shailendra is known for building sustainable customer relationships by anticipating and mapping customer needs, with focus on consultative sales and solutions development. Contributor biography. He has worked in process applications such as cold rolling mills, profile mills and iron and steel making, delivering electrification, drives, motors, and automation system solutions. His focus and specialist knowledge of this market resulted in the achievement of several large strategic awards whilst simultaneously increasing the footprint of ABB throughout the metals industry in this key region.

Metals

What are the challenges facing the metals industry during this pandemic?



The pandemic is reshaping how companies operate across most industries. We are supporting our customers through these changes with safety the highest priority, relying more than ever on virtual communications tools and offering remote services. Globally, the pandemic has also impacted the consumption of metals. For example, we know our customers are facing substantially reduced demand for steel products.

This trade requires you to be on site for your clients frequently. How do you manage this during this time?

We continue to visit our customers when it is required, leveraging our network of local ABB teams to provide direct support, diligently following ABB



health and safety protocols and those of our customers. Evidently, cross-border travel has been reduced within countries and between countries, so we have adapted. Particularly for our customers in other countries, we have adopted new tools to connect sites and perform necessary tasks, including commissioning.

What technology has your company adopted to facilitate work between you and the end users?

We have used various digital tools to connect with our customers, including video calls and file sharing platforms, which we have all become more familiar with over the last year. There is mutual understanding, with customers more open to using these tools to carry out as much work as possible remotely to ensure the safety of all teams. On top of the common tools, we are working more with Augmented Reality (AR) and other digital applications to support our customers with issues, repairs and commissioning of new projects.

What do you view as the most important metals issue facing our industry today?

From a global point of view, supply is currently higher than demand with an overcapacity of steel. This is undoubtedly affecting prices and the growth of the industry. It is important that businesses

improve the efficiency of their operations to stay competitive and ABB is leading the way in this space as always. However, sustainability cannot take a backseat and business owners remain open to exploring tools and solutions. Many existing solutions are helping to improve productivity while reducing environmental impact.

How is ABB overcoming some of the known hazards within the metals industry?

Many of our digital tools help customers to remove workers from hazardous areas or shorten the time that they need to be there. Our metallurgical offerings not only improve efficiency and quality but provide for a smoother, more repeatable process with less manual intervention, contributing to the safety of workers.

Using our understanding of the metals process, we have designed digital tools to perform specific tasks. For example, we use ABB Ability™ Remote Insights to connect field personnel to ABB experts directly. The application helps us to see whatever the plant operator is seeing and utilizes augmented reality and live on-screen annotations to help the customer resolve issues more quickly. Our ABB Ability™ Performance Optimization for steel melt shop solution improves human safety by reducing exposure to hazardous hot metal zones and allowing for decision-

making based on information dashboards.

What is a new trend in the metals industries this year?

We see a plethora of technology to assist steelmakers in their roles such as fully and semi-autonomous robots, drones, increased use of artificial intelligence (AI), virtual, augmented, and mixed reality, digital twins and ever more innovative ways to transform. Steel players around the globe are increasingly focusing on decarbonization. Overcoming the challenges to decarbonize the steel industry is one of many key steps in reaching the world's global climate targets. Through innovation, low-carbon technology deployment and resource efficiency, iron and steel producers can reduce energy consumption and greenhouse gas emissions and enhance their competitiveness.

What is your strategy this year for the metals industry in Asia?

Due to global competition, metals manufacturers are under constant pressure to find new and improved ways to enhance operations and reduce costs. More powerful tools are needed to monitor operations, identify and diagnose current problems, and predict new ones before they cause bottlenecks, unplanned downtime or unnecessary use of resources such as utilities, energy and assets. ABB's focus is on digital solutions

that combine real time, remote expert insights with continuous monitoring and process-specific data analytics. These solutions offer steel, aluminium and other metals manufacturers opportunities to reach new levels of operational performance through technology, boosting their processes and profitability. ABB will work alongside customers with the vision of continuing to transform the metals industry.

This pandemic has helped to speed up the whole Industry 4.0 trend. How has it been for the metals industry in Asia so far?

Industry 4.0 technologies were already transforming manufacturers' operations before the pandemic. But the pandemic has fuelled and expedited the adoption of digital technologies by a few years and the changes are here to stay. In the metals industry, the response is mixed; large steel players had already started scaling up and are now ramping up at a higher pace, the smaller players need to catch up soon to stay in the game.

How long do you think it will take for metals companies to transit deeper digitally?

The metals industry has a history of long lead times when it comes to adopting new technologies. While the industry has made significant investments in process control and automation, it has lagged in digitalization. However, this pace has picked up over the last few years and now accelerated by a global pandemic, the

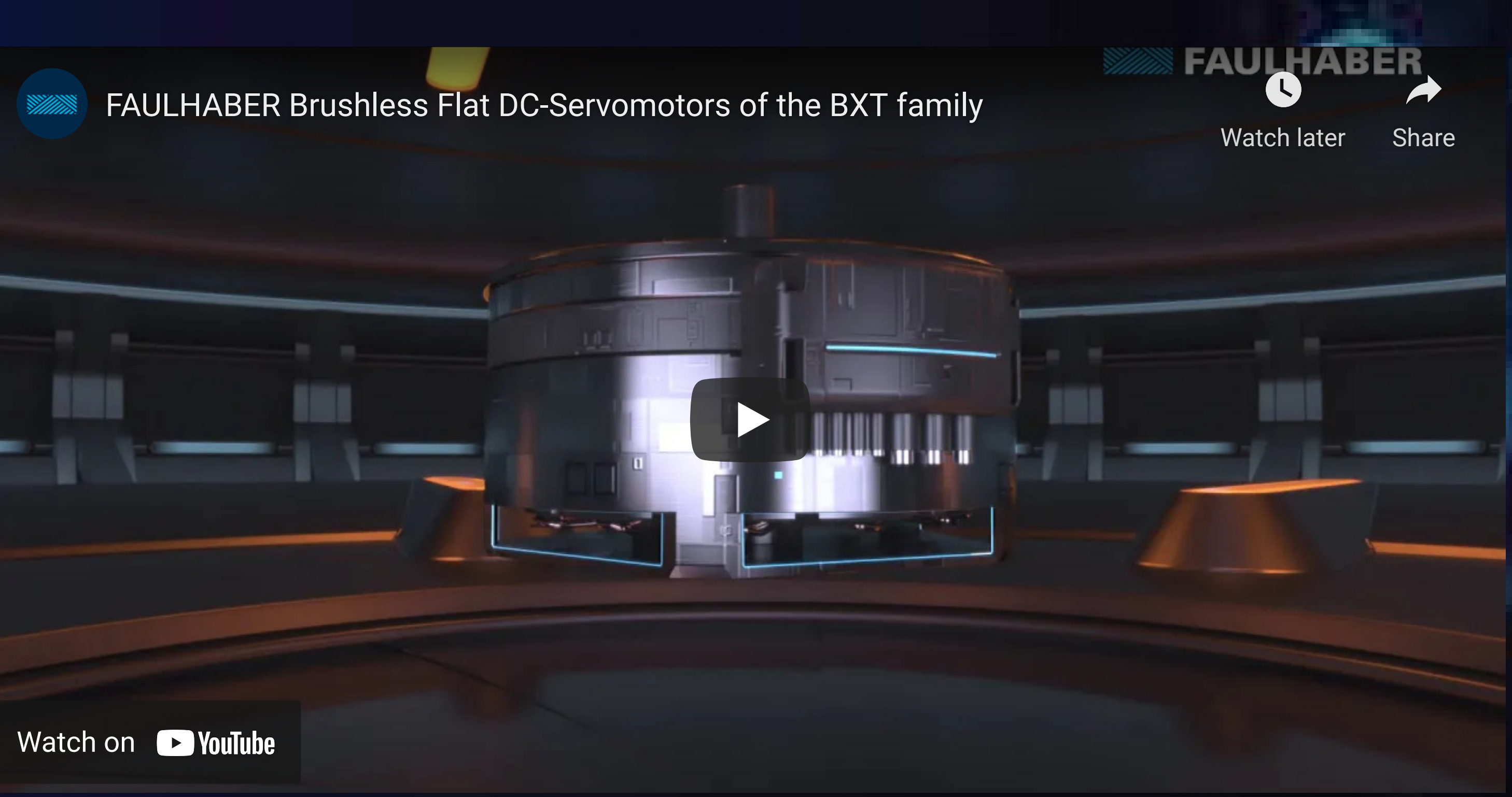


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industry is all set to witness a big change in the operations and adoption of digital technologies. With the metals manufacturing companies now leveraging value out of latest technologies like data analytics and AI, the industry is racing towards a digital future.

Tell us how does ABB intends to transform the metals industry?

We are now in the century defined by Industry 4.0, which is progressively evolving to meet the needs of rapid and productive operations. Metals companies cannot rely on aging systems to support the business activities of the future. To remain competitive, they need to transform, create new operating and business models, and foster a digital culture. ABB can envision, create and manage the digitalization initiatives of our customers, capture real value from Internet of Things (IoT) applications with our deep domain knowledge of the steel industry, copper, aluminium, other metals and metallurgy. Our vision of an intelligent metals plant is where ABB enables end-to-end visibility and optimization, consolidates data in a unified digital ecosystem to create impact on every aspect of operations and makes the transformation to intelligent plants a reality.

11. What is the latest technology from ABB for the metals industry?

As a technology leader ABB has always

innovated, working closely with customers to directly understand the emerging trends and issues. We offer a host of customizable solutions already deployed at plants around the globe - to better monitor, control and optimize the complete value chain. Some of our new offerings like ABB Ability™ Performance Optimization for steel melt shop help boost overall productivity, safety and energy efficiency in steel manufacturing. Our ABB Ability™ Data Analytics platform for metals offers plant-wide and enterprise-wide data integration, monitoring, data analytics and optimization in iron, steel and other metals manufacturing - with one single platform. At ABB we believe a more collaborative approach is the way forward to implement proactive maintenance strategy tailored to the needs of your metals plant - improving availability, reliability and reducing maintenance costs.

Medical device outlook for 2021 and beyond

Here are some major trends attributed to the transformation of the medical device industry technological advances, presenting new opportunities as well as challenges for medical device companies. Source : Wolters Kluwer



Wolters Kluwer

Technological advances are revolutionizing the medical device industry, not only increasing the number of connected medical devices available to market but strengthening their role in healthcare. The global medical devices market in 2020 was valued at \$456.9 billion, which is an increase at a compounded annual growth rate (CAGR) of 4.4% since 2015. Despite an expected decline of -3.2% in 2020, it is expected to rebound in 2021 with a 6.1% CAGR and reach \$603.5 billion in 2023.

Developments in wireless technology, smaller devices, and computing power are changing the landscape of the interconnectedness of devices. The data collected, analyzed, and shared from medical devices with healthcare organizations is allowing for better patient outcomes, lowering of costs, and presenting an additional revenue source. Properly integrating and disseminating patient information will only strengthen future growth in MedTech.

The following are some major trends attributed to technological advances, presenting new opportunities as well as challenges for medical device companies.

IoMT (Internet of Medical Things) to modernize healthcare

Significant innovations in new technologies such as smart sensors, smart devices, and other lightweight communication devices are driving medical devices that generate data into care pathways, creating alliances with IoMT systems. These advancements that help aid in the monitoring of biomedical signals and the diagnoses of diseases without human intervention are aiding healthcare organizations to improve patient outcomes, lower costs, and improve efficiency. The role of MedTech is now even more important, serving as a value-based partner rather than just a developer and supplier of devices.

The IoMT market is expected to grow \$285.5 billion by 2029, which is a compound CAGR of 28%.

Medical device companies are looking at their business models and identifying ways to integrate IoMT in order to serve as partners for By harnessing the data and making it meaningful to healthcare providers, a new value-based program can be monetized.

According to Deloitte's Research2Guidance, medical device companies are starting to utilize the IoMT connected infrastructure:

- 31% are offering data distribution channels as a service
- 39% are incorporating data as an added value to justify pricing
- 43% are using data to drive business decisions.

For IoMT to successfully integrate into MedTech, proper integration between all parties across the IoMT ecosystem should be in place. Medical devices need to

generate, analyze, and send accurate data to reveal the condition of patients and the effectiveness of the treatments in order to show true value.

Creating integrated platforms will allow for the information to be collected, shared, and accessed in an efficient and secure way. The key for successful IoMT is the accuracy and fluid transfer of the data providing an analysis of health conditions for healthcare systems and patients. The goal is to improve patient outcomes while reducing costs. These service-based solutions offer valued-based care, making medical device companies a partner in healthcare rather than just a manufacturer or supplier.

Device connectivity as another source of revenue

MedTech is discovering an opportunity to create another revenue stream with data. Software as a medical device (SaMD) is transforming healthcare, empowering patients to be better informed and involved in their own health conditions. Patients with chronic conditions that require monitoring can obtain the data and share it with other healthcare professionals, allowing them to better manage their health. Those that are willing to share data can help improve their treatments and help medical device companies enhance their products. Currently 40% of patients are willing to share personal data for medical research, while 35% are willing to share it with medical device manufacturers according to a survey. This presents an opportunity for medical device companies to monetize the sharing of data, where patients own the data and proprietary

tools are then used to distribute them to interested parties.

According to a survey by Deloitte Center for Health Solutions and AvaMed, all the medical device companies questioned are investing in medical device connectivity. Out of the group, 68% are creating payment structures to include SaMD. The portfolio of products, supporting services, and software technology surrounding patient data will produce better patient outcomes, lower costs, and aid in efficient patient treatments. As SaMD technology becomes less costly, more accessible, and sophisticated, it will influence healthcare delivery, research, and allow for more personalized treatment. There are, however, some obstacles that need to be considered. Of all the medical device companies surveyed, 77% stated combining data with new technology will be challenging. Medical device companies will also need to source a workforce with skills set to innovate the development of medical device software



solutions. Additionally, regulation will be pressed into being agile and ready to address privacy concerns at all levels of information dissemination.

A trend we expect to see in 2021 is tougher governmental regulations aimed to protect the privacy of patient information.

Robotics



The advancements in robotic surgery has led to a huge demand for minimally invasive robotic surgery (MIRS) both from physicians and patients, creating a double-digit growth rate within the last five years. The surgical robot market is expected to grow from \$5.5 billion to over \$24 billion by 2025, doubling the current 1 million MIRS procedures worldwide.

Physicians are increasingly recommending robotic surgeries to their patients due to the quality precision, better

ergonomics, and the ability to have better control. On the patient side, their growing preference for minimally invasive procedures with the use of robotics is fueled by their desire to experience smaller incisions, less blood loss, decreased hospital stay, and a quicker recovery time. Overall, minimizing post-operative trauma and decreasing complications is a win-win for both sides.

This demand for MIRS is pushing the industry to create more technological advanced surgical robots with increased accuracy, dependability, and ease of use. This will also allow various segments to grow and allow other procedures to offer MIRS.

Strengthen cybersecurity



The threat of cybersecurity is now at the forefront for medical devices, with numerous exchanges of information and accessibility between healthcare providers, manufacturers, and suppliers. As technology , so has the sophistication of

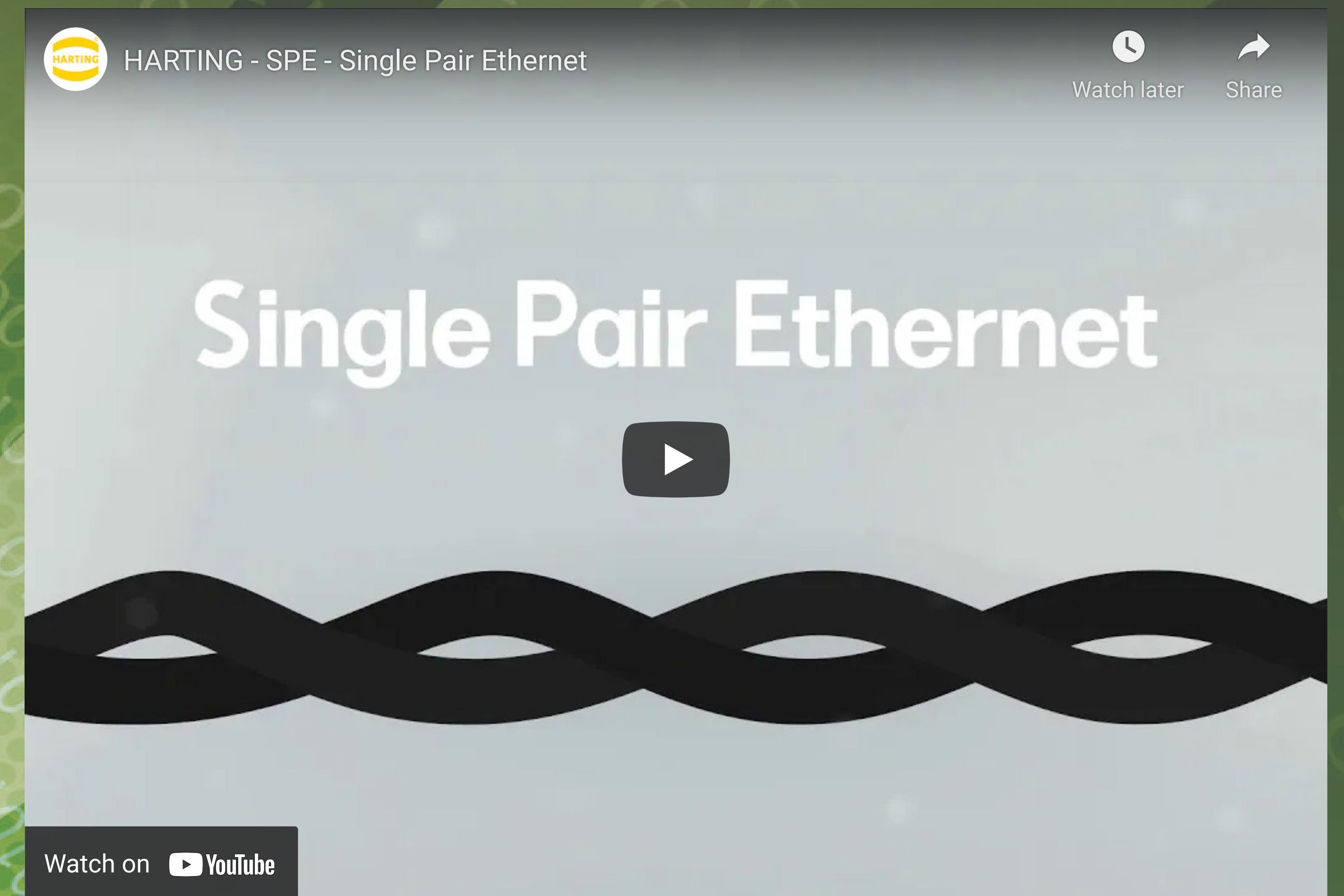
cyberattacks. Medical device security can be implemented not only during the conceptual and developmental stages but extended throughout the product's lifecycle in order to prevent cyberattacks. Though larger companies claim they are better prepared to handle cybersecurity issues, smaller companies need to react quickly and work together to minimize any harm to the flow of information.

The FDA recognizes that medical devices share the responsibility of cybersecurity threat across the ecosystem but specifically holds manufacturers primarily responsible for managing cybersecurity risks within their products. A security 'playbook' was created last year to assist healthcare delivery organizations to respond to threats of cybersecurity. There have not been any cases to date on attacks on medical devices. FDA commissioner Scott Gottlieb stated in October 2018, "The FDA isn't aware of any reports of an unauthorized user exploiting a cybersecurity

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vulnerability in a medical device that is in use by a patient, but the risk of such an attack persists.” Medical device companies should be prepared to provide documentation of processes implemented to the FDA showing that cybersecurity risks are being managed.

In the EU, an agreement was made to the Cybersecurity Act in December of 2018, reinforcing the directive of the European Union Agency for Network and Information and Security (ENISA). The purpose was to aid member states in fighting cybersecurity threats and attacks. It also addressed certification for certain information technologies regarding those that included medical devices.

Advancement in technology and the growth of information sharing through medical devices are reshaping the landscape of healthcare. The world needs to be prepared to not only utilize

utilize the data to enhance patient outcomes but to safeguard their privacy. It will take regulatory agencies and medical device companies to work together to create an infrastructure with defined expectations. Those medical device companies who are already investing in the technology, infrastructure, and partnerships amongst healthcare organizations have the potential for further exponential growth.

2021 Healthcare Trends: What Leaders Need to Know from COVID-19 to New Administration Policies

Source: Health Catalyst



After a turbulent, COVID-19 dominated 2020, healthcare leaders, policymakers, and the U.S. public are eager to know what 2021 holds. Pressing concerns include persisting and emerging pandemic challenges, the long-term effects of COVID-19, future emergency preparedness, and how the Biden administration will impact healthcare—notably, the future of the Affordable Care Act (ACA).

2021 healthcare trends fall into three main categories: healthcare policy, care delivery, and technology. The industry can prepare for the future by understanding critical areas to watch within these categories and which events and activities may affect the healthcare ecosystem.



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Healthcare Trends:

Three Main Categories to Watch

2021

Three main Healthcare trends to watch in 2021: healthcare policy, care delivery, and technology. Critical areas to watch include persisting and emerging pandemic challenges, the long-term effects of COVID-19, future emergency preparedness, and the impact of the Biden administration on healthcare—notably, the future of the Affordable Care Act (ACA).

Trend 1: Policy Changes

With President Joe Biden's inauguration, the healthcare industry will watch for shifting priorities around the ACA and a new COVID-19 plan, as well as who will be on the administration's healthcare team and on which policies it focuses.

Trend 2: Care Delivery

COVID-19 will continue to drive care delivery in 2021. Prominent areas of concern include how the pandemic continues to impact health systems, clinicians, providers, patients, and value-based care programs as well as preparing for future pandemics.

Trend 3: Healthcare Technology

The pandemic has accelerated innovation and pushed agility in healthcare technology. COVID-19 response has driven increased activity in healthcare data analytics, artificial intelligence, and telemedicine, which will likely continue to propel healthcare technology.

2021 Healthcare Trends in Policy: What to Expect Under the Biden Administration

With President Joe Biden's inauguration on January 20, the healthcare industry will be watching for the new administration's priorities around the ACA and its -19 plan, as well as who will be on the administration's healthcare team and on which policies it focuses.

The Affordable Care Act

While ACA repeal was a constant threat under the last administration, the Act looks more secure following recent developments. The ACA's future likely hinges on the constitutionality of the individual mandate and potential severability under the California versus Texas case, which the U.S. Supreme Court is currently considering.

The California versus Texas case came to the Supreme Court from a federal appeals court.

If the Supreme Court affirms the appeals court ruling, the case will go back to the federal district court to decide on the issue of severability of the individual mandate from the rest of the ACA. At the November 2020 oral argument, it looked like the Supreme Court, including one or more of the new justices, was inclined to honor the doctrine of severability, making it less likely the ACA will face complete repeal. Additionally, the new slim Democratic majority in the Senate (thanks to the Georgia runoff) makes it likely that Congress would fix the constitutional problem by reinstating the mandate with a nominal penalty.

The ACA also includes many popular, patient-focused programs, making it less likely to face repeal. These include the protection for individuals with pre-existing conditions, parental healthcare coverage for children up to age 26, and greater access to health insurance through the exchanges.

Popular on the healthcare-industry side are value-based care (VBC) and the Medicare Shared Savings Program. These programs and are likely to continue, regardless of the ACA's future, because they enjoy bipartisan support.

The Biden administration may also take steps to strengthen aspects of the ACA, such as making more resources available for demonstration projects, and raising tax credits and subsidies to purchase insurance on the exchanges. These actions may be attainable within the framework of the existing law and wouldn't require new legislation.

The Biden Healthcare Team

The Biden administration has made a number of appointments and nominations to fill healthcare positions, with notable roles including the following:

- Xavier Becerra, Secretary of Health and Human Services (HHS) (Attorney

General of California and

- Jeffrey Zients, COVID-19 Coordinator (previously led Healthcare.gov turnaround).

- Vivek Murthy, Surgeon General (served as Surgeon General in Obama administration).

- Carole Johnson Chair, National Pandemic Testing Board (New Jersey Human Services Department commissioner and former Obama administration official).

- Cyrus Shahpar, COVID-19 Data Director (CDC official, and FEMA official in Obama administration).

- Anthony Fauci, Director of the National Institute of Allergies and Infectious Diseases (the current Director of the National

- Institute of Allergies and Infectious Diseases, will remain in his post and serve as Biden's Chief Medical Advisor).

- Sonya Bernstein, Senior Policy Advisor (HHS official).

FEATURE STORY

- David Kessler, Chief Scientific Advisor to Operation Warp Speed (former FDA Commissioner).
- Rochelle Walensky, Director of the CDC (Chief of Infectious Diseases at Massachusetts General Hospital and Professor at Harvard Medical School).
- General Gustavo Perna, Operation Warp Speed COO (to continue to control vaccine distribution logistics).
- Marcella Nunez-Smith, COVID-19 Equity Task Force Chair (a new role) (Professor at the Yale School of Medicine and the Founding Director of Yale's Equity Research and Innovation Center).
- Osaremen Okolo, Policy Advisor (Senior Health Policy Advisor to U.S. Representative Jan Schakowsky of Illinois).
- Andrea Palm, Deputy Secretary HHS (Wisconsin health official and former Obama administration official).

These appointments and nominations point to a strong emphasis on COVID-19 recovery and vaccine distribution and coordination. For example, Fauci remains as the Director of the National Institute of Allergies and Infectious Diseases, and there's now a COVID-19 data director (Shahpar), indicating this administration will emphasize data and reporting. Also evident in these appointments is a Biden administration focus on health equity and healthcare disparities—particularly with Nunez-Smith as the first Equity Task Force Chair for COVID-19.

Democratic control in the Senate will also impact healthcare. For example, Washington state Senator Patty Murray will chair the Senate Committee on Health, Education, Labor, and Pensions. She has advocated for a more robust federal response on COVID-19.

And Senator Ron Wyden, Oregon, leads the Finance Committee and has pushed for drug pricing reform and drug price negotiation.

Biden Administration Priorities

COVID-19 tops the Biden administration's priorities and will likely do so for the foreseeable future. Vaccine distribution will dominate the first six months of 2021, with federal effort focused on the expansion of testing, contact tracing, and better public health reporting from states and localities up to the CDC and other federal agencies.

Data collection and expanded use of data will be critical to the Biden administration's ongoing COVID-19 response. The administration proposes funding to states and localities for their public health response infrastructure (including registries, reporting, surveillance, and dashboards). The administration also plans to expand the availability of

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of platforms that ensure patient data security and to expand data use rights to enable use and disclosure for research and surveillance. These actions will accelerate research on effective clinical interventions and treatment pathways, expand patient monitoring, and help public health reporting and tracking vaccine distribution.

The new administration will also likely push to expand healthcare program funding, including ACA programs and value-based care, and expansion of coverage. The Senate may use the budget reconciliation process to push through a COVID-19 relief package and some healthcare-related policies. Budget reconciliation requires only a majority vote, as contrasted to a supermajority vote for regular legislation. However, budget reconciliation can only happen a couple of times per year, generally speaking, when the budget is up for approval, and is

limited to budget-related items.

Budget reconciliation pushed through some provisions of the ACA in 2010. While some of the ACA expansions, increased subsidies, and tax credits could occur through budget reconciliation, this process would not be available for bigger picture health policy issues that are unrelated to the federal budget. These bigger picture items include issues such as a public option, Medicare for all, and lowering the Medicare eligibility age to 60.

The following policy priorities, if the administration adopts them, would also help the nation better prepare for future emergencies at the health system, local, state, and national levels:

- A national patient matching strategy, such as implementing a national patient identifier, will be critical in public health emergencies to enable healthcare organizations to link patients across providers and health

information exchanges and surveillance and contact tracing efforts.

- Continued support for interoperability across the healthcare industry and enforcement against information blocking practices will also enhance emergency preparedness.
- Funding for the development of a national epidemic/pandemic information network that will include an overhaul of the CDC's data aggregation and reporting system, and mandating healthcare data vocabulary standards across EHRs.

The Biden Administration COVID-19 Plan

The Biden administration has released its National Strategy for the COVID-19 Response and Pandemic Preparedness, a \$1.9 trillion-dollar plan, which Congress was debating as of early February 2021. Although Congress will likely approve a reduced COVID-19 relief package, some notable features of the proposal include the following:

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- A national vaccination program, including \$20 billion to states, localities, tribes, and territories to launch community vaccine centers around the country and mobile vaccination units.
- Enhanced testing and contact tracing, including \$50 billion to expand testing, including in-home and instant tests, and funding the hiring of 100,000 public health workers to assist in vaccine distribution and build public health capacity.
- Equitable distribution of tests, treatments, and vaccines, including addressing disparities in the equitable distribution of vaccines and supplies and expanded services and vaccine availability for underserved populations.
- Domestic production of personal protective equipment (PPE), including fully utilizing the Defense Production Act to increase the production of masks, face shields, and other PPE, a \$30 billion

investment in the Disaster Relief Fund, and \$10 billion to expand manufacturing capacity.

- Support Tribal governments' response to COVID-19, including a \$20 billion investment and access to PPE, clean water, electricity, and internet for education, telehealth access, and more.
- Public health surveillance, including expanded surveillance of new strains of COVID-19 and monitoring effectiveness of new treatments and therapies.
- Preserve and expand healthcare coverage, including subsidizing COBRA continuation through the end of September 2021 and expanding and increasing the Premium Tax Credit.
- Preserve and expand healthcare coverage, including subsidizing COBRA continuation through the end of September 2021 and expanding and increasing the Premium Tax Credit.



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2021 Healthcare Trends in Delivery

Like healthcare policy, COVID-19 will continue to drive care delivery in 2021. The pandemic will shape healthcare moving forward, with the impact and toll of the virus factoring in care delivery for a long time. Critical areas of concern include how COVID-19 continues to impact health systems, clinicians, providers, patients, and VBC programs and healthcare delivery changes to prepare for future pandemics.

The Toll of COVID-19

As of early February 2021, the Washington Post reported that COVID-19 deaths had reached over 2 million worldwide. This number included more than 444,00 deaths in the United States and more than 100 million cases worldwide.

In Figure 1, below, from Center for Disease Control (CDC), the bottom line shows the expected deaths in the United States for any given year. As of January 23, 2021, the actual observed numbers of deaths were well above the threshold for excess deaths.

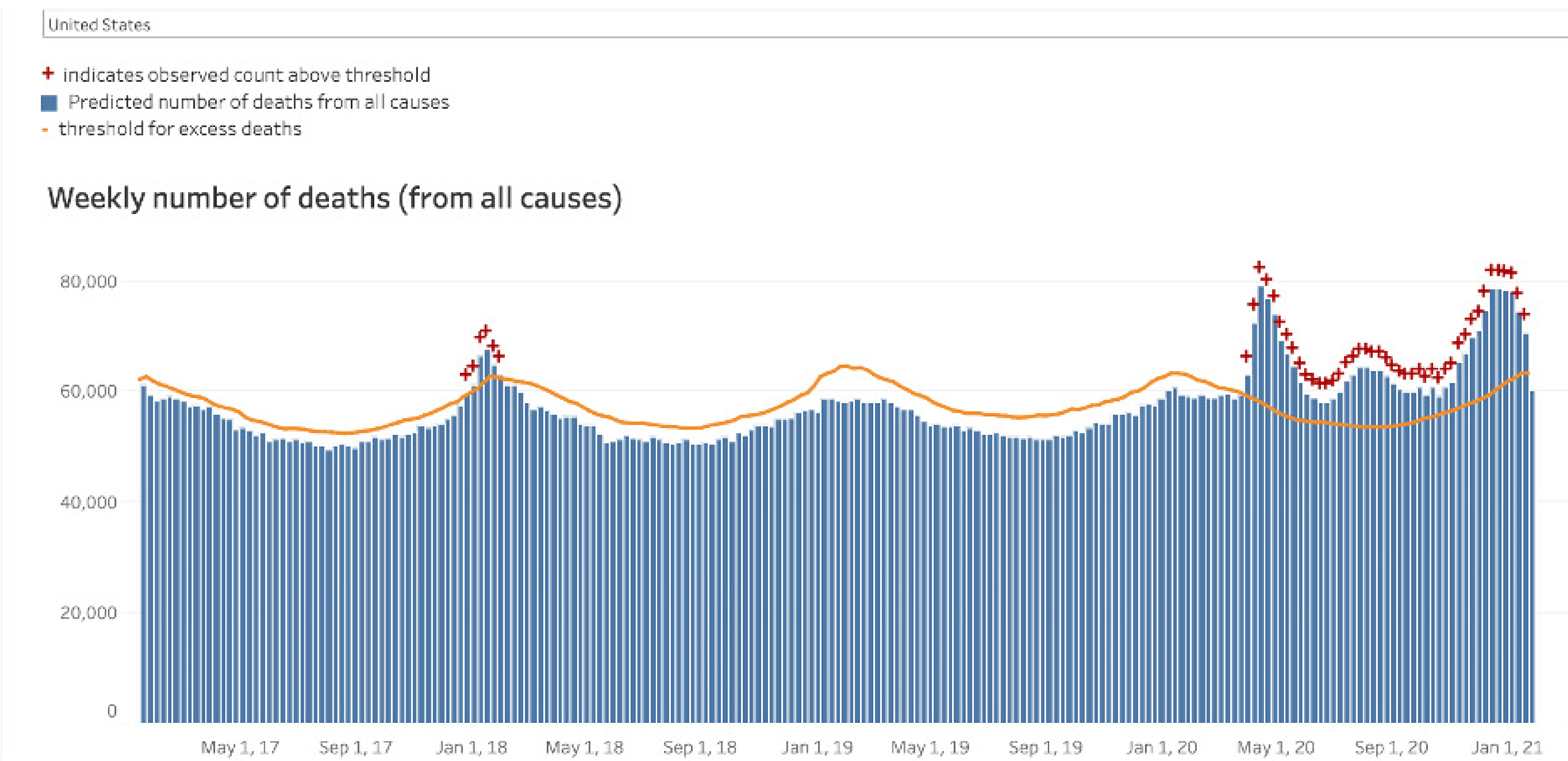


Figure 1: U.S. COVID-19 deaths likely exceed threshold rates.

The above numbers represent a tremendous burden on COVID-19 victims and their loved ones and the U.S. healthcare workforce—with both physical and mental impacts. Those working in high-risk departments (e.g., emergency departments (EDs) and ICUs) with infected patients, sometimes with suboptimal PPE access, have felt the most significant impact and experienced the highest mortality. This loss will impact the industry indefinitely. To fill in frontline gaps, many organization team members who usually focus on process improvements in care settings are doing frontline work. This matter reflects the financial impact and the shortage of staff due to COVID-19.

The CDC has responded to the pandemic's toll with Project Firstline, an initiative for communities and health frontline workers to promote infection prevention and infection control. The Health Research and Education Trust, American Medical Association, and the American Nurses Association co-sponsor the initiative, which provides practical tools and resources to implement infection control protocols in every patient interaction.

COVID-19-Driven Changes to Care Delivery

The influx of COVID-19 patients has driven massive change in the healthcare delivery system. According to the Kaufmann Hall National Hospital Flash Report, many individuals are avoiding routine and elective interactions with healthcare, with consequences including a drop in weekly screening for breast cancer, colon cancer, and cervical cancer of between 86 and 94 percent, according to the Kaufmann Hall National Hospital Flash Report: December 2020. Foregoing screenings and other preventive care will have a long-term impact on healthcare, as early detection and intervention will decrease.

Kaufmann Hall's findings also showed discharges volumes were down in terms of elective discharges, as were operating room minutes, elective procedures and ED visits in general, and

revenues were dramatically down at 14 percent per adjusted discharge. Outpatient revenue (a source of loss for elective work) was down 6 percent compared to an inpatient revenue drop of 1 percent.

As healthcare consumers have made fewer routine and elective visits, organizations have felt a financial impact, hitting ambulatory and hospital settings. Operating margins have fallen dramatically, with a 5 percent drop in margins nationwide by the end of 2020. The CARES Act provider relief has given some support to the healthcare delivery system, but 2020 margins still declined nearly 2% compared to 2019. (Figure 2, Kaufman Hall National Flash Report: December 2020).

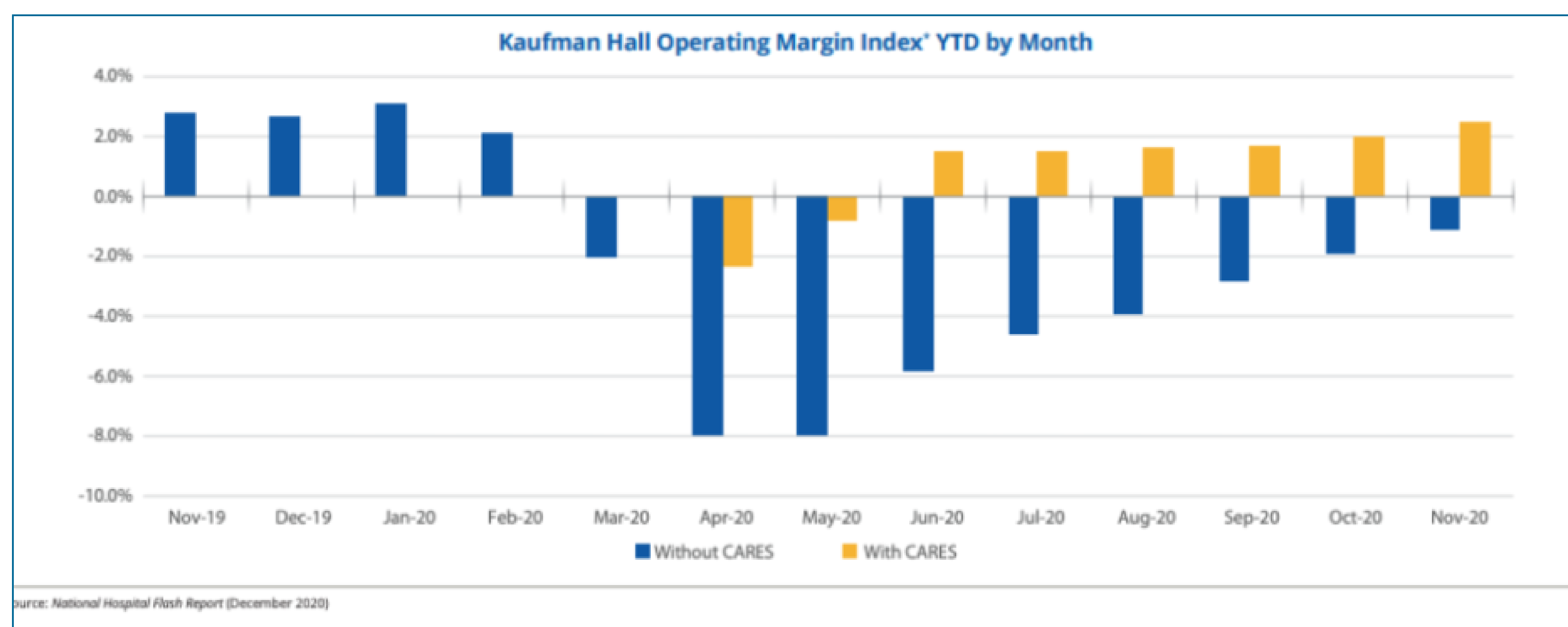


Figure 2: Even with the CARES Act, hospital operating margins fell dramatically in 2020.

A Light at the End of the Tunnel but More Challenges to Come: The COVID-19 Vaccine

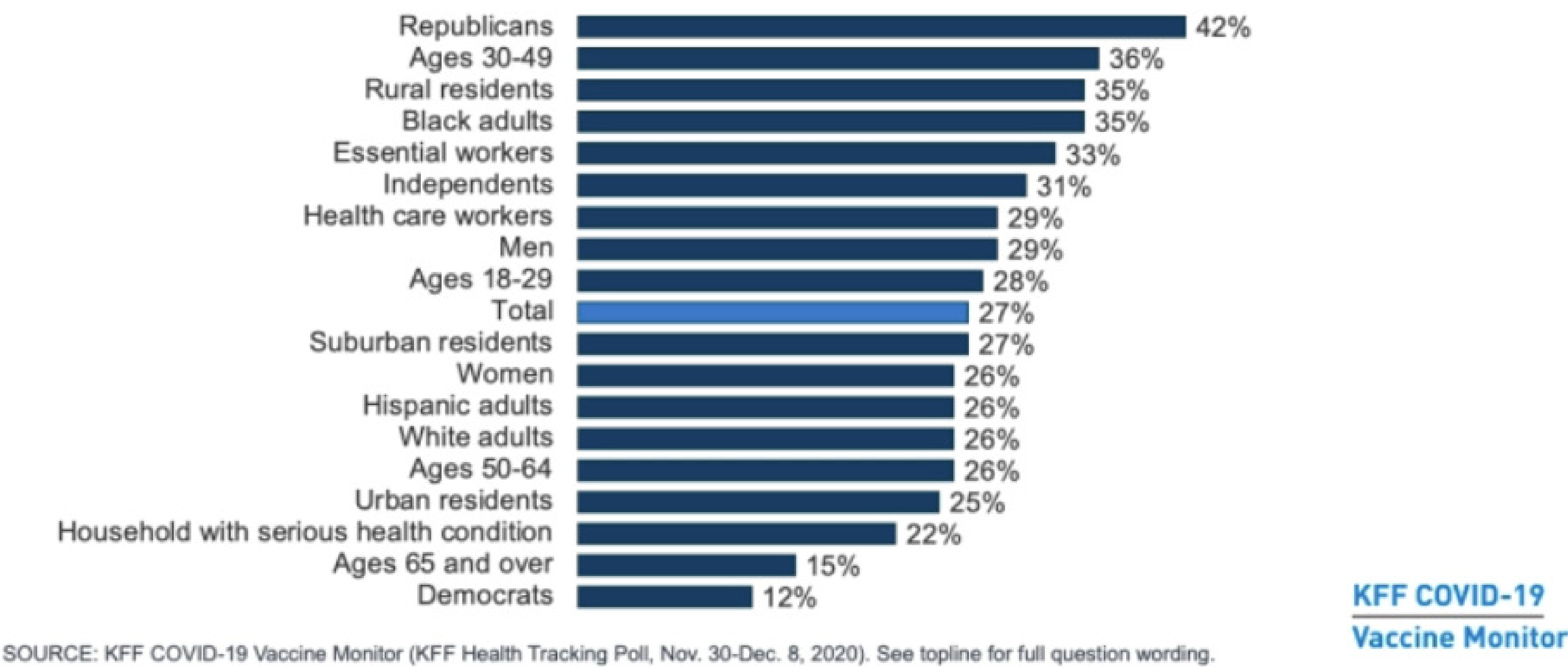
In 2021, on the other side of COVID-19's tolls, is a light at the end of the tunnel: the COVID-19 vaccine. By the last week of January, the United States averaged around 1.5 million vaccinations a day.

Despite encouraging vaccination numbers, distribution is meeting challenges. According to the Kaiser Family Foundation, some Americans are hesitant to receive the vaccine, a preference that appears to correspond to political orientation, ethnicity, age, and urban or rural setting (Figure 3, Kaiser Family Foundation).



Which Groups Are Most Likely To Be COVID-19 Vaccine Hesitant?

Percent within each group who say, if a COVID-19 vaccine was determined to be safe by scientists and available for free to everyone who wanted it, they would **probably not get it or definitely not get it**:



As of December 2020, people in their 50s and older, urban residents, those with a household member with a health condition, Democrats, and Hispanic adults appeared more likely to get the vaccine, and women were more likely than men. Interestingly, healthcare workers were a little cautious, with 29 percent hesitancy.

One of the best chances for more comprehensive COVID-19 vaccination among U.S. populations is for primary care physicians to become a recognized information source about the vaccine. According to a Kaiser Family Foundation poll, 85 percent of patients regard their healthcare provider as the most trusted source of information about the vaccine.

2021 Healthcare Trends in Technology

As an extension of COVID-19’s far-reaching impact across healthcare, the pandemic has also affected healthcare technology, accelerating some changes and dramatically demonstrating how nimble the industry can be. Healthcare data analytics, artificial intelligence, and telemedicine capabilities have massively expanded to support the pandemic response and recovery, a trend that will likely continue to propel healthcare technology.

Data and Analytics Are Increasingly Central to Health System Operations

COVID-19 made the need to leverage data and advanced analytics central to many health systems. Expansion of those capabilities to meet the demand for real-time data or close to real-time data has been dramatic.

For example, hospital administrators are looking at their COVID-19 dashboards hourly and using data to update their business intelligence reporting tools. Previously, the most useful artificial intelligence applications (AI) and machine learning (ML) were likely predicting revenue cycle trends, with attempts for more sophisticated use, such as reading imaging with AI stalled. Now, COVID-19 has compelled innovation to bring advanced analytics to the forefront of disease response, using predictive models to track the virus and estimate the risk of COVID-19 to patients with severe symptoms, enabling more effective treatment.

Health systems are rapidly

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expanding their support for a digital workforce, including the chief information officer (CIO) role. The CIO is playing a larger role in an organization's strategy, risk management, and cybersecurity. The EHR has expanded and will likely continue to evolve with digital and voice assistance and natural language processing. With such clinical IT developments, including augmented reality and wearable technology so that patients can make decisions in real-time with real data, the digital workforce and CIO roles stand to continue to grow.

Telehealth Is Here to Stay

COVID-19 created an urgent need for telehealth to care for patients outside of the clinic or office setting and offset financial losses due to reduced ambulatory visits. According to a McKinsey study, the number of patients using telehealth increased from 11 to 46 percent in 2020, with growth likely to

continue. McKinsey predicts telehealth could account for 20 percent, or \$250 billion, of U.S. healthcare spending in the near future.

Though the transition towards expanded telehealth is in motion (including policy changes around accessibility and reimbursement), healthcare technology will still need to adapt to accommodate the continuing shift. Health systems need greater integration with existing technology platforms and strategies to address cybersecurity and privacy concerns. In this way, telehealth is another area that will increase demands on the digital workforce and healthcare CIOs.

Through Loss and Recovery, a Silver Lining

The healthcare industry begins 2021 forever-changed by COVID-19 and still trying to recover and find its direction. While healthcare leaders and professionals are recuperating from the significant losses of 2020, they will continue to face challenges as the pandemic continues and the recovery begins. A new federal administration will look to lessons learned so far during the pandemic, available data, and industry experts, to accelerate vaccine distribution and get the nation back on its feet. Changes in care delivery models and technology have accelerated, and will continue to, as a result of the pandemic response and recovery. Perhaps a silver lining is that the healthcare industry, patients, and providers, would continue to benefit from these positive developments in care delivery and technology.

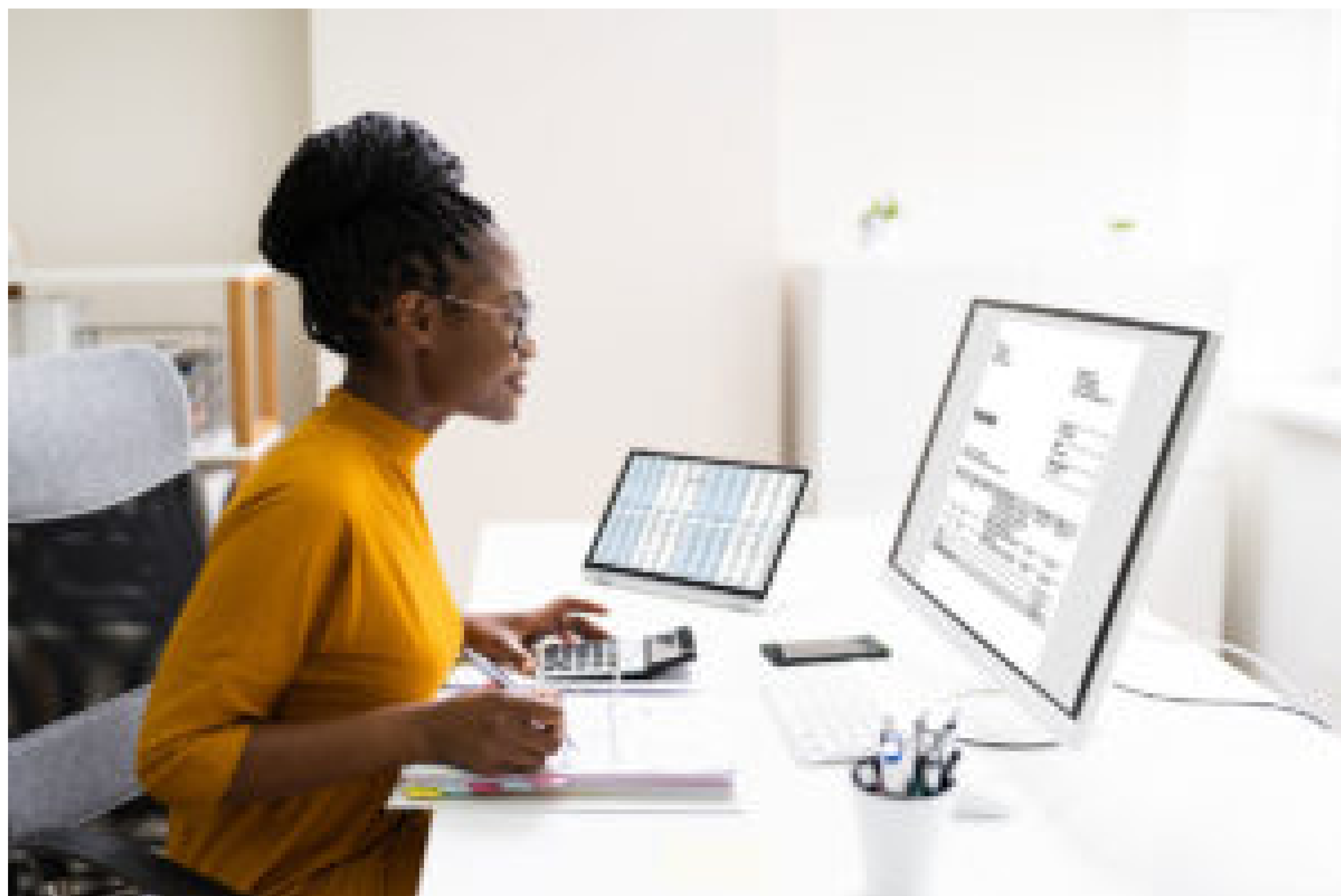


The 2021 Healthcare Financial Forecast: What to Expect, How to Prepare



Source: Health Catalyst

2020 was full of unbelievable statistics and powerful events. No one predicted the year we experienced—one that jolted the entire world and will impact healthcare institutions for years to come. We need to thank the workers in our industry and acknowledge the burnout many have felt. At the same time, we need to emerge from crisis mode and plan for uncertainty. Our industry proved we could respond quickly and meet our communities' healthcare needs, and the COVID-19 vaccine development and distribution will strengthen our effort in 2021.



Every year, I create lists on topics and lead healthcare stories. In 2020, COVID-19 topped all the lists. In my review of Health Affairs' top ten blogs, COVID-19 made the title of all ten entries.

With the pandemic's prominence in global consciousness in 2020, we can expect COVID-19 awareness to continue into 2021, shaping healthcare policies, delivery, and industry financial well-being. The Wall Street Journal article "Economists Expect Tough Sledding in Winter, then a Rebound," presents a logical case for our current situation, which includes a surge in cases followed by results from the stimulus and the vaccine. Goldman Sachs expects our gross national product to grow 5.8 percent in 2021, which contrasts with a contraction of 3.5 percent in 2020. The next-normal 2021 economy will look different, including work options, travel, digital shopping, and telehealth medical appointments.

The Healthcare Financial Forecast: Five Top Areas of Impact for 2021

Looking at healthcare financial topics in 2021, I've chosen five prominent areas of impact for

healthcare finance teams to monitor and take action:

Election Impact

President-elect Joe Biden campaigned on supporting the Affordable Care Act (ACA), managing the coronavirus pandemic, and lowering drug costs. While Trump and Biden agree on policies for lowering drug costs, sweeping healthcare policy changes will face hurdles and most likely will not be on top of the list. Both the American Medical Association (AMA) and the American Hospital Association (AHA) rank ending the pandemic as job number one. In the first 100 days of the new administration, the AHA has requested the enactment of 28 specific priorities to ensure hospitals have resources in the areas of relief, recovery, and rebuilding.

Biden and his administration will provide a federal leadership role—a more centralized approach and guidance—for the coronavirus. Key areas of action include

more rigorous guidelines to stop pandemic surges, strengthening the role of public health, and a demand for reporting transparency that shows COVID-19 impact on all populations.

A likely flurry of executive orders will rescind Trump administration policies. Additionally, the new administration would like to expand the ACA by building on health insurance exchanges. The Biden campaign did not support the Medicare-For-All initiative, which more progressive Democrats have advocated, though Biden has discussed a public option to offer a Medicare-like plan. Other potential change areas include lowering the age of Medicare eligibility to 60 and support for Medicaid expansion. Healthcare consolidations will likely be of high interest to the incoming Secretary of Health and Human Services, Xavier Becerra.

As the new administration unveils and discusses more comprehensive policies, providers must be aware of these policies'

potential impact. The cost of healthcare has not been a focus area, but the Congressional Budget Office (CBO) estimates healthcare will exhaust Medicare's Hospital Insurance Trust Fund in 2024. This pending urgency will force national-level discussion on healthcare for the Biden administration. All providers and beneficiaries will need to be stakeholders in this discussion.

While hospitals and clinicians are currently working at full capacity on the pandemic, organizations must also consider these actions to prepare for the new administration:

- Organizations receiving CARES funding of more than \$10,000 need to prepare for reporting requirements due February 15, 2021.
- Providers need to work with their associations to continue to advocate for their needs. There could be changes to due dates and reporting requirements as the new administration takes control of the various offices.

Price Transparency

The hospital price transparency rules went into effect as of January 2021, after attempts from various hospital associations to prevent the new legislation were unsuccessful. CMS believes price disclosure will help the public make more informed decisions about their care, increase market competition, and drive down costs of care.

Each hospital must provide transparent, accessible pricing on its website to comply with the regulations. The organization must post the charges in two ways:

- A machine-readable file.
- A consumer-friendly display of shoppable services (at least 300 services the consumer can schedule in advance).

For the above postings, hospitals must provide the discounted cash price, payer-specific negotiated charges, and de-identified minimum and maximum negotiated charges.

CMS announced aggressive plans to monitor the enforcement of this regulation. The organization plans to audit websites starting in January 2021 and investigate all complaints. Meanwhile, The AHA has sent a letter to the Biden administration asking for relief from this regulation.

The second transparency bill, the Transparency in Coverage proposed rule, involves the second stimulus bill, which includes a provision to stop surprise billing. A surprise bill occurs when an out-of-network provider is involved in a patient's care (e.g., an emergency department physician employed by an out-of-network provider). The Republican and Democratic parties and consumer groups supported this legislation. The changes will take effect in 2022 and apply to doctors, hospitals, and air ambulances, with ground ambulances excluded. Health providers and insurers will work through an arbitration process to settle on a fair price.

Health systems must perform the following to navigate the above price transparency rules:

- Review for accuracy and branding all pricing materials posted to the organization's website.
- Prepare a response for consumers and the press regarding the above postings.
- Search online and see if price postings are easy to find and understandable from a consumer perspective.
- Regarding surprise billing, review out-of-network providers at all system facilities and plan for a 2022 response in conjunction with payers and providers.
- Develop materials for consumers to explain the implication of the surprise billing regulations including dates, intent, and how to find support within the healthcare organization.

Financial Forecasting

In a January 2021 Wall Street Journal article, "CFOs in 2021 Will Keep an Eye on 10 Things," CFOs stated their priorities for the upcoming year. The top of the list includes

economic recovery, corporate taxes, and mergers and acquisitions. CFOs are scrutinizing spending plans for both operating and capital expenses. The remote work environment may lead to additional reductions in office space. CFOs are eyeing essential healthcare functions, like keeping the revenue cycle and supply chain running smoothly with world-class goals.

The following factors make projecting future trends and developing budgets challenging. There are massive volume changes, new consumer trends, and payer shifts:

- The AHA estimates the projected loss to hospitals in 2020 at \$323 billion. Revenue dropped due to elective shutdown and volume declines with higher costs for staff, supplies, equipment, and buildings. The Kaufman Hall National Flash Report for December 2020 shows 2020 volume decreased from 2019 with emergency department (ED) visits

down by 16 percent and adjusted discharges down by 11 percent. Margins without CARES Act dollars are 5.1 percentage points lower, and margins with CARES money are 1.9 percent lower.

- Additionally, visits in the ambulatory setting fell by 60 percent in April. These visits climbed higher but remained 10 percent below pre-pandemic baselines at the end of 2020. The insurance sector reflects this decline in healthcare spending in its rising margins, which are approximately 20 percent higher in the third quarter of 2020 compared to the previous year.

- Altarum reported the overall healthcare spending was up .8 percent in October, with hospital, nursing home, and dental spend all lower. Meanwhile, spending increased on home health and prescription drugs.

- In August 2020, Medicaid enrollment had increased by 7.4 percent or 5.3 million enrollees compared to February 2020.

The increase has been steady across the months.

- 2020 saw an explosion in telehealth visits. In April 2020, 43 percent of all primary care visits for Medicare occurred via telehealth—compared to a pre-pandemic telehealth share of .1 percent. Medicare and other payers revised regulations (e.g., reimbursement parity) on these visits, which helped prompt this dramatic growth.

Healthcare finance teams need to take the above dynamic factors into account as they develop healthcare financial forecasts. They must rethink old processes, timeframes, and assumptions. Many healthcare organizations are using shorter timeframes and re-forecasting quarterly. War rooms taught us a lot about crisis management and our organizations. We need to bring those learnings forward to create new models of care. For example, collaboration with partners and population health can help our patients and members with preventative care.

The following actions will help finance teams account for the dynamic factors in healthcare today as they forecast for 2021:

- Start with a dynamic and frequently updated forecasting model and test its drivers.
- Have the patience and flexibility to accommodate multiple iterations of the model.
- Develop a communication plan for actions and follow-up in which all levels of management must sign-off on the latest version of financial projections.
- Remember the basics of revenue cycle and cost management and review existing processes.
- Review and update the existing planning process to consider organization knowledge of backlog
- Teach the forecasting concepts and learn from clinicians on operations.
- Develop contingency plans for various financial scenarios.

Value-Based Care

The ACA initiated many new programs for value-

based care (VBC), which have gained some traction but not what legislators expected. According to the Health Care Learning and Action Network, in 2018, 35.8 percent of healthcare payments were involved in APMs, including government and commercial payers. Value-based care involves alternative payment models (APMs) that shift from a piecemeal payment to a more inclusive payment for a bundle or a member. The main goal is rewarding providers for high performance in quality and affordability.

The pandemic has shown that VBC represents the potential to align incentives, provide revenue streams, and manage a population. By covering the entire continuum of care and focusing on patient health, providers can improve care quality and cost. The VBC model incentivizes industry entities to work together and with their communities.

However, despite VBC benefits, transitioning from the fee-for-service (FFS) model has been

challenging. Various models shift risk to the provider, including bundled payment for a condition and ACOs with upside and downside potential. CMS introduced the Shared Savings Program in 2012 as a voluntary program. In November 2020, the National Association of ACOs presented evidence this ACO model has shown improved performance over the seven years with a combined gross savings of \$7 billion. In 2019, ACOs were covering 11.4 million members. Only 35 organizations joined the National Association of ACOs in 2020, and the organization didn't accept new applications for 2021 due to the pandemic.

CMS continues to pilot and test payment models in addition to VBC. In December 2020, CMS announced the Geographic direct Contracting Model called Geo. The model will allow direct contracting entities to take full financial responsibility for all care for Medicare FFS beneficiaries in a geographic region. Applications are due April 2, 2021. Geo will be the most aggressive move

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CMS has made to move to a full capitation model, as it shifts the risk to the direct contracting entity. One of Geo's most interesting parts is the two-page application guide that includes best practices and a checklist. The scoring template can help healthcare leaders survey their organizations and to see their projected score.

While CMS is trying to test and pilot new models, the complexity and overlapping of programs are becoming overwhelming for the average healthcare provider. Health systems know they need to provide care in the right setting, even if it's outside the hospital. Organizations understand care management can improve health for a population, but how can they get paid to do the right things for patients and members?

Resolving healthcare's financial complexity daunts even high-powered projects. For example, for three years, Haven (a joint venture of Amazon,

JPMorgan, and Berkshire-Hathaway) tried to find innovative healthcare solutions, but Haven has announced they will close as of February 2021.

While healthcare hasn't found the perfect model, the industry can continue in the journey. Leaders and innovators must acknowledge there will be changes in payment and that VBC is here to stay. The mechanisms of payment and risk may change, but the need for affordable, quality care is fundamental.

Organizations can continue to navigate VBC with the following actions:

- Review all VBC contracts based on COVID-19 and determine where risk has increased?
- Determine the impact of reduced utilization and the potential increases in volumes.
- Evaluate quality metrics measurement processes.
- Work with partners, such as payers and other

providers, to communicate contract status.

- Complete an honest evaluation of the organization using the aforementioned best practices and checklist from Geo—where are the strengths and weaknesses?



Health Equity

COVID-19 has exposed equity gaps in our healthcare system. Communities of color face a disproportionate impact from the disease, including higher rates for cases, hospitalizations, and death among Black and Hispanic Americans and American Indians.

Ratios compared to White Person	American Indian	Black	Hispanic
Cases	1.8x	1.4x	1.7x
Hospitalizations	4.0x	3.7x	4.1x
Deaths	2.6x	2.8x	2.8x

COVID-19 impact by race and ethnicity.

Health equity made Forbes’ and the Commonwealth Fund’s top ten lists of healthcare predictions for 2021. McKinsey listed the need to upgrade our public health infrastructure, including broader use of telemedicine and virtual health, in its forecast for the next normal. Major healthcare organizations are also addressing the equity gap. For example, in January 2021, the Mayo Clinic posted a leadership position in health equity and community engagement and has committed \$100 million over ten years to support the growth and development of diversity, inclusion, and equity programs.

The following actions support sustainable health equity improvement:

- Participate in all reporting that includes diversity metrics.
- Support efforts to expand health equity programs.
- Partner with other community organizations that focus on social determinants such as foodbanks and housing resources.

Include awareness of community diversity needs in COVID-19 vaccine distribution.

Include social determinants of health in strategic planning.

Change and Progression in 2021

As we focus on a future of change and progression, concepts such as reshape, retool, and reimagine come to mind. Events planned in 2021 in healthcare and beyond are looking forward with these themes in focus.

For example, the conference theme for the 2021 AHA Leadership Summit and Virtual Conference is “Lead, Connect, Transform—Reimagining Health Care.” Also, in the Washington Post January 3, 2021, article 6 Things Disney Fans Can Expect from the Parks in 2021, Disney announced plans for the 50th anniversary of Walt Disney World in Florida. While the celebration has shrunk due to the pandemic, and the experience will be different, Disney is embracing the next normal. The park has reimaged one of its rides, “Snow White’s Scary Adventures,” with new scenes, story details,

technology, a new, less-scary name, “Snow White’s Enchanted Wish.” If Disney can reimagine a new world, we can all do the same for healthcare.

I would challenge you to an exercise I saw in the New York Times early in 2021. Imagine and draw (not just write) what you want to see more of and what you want to see less of in 2021. Do this exercise for your personal and professional life as we reshape, retool, and reimagine more sustainable, inclusive healthcare delivery.

5 CNC machining trends to watch out for in 2021



Computer numerical control (CNC) machining, a subtractive manufacturing process that employs computerized controls and machine tools to remove layers of material and

produce a desired part, is one of the most commonly used manufacturing techniques. However, it’s actually based on technology that was developed in the 18th century.

The beginning of industrialization in the mid-eighteenth century saw the technological precursors of CNC machining. However, it wasn’t until the Cold War that the technology was automated and the CNC machining method was fully realized. Finally, in 1952, Richard Kegg developed the “Cincinnati Milacron Hydrotel,” considered the first modern CNC milling machine.

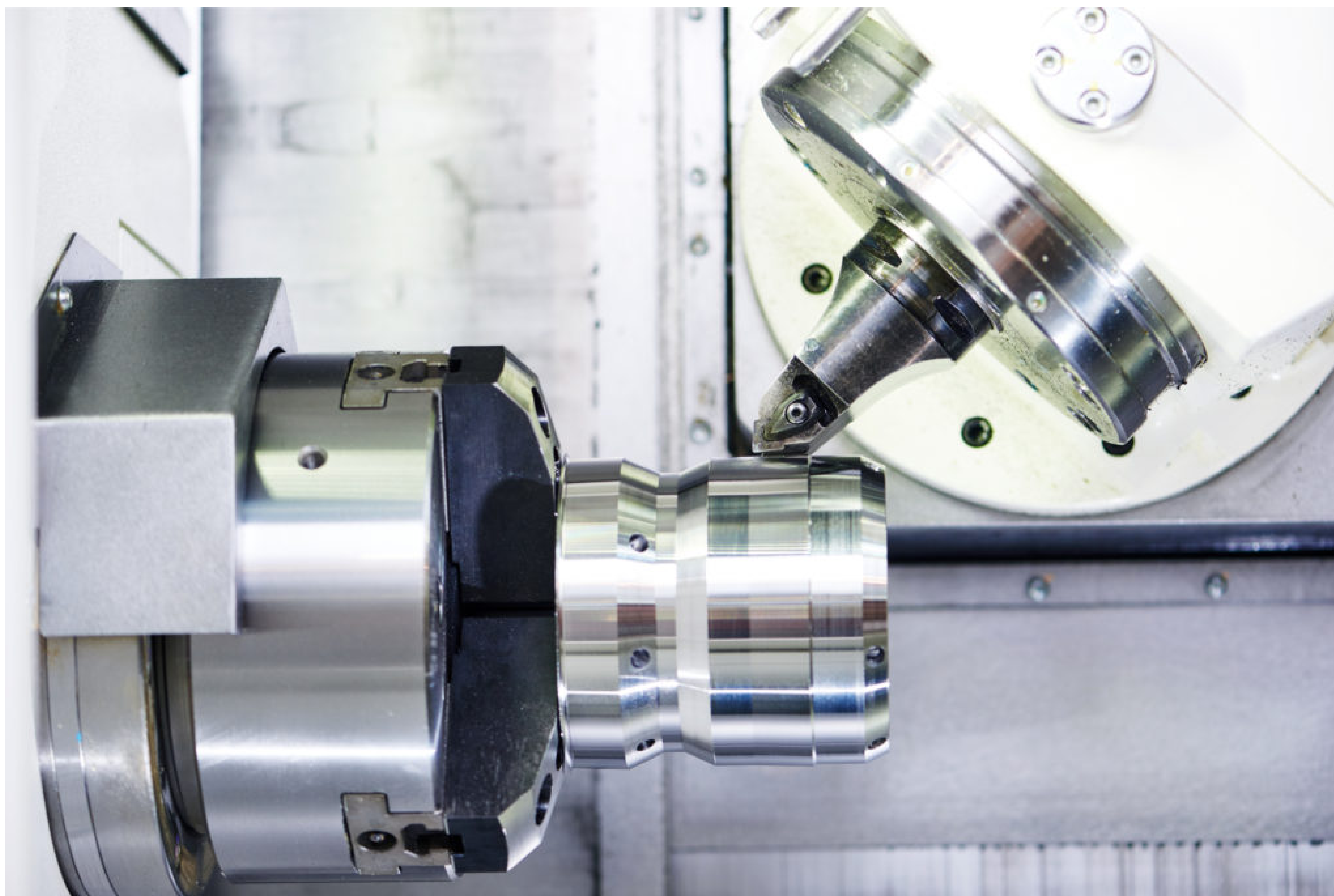
Milling technology continues to evolve and find new applications each year alongside rapidly-developing computer and manufacturing technology. And amidst disruptions including the boom of “smart” technology and the COVID-19 pandemic (and its ongoing impacts on consumer behaviors), manufacturers increasingly seek ways to improve productivity and flexibility while cutting costs.

This challenge requires the widespread adoption of new technologies, some of which are likely to take hold industry-wide in the coming year. These five trends are on the horizon — and almost certain to shape the direction of CNC machining in 2021.

1. More axes for greater cost-savings

Traditional CNC machines feature linear motion in three axes. While many machines now include a moving bed, a 3-axis milling center remains still as the cutter itself moves. Typically, with a 3-axis machine, the bed moves linearly along two axes while the spindle translates up and down along the third axis. 4-axis machines enable more detailed cutting by incorporating a rotational axis. Typically, a fourth-axis rotary is mounted to the machine table, and the part is mounted to the face of the fourth-axis rotary. This makes 4-axis machines well-suited for manufacturing medical devices and parts with complex geometries.

Finally, 5-axis machines represent the pinnacle of milling ability. These machines enable micromachining, and are capable of producing extremely detailed cuts at unmatched speeds. They consist of three linear axes and two rotational degrees of freedom. While 4- and 5-axis CNC machines have been commercially available for a number of years, they have only recently become financially accessible to many manufacturers.



Fewer setups and a greater number of axes will lead to greater CNC machining savings for manufacturers.

Finally, 5-axis machines represent the pinnacle of milling ability. These machines enable micromachining, and are capable of producing extremely detailed cuts at unmatched speeds. They consist of three linear axes and two rotational degrees of freedom. While 4- and 5-axis CNC machines have been commercially available for a number of years, they have only recently become financially accessible to many manufacturers.

What's more, legacy CNC machines can be retrofitted to include more axes; by adding a trunnion that allows for greater tilt and rotation, a 3-axis machine can easily

become a 5-axis machine. This increases the capabilities of the machine, allowing for more operations with fewer setups.

Considering that each setup requires additional operations, materials, time, and potential for error, fewer setups translate directly into cost-savings. At the same time, the proliferation of multi-axis machines is lowering prices across the board for smaller CNC machines, making the practice of milling more accessible to small operations and hobbyists.

2. Universal solutions for tooling

Vacuum fixtures or vacuum plates, which are used to hold projects in place that are difficult to secure or might easily deform, have traditionally been custom-made for each project. As a result, they have been quite costly, and most manufacturing teams tend to avoid using them unless strictly necessary.

However, the introduction of universal bases like the

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Pierson SmartVac and the Blue Photon UV workholding system have made it possible to custom-configure a single part for multiple operations. As a turnkey alternative to custom fixtures, these tools make it possible to create certain parts at a fraction of what it would have previously cost.

Matrix Innovations created a similar solution in the form of universal soft jaws, which can also be customized and used for repeated operations. Together, vacuum tables and reusable soft jaws make it far more affordable to complete complex CNC machining projects.

3. Increased use of robotics



While robots have long been used in CNC machining, it's only recently that collaborative robots, or "cobots," have seen widespread adoption. Cobots, unlike industrial robots, are designed to work closely alongside.

human workers. They're programmed to work intuitively, and can even be taught their intended operation with manual movements.

Cobot adoption is accelerating rapidly due to advances in robot vision systems. Just like a Tesla car has vision systems that can recognize cars and pedestrians, vision systems can be attached to cobots, teaching it to see, recognize, pick, and place parts in a machine shop.



In the future, "cobots" will work alongside humans in the factory, learning how to optimize performance and reduce operating costs.

Because these robots have minimal programming and training needs, they are incredibly versatile and rarely require significant time investment up-front. It's expected that this technology will help make workers more productive while also reducing costs in the long-run by reducing the likelihood of human error. Further, as machine learning capabilities are increasingly built into robotic systems, some experts predict that cobots will become even more effective workplace collaborators in the near future.

4. Advances in workforce training

Equipment manufacturers are increasingly installing 3D CAD viewers into their standard machine platforms. This screen acts as the primary visual guide for operation setup and progression, and can even be configured to include troubleshooting videos.

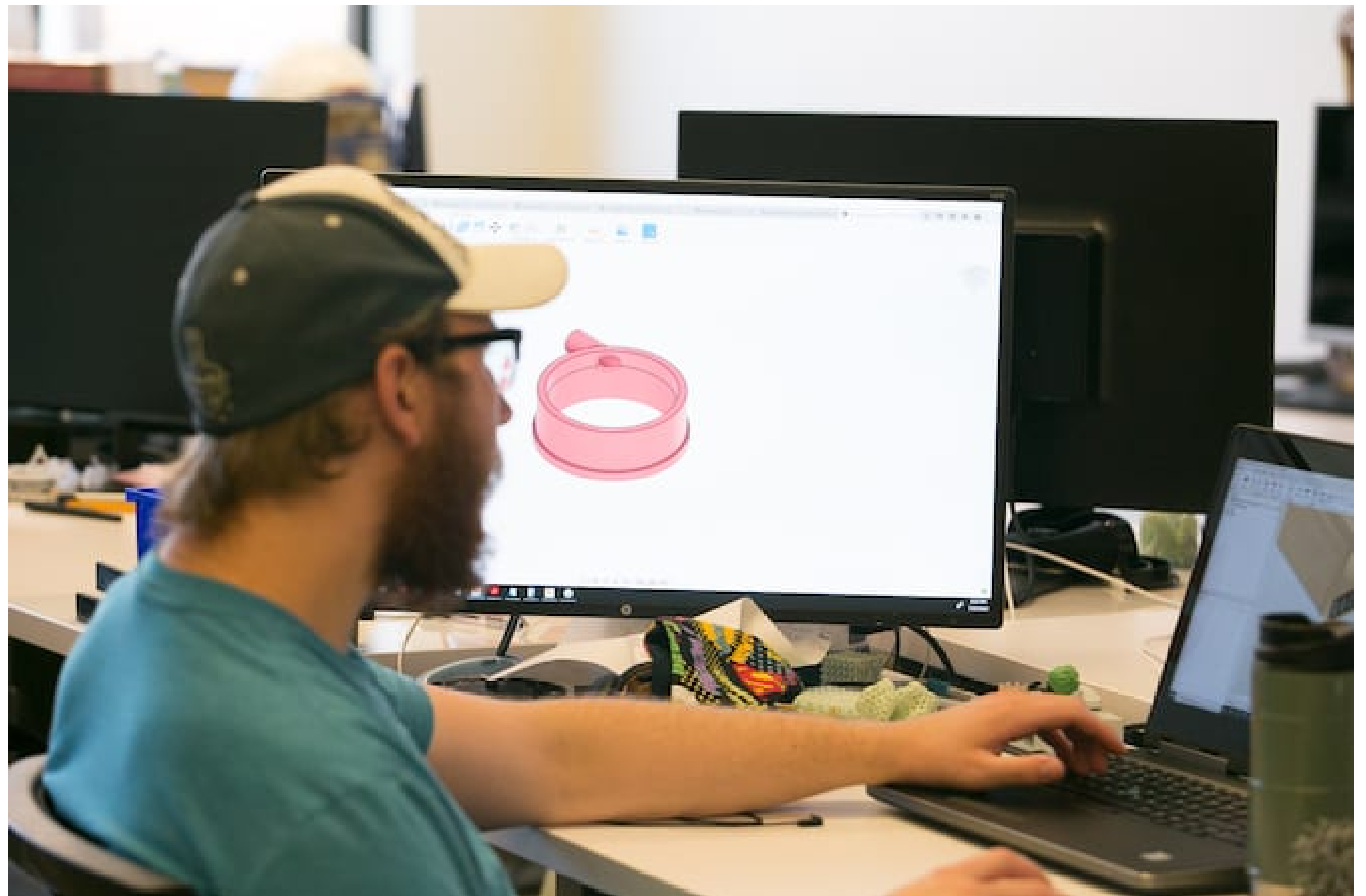
The integration of this software in CNC machining equipment will help manufacturers not only improve workforce training but also increase the effectiveness and efficiency of existing employees. What's more, though this technology comes at a high upfront cost, it is likely to increase cost-savings in the long run by reducing operator error.

5. Advances in CAD/CAM software



In just the last five to 10 years, CAD/CAM has become increasingly

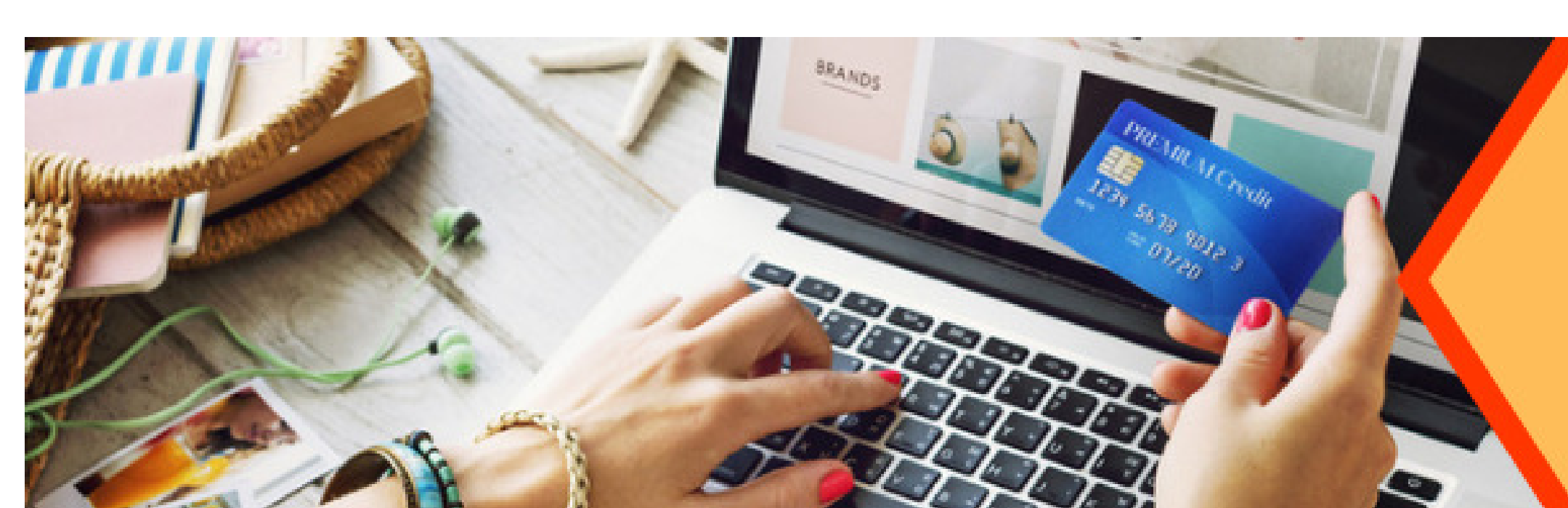
democratized. The software, which was once prohibitively expensive, is now not only more affordable but also more accessible, intuitive, user-friendly, and powerful. This upgraded CAD/CAM software enables increased efficiency and accuracy — as well as even more innovative workflows.



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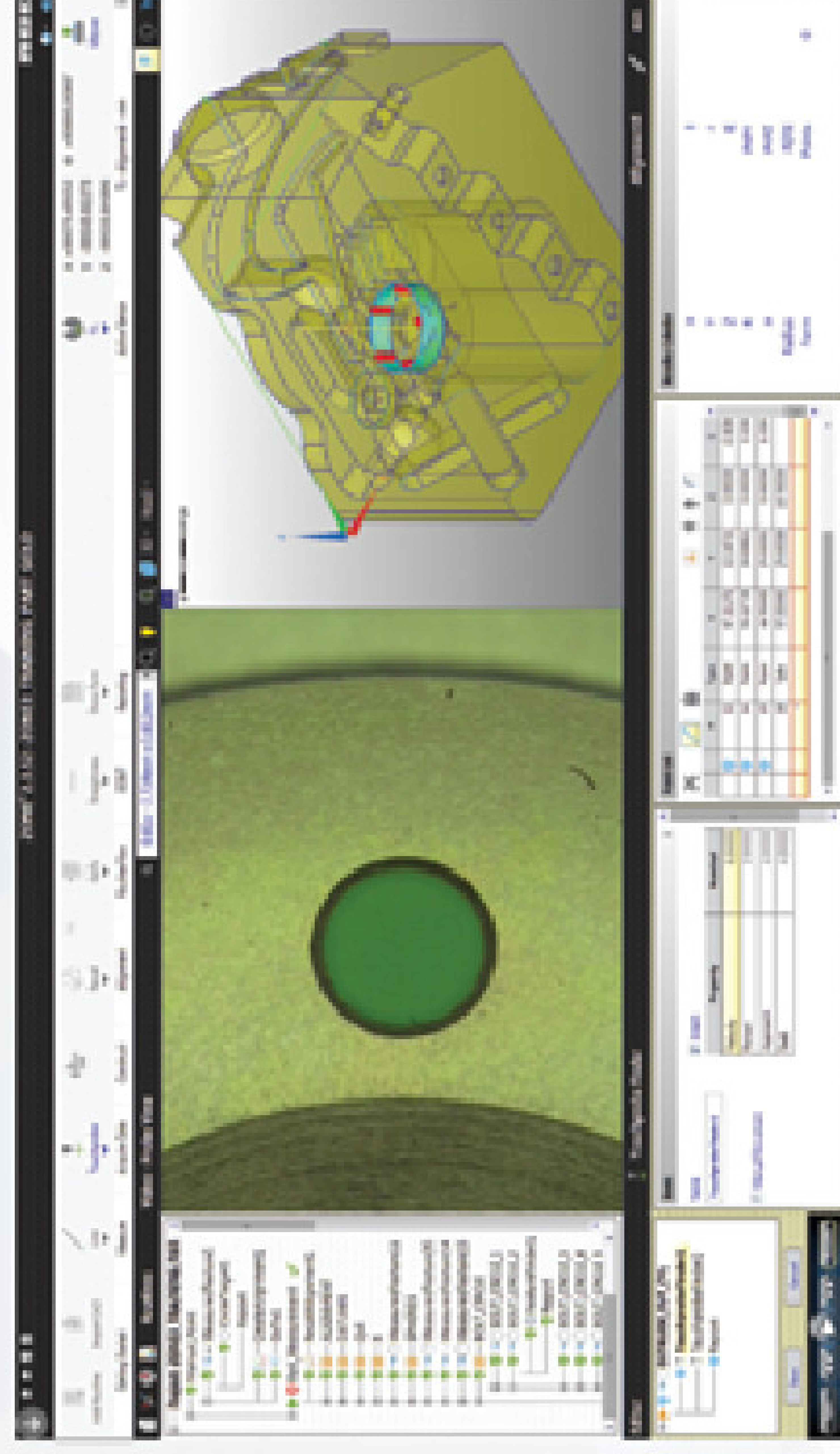
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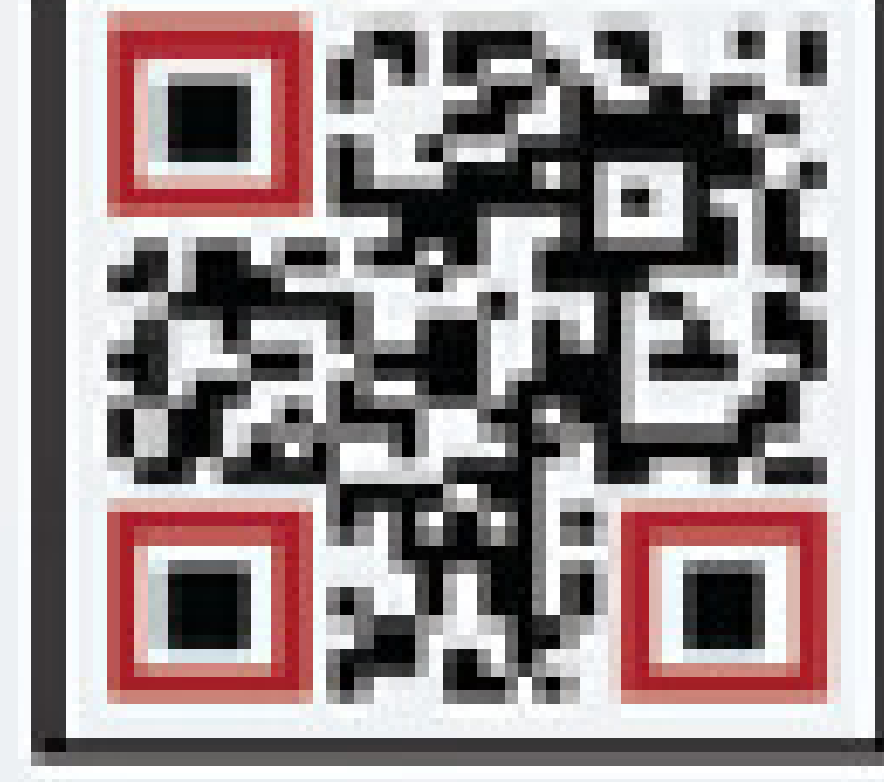
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Economic Outlook Asia-Pacific Q2 2021: Three-Speed Recovery Will Benefit From Faster Global Growth

Source: S&P Global

• Key Takeaways

- Asia-Pacific will benefit from a stronger global recovery. Vaccine rollout in the region may lag but we expect enough progress to lift consumer spending and domestic demand later in 2021.
- Our Asia-Pacific 2021 growth forecast is revised up to 7.3% from 6.8%. Stronger trade and manufacturing offset softer consumption. We expect inflation in most Asia-Pacific economies to remain subdued. Central banks are mostly on hold.
- We see China growing at 8% in 2021 (up from 7%) on stronger trade and real estate activity. We upgrade India to 11% from 10%, due to a faster-than-expected re-opening and fiscal stimulus. We keep Japan at 2.7% in 2021 but see upside risks from exports. We revise emerging market growth lower on a delayed but not derailed recovery.
- As we did in late 2020, we see risks to economic growth over the next 12 to 18 months as balanced. The pandemic and higher real bond yields present downside risks. Improving external demand, a domestic consumption boom, and productivity gains count for the upside risks.

S&P Global Ratings upgrades growth forecasts for Asia-Pacific to 7.3% for 2021 from 6.8% previously. A faster-than-expected global vaccine rollout, a large dose of U.S. stimulus, and upside surprises in trade and

manufacturing push our forecasts higher and offset recent weakness in household spending.

We expect consumers to power the recovery later in 2021 as gradual vaccine coverage lifts confidence and spending on services, creating jobs and boosting incomes.

We expect inflation in the region to remain subdued, notwithstanding higher commodity prices. The passthrough to core inflation, excluding volatile items such as food and energy, will remain weak so long as activity is well below potential. A robust service sector rebound, and an associated rise in hiring, will be needed to ignite inflation. In turn, this will keep most central banks on the sidelines.

lingering momentum in the property market. We expect a cautious policy stance to dampen investment later in 2021, while consumption should pick up. We raise our forecasts for India to 11% (from 10% previously) for fiscal year 2021-22 in part due to an expansionary fiscal policy that should boost domestic private spending. We maintain Japan's outlook at 2.7% for 2021 but revise up to 2.0% in 2022 on better prospects for capital goods exports. We hold Australia's 2021 growth forecast at 4% after a much better-than-expected 2020.

In emerging markets, including Malaysia, the Philippines, and Thailand, we see a delayed but not derailed recovery. We revise down Indonesia's growth to a below-trend 4.5% in 2021 (from 5.4% previously) as the COVID wave early this year dented confidence and held back consumer spending.

With these latest

revisions, we see risks to the economic growth outlook over the next 12 to 18 months as balanced. The pandemic remains the main downside risk. But along with a tetchy U.S.-China relationship, other risks include the threat of sharply higher real yields in global bond markets that could tighten Asia-Pacific's financial conditions. Upside risks include even hotter external demand, more confident consumers sitting on a stockpile of savings, and productivity gains from rapid digital adoption during the pandemic.

Widespread Vaccination And Immunity Most Likely Path To New Normal

Achieving widespread immunity is still the most likely route back to normal but for Asia-Pacific, this may come later than in Europe and the U.S. Low infection rates in Asia-Pacific (and, therefore, less natural immunity) may mean higher vaccine coverage is required. At the same time, the region's vaccine rollout has been more gradual, due to vaccine hesitancy among the population and limited supplies.

Some countries are targeting full coverage by later in 2021 (including Australia, Korea, and Singapore). Others, including China, Japan, and emerging economies such as Indonesia, may have to wait until 2022 or later. Still, the closer economies get to herd immunity, the more that activity can resume, jobs can come back, and households can spend.

Leaders And Laggards Across Asia-Pacific Economies

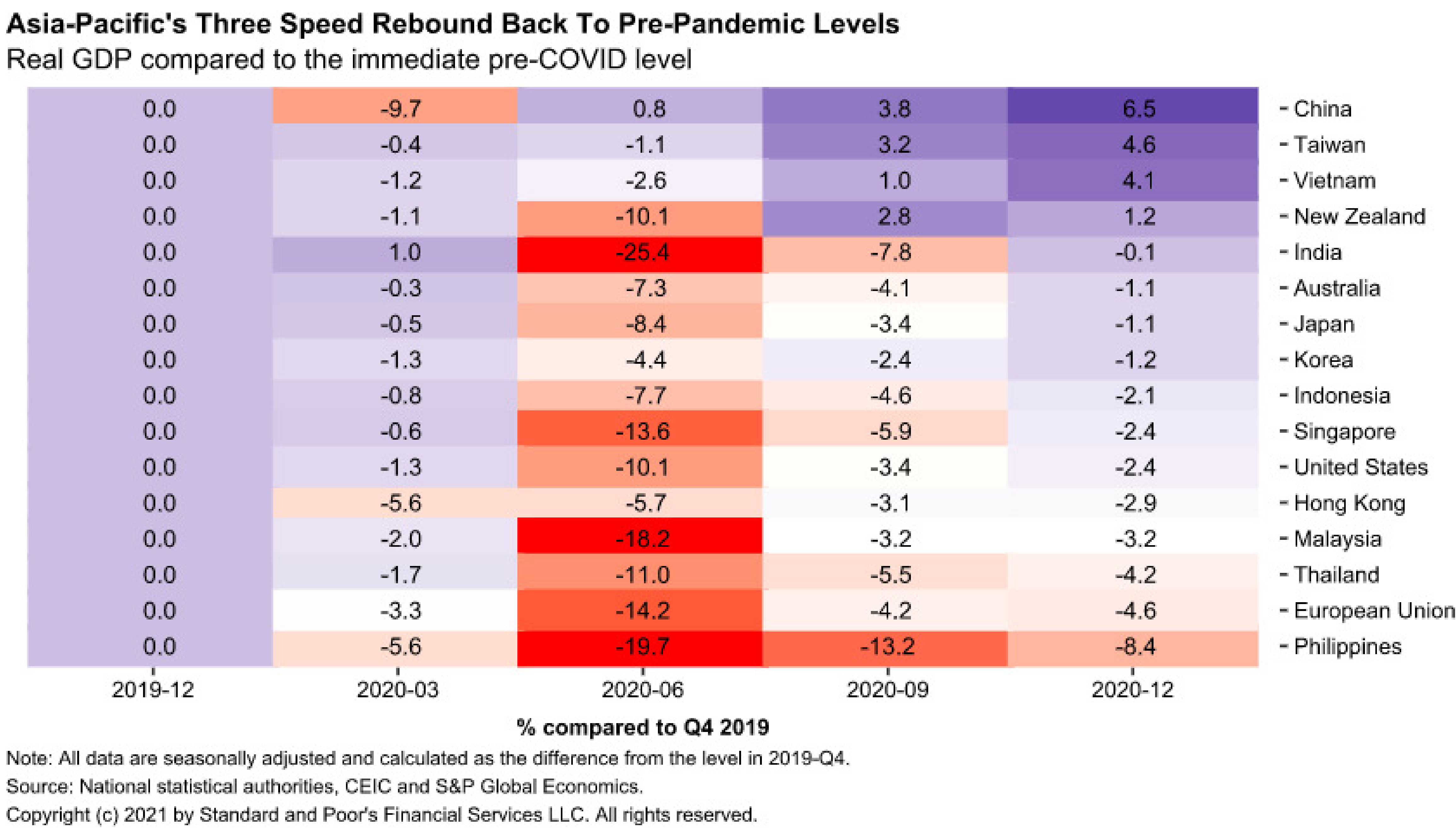
While a three-speed recovery has emerged in Asia-Pacific, we expect the laggards to pick up speed later in 2021. Early recoveries have been helped by containing COVID before the vaccine rollout, more exposure to global electronics trade, and less exposure to tourism.

FEATURE
STORY

The leading group includes China, New Zealand, Taiwan, and Vietnam, where activity is already above pre-pandemic levels. The middle group includes Australia, Japan, and Korea, where activity should reach pre-pandemic levels in early to mid-2021. India has joined this group following a sharp rebound in recent months. The lagging group consists mainly of emerging markets, including Indonesia, where uncontained spread of COVID and a gradual vaccine rollout mean getting back to pre-COVID levels only in late 2021.

As the recovery matures, laggards are likely to grow more quickly (relative to their trend growth rates) than leaders later in 2021 and early next year. The speed of recovery will then be driven by vaccine rollout, service sector reopening, and private consumption.

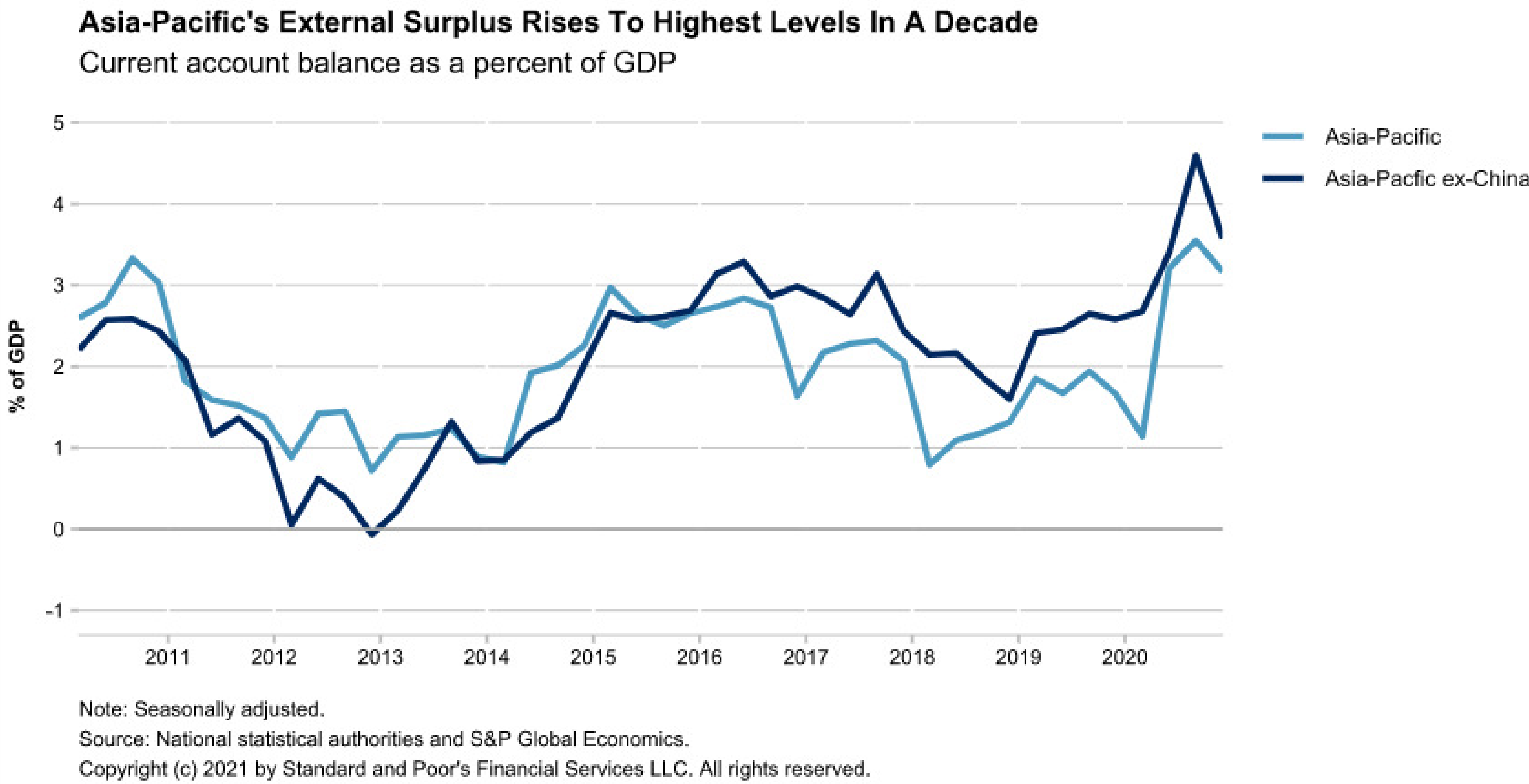
CHART NO.1



Consumers To Help Power Next Leg Of Recovery

We expect consumers to boost Asia-Pacific's recovery later in 2021. Up to now, Asia's own domestic demand recovery has been sluggish, even in those economies that have contained COVID. Household spending, while improving, has been soft compared with other major economies. Weak social protection partly explains this gap. While coverage has broadened in recent years, it often remains shallow and provides limited support during shocks. The Asian Development Bank has calculated that pre-COVID, social protection spending per intended beneficiary reached just 4% of GDP per capita. There have been exceptions, especially Australia, and these economies have seen a quicker pick-up in household spending.

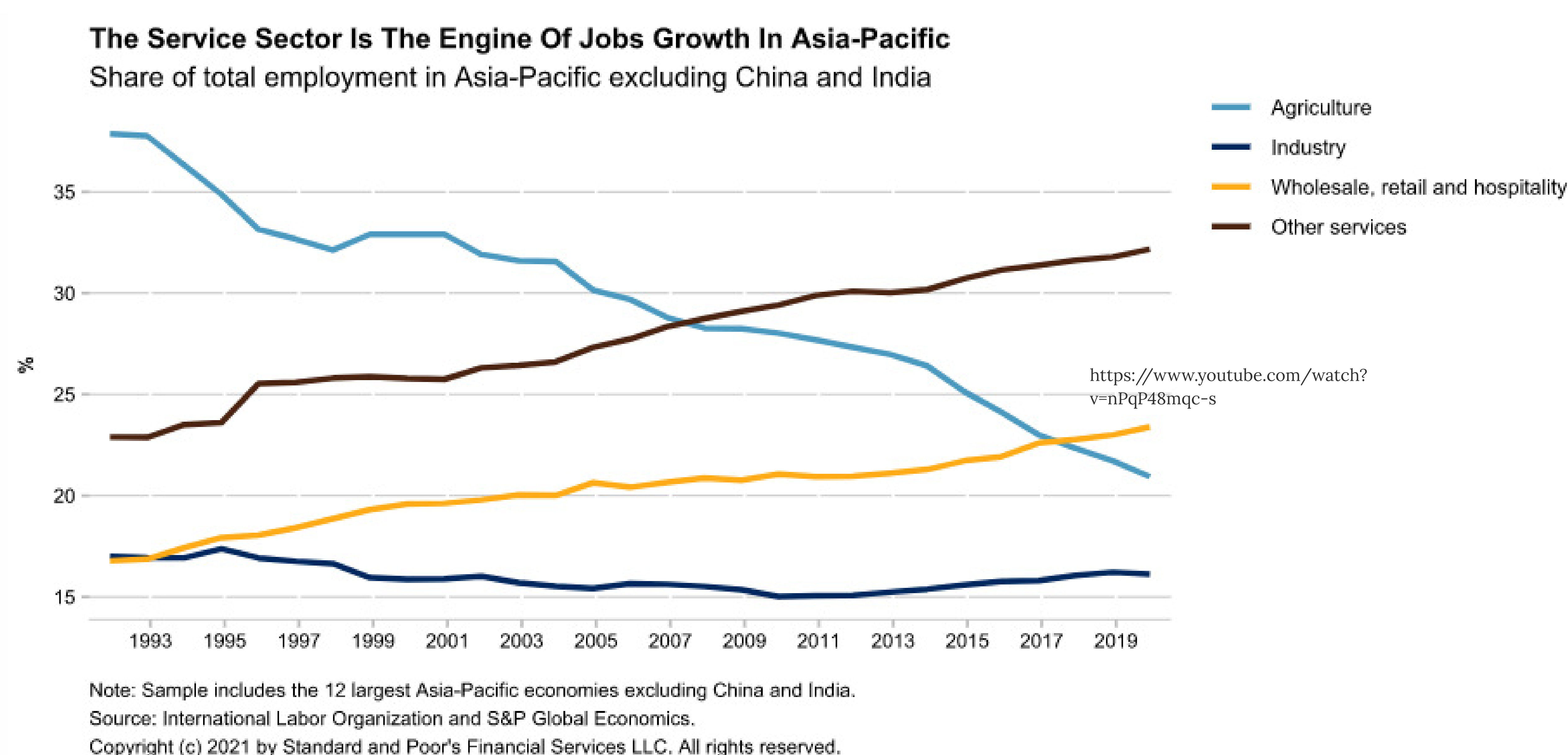
CHART NO.2





In turn, weak domestic demand shows up in the region's rising current account surplus with the rest of the world, as seen in the gap between domestic saving and investment (see chart 2). It is striking that the region that managed COVID best has, relative to the rest of the world, saved more and invested less. While stimulus in the major economies may boost Asia's exports and surpluses for a while longer, we should expect some narrowing as the region's consumer recovery and imports gather steam.

CHART NO.3



Higher Demand For Services Will Create Jobs

As the vaccine is gradually rolled out, Asia-Pacific's consumers should gain confidence and spend more. When consumers lift their spending, we think it is likely that domestic service sectors hammered by the virus may be the largest beneficiaries. Appetite for activities outside the home will be robust. This is also where most jobs are created. In Asia-Pacific excluding China and India, before the pandemic, there were over three times as many service sector jobs than in industry (see chart 3).

This can create a virtuous cycle of higher spending, more jobs, and higher incomes.

While Asia-Pacific's job losses were relatively moderate, people working part time or in temporary jobs were hit hard and this clearly dented consumer confidence in most economies.

U.S. Stimulus And Improving Capex To Support Asia's Exports

COVID-related spending that drove the first stage of Asia's export cycle will fade as economies reopen and global consumer spending switches more to domestic services and away from gadgets. Supply bottlenecks and higher prices for some goods could also curtail some spending and export momentum in 2021, but we do not expect these factors to significantly dampen growth.

Higher U.S. demand due to the new fiscal stimulus will help. Final demand in the U.S. accounts for about 5% of GDP, on average across Asia-Pacific, according to the Organization for Economic Co-operation and Development.

About half of this exposure is in the manufacturing sector and this is where the largest impact will be felt-- Korea, Malaysia, Singapore, and Thailand stand to benefit most. Even after the trade war, China will also see some positive spillovers on its exports.

Global capital spending can also keep trade and manufacturing on track, but we will see wide divergence in investment demand across sectors, including between manufacturing and service sector firms. For manufacturing firms, whose operations were little affected by COVID and for whom demand has been strong, there may be incentives to boost investment (indeed, Japan's exports of semiconductor capital equipment are already picking up). However, in the services sector, where balance sheets have been damaged by a long period of dormant demand, the appetite to start spending may be lower.

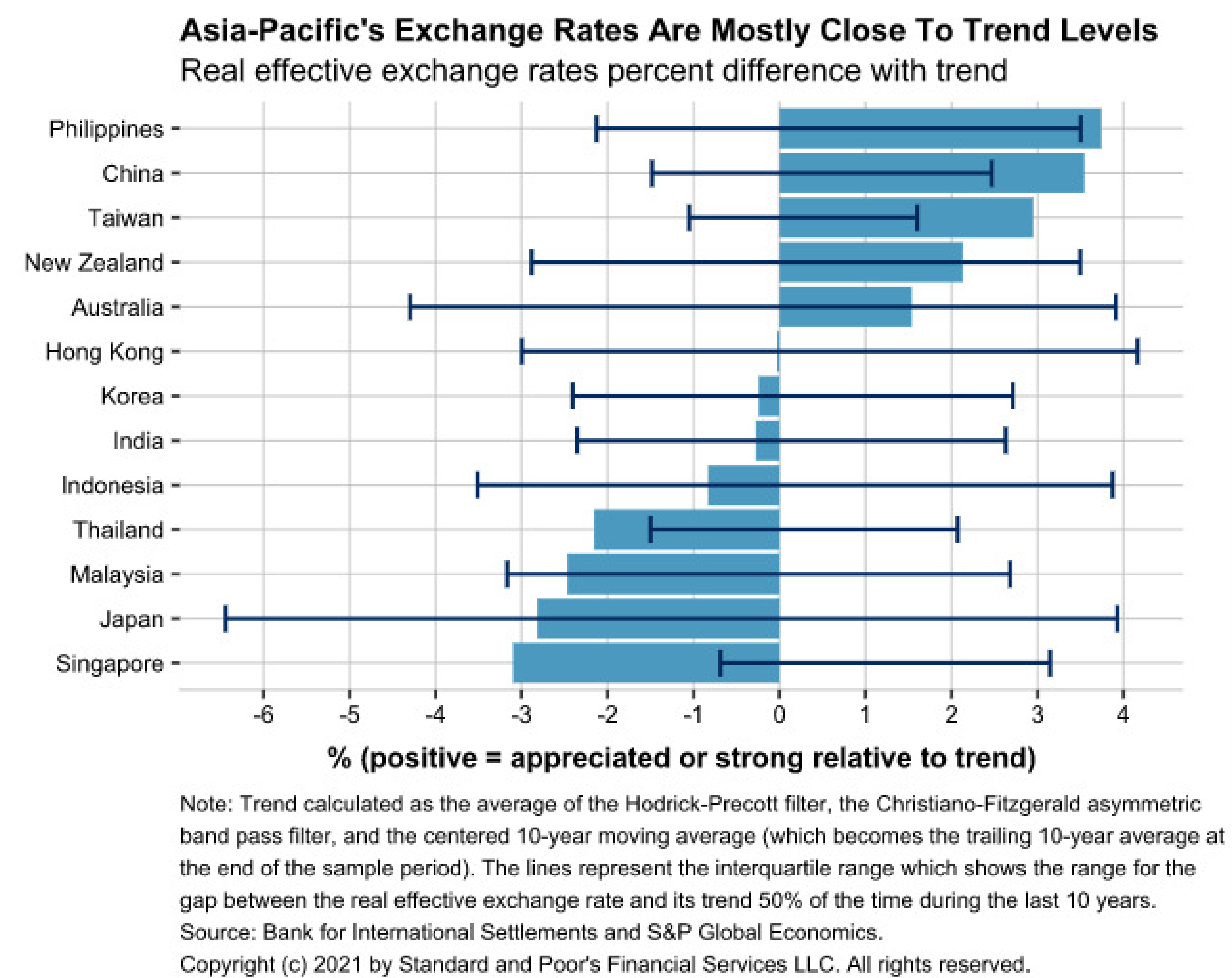
Overall, we expect capex

to make an important positive contribution to growth in most economies in 2021, via domestic investment and exports. For emerging market economies, including Indonesia, infrastructure investment will be especially important for the economy and this will depend, in part, on the willingness of foreign investors to fund a widening current account deficit.

Real Exchange Rates Close To Trend

Despite leading the recovery, at least in terms of activity getting back closer to potential, real effective exchange rates are close to trend for most economies. In other words, the region's exchange rates are not obviously overvalued and in need of a correction, while exports retain their usual competitiveness.

CHART NO.4



Unsurprisingly, most of the economies with the strongest currencies are those that are at the leading edge of the rebound, including China, New Zealand, and Taiwan. The exception is the Philippines where the peso s about 5%

appreciated versus its long-term trend, despite its lagging recovery. Other emerging market economies' currencies are all either close to trend or somewhat weaker.

Gradual Reflation, Not Surging Inflation

Despite a steady recovery, with growth rates amplified this year by the low base in 2020, we expect Asia-Pacific's low inflation--about 0.2% during the final quarter of 2020--to pick up only gradually. We do not expect a broad-based, cost-push consumer price inflation surge. This should continue so long as many people are looking for work and businesses, especially in the service sector, are operating far below capacity. This means inflation will largely remain below central bank targets.

Still, higher commodity prices will pass through to headline inflation, more so in emerging markets (see **"Rising Commodity Prices**

Are Generally Good News For Emerging Markets--But Watch Out For Inflation," published March 19, 2021, on RatingsDirect). Higher weights of food and energy in the consumer price index almost guarantee this outcome. Consider that the average weight of food and energy in India, Indonesia, and Malaysia is about 30%, compared with less than 20% in Australia, Japan, and Korea. Subsidies and price controls may blunt the impact in emerging markets a bit. However, inflation in these economies has in the past been more sensitive to commodity prices.

CHART NO.4



Higher commodity prices are more of an issue for household disposable income than for inflation. With domestic output gaps so wide, workers in many industries are in a weak position to ask for higher wages to compensate for their food and energy bill hikes. In other words, commodity price spikes could ultimately prove deflationary, by damping spending, at least in the early stages of recovery.

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Negative Fiscal Impulse Delayed

While headline deficits may shrink by a few percentage points of GDP, the fiscal stance will remain supportive. In fact, we may see only mildly negative fiscal impulses defined as the change in the fiscal balance unrelated to the economic cycle and which directly adds or subtracts demand.

This is because we should expect fiscal balances to improve quite sharply when growth is growing above potential and the output gap is closing. However, most governments are playing safe and putting off large adjustments that would subtract multiple percentage points from domestic demand even as activity rebounds. India, in contrast, will further ease fiscal policies, mainly by boosting spending, over the next 12 months.

Central Banks To Keep Rates Low, With An Eye On Bond Yields



Central banks will carry the burden of stimulus longer than governments. In most cases, they will keep policy rates at post-COVID lows for as long as domestic economic conditions warrant. At some point in the next 12 months, the focus will turn to the start of policy normalization. We do not expect substantial hikes in policy rates until 2023. Still, we expect some unconventional policies, such as asset purchases in India or bond yield targets in Australia, to be phased out as early as the end of 2021. Japan has already widened its tolerance range for the 10-year government bond yield, albeit slightly.

The rise in long-term global bond yields, led by the U.S., will complicate the task of central banks in keeping financial conditions supportive. For developed market economies with high asset price correlations with U.S. markets, yield curves may continue to steepen. This will raise many longer-term rates priced off government bonds and swaps. For emerging market economies, higher global yields could trigger capital outflows and abrupt currency depreciations.

Our baseline growth forecasts assume that Asia's emerging economies should withstand rising U.S. yields. This assumes that events reflect reflation, and not a monetary shock in the style of the 2013 taper tantrum. These economies are better able to withstand higher yields now given improved current account positions, low inflation, and higher real interest rates (see "Emerging Asia's Recovery Can Withstand A Reflation Trade," March 16, 2021). Market conditions can change quickly. For now this is a downside risk rather than a baseline assumption.

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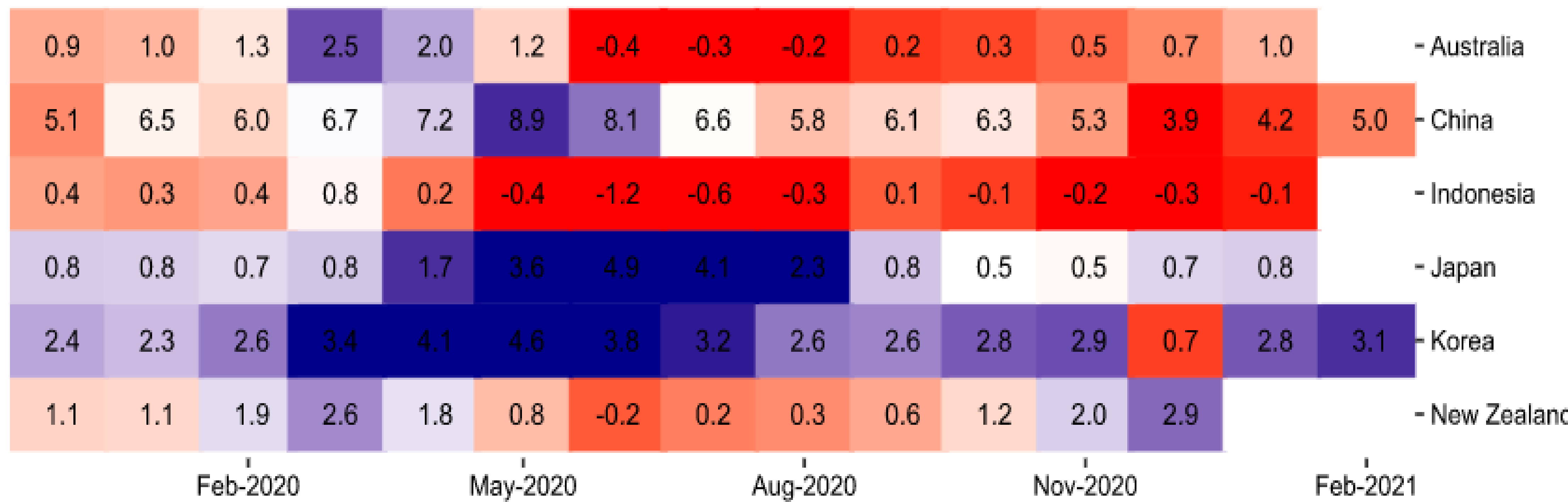


Asia-Pacific's Credit Flow Heatmap Is Stabilizing



After the peak and trough in credit to real economies in 2020, credit flows are stabilizing. This is good news for the growth outlook. We had worried that impending exits from certain supportive financial sector policies--such as loan moratoriums--could tighten access to credit. In turn, this would increase pressure on financially weak households and firms, constrain spending, and set back growth. Some of these challenges still lie ahead, but in many economies the share of loans in moratorium has either fallen a lot (Australia) or remained small (Korea). In some others (Indonesia) loans under moratorium remain high.

Net Credit Flows Are Stabilizing After Falling From Stimulus Spike
Three-month net new credit to the real economy as a percent of trend GDP



Note: All data are seasonally adjusted and colors denote the difference from the average level since January 2010 in standard deviations.
Net credit includes depository corporation lending to the non-financial sector and net non-financial corporate bond issuance. China data includes shadow banking and net local government bond issuance to allow historical comparisons. Trend GDP calculated from Hodrick-Prescott filtered nominal GDP extended using S&P Global Economics long-run forecasts to address end-point bias.
Source: National statistical authorities, CEIC and S&P Global Economics.
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Risks To Growth Over The Next 12-18 Months Are Balanced

In our last forecasts, we suggested risks were balanced (rather than skewed lower) for the first time in about two years. This played out with several upgrades to our forecasts for 2021 and 2022 (including China, India, Japan, and Taiwan).

We retain our view that risks remain balanced, with a roughly equal probability of upgrades or downgrades. Still, until the pandemic is behind us, uncertainty remains unusually high.

Downside risks include:

- **Pandemic:** A delay in vaccinations or new variants would keep us in the 80%-90% economy world for much of 2021 and obviously delay the recovery. More importantly, it would mean higher permanent costs.
- **Global financial conditions:** Markets may start to price in an earlier exit from extraordinarily loose monetary policies by major central banks, forcing real yields higher.
- **Geopolitics:** Hard to quantify but potentially a large impact. There has not been a major change yet in the dynamics of the U.S.-China relationship under the new U.S. administration.

Upside risks include:

- **External demand:** The flipside of global inflation concerns is the potential for a much larger boost in export demand that drives the region's manufacturing sector.
- **Consumer boom:** Household saving has risen sharply across the region and has remained stubbornly high. If vaccine rollout boosts confidence, spending may

rebound quickly.

- **Productivity shock from COVID:** This is an emerging long-term risk, but the region's economies are learning new, more efficient ways of doing business that will stick.

Australia Set To Grow 4% In 2021, With Lower Permanent Damage



Australia's economy is healing faster than many expected. After a much stronger second half to 2020, we still expect real GDP growth of 4% this year and 3.3% in 2022 as the service sector reopening continues and hiring picks up, albeit at a slower pace. The swift jobs rebound may be temporarily hit by the end of wage subsidies, but after faster than expected progress in recent months we expect a steady fall in the broad unemployment rate (including underemployment).

Remarkably few people have been discouraged from working by the COVID recession. The participation rate (the percentage of the working-age population that is either in employment or looking for a job) has rebounded above pre-COVID levels, likely aided by lower immigration. This means new jobs should more directly affect unemployment rather than bring new people into the labor force.

This may sustain the nascent rebound in wages, which grew by an annualized seasonally adjusted 2.4% (or 1.4% in year-on-year terms) during the final quarter of 2020. Household spending, which accounts for about 55% of GDP, should grow faster than income in 2021. We anticipate the saving rate will drop from 12% at the end of 2020 gradually towards the pre-COVID five-year

average of just above 5%. In real terms, we expect private consumption growth of about 6%.

Investment should also pick up to about 5%, helped by residential construction. The house price correction was short-lived. The combination of improving job market prospects and low borrowing rates has boosted housing demand. Dwellings investment rose over 4% during the final quarter of 2020 and the Australian Industry Group's surveys point to stronger new orders. Commodity demand will influence business investment and exports. The pace of global growth will determine commodities consumption, while demand from China may cool as investment growth there slows. Fiscal support should fade, but we do not anticipate abrupt changes that could derail growth.

The largest change to our forecast projections is for permanent damage, which comes down by about 1 percentage point to 2%. With a higher GDP base than we anticipated from 2020 and keeping our forecasts the same, we end up much closer to the pre-COVID trend. This is a direct result of a faster reopening, which has stemmed further corporate bankruptcies and kept people in jobs.

Inflation should continue to rise

toward, but remain below, the Reserve Bank of Australia's (RBA) target range of 2% to 3%, through 2022. The RBA has committed to hold off from hiking its policy rate, currently at 0.1%, until "[actual] inflation is sustainably within the 2%-3% range." This shift to focusing on actual inflation rather than forecast inflation could mean the RBA waits longer to hike than it would have in the past.

The RBA thinks the conditions for a rate hike, principally wage growth above 3%, will be met in 2024 at the earliest. Assuming the RBA retains its new approach of focusing on actual rather than forecast inflation, we anticipate lift-off for the policy rate in 2024. The RBA may be much quicker to unwind its unconventional measures, especially its 0.1% target for the three-year government bond yield.

The key downside risk for growth over the next 12 to 18 months remains the pandemic, notwithstanding recent success in tamping down outbreaks. Sharply higher global bond yields could also abruptly tighten financial conditions for domestic borrowers given Australia's integration in global financial markets and high asset price correlations. On the upside, stronger global growth could boost commodity prices and exports, while consumers may run down their savings faster than we expect.

We Revise China's 2021 Growth Up To 8% On Momentum In Manufacturing And Property

China is leading the global recovery but a rotation in demand, towards consumption, will be needed to ensure a healthy, sustainable expansion.

We revise China's growth to 8% (from 7%) in 2020 and edge up to 5.1% (from 5%) for 2022. The economy retained substantial momentum through the final quarter of 2020. This was due mainly to three key drivers: infrastructure investment, real estate, and exports. Even in the unlikely scenario that the economy flatlined in 2021, the statistical carryover from late last year would mean growth of 6%, which is also the minimum level targeted by the government.

Early indications from 2021 suggest that the shape of China's recovery remains intact for now. Manufacturing, powered by investment and exports, is still expanding at an annualized rate of about 8%. Some areas of the economy are booming. While we expect tighter fiscal, credit, and housing policies to cool infrastructure and real estate investment growth through this year, these drivers may last for a little while yet.

COVID-related demand helped exports from China. While this may fade, higher global growth and nascent signs of a pickup in capital goods demand suggests that real export growth could remain buoyant at about 14% in 2021. The real effective exchange rate has appreciated to the strong side of its recent range recently, but we do not expect this to have

a large effect on China's competitiveness.

We anticipate real private consumption growth of about 10%, as service sector hiring picks up and the vaccine rollout proceeds. So far, consumption has remained soft throughout the recovery. For example, retail sales in 2020 fell by almost 4% even as the overall economy grew by 3% in nominal terms. Early data in 2021 do not yet suggest an inflexion point in household confidence. Higher saving rather than lower incomes explains this weak spending. The household survey shows that urban per capita incomes continued recovering during the second half of 2020 and had easily surpassed pre-COVID levels, while spending has lagged.

So why the lack of confidence? One reason may be the lack of direct income support during the peak of the pandemic, which is encouraging higher precautionary saving. We also have a clue from official service sector surveys. These indicate that hiring has been soft, which could be having an outsized effect on migrant workers who left the cities in early 2020 and never returned.

Pipeline inflation pressures are building as the manufacturing sector booms and producer prices rise, but we do not expect this to lead to a broad-based consumer price inflation surge.

Consumer prices have tipped into a very mild deflation in recent months, even excluding volatile items such as food and energy. Until the service sector starts growing at or above pre-crisis growth rates, which would fuel a pickup in hiring, incomes, and spending, we expect core inflation to remain below 2%. This should keep headline inflation below the government's 3% target in the absence

of food supply shocks.

Our forecasts assume that policies tighten slightly. Overall financial conditions, which reflect the broad policy stance, have already tightened substantially over recent quarters. The three-month net credit flow, as a percentage of trend GDP, is at the low end of its 10-year range. For 2021, the government aims to narrow the fiscal deficit by 0.4 percentage points of GDP, some of which will be explained by the rebound in activity. However, we believe that some local governments may feel some financing pressure, which could affect policy support in some regions.

Property developers should face increasingly tight financing restrictions, with demand cooling measures likely in higher tier cities. Macroprudential policies should either remain steady or tighten further. With low inflation and other policies tighter, we think the People's Bank of China will keep its policy rates, including the seven-day reverse repo and the medium-term lending facility rate, little changed through the year. This will anchor the loan prime rate, now used to benchmark interest rates on loans to the real economy.

Downside risks stem from continued weakness in household

spending. Vaccine hesitancy, lingering restrictions, and household caution could delay the full reopening of the service sector. Efforts to restrain leverage and keep financial conditions tight could result in lower infrastructure and real estate investment.

The effect of higher global bond yields on growth should be limited directly, as China's bond market is weakly correlated with those elsewhere. However, there may be an indirect effect, via trade, if higher yields result in stress and lower demand from trading partners.

The U.S.-China relationship remains a downside risk. The threat of a renewed exchange of tariff hikes has receded. However, progress in resolving the more structural aspects of the economic relationship, including technology transfer, has been limited.

Consumers also represent the largest upside risk to growth. If confidence returns quicker, then a speedy reduction in higher household saving could ignite faster consumption growth. External demand, driven by policy stimulus in major economies, could also sustain the export boom for longer.

We Lower 2021 Growth Forecast For Indonesia To 4.5% On Weak Domestic Demand

Weak retail sales, slack consumer confidence, falling core inflation, and weak imports reflect lingering weakness in the Indonesian economy. The corporate and financial sectors are facing challenging operating conditions. The corporate

credit impulse, which is net new credit as a percentage of GDP, is still contracting after falling through 2020.

Indonesia cannot shake off the persistent effects of COVID. Indonesia is vaccinating about 0.1 persons per 100 people, one of the higher rates in Asia, but achieving broad immunity through vaccination is still some way off.

Unemployment rose to 7.1% in the third quarter of 2020. Weak activity since then means that employment conditions have not improved. The downturn is straining small and midsize enterprises, and informal sectors of the economy, which weighs on employment. Total employment contracted by 0.2% between August 2019 and August 2020, while annual growth in the working age population is about 1.6%. This means that a job creation gap has opened, which is creating longer-term losses in activity while job seekers find jobs.

Output is well below its full capacity level, which will keep underlying inflation below the mid-point of Bank Indonesia's (BI) 2%-4% target range. Even BI has cut the reverse repo rate by 150 basis points, we estimate that monetary policy remains broadly neutral, as measured by the real policy rate. BI will be closely watching local bond yields and the



Indonesian rupiah (IDR), which are both sensitive to rising U.S. long-term yields. The window for further policy easing is likely to have closed. Fiscal policy was moderately accommodative in 2020 and is set to consolidate only gradually over the next few years.

The weak first quarter will likely push back recovery by about three months, which will lower growth this year and raise growth next year. However, the downturn will deepen balance sheet losses and constrain the economy's recovery. Trade remains favorable and commodity prices are relatively high, which is providing some external support to the economy. We revise our growth forecast for this year lower by 0.9 percentage points to 4.5%, followed by above-trend 5.4% in 2022.

We Revise India's Forecast Higher Even As COVID Risks Linger

The economy has been recovering briskly over the past several months. Seasonally adjusted GDP grew by more than 6% quarter on quarter over the final quarter of 2020. High frequency indicators including bank credit, trade and manufacturing, and purchasing managers' indices show the economy continued to recover in early 2021. Services activity is still lagging behind manufacturing and we expect this to persist until the third quarter of the year when the vaccination rollout is more advanced and fiscal stimulus spending is underway.

COVID-19 risks loom. There has been a spike in new infections and the country could be entering a second pandemic wave. Some targeted lockdowns have been implemented already and more of these will likely be needed. The cost of broader

lockdowns on the economy would be very severe as they would cut the recovery short.

The speed of the vaccination rollout will determine how severe the fresh COVID-19 wave will be. India has one of the highest doses administered globally at about 40 million vaccine doses, but given the large population, this is only about three doses per 100 people. This is notably lower than the highest vaccination covers. The U.K. and the U.S. have administered 40 and 35 doses per 100 people. India will need to hit a much higher vaccination rate over the next few months to contain the pandemic.

The Reserve Bank of India (RBI) has kept the policy rate at 4.0%, while core inflation has risen to 5.9% compared with an average of about 5.0% over 2018 and 2019. Food inflation has eased in recent months, so headline inflation remains in the target range of 2% to 6%. However, rising energy prices and sticky core inflation does pose upside risks for inflation. We expect the central bank to respond by hiking policy rates this year.

We forecast growth of 11% over fiscal year 2021/2022, followed by 6.1% over 2022-2023. Larger corporate sector firms have fared much better than smaller players, and the balance sheet weakness

weakness in smaller and informal businesses will weigh on the recovery.

We Maintain Our Forecast For Japan's 2021 Growth At 2.7%, With Upside Risks From Trade
We maintain Japan's forecast for 2021 GDP growth at 2.7% and revise 2022 higher to 2.0% (1.3% previously) due to the spillovers from stronger global demand. We expect a gradual vaccine rollout, although there remains uncertainty when broad population coverage can be achieved. Assuming Japan makes good progress in the second half of 2021, we expect a sustained reopening of the service sector, and a steady improvement in household spending, mostly later this year.

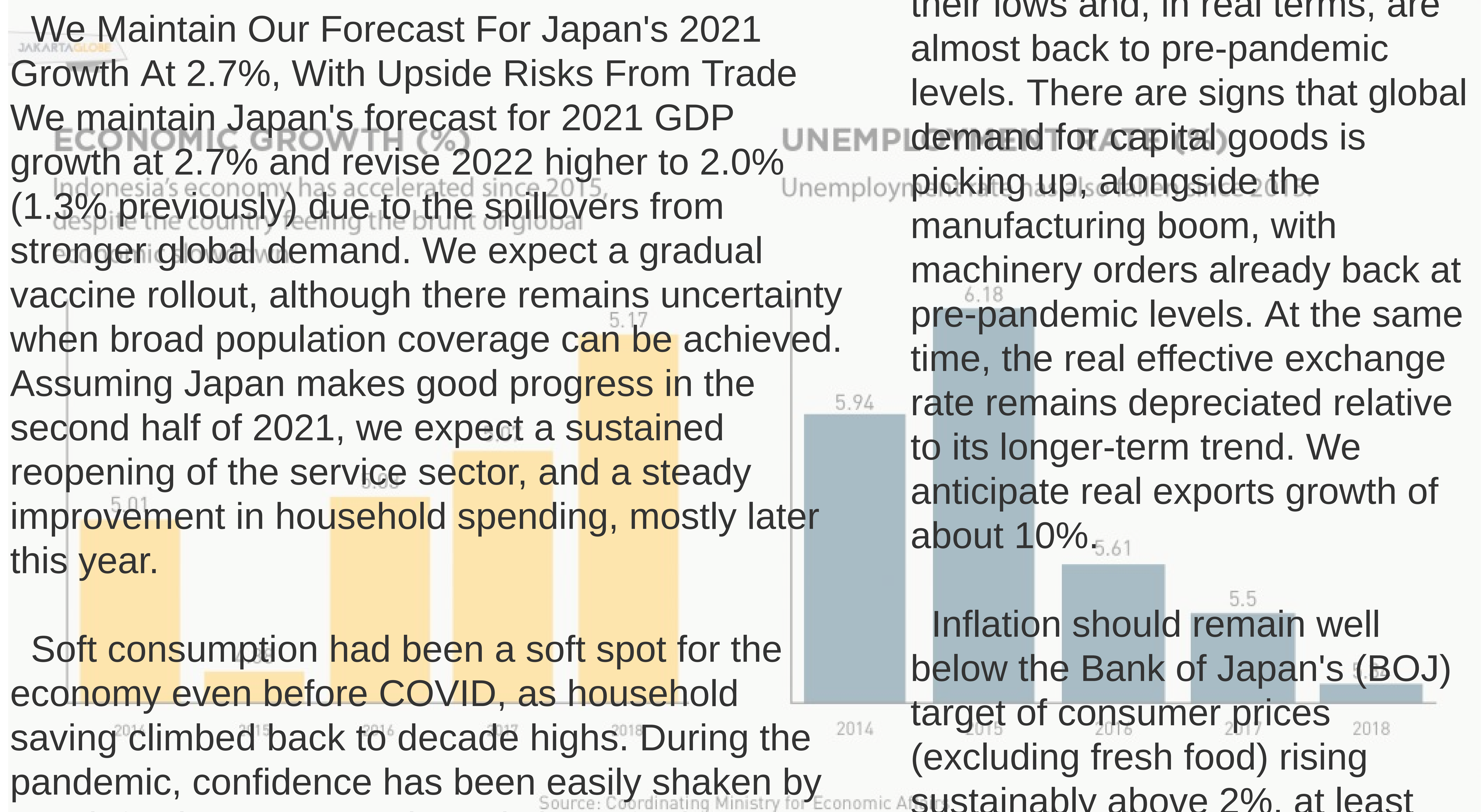
Soft consumption had been a soft spot for the economy even before COVID, as household saving climbed back to decade highs. During the pandemic, confidence has been easily shaken by new infection waves and restrictions, further denting spending. A jobs recovery will help. The country has already clawed back half of the 2% drop in employment it suffered because of COVID. However, with many new jobs now part-time or temporary, it may take a sustained period of hiring and clear evidence of higher wage growth to restore fully consumer confidence. We expect real private consumption growth to improve to about 1.5% but still lag behind GDP for the full year.

Public spending has plugged the large hole in domestic demand since COVID, with government consumption rising 2.7% in 2020. The draft budget for fiscal year 2021 suggests ongoing support for demand although the impulse, the change in the growth rate, will now fade. Investment has stabilized at a low level. Prospects for a rebound

are improving as corporate profitability is improving, albeit with sharp differences across some sectors.

Exports have bounced quickly off their lows and, in real terms, are almost back to pre-pandemic levels. There are signs that global demand for capital goods is picking up, alongside the manufacturing boom, with machinery orders already back at pre-pandemic levels. At the same time, the real effective exchange rate remains depreciated relative to its longer-term trend. We anticipate real exports growth of about 10%.

Inflation should remain well below the Bank of Japan's (BOJ) target of consumer prices (excluding fresh food) rising sustainably above 2%, at least through 2022. The economy will need to work through its excess capacity, including an unemployment rate that is about 0.7 percentage points above pre-pandemic lows. Core inflation (excluding both food and energy) has rebounded off its lows but at 0.2% is not yet high enough to generate a material shift in inflation expectations. Higher global commodity prices are unlikely to change this picture. The passthrough to consumer prices since 2010 has been very weak.



The BOJ is likely to maintain a steady policy after recently widening the band around its 0% yield curve target for government bonds from plus/minus 20 basis points to plus/minus 25 basis points. It also scaled back its equity purchases to ensure a "sustainable" policy. As a recovery is not yet secured, inflation is likely to stay well below target. And with the fiscal impulse starting to fade, there are few good options open to the central bank. We may see some tweaks to monetary policy (including asset purchase targets), but nothing that would alter this stance too much.

Downside risks to the economy stem mainly from the pandemic, especially a slower-than-expected vaccine rollout, and the knock-on effect on fragile consumer confidence. We expect limited effects of rising global bond yields, including on financial institutions whose exposures are manageable, although the BOJ may need to scale up its bond purchases to ensure 10-year yields remain within its new target range. Upside risks are emerging, however, especially via the effect on stronger external demand on exports.

We Maintain Korea's Growth Forecast At 3.6% As Trade Offsets Wobbly Start For Consumption



We maintain our growth forecast for Korea at 3.6%. External demand and brighter prospects for investment help offset bumpy consumption. We have set our 2022 assumption slightly lower, to 3.1% from 3.2%. Manageable, yet recurrent, mini waves of COVID infections have dented consumption. But as cases have headed lower, irregular workers are experiencing a jobs recovery after a concerning decline early in 2021. Irregular

workers account for almost one half of the workforce.

For the full year, vaccine rollout is key and the government is targeting "herd immunity" coverage by the fourth quarter of 2021—this would boost consumer confidence and spending on local services, helping to drive the unemployment rate back to pre-COVID lows of about 3%.

Household debt may be a lingering headwind for the speed of the bounce, however, as the debt-to-income ratio has risen by over 10 percentage points over the last two years to 171%, according to the Bank of Korea (BoK).

We now expect higher exports and investment growth in 2021 as external demand picks up and electronics demand shows persistence. Profitability is improving in some key sectors, including semiconductors and more recently autos. Even in some lagging sectors, including oil refining and chemicals, improving demand is lifting revenues. This should support real capital spending which suffered a sustained decline during the 2018-2019 U.S-China trade war.

We expect inflation to gradually move closer to the BoK's target of 2%, helped by the jobs recovery and a pick-up in wages, especially among irregular workers. Still, with

FEATURE STORY

the fiscal impulse gradually fading, unemployment remaining above pre-COVID levels through 2023, and inflation below target, we expect the BoK to keep its policy rate unchanged at the record low level through 2022. This should keep financial conditions supportive—S&P Global Ratings has revised down its credit loss estimates for banks, and this should help support lending. Lift-off for rates may come in late 2023 if the BoK expects inflation to edge above the 2% target in 2024.

The pandemic, especially a delayed vaccine rollout and new mini infection waves, present the key downside risk to growth over the next 12 to 18 months, especially as household confidence remains fragile and debt service has risen.

A surge in global inflation and a disorderly rise in global bond yields could tighten domestic financial conditions, and the speed of any currency depreciation could affect how long the BoK is willing to keep interest rates at their record low—the BoK has explicitly highlighted "fund flows to asset markets" as an important consideration.

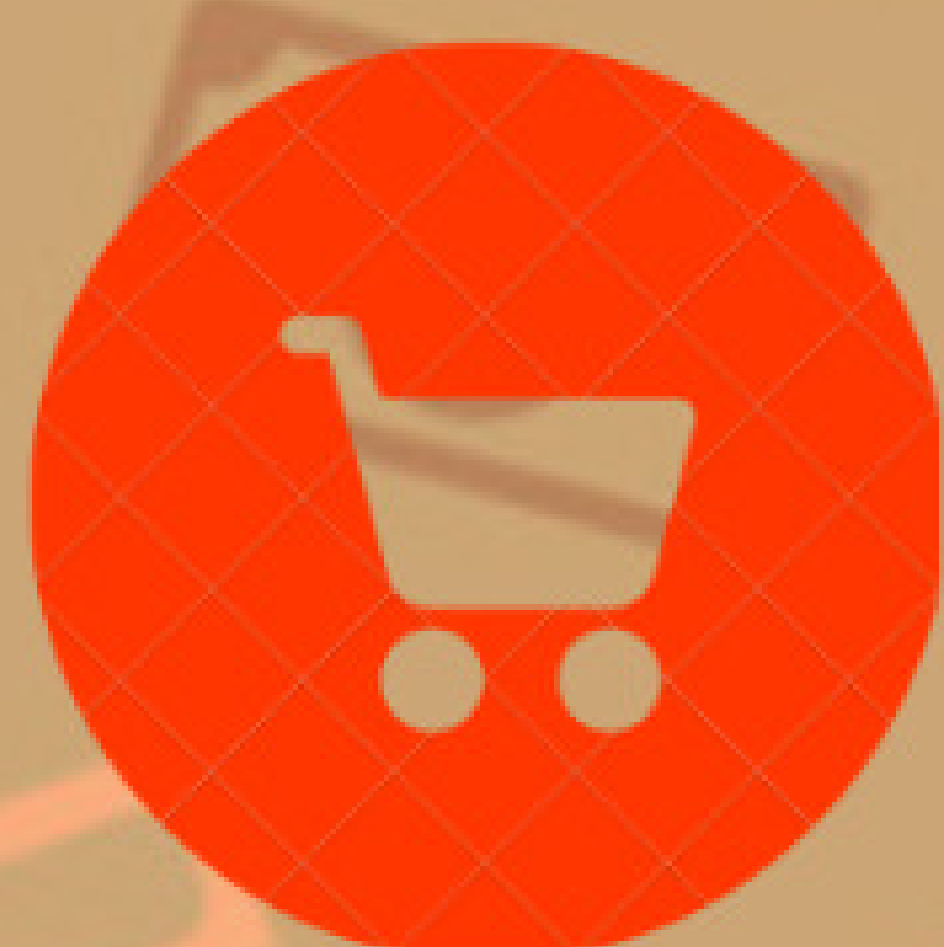
The U.S.-China relationship is a lingering risk, especially if it affects the outlook for investment in the technology sector. The main upside risk stems from stronger external demand, especially for electronics and autos. Korea's economy is one of the most exposed to U.S. final demand in Asia-Pacific.



Malaysia Growth Forecast Lowered Due To Renewed Economic Weakness In The First Quarter

We forecast growth of 6.2% this year and 5.6% in 2022 from our earlier forecasts of 7.5% and 5.2% respectively. Fresh mobility restrictions following a rise in COVID infections early in the year lowered activity in the first quarter. The recovery in labor markets and consumer spending has slowed, and the recovery will be delayed. Normalization will depend on the containment of the pandemic and local vaccination efforts. Trade and manufacturing have remained resilient, and external demand is strong, especially for electronics. Trade presents an upside risk to growth this year given Malaysia's position in electronics supply chains and exposure to U.S. final demand.

Inflation will rise this year after prices fell over 2020. Higher oil prices will drive energy related components of inflation higher.



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Due to the weak demand conditions, core inflation halved over 2020 from about 1.5% before the pandemic to about 0.7% at the end of the year. Core inflation will only rise later in the year when demand rotates toward consumption, and until then low core inflation will buffer some of the rise in noncore inflation. Given the slight pickup in inflation, we expect monetary policy to be on hold this year.

Weak Mobility Weighing On Private Demand In The Philippines



Mobility indicators remain far below pre-COVID levels, and movement restrictions have extended far longer than we expected. Vaccination efforts have begun, but progress has been expectedly slow. We continue to expect a pickup in mobility in the second half of the year, but there will be a delay in economic recovery.

Meanwhile, inflation is high despite the lack of demand, on the back of sharp supply-side driven increases in food prices. We expect this to be transitory, but it does weigh on consumption in the first half of the year. Taken together, these lead us to revise our growth forecast for 2021 downward to 7.9% from 9.6% earlier, pushing some of the recovery into next year. We expect output to be about 10% below its pre-COVID trend, which will keep underlying inflation subdued.

It is doubtful that fiscal support will rise significantly this year compared with 2020. On the monetary policy front, we expect Bangko Sentral ng Pilipinas (BSP) look through the transitory rise

in inflation and instead focus on supporting the recovery. At the same time, real policy rates are already low and the ability of the BSP to hold policy steady will depend on the impact of higher global bond yields on capital flows, the currency, and pass through to headline inflation from any depreciation.

The lack of additional policy support implies a sharper downside risk if the economy's mobility suffers further impediments. This may be due either to a lack of confidence in the speed of vaccine rollout, or to fresh infection waves if vaccinations cannot keep pace. Global bond yields also present a risk if they threaten to limit the space for the BSP to keep real rates low.

Consumer Spending Still Subdued In Singapore

Private consumer spending is still well below normal given weaker labor market conditions, social distancing measures, and the absence of international travel. Employment losses have been broad based, but the impact on the unemployment rate has been cushioned by the asymmetric impact on foreign workers. The service sectors excluding the finance and telecoms have been

more heavily affected. Tourism and aviation sectors will remain weak amid a slower reopening of borders and weak travel demand. Manufacturing, finance and telecoms have provided some support.

Inflation is expected to pick up modestly because of a rise in energy prices, while wage growth will be subdued and keep a lid on core prices. Fiscal policy is consolidating following a large stimulus package in 2020 worth Singapore dollar (S\$) 75 billion. The government has announced a modest stimulus this year of S\$11 billion. We anticipate monetary policy settings to remain unchanged this year. The Monetary Authority of Singapore (MAS) manages the currency and will continue to keep the currency flat against a currency basket.

Trade and manufacturing will be the main drivers of growth in 2021. Private consumption will pick up over the course of this year and will drive growth in 2022. Ongoing fiscal consolidation may be a downside risk to growth. We expect the economy to grow by 5.8% in 2021 and 3.7% in 2022, compared with our earlier forecasts of 6.0% and 3.0%.

Electronics Driving Economic Outperformance in Taiwan



Growth in 2020 surprised on the upside due to exports. In particular, global demand for semiconductors is driving strong growth in the electronics sector. We expect this to continue this year as export orders remain buoyant and geographically broad-based. Domestically, COVID remains under control, consumer confidence and spending are recovering gradually but remain

weak partly due to social distancing measures.

Inflation is set to rise this year due to higher global oil prices and as returning consumer demand pushes core prices higher. Core prices rose at about 0.8% for the first two months of the year, which was in line with the medium-run core inflation rate. While Taiwan's central bank is expected to maintain an accommodative policy stance, a rate hike cannot be ruled out once higher inflation reflects stronger consumption. Fiscal policy is expected to consolidate following a stimulus of about 6% of GDP last year.

We forecast above-trend GDP growth of 4.2% in 2021 but slower growth of 2.7% in 2022 from our earlier forecasts of 2.9% and 2.5%. External demand remains the key swing factor this year. Any slowdown in the global electronics cycle could weigh on manufacturing, but there is also significant upside risk from stronger demand in the U.S. as exports to the U.S. comprise about 8% of GDP.

Recovery In Thailand Delayed Due To More Gradual Recovery In Consumption And Tourism

Consumption was less negative than feared in the final quarter of 2020 reflecting fiscal stimulus spending and some resilience in domestic activity. However, the outlook for consumer spending overall remains weak given fragile confidence and soft employment. The labor-intensive tourism sector is still missing in action and accounts for about 11% of the economy. Manufacturing remains a pillar of strength with both autos and electronics production and exports holding up.

Fiscal policy is set to contract only gradually as some of the total fiscal stimulus planned remains unutilized. The policy interest rate will remain low at 0.5% but core inflation is still steady at near 0%, reflecting not only weak demand but also structural factors, such as aging, that have depressed inflation for some time. Headline inflation may rise modestly due to higher energy prices this year, but not enough to affect the path of monetary policy. Given its strong external balance sheet, Thailand is also less affected by capital flow volatility than other emerging market peers.

We forecast growth of 4.2% this year, down from our earlier forecast of 5.0%. The delayed recovery will mean higher growth of 4.5% next year compared with our prior forecast of 3.9%. The timing and speed of recovery depends on travel normalization, which we assume only resumes gradually starting in the final quarter of the year. Trade and manufacturing could provide some upside risk to growth, especially as U.S. final demand accounts for almost 4% of GDP, purely via manufacturing.

Growth Outlook Remains Favorable In Vietnam On Strong Trade and Manufacturing

Strong global demand for electronics coupled with a mild COVID outbreak meant that economic performance in Vietnam was strong. The economy outperformed expectations in 2020, with the initial phase of economic recovery happening earlier than expected. The recovery started in the second half of 2020, which means growth in 2021 will happen from a higher base. As a result, we have revised down our 2021 growth forecast to 8.5%. Nonetheless, our current GDP growth expectation remains one of the strongest globally.

With the growth outlook relatively strong and the inflation rate fairly stable but not low, we expect State Bank of Vietnam to maintain rates at current levels throughout the year. Large positive current account balances due to strong exports have driven large capital inflows into the country. Vietnam has entered the U.S. Department of Treasury's currency manipulation watchlist given its peg against the U.S. dollar and rapidly rising foreign exchange

reserves. The risk of U.S. tariffs or similar measures on Vietnamese imports has risen over the past year.

We believe Vietnam will continue to benefit from a strong consumer electronics sector, especially with a significant U.S. stimulus on the way, while demand from China and northeast Asia also remains strong. Domestic consumer demand is also recovering gradually.

S&P Global Ratings believes there remains high, albeit moderating, uncertainty about the evolution of the coronavirus pandemic and its economic effects. Vaccine production is ramping up and rollouts are gathering pace around the world. Widespread immunization, which will help pave the way for a return to more normal levels of social and economic activity, looks to be achievable by most developed economies by the end of the third quarter. However, some emerging markets may only be able to achieve widespread immunization by year-end or later. We use these assumptions about vaccine timing in assessing the economic and credit implications associated with the pandemic (see our research here: www.spglobal.com/ratings). As the situation evolves, we will update our assumptions and estimates accordingly.

Source: Asia Development Bank

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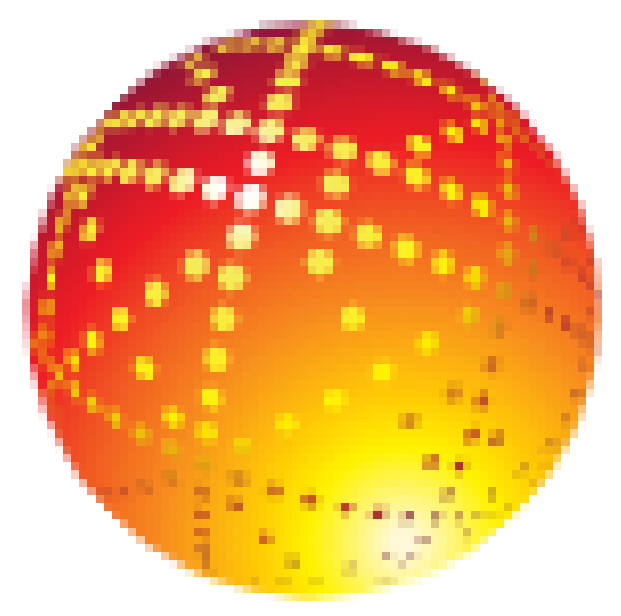


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PsiQuantum and GLOBALFOUNDRIES to Build the World's First Full-scale Quantum Computer



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Partnership Achieves World-first Manufacturing Milestone in Photonic Quantum Computing

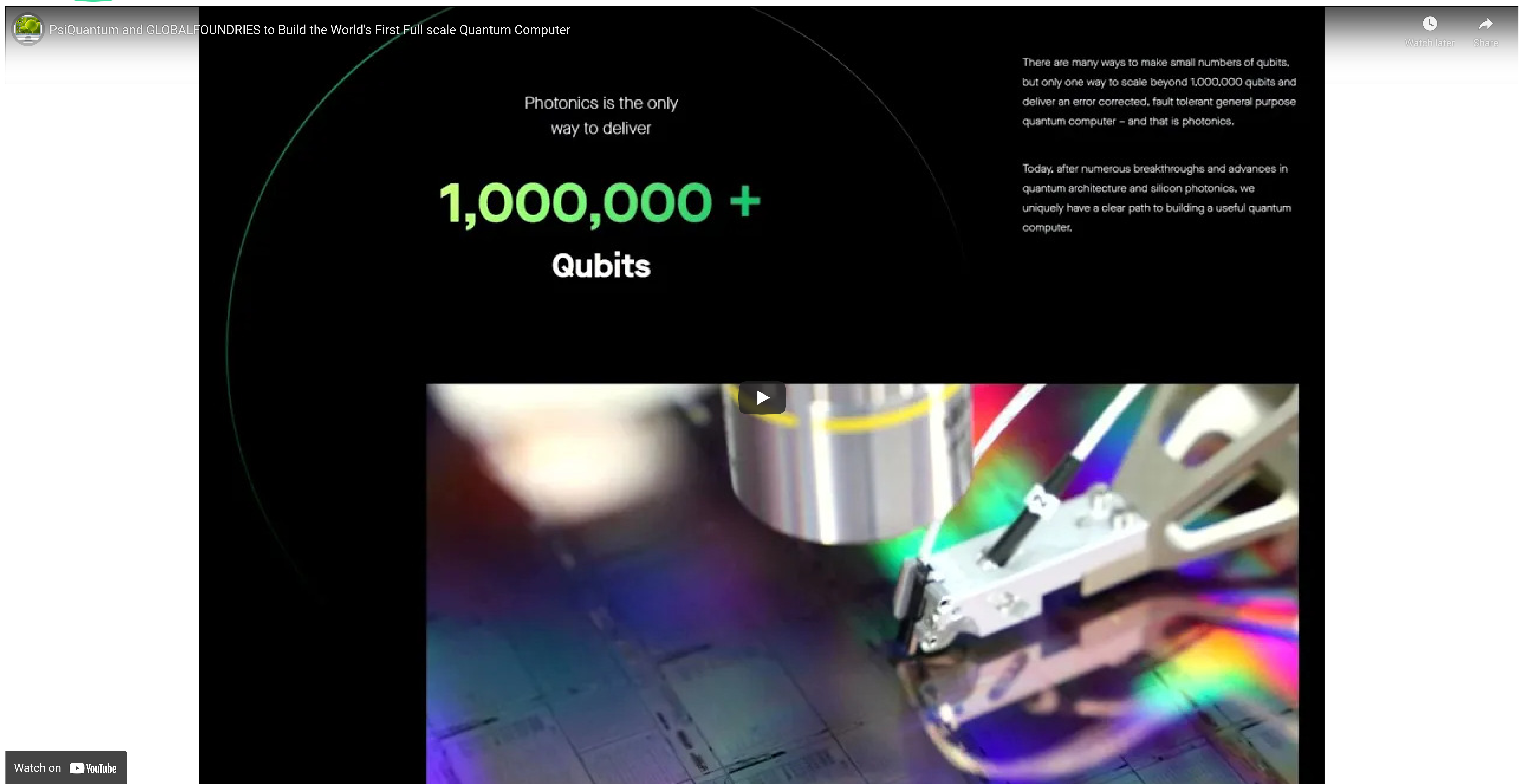
PsiQuantum™, the quantum computing company focused on delivering a 1 million-plus qubit quantum computer, and GLOBALFOUNDRIES® (GF®), the global leader in feature-rich semiconductor manufacturing, today announced a major breakthrough in their partnership to build the world's first full-scale commercial quantum computer. The two companies are now manufacturing the silicon photonic and electronic chips that form the foundation of the Q1 system, the first system milestone in PsiQuantum's roadmap to deliver a

commercially viable quantum computer with one million qubits (the basic unit of quantum information) and beyond.

PsiQuantum and GF have now demonstrated a world-first ability to manufacture core quantum components, such as single-photon sources and single-photon detectors, with precision and in volume, using the standard manufacturing processes of GF's world-leading semiconductor fab. The companies have also installed proprietary production and manufacturing equipment in two of GF's 300mm fabs to produce thousands of Q1 silicon photonic chips at its facility in upstate New York, and state-of-the-art electronic control chips at its Fab 1 facility in Dresden, Germany.

Quantum computing is expected to deliver extraordinary advances across a multitude of industries including pharmaceutical development, materials science, renewable energy, climate mitigation, sustainable agriculture, and more. PsiQuantum's Q1 system represents breakthroughs in silicon photonics, which the company believes is the only way to scale to 1 million-plus qubits and beyond and to deliver an error-corrected, fault-tolerant, general-purpose quantum computer.

The Q1 system is the result of five years of development at PsiQuantum by the world's foremost experts in photonic quantum computing.



The team made it their mission to bring the world-changing benefits of quantum computing into reality, based on two fundamental understandings:

- 1) A useful quantum computer capable of performing otherwise impossible calculations requires 1 million-plus physical qubits; and
- 2) Leveraging the 50-plus years and trillions of dollars invested in the semiconductor industry is the only path to create a commercially viable quantum computer.

“In the past year, we have experienced a decade of technological change. Now, due to the digital transformation and the explosion of data we are faced with problems that require quantum computing to further accelerate the Renaissance of Compute,” said Amir Faintuch, senior vice president and general manager of Compute and Wired Infrastructure at GF.

technology applications across climate, energy, healthcare, materials science, and government.”

GF’s leading silicon photonics manufacturing platform enables PsiQuantum to develop quantum chips that can be measured and tested for long-term performance reliability. This is critical to be able to execute quantum algorithms, which require millions or billions of gate operations. PsiQuantum is collaborating with researchers, scientists and developers at leading companies to explore and test quantum use cases across a range of industries, including energy, healthcare, finance, agriculture, transportation and communications.

PTTEP seeks rig for Myanmar drilling campaign

Thailand's PTT Exploration & Production (PTTEP) is seeking a moored floating drilling rig for an appraisal drilling campaign off Myanmar.

Drilling is planned to start in April 2022 at PTTEP's Zawtika field in Block M9 in waters some 170 metres deep, Westwood Global Energy said in its latest report. "The duration is said to be for eight firm wells plus five options, with the firm period expected to last for about 280 days. Cold stacked rigs will not be accepted. A bid bond of \$300,000 is required as part of the tender. Submissions are to be made by 11 May in Bangkok, Thailand and bidders are to keep their proposals valid for 180 days," said Westwood. The operator is currently using Japan Drilling semi Hakuryu-5 in-country on a 280-day contract that began in February.



The PTT Exploration & Production Pcl logo is seen at PTTEP's headquarters in Bangkok, Thailand, on Monday, Nov. 12, 2007.

Photographer: Udo Weitz/Bloomberg News

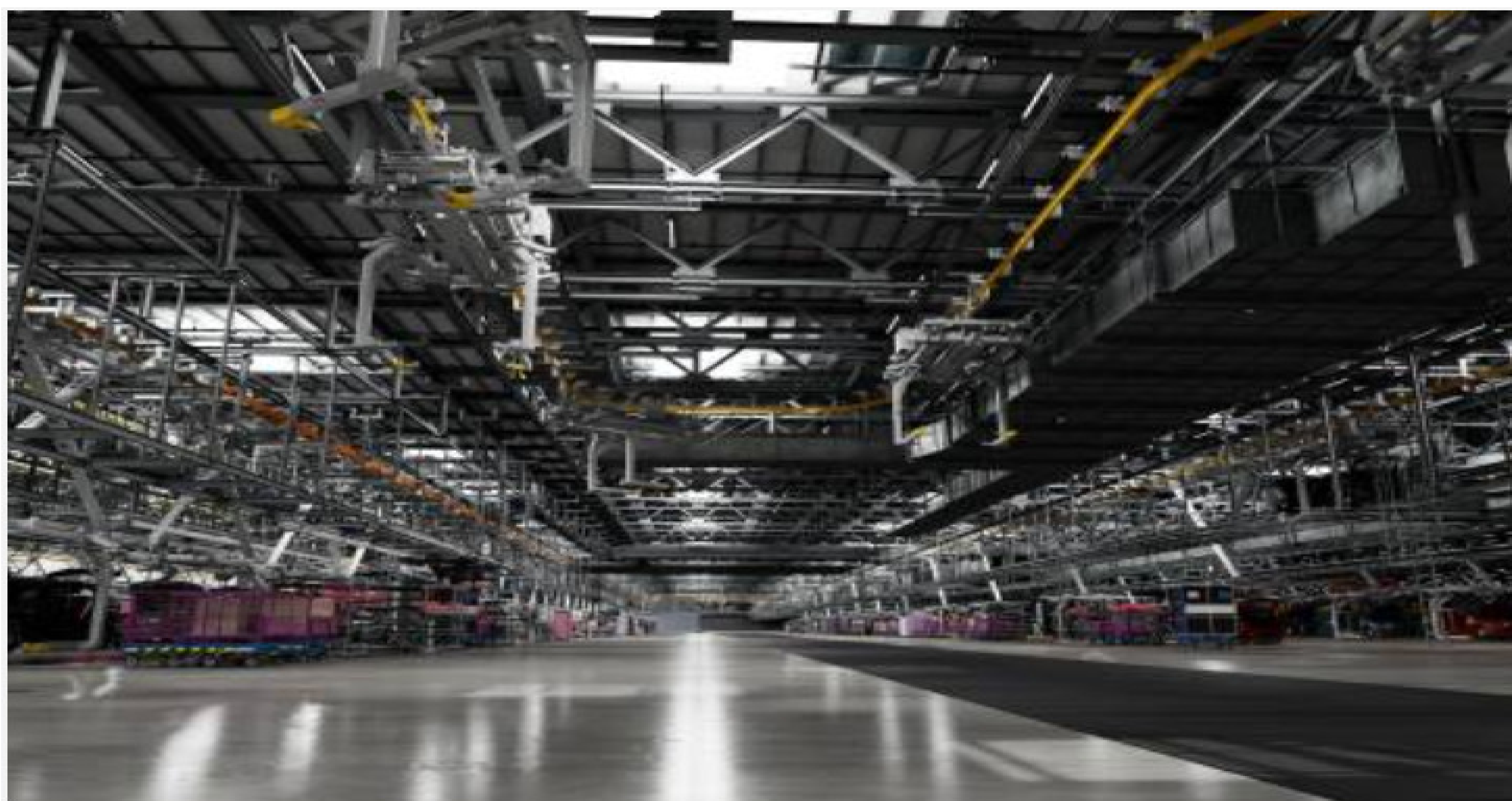
BMW Group and NVIDIA take virtual factory planning to the next level

The BMW Group and NVIDIA are generating a completely new approach to planning highly complex manufacturing systems – with the Omniverse platform. The virtual factory planning tool integrates a range of planning data and applications and allows real-time collaboration with unrestricted compatibility. As industry leaders, the BMW Group and NVIDIA are setting new standards in virtual factory planning.

Milan Nedeljković, BMW AG Board Member for Production: "Together we're about to make a huge leap forward and open up completely new perspectives in the field of virtual, digital planning. In the future a virtual representation of our production network will allow us to realise an innovative, integrated approach to our planning processes. Omniverse greatly enhances the precision, speed and consequently the efficiency of our planning processes."

“BMW does personalized manufacturing at a massive scale - their operations are among the most complex in the world,” said Jensen Huang, founder and CEO of NVIDIA. “In their vision of future factories, people and robots work together, engineers from all aspects of factory design collaborate in a shared virtual space, and the entire factory is simulated with photorealistic detail. NVIDIA Omniverse was built to realize this future. I am delighted that BMW is using NVIDIA Omniverse to connect their teams to design, plan and operate their future factories virtually before anything is built in the physical world. This is the future of manufacturing.”

Virtual factory planning is already widespread, but until now it has required data to be imported from various applications. This is not only time-consuming but also raises compatibility issues.



In addition, the data is not always up to date. In the future, the Omniverse platform will enable live data to be collected and collated from all the relevant databases to create a joint simulation – eliminating the need to reimport data. The goal is to enable modifications and adjustments to be assessed in the early stages of planning in order to create an overall view. This extreme transparency will allow planners and production specialists to plan highly complex production systems even more quickly and accurately, without interface losses or compatibility problems. Omniverse integrates data from various professional design and planning tools from a range of different producers and uses it to

generate photo-realistic real-time simulations in a single collaborative setting.

Outstanding photorealistic quality is just one of the many benefits of Omniverse. Another is that employees at different sites in different time zones can access the virtual simulation and work together to plan and optimise details of a process or production system whenever they need to. In addition, Omniverse can be used in a multitude of applications: in the future, planners and production specialists will collaborate using real-time data that is synchronised in the Omniverse cloud infrastructure.

INSIGHT OUT

They will also be able to discuss the integration of new production systems with suppliers. Omniverse allows structure and facility data to be integrated, as well as items and part numbers of materials in production. It can also be used for logistics planning, offering unprecedented data consistency, from planning through to production. “This is redefining collaboration,” emphasises Board Member for Production Milan Nedeljković. The ability to carry out changes live will speed up decision-making noticeably.

Production planners at the BMW Group will be able to visualise the entire planning lifecycle for every plant in the global production network, accelerated by scalable GPU performance. This will be supported by a wide range of AI-capable application cases, from autonomous robotics to predictive maintenance and data analysis.



The BMW Group and NVIDIA are long-standing partners. In a first pilot project, the US-based company fitted high-performance technologies and special AI control modules to logistics robots and to the BMW Group's self-developed autonomous transport robots (STR).



Maire Tecnimont's Unique Expertise in Process Engineering and Maintenance Services combine with AVEVA's competencies as A Digital Transformation Leader to Address Customer's Industrial Challenges



AVEVA, driving digital transformation and sustainability, has signed a memorandum of understanding (MoU) with engineering, procurement and construction (EPC) contractor Tecnimont, a subsidiary of the Maire Tecnimont Group, a leader in the global natural resource processing industry, to create new digital predictive and prescriptive maintenance services that drive enhanced business outcomes.

This partnership will extend usage of AVEVA's Asset Performance

consuming but also raises compatibility AVEVA's Asset Performance Management (APM) solutions across the Maire Tecnimont Group, globally, enhancing plant operability and lowering maintenance costs. This will in turn deliver increased information availability empowering better, more informed decision-making, and ultimately improving overall business performance. As part of the agreement, the two companies will work together over a twelve-month period on a defined number of customer

projects to promote the application of predictive maintenance technology for critical plant assets.

"Digital transformation is one of the technology drivers most needed to give our industry a much-needed boost. This MoU with AVEVA aligns seamlessly with Maire Tecnimont's strategy for digital transformation: it complements our value proposition which focuses on NextPlant, our new digital services and solutions portfolio that has been designed to fully meet customer's needs, while simultaneously

improving our operational model through the creation of digital enablers,” commented Pierroberto Folgiero, CEO Maire Tecnimont Group.

“AVEVA’s Asset Performance Management suite is well positioned to advance industrial operations of the future. By enabling companies to predict failures before they occur, we are helping to reduce unplanned downtime as well as drive efficiency and safety throughout plant operations. We are excited about the partnership with Maire Tecnimont and look forward to supporting our joint customers in overcoming today’s industrial challenges by leveraging human experience with artificial intelligence.” commented Kim Custeau, Vice President, Asset Performance Management, AVEVA.

As an EPC contractor and global leader in the transformation of natural resources,

Maire Tecnimont will leverage its unique process, automation, and maintenance competencies to supply plant owners with perfectly customized digital products and solutions that are tailor-made for their maintenance needs. The combination of Maire Tecnimont’s proven market experience and AVEVA’s leadership as an industrial technology provider will deliver improved analytics which in turn will help to reduce inefficiencies, optimize operations, and improve our customer’s profitability. With this MoU, Maire Tecnimont Group has reached a new milestone in its digital transformation journey, with the activation of a new technology-enabled value stream which is a crucial part of its roadmap. To achieve its drive to become the ‘contractor of the future’, Maire Tecnimont is enhancing overall value for plant owners through a suite of advanced digital products and services geared towards EPC customers.



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Siemens and FC Bayern make hearts beat faster for #WeKickCorona initiative



This data project from Siemens and FC Bayern Munich calculates match intensity based on heart rates and various match data. The #HeartBeatFinal Bundesliga match between FC Bayern Munich and FC Augsburg on May 22, 2021 is all about a good cause – and about the heartbeat of Bayern fans. They will be measuring their heart rates during the game for #FCBayernPulse, a joint data project from Siemens and FC Bayern Munich. Siemens will donate 1 euro cent per measured heartbeat to #WeKickCorona. The initiative was founded by Bayern professionals Joshua Kimmich and Leon Goretzka to help social institutions that are in financial difficulties due to the Corona pandemic. Numerous Bayern fans have already measured their heart rates for

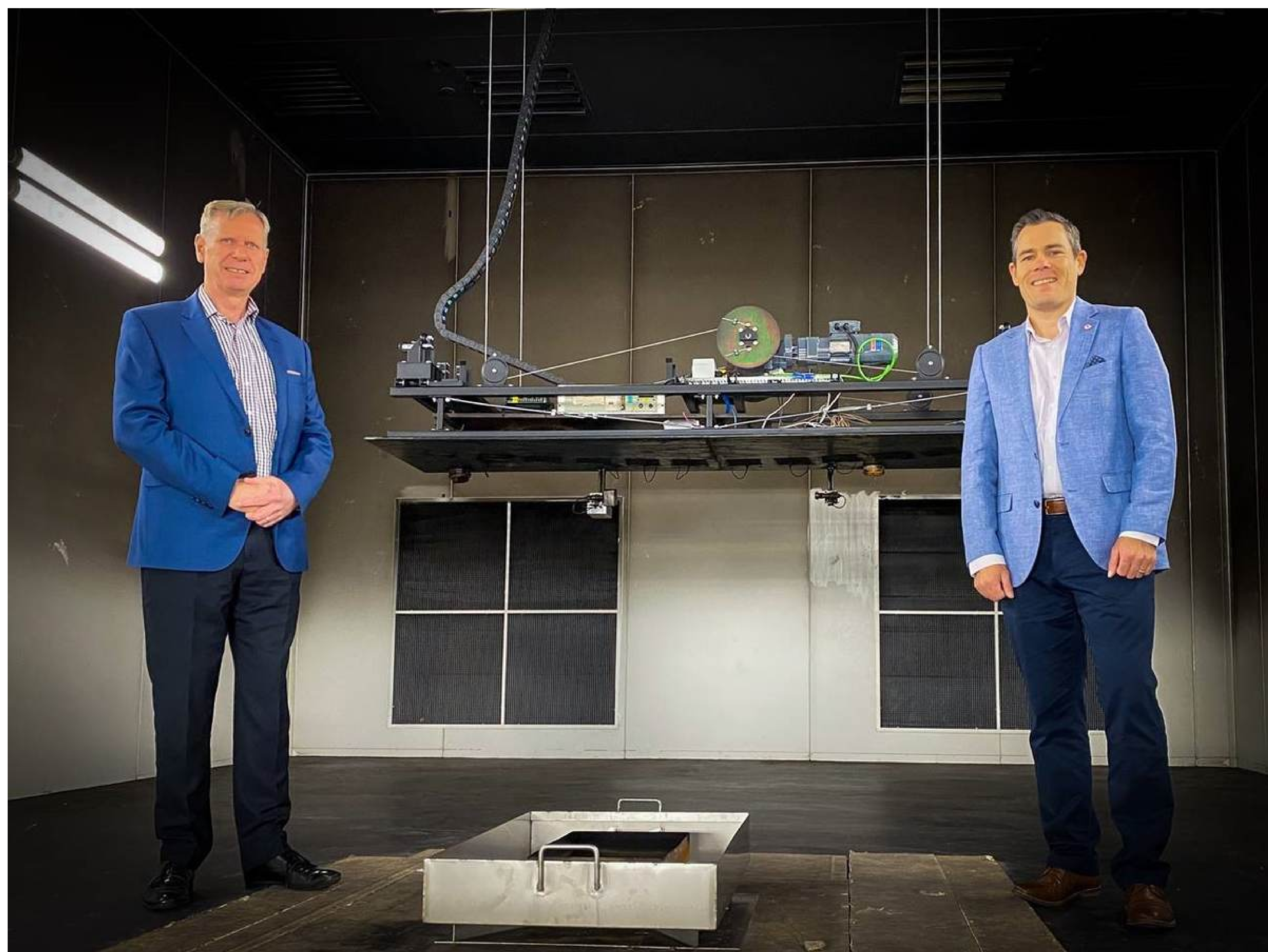
#FCBayernPulse during matches in the 2020/21 Bundesliga season. They upload the data to an interactive website, where it is combined with further information about the course of the game, such as the speed of players or action near the goal. The result is an exciting multimedia visualization. “As FC Bayern’s official performance partner, we support the club in providing extraordinary fan experiences in all disciplines, inspiring people beyond the game itself and contributing to society. Our solutions work mainly quietly and behind the scenes, ensuring safety in the stadium, a perfect pitch, and a safe journey for fans to and from the stadium, whether they travel by subway, bus, or car,” says Roland Busch, CEO of Siemens AG.

“With #FCBayernPulse, we’re demonstrating the possibilities of innovative data technologies. We’re proud that thanks to this collaboration with #WeKickCorona, our work on this project is now also helping social services that have come under pressure during the pandemic.” For the #HeartBeatFinal on May 22, Siemens, FC Bayern Munich, and #WeKickCorona are seeking even more fans to take part in the initiative. They can win activity trackers that can measure heart rates, among other things. They can use these to take part in the initiative. “I hope that many of our fans will participate in #HeartBeatFinal, because it is time well spent for two causes at once: Every heart rate measured helps CEO of Siemens AG.

"Product conformity represents the foundation of safety outcomes. Improving access to product certification that meets demand for confidence in conformity to local regulatory requirements is critical to maintaining brand integrity and serving market expectations," said Matthew Wright, built environment manager for UL in Australasia.

"CSIRO's reputation for accuracy and competency to deliver reliable test data and operational excellence at its local facilities complements UL's approach to help our customers achieve their safety goals, meet quality and performance expectations, manage risk and achieve regulatory compliance."

"The agreement with UL to mutually accept evaluation data will help the construction industry and its stakeholders advance the reliability and fire safety of building products and systems in Australia and New Zealand,"



said Mark Burgess, director, Infrastructure Technologies and Testing Services for CSIRO. "We look forward to providing testing and certification services that support industry and improve building conformity."

Intel to Invest \$3.5 Billion to Expand New Mexico Manufacturing Operations

What's New:

Intel Corporation will invest \$3.5 billion to equip its New Mexico operations for the manufacturing of advanced semiconductor packaging technologies, including Foveros, Intel's breakthrough 3D packaging technology. The multi-year investment is expected to create at least 700 high-tech jobs and 1,000 construction jobs and support an additional 3,500 jobs in the state. Planning activities begin immediately, with construction expected to start in late 2021.

And with one cent per heartbeat, a lot of money can be raised for #WeKickCorona," says KarlHeinz Rummenigge, CEO of FC Bayern Munich AG. The #WeKickCorona donation campaign was launched by the two FC Bayern players Joshua Kimmich and Leon Goretzka to support social and charitable projects with donations during the crisis surrounding the pandemic. "So far, more than five million euros have been raised from over 4,000 donors. This is our contribution to helping our society survive this crisis, making sure it will be just as diverse and strong afterwards," explains Kimmich. His teammate Goretzka adds: "We are pleased that Siemens, our club, and our fans are joining us in support of the #HeartBeatFinal. It's important to assist the many helpers working for social services during this difficult time."

UL Partners with Australia's National Science Agency to Help Advance Fire Safety for the Construction Industry

UL Partners with Australia's National Science Agency to Help Advance Fire Safety for the Construction Industry

UL and the Commonwealth Scientific and Industrial Research Organisation have entered into an agreement to empower faster evaluation of fire detection and alarm products for Australia and New Zealand, allowing improved availability to certified safety systems.

UL announced a data acceptance agreement with the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia's national science agency, that will empower faster evaluation of fire detection and alarm products for Australia and New Zealand, allowing improved availability to certified safety systems.

The collaboration will enhance the journey to UL-AU Mark product certification for the Australia and New Zealand markets while improving customer access to a local test solution and complementing the global testing solutions UL currently offers.

The agreement will allow product evaluation data for a suite of fire detection and alarm system products that are tested to standards specifically recognized in Australia and New Zealand, to be accepted by UL and CSIRO. After successful evaluation to a test plan agreed by both parties, the data generated can then be accepted for products to achieve a UL-AU Mark or CSIRO certification for the Australian and New Zealand markets.

What Foveros Is:

Foveros advanced 3D packaging technology enables Intel to build processors with computing tiles stacked vertically, rather than side-by-side, providing greater performance in a smaller footprint. It also allows Intel to mix and match compute tiles to optimize for cost and power efficiency. The move from system-on-chip to “system on the package” will enable Intel to meet increasing computing performance needs for artificial intelligence, 5G, and the edge.

Why It Matters:

Intel’s global factory network is a competitive advantage that enables product optimization, improved economics and supply resilience. Investing in the company’s manufacturing operations is a key component of its recently announced IDM 2.0 strategy.



The technologies currently developed and manufactured at the Rio Rancho site — Intel® Optane™ technology, embedded multi-die interconnect bridge and Intel® silicon photonics technology — play important roles in Intel’s new era of innovation by simplifying and optimizing semiconductor memory, packaging, and connectivity.

“Intel’s \$3.5 billion investment in New Mexico will create 700 new jobs in the next three years and establish the Rio Rancho campus as the company’s domestic hub for advanced semiconductor manufacturing,” said New Mexico Gov. Michelle Lujan Grisham. “With this exciting development, we are

already seeing the benefits of this year’s legislation expanding LEDA, generating high-quality and high-paying jobs for New Mexicans. The state and Intel have a 40-year partnership, and today, with innovative economic development tools and global demand for this technology, we can celebrate a new generation of workers and job growth at Intel’s New Mexico manufacturing plant.”



BASF and Umicore enter into a patent cross-license agreement

BASF and Umicore have entered into a non-exclusive patent cross-license agreement covering a broad range of cathode active materials (CAM) and their precursors (PCAM), including chemistries such as nickel cobalt manganese (NCM), nickel cobalt aluminum (NCA), nickel cobalt manganese aluminum (NCMA) and lithium rich, high manganese high energy NCM (HE NCM).

CAMs are critical for the performance, safety and cost of lithium-ion batteries used in modern electromobility and other applications. The interplay between PCAM and CAM and the development of these materials are crucial to maximize battery cell performance. For many years, BASF and Umicore have been investing intensively in product innovation for low, medium

and high nickel PCAM and CAM resulting in each company owning sizeable and largely complementary patent portfolios.

Building on each other's strong product technology expertise to support the technological needs of their customers, BASF and Umicore have entered into a landmark patent agreement allowing both partners to combine a wider range of IP-protected technologies related to features such as chemical composition, powder

morphology and chemical stability. The agreement increases both parties' ability to customize their materials to meet the increasingly diversified and complex customer requirements at the battery cell and application level. Furthermore, through this agreement, both parties can increase even more their product development speed demonstrating their commitment to addressing the main challenges e-mobility is facing, such as energy density, safety and cost while enhancing



transparency and reducing IP-risks for battery cell manufacturers and their customers.

The agreement covers more than 100 patent families filed in Europe, US, China, Korea and Japan. Both parties retain the right to enforce their own IP-rights against third parties in the future.

“This agreement with Umicore enables even faster, more sustainable and innovative battery materials development to serve our customers including battery cell manufacturers and automotive,” said Dr. Peter Schuhmacher, President of BASF Catalysts.



“The continuous development of battery materials will accelerate the transformation towards full electrification and thus support the world’s efforts to fight climate change.”

Marc Grynberg, CEO of Umicore, commented: “This agreement with BASF is an important step

in promoting cathode material innovation. It strengthens our technology positioning and further increases our ability to develop bespoke solutions which meet the most stringent performance and quality standards of our battery and automotive customers.”

MIDA and UOB Bank Successfully Organises Hybrid Roundtable Meeting with Captains of Industry in China Greater Bay Area

The Malaysian Investment Development Authority (MIDA) in collaboration with UOB Malaysia organised a virtual roundtable with a delegation team from Shenzhen, China to facilitate inbound investments from China’s major companies of high-value added sectors in the electrical and electronics (E&E), chemical, manufacturing and industrial sectors. The roundtable was an invaluable platform for participants to gain insights

into Malaysia's latest economic developments, policies and potential investment opportunities post-pandemic.

The Malaysian delegation was led by YB Senator Datuk Lim Ban Hong, Deputy Minister of International Trade and Industry, Malaysia (MITI), together with Mr Sivasuriyamoorthy Sundara Raja, Executive Director, Investment Promotion of MIDA and UOB Malaysia's Managing Director and Country Head of Wholesale Banking, Ms Ng Wei Wei.

China's delegation comprised representatives from UOB China, MIDA's offices in China (Beijing, Shanghai and Guangzhou), China Council for the Promotion of International Trade (CCPIT) and potential investors from 20 China companies representing E&E, medical devices, automotive and chemical sectors. Also, in attendance were His Excellency Mr Beh Ching

Chye, Consul General of Malaysia in Guangzhou, China; Madam Tang Jin, Deputy Director General, CCPIT Shenzhen and Ms. Adaline Zheng Jun, Managing Director and Country Head, Wholesale Banking, UOB China. In his Keynote Address, YB Senator Datuk Lim Ban Hong remarked, "Malaysia, as an open trading nation, was not spared from the COVID-19's devastating impact. The best way to handle the present global economic headwinds is to increase cooperation and create mutually beneficial and sustainable growth, through trade and investments. Malaysia's pro-business policies complement the Chinese Government's push for increased China's overseas investment and cooperation with other countries. I am sure that China's investors will find Malaysia an exciting base to expand their overseas operations. I am confident that existing stakeholders will also attest to our commitment towards economic progress and business friendliness. Hence, we look forward to welcoming more businesses

businesses, from both China and Malaysia to further collaborate together for mutually beneficial outcomes on its road to recovery post COVID-19."

The Deputy Minister of MITI further elaborated that Malaysia's value proposition in Southeast Asia as a profit centre for global companies, including those from China, cannot be overlooked. He shared, "Supported by a reliable and diverse local supporting industry, investors seeking to expand their production capacity in Malaysia can do so efficiently and with ease. Our young and quality talent pool that is well versed in multiple languages, including Mandarin and English, create an ideal business environment for our foreign investors. The Government, through MIDA in collaboration with our stakeholders will intensify efforts to attract projects that are high value-added, high-tech, knowledge and R&D intensive in line with our National Investment Aspirations to generate multiplier effects to Malaysia's domestic industrial ecosystem."

bp and Pure Planet form tech partnership, enabling energy consumers to make smart home and mobility choices



- bp's new zero carbon digital services to be launched with renewable energy supplier Pure Planet, building on their existing relationship.

- New digital services will enhance Pure Planet's digital retail offer with a range of green, low carbon, and e-mobility services helping consumers get to net zero.

bp and 100% renewable energy supplier Pure Planet today announce a partnership to launch a new digital energy service that will support households, EV drivers and energy consumers in the UK.

The new digital service brings smarter control of renewable home energy, electric vehicles, batteries, smart heating and solar

power, as well as carbon-offsetting options, onto one easy-to-use consumer platform. It will be launched exclusively on Pure Planet's award-winning app and website next month.

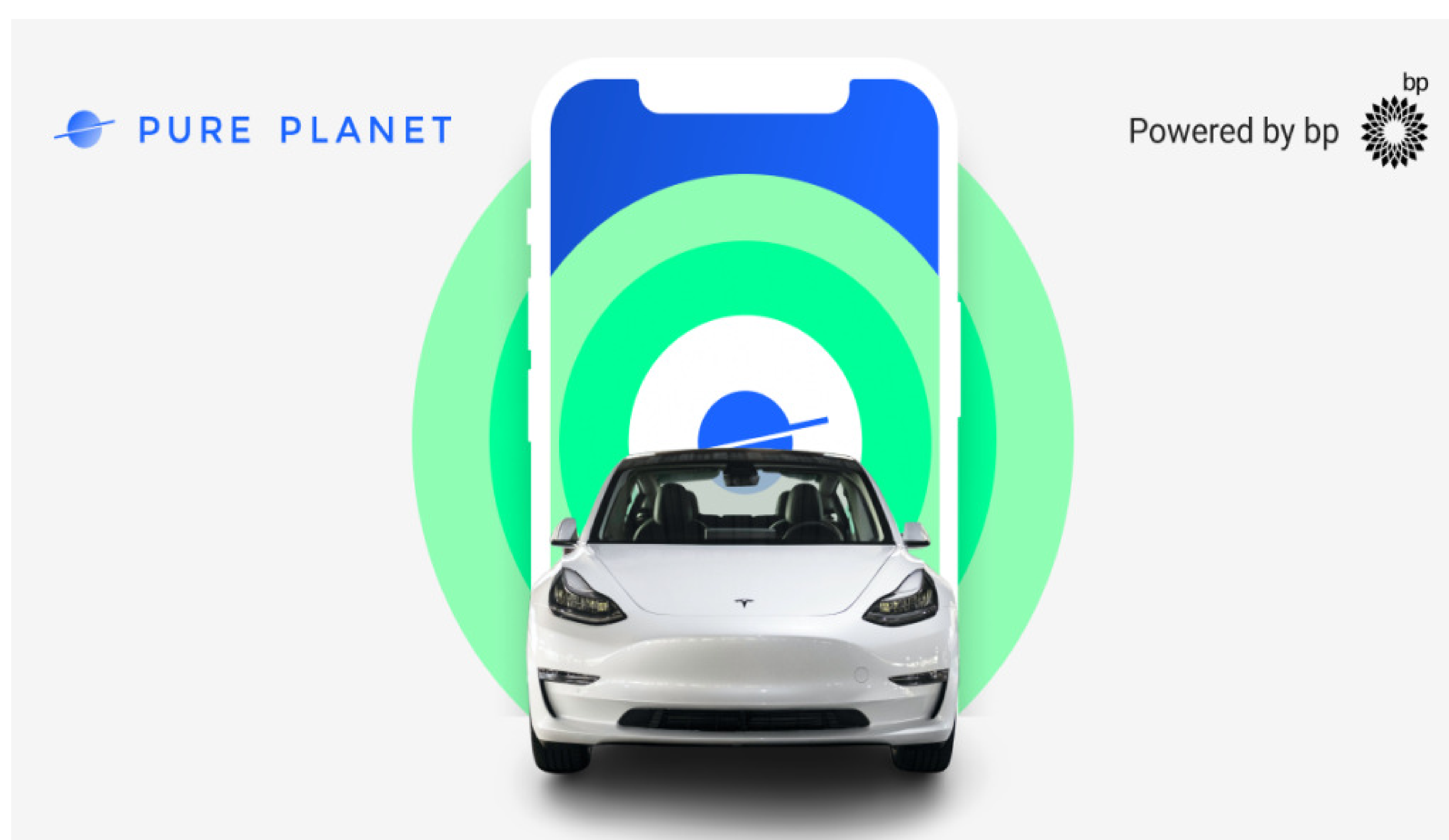
The low-carbon technology platform is intended to help people simply and more efficiently manage all of their varied energy usage – at home and on the road. The digital services will be available to every Pure Planet Member and will be embedded into their app and online energy accounts.

Initial bp-powered features for Pure Planet Members include:

- Personalised insights into energy consumption at home and on the move
- An estimate of how many CO2 emissions members are saving with

Pure Planet

- EV drivers will see real-time data on their energy usage, car battery status and cost per mile
- Ability to link any car (petrol & diesel) to the app to see and estimate of how much CO2 it emits and compare it with an electric vehicle
- Recommendations for other sustainable solutions to help them save even more, such as smart thermostats and EV home charging points



Industry, business and individuals all have a part to play in achieving a net zero future. Equipping energy users with knowledge and understanding can help them better manage their energy and make more sustainable choices. We are delighted to partner with Pure Planet to develop this smart tech which can help inform smarter energy decisions.

Felipe Arbelaez, bp senior vice president for Zero Carbon Energy Pure Planet co-founder and CEO, Andrew Ralston said:

“Future energy services are more dynamic, personal and digital. And they must be low carbon. This new service helps people manage their energy better by giving them all the information they need to reduce their emissions.

“By deepening our relationship with bp, we’re creating Pure Planet 2.0. We’re building on our low carbon and green contribution to society by

offering exciting new tech services and low carbon insights and are looking forward to sharing these with a wider audience.”

bp’s senior vice president for Zero Carbon Energy, Felipe Arbelaez said: “Industry, business and individuals all have a part to play in achieving a net zero future. Equipping energy users with knowledge and understanding can help them better manage their energy and make more sustainable choices. We are delighted to partner with Pure Planet to develop this smart tech which can help inform smarter energy decisions.”

The move unites the award-winning digital renewables retail expertise of Pure Planet with the e-mobility focus and scale of bp. Pure Planet, which launched in 2017, is Britain's first energy supplier to offer both 100% renewable electricity and 100% carbon offset gas as standard across all tariffs.

Pure Planet, recently named as a Which? recommended energy provider for the second year running, is also one of the Sunday Times’ Top 100 Small Companies to work for and the only independent energy supplier to be a signatory to the UN’s Global Compact, supporting the Sustainable Development Goals.

bp is a shareholder in Pure Planet. This exclusive UK partnership builds on the existing relationship between the two companies.



Endress+Hauser development team receives AMA Innovation Award

QWX43 multisensor system provides continuous and easy monitoring of fermentation

This year's AMA Innovation Award goes to a team of developers at Endress+Hauser. The QWX43, designed for breweries, impressed the experts at AMA Association for Sensors and Measurement with its compact design, high measuring accuracy and easy application as well as uncomplicated installation, commissioning and maintenance. The award was presented during the opening ceremony of Sensor and Measurement Science International (SMSI) in Nuremberg, Germany on 3 May 2021.

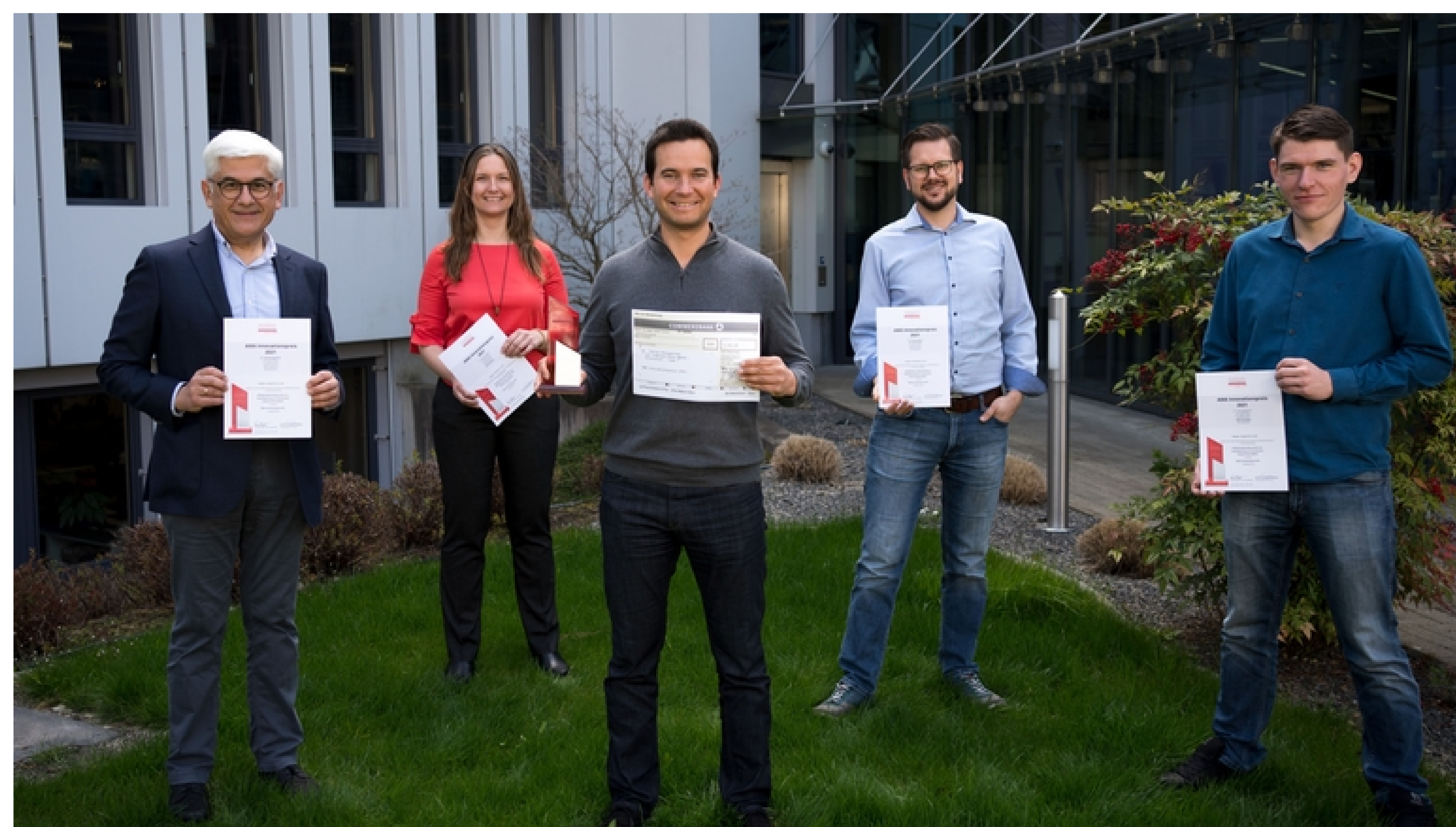
Brewing beer requires continuous monitoring of many parameters. Manual samples can now be eliminated thanks to a

sensor for fermentation monitoring by Endress+Hauser called QWX43 that features highly accurate inline-measuring of relevant parameters like density, viscosity, fermentation grade, residual extract, original extract or alcohol content around the clock.

Brewers can retrieve measured values at any time using either mobile devices or a computer with internet access. Notifications can be configured in addition immediately notifying users in case of critical deviations during fermentation. "When developing the sensor our first thought was to support our brewers in the best possible way," says Julia Rosenheim, product manager at Endress+Hauser Level+Pressure. "And we

are pleased that we found a convincing answer, which is this compact and easy to operate multisensor system." From the first prototype to the finished instrument in its compact design, the development took two years. Currently, the QWX43 is in use at pilot customers. The serial product will be launched in fall 2021.

To independently and precisely measure several parameters, the QWX43 was designed as a multisensor system that simultaneously measures four physical values, including density, viscosity, acoustic velocity and temperature. It can easily be fit to different fermentation tank systems without adjustment or calibration. The hygienic sensor design allows for quite simple cleaning.



SoftBank-backed Coupang starts hiring for top positions in Singapore



South Korea's Coupang is hiring for several positions based in Singapore, signaling its push into the city-state's ecommerce scene, which is largely led by regional players.

According to its LinkedIn page, Coupang is looking to fill at least seven lead positions in Singapore, including heads for operations, retail, and logistics.

The SoftBank-backed online retailer is also searching for a senior front-end engineer for its video-streaming service Coupang Play.

The Korea Economic Daily recently reported that Coupang is fronting its global expansion with its entry in Singapore. Citing banking and ecommerce sources, the report said

Coupang has been recruiting hundreds of employees in country, including those for logistics, marketing, sales, and payment positions.

The development comes months after Coupang bought the software assets of Hooq, a Singtel-backed video-on-demand service that filed for liquidation in March 2020.

With its potential entry in Singapore, Coupang is primed to go up against Sea's Shopee, Alibaba's Lazada, and US giant Amazon.

According to Sea's latest earnings report, Shopee registered over 430 million orders in the fourth quarter of last year. Meanwhile, a March 2020 report stated that Lazada remained dominant in Singapore, as well as the Philippines, Thailand, and Malaysia.



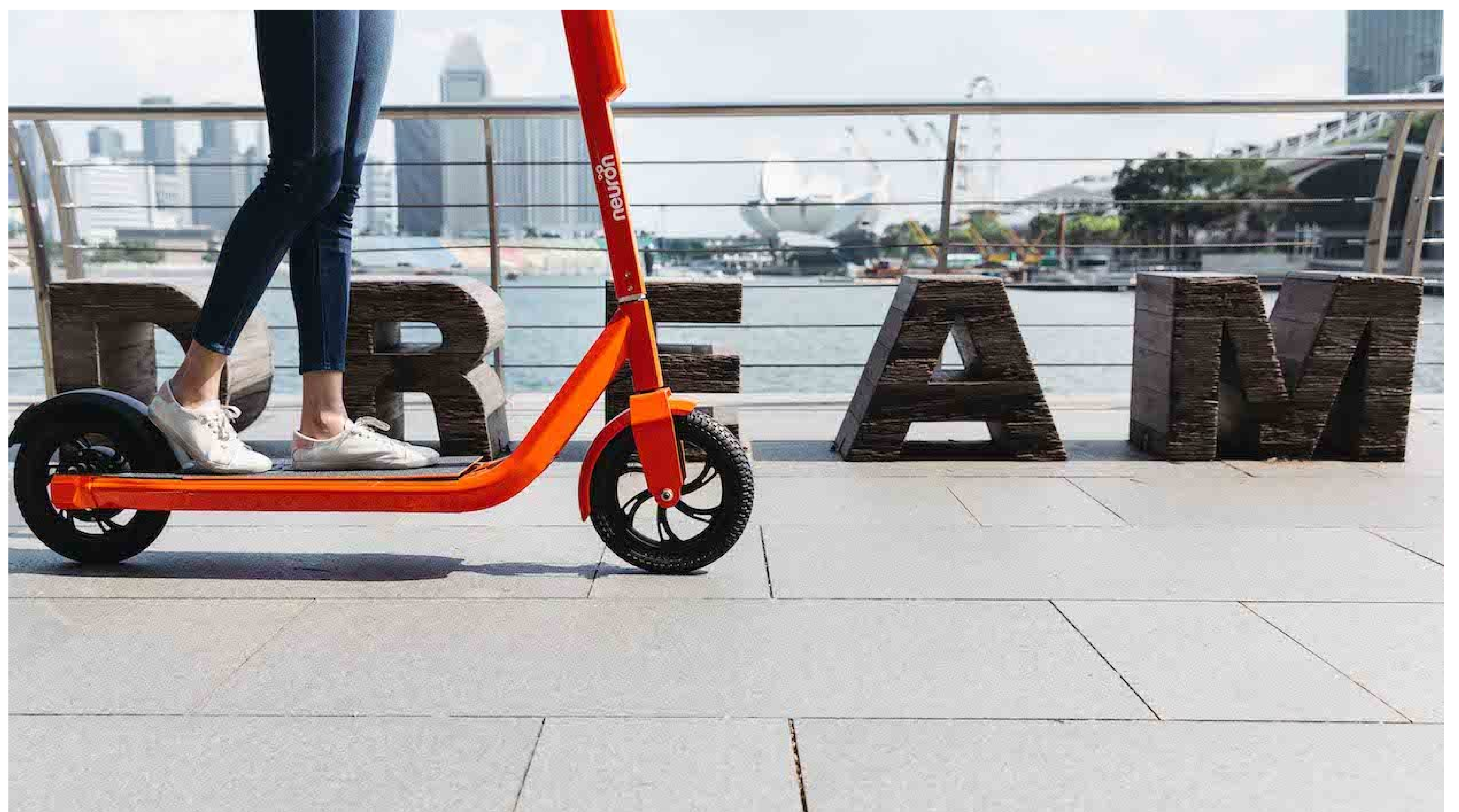
Singapore's Neuron Mobility to launch e-scooter fleet in South Korea



Singapore-based e-scooter startup Neuron Mobility announced its broader international expansion plans to launch a fleet of its EVs in South Korea starting March 5.

Neuron's launch in the country's capital of Seoul comes after the local government's recent introduction of tighter rules which outline how e-scooters should be ridden and operated. With this, the company said it will be launching its "Korean-spec" e-scooter in the country, which will be fitted with an app-controlled helmet lock.

The company is set to deploy 2,000 of its tailor-made e-scooters initially for testing and refinements before scaling "significantly" later this year. The launch will create over 100 jobs in Korea and lead to an additional 30 roles in the firm's



Singapore headquarters.

"Now that new regulations are being introduced, as well as an increased focus on safety, we think it's the perfect time to bring our safely leading e-scooters and collaborative ways of working to the city," said Neuron Mobility CEO, Zachary Wang.

The move builds on the smart mobility firm's international expansion drive, which includes its entry into three cities in Australia and New Zealand as well as three cities in the UK.

In September last year, Neuron bagged US\$12 million in its series A+ funding round led by Australian tech-focused VC firm Square Peg, along with GSR Ventures. The company said at the time that it planned to use the capital raised to accelerate its international expansion efforts.

Other e-scooter startups in Singapore include Sequoia-backed Beam and Quest Ventures-backed Telepod.service Coupang Play.

Japan kicks off full-fledged talks on safety standards for flying cars



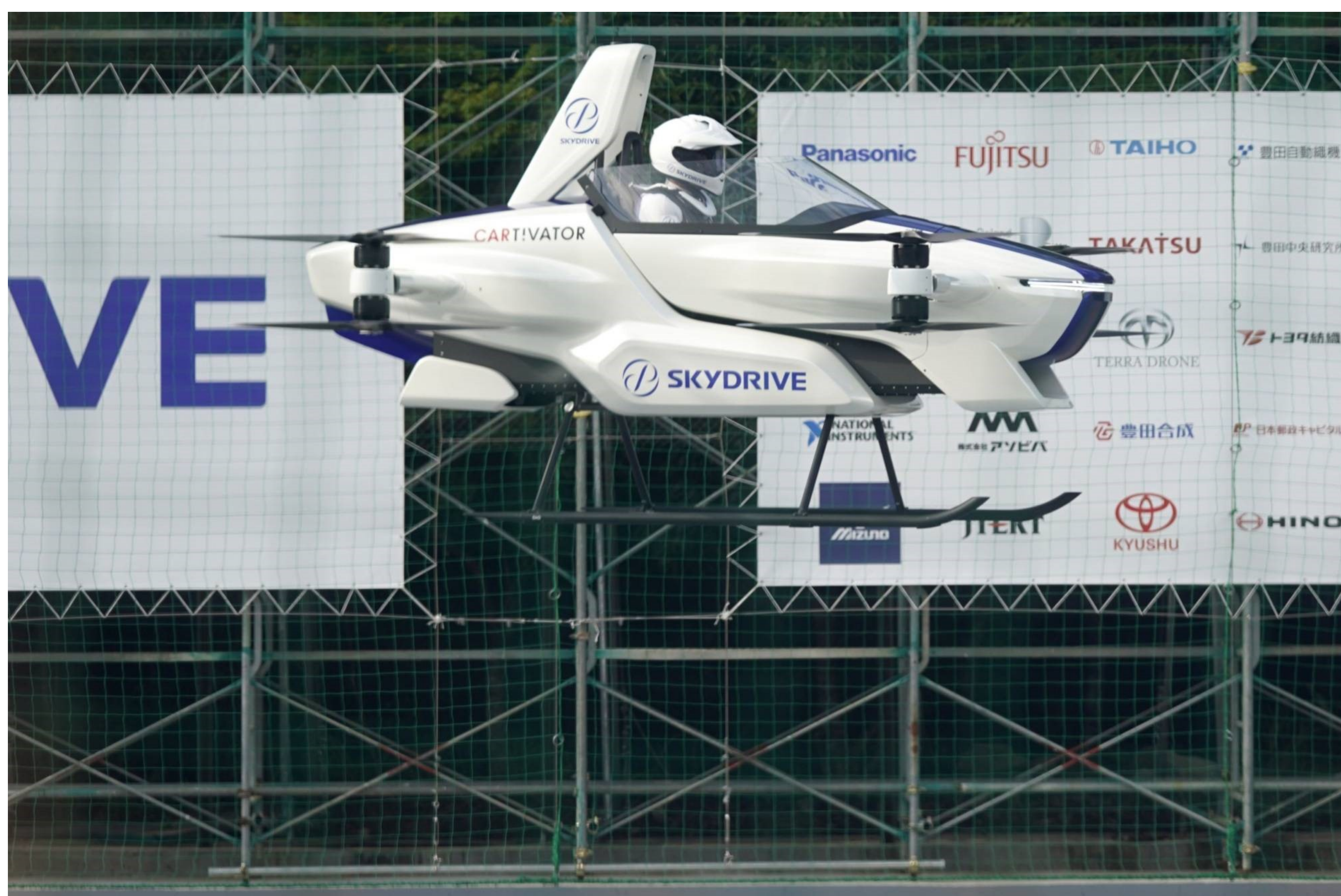
The transport ministry has started full-scale discussions on safety standards and other key issues related to putting flying cars into practical use. In April this year, the ministry set up a dedicated department that will draw up guidelines as early as this autumn on procedures needed for companies to conduct test flights of vehicles currently under development. The ministry plans to establish standards on required performances and safety, as well as a licensing system, by the end of 2023. Such flying cars use propellers and other devices to rise and move in the air.

The ministry hopes to establish related technologies and systems in 2023 and for such

vehicles to start flying in safe areas where there are no people around. After gradually introducing such vehicles to transport goods, save lives at times of disaster and as a method of transportation in underpopulated areas and remote islands, the ministry plans to start flying car operations in urban areas in the 2030s. The ministry ultimately aims to introduce vehicles that are cheaper than helicopters, easy to maneuver and fit for daily use.

In December 2018, Japanese startup SkyDrive Inc. conducted a test flight of a pilotless vehicle controlled remotely. The Tokyo-based company successfully conducted a manned test flight in August last year.

More tests are expected to be conducted for vehicles developed by Japanese companies, as well as for those imported from overseas.



In December 2018, Japanese startup SkyDrive Inc. conducted a test flight of a pilotless vehicle controlled remotely. The Tokyo-based company successfully conducted a manned test flight in August last year.

More tests are expected to be conducted for vehicles developed by Japanese companies, as well as for those imported from overseas.

For tests conducted outdoors, companies need to obtain approval from the transport minister under the civil aeronautics act, as is the case with tests of aircraft.

The firms must also submit documents including blueprints of the flying car prototype, licenses including those to fly helicopters and a plan of measures to mitigate accident risks.

With many within the industry asking that Japan adopts simplified procedures, the ministry plans to create guidelines that are easy for companies conducting tests for the first time to understand. The ministry's new department will act as a point of contact for such firms,

allowing them to complete one-stop procedures. The ministry will hold discussions on the performance of such vehicles, including vehicle stability, weight and flying range, and on safety standards such as collision avoidance systems. It will also debate whether to create a dedicated license for flying car pilots.

Outside of Japan, the United States, Europe and China have already launched flying car development.

The value of the global market for flying cars is seen reaching some ¥150 trillion by 2040.

INCREASE ENGAGEMENT ON YOUR
**VIRTUAL AND NONE
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1

**ELECTRONICS IN THE
CONTROL CABINET**



2

INTERFACES



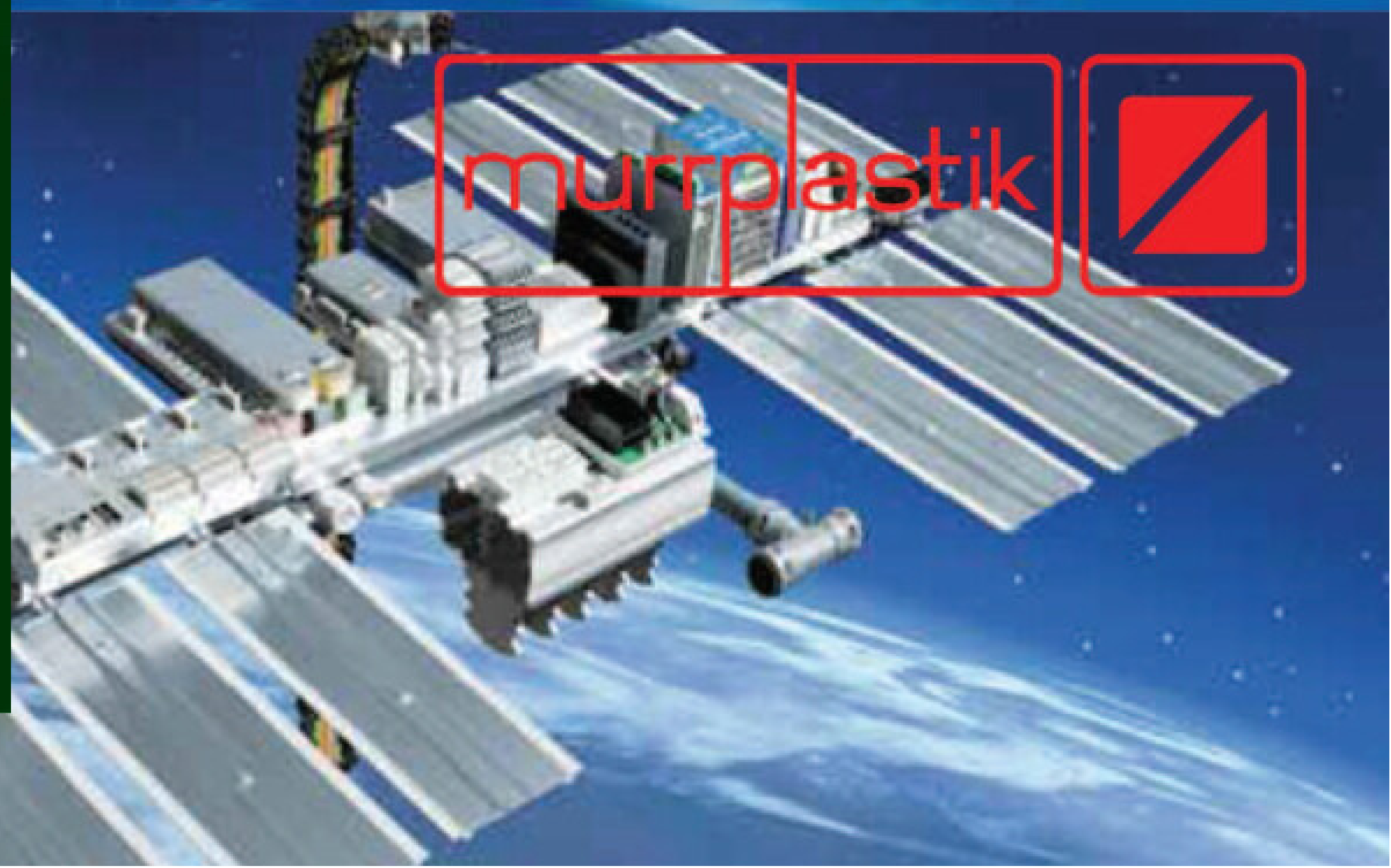
3

**CONNECTION
TECHNOLOGY**



4

I/O SYSTEMS





Abu Dhabi and Singapore expand bilateral cooperation with the launch of a smart city innovation call



Enterprise Singapore (ESG), Abu Dhabi Investment Office (ADIO) and IPI Singapore, a subsidiary of ESG, have launched an innovation call for solutions focused on advancing the smart city agenda. The innovation call aims to expand the economic cooperation between the two markets, by increasing collaboration, connecting innovation ecosystems and promoting the exchange of knowledge and expertise between both sides. A total of six challenge statements have been shortlisted. This offers Singapore companies the opportunity to pitch, develop and test-bed their solutions with Abu Dhabi entities. The innovation call provides a platform for companies to co-innovate and develop targeted solutions that may

be considered for city-wide implementation in Abu Dhabi. ADIO has worked closely with Abu Dhabi entities Abu Dhabi National Oil Company (ADNOC), the Department of Municipalities and Transport (DMT) and Masdar to identify the six smart city challenge statements and commit to a pilot with the winning solution providers. Eligible companies will be able to receive funding support from Enterprise Singapore. Mr Tan Soon Kim, Assistant Chief Executive Officer of ESG said, "The smart city joint innovation call will deepen collaboration between Abu Dhabi and Singapore. Singapore companies with the capabilities and experience in smart solutions would be able to partner established entities

in Abu Dhabi to co-create and pilot tech-enabled solutions for a range of urban challenges, including energy and water sustainability, transport efficiency and dense communities. As partners, we can work together to drive social transformation and enhance the lives of our citizens." Mr Wong Lup Wai, Chief Executive Officer of IPI said, "We are glad to be part of this joint innovation call, together with participants of Singapore's innovation ecosystem Page 2 of 4 network such as the local trade associations. . IPI is committed and looks forward to presenting solutions that could create more liveable and sustainable urban areas for the region." H.E. Dr. Tariq Bin Hendi, Director General of ADIO, the Abu Dhabi government hub

GREAT OPPORTUNITIES

supporting private sector investment in the Emirate of Abu Dhabi, said, “Abu Dhabi is committed to continuing the already strong economic cooperation with Singapore and to advancing innovation for long-term, sustainable growth. The innovation call with Enterprise Singapore strengthens existing partnerships and bridges new collaboration opportunities between Abu Dhabi and Singapore. We look forward to uncovering viable solutions that are not only locally relevant but also exportable worldwide. This will contribute to the development of knowledge economies as well as smart cities in our regions and beyond.”

The innovation call is open for submissions from now until 29 July 2021. Interested companies can find out more about the about the challenge during the virtual challenge briefing on 10 June 2021, or visit <https://adsjic.innovation-challenge.sg/>



INTO THE WILD - COMPETITION SERIES



Non Architecture just launched “Into the Wild”, a compilation of design competitions aiming to approach the element of nature in different perspectives. Three unconventional design competitions to discover new synergies between natural ecosystems and humans.





Competition One: Remote Work Cabin – One axonometric competition

In this competition, we ask you to bring people back to nature, by designing an ideal workplace in a natural environment. Only one image to design a pavilion for remote work. The extent of the program and all the accessory functions are up to the participants. Designers can decide spatial organization and size, as long as it doesn't exceed the given parameters. There is only one fixed parameter: the relationship between people and nature must be reinterpreted through design in a creative way.

Competition Two: Re-Nature Rome – Park 2.0

Located in the center of Italy, Rome has evolved throughout history into a unique landmark, earning the title of “Eternal City”. The city is not only rich in heritage, but also in natural areas, parks, and gardens.

In this competition, participants are asked to

Deliverables: One image (axonometric projection)

Timeline:

Registration Period: 01 May - 22 June 2021

Submission Deadline: 22 June 2021

Winners Announcement: 12 – 16 July 2021

Registration Fee:

1 – 14 May – Special registration period (40 €).

15 – 31 May– Early registration period (55 €).

1 – 14 June – Regular registration period (70 €).

15 – 22 June – Last Minute registration period (100 €).



imagine a new urban model to promote biodiversity in the metropolitan area of the Italian capital. Submissions can be ideas for new green infrastructure, parks, green buildings, or any kind of strategy that would boost biodiversity while enhancing the urban experience of the historical city.

When empowering biodiversity, how can we turn a city famous for its past, into a model for tomorrow?

Deliverables: two images (presentation image + concept image)



Timeline:

Registration Period: 01 May - 15 July 2021

Submission Deadline: 15 July 2021

Winners Announcement: 09 - 13 August 2021

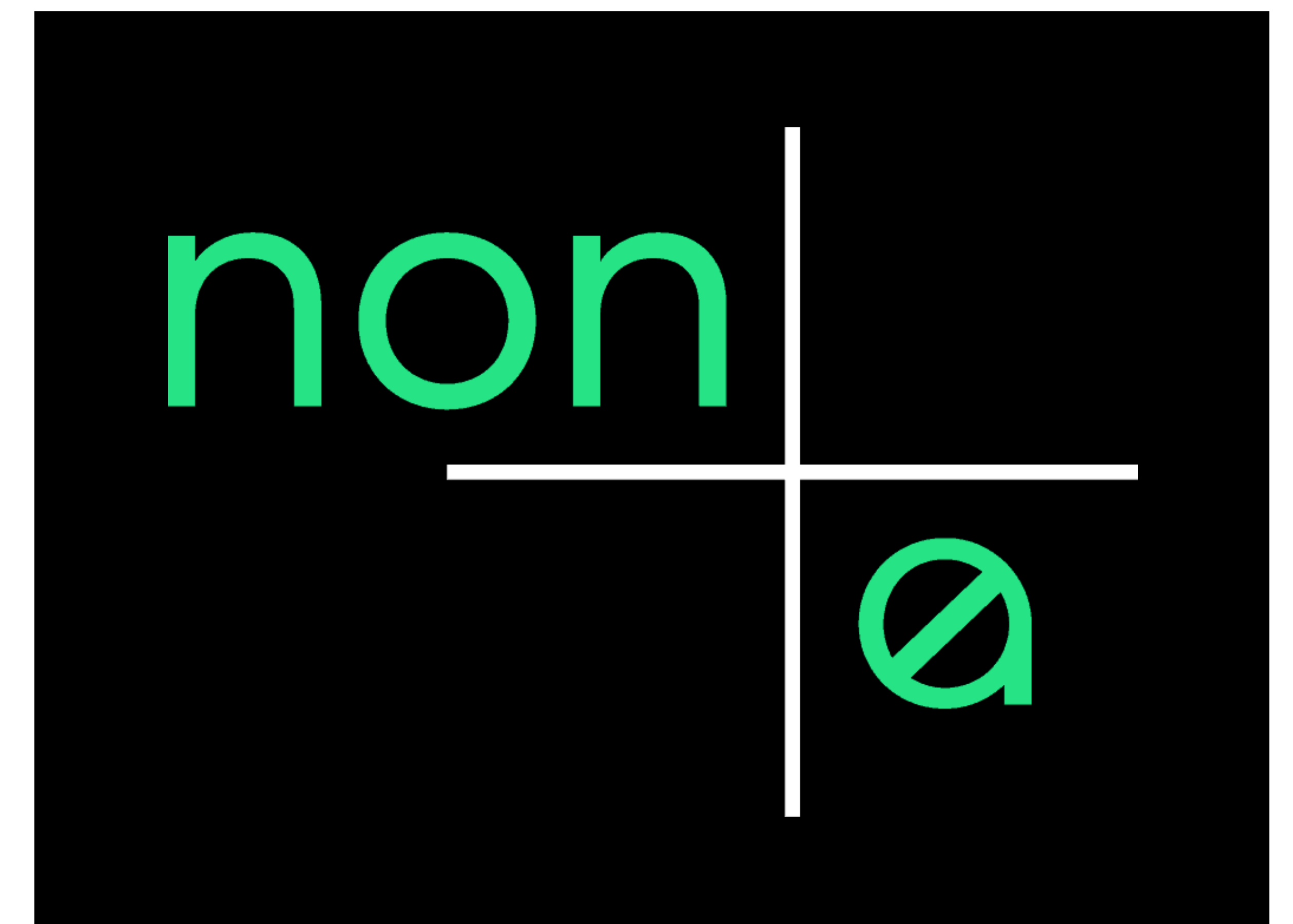
Registration Fee:

1 – 14 May 2021 -Special registration period (40 €).

15 May– 14 June– Early registration period (55 €).

15 – 30 June – Regular registration period (70 €).

1 – 15 July – Late registration period (85 €).



Competition Three:

Manhattan Wildscraper –
Your mark in NY skyline

As the world becomes more urbanized, this competitions' purpose is to emphasize the importance of providing a synergy between architecture and biodiversity. By imagining a world where nature and people coexist as much as possible, it is up to the participant to come to a very high degree of interaction between these two entities within the boundaries of a building.

The site for this competition is framed within mid-town Manhattan, home to some of the most iconic skyscrapers in the world.

Deliverables: three images (section + floorplan + presentation image)

Timeline:

Registration Period: 01 May - 15 August 2021

Submission Deadline: 15 August 2021

Winners Announcement: 06 – 10 September 2021

Registration Fee:

1 – 14 May 2021 -Special registration period (40 €).

15 May – 14 June – Early registration period (55 €).

15 – 30 June – Regular registration period (70 €).

1 – 15 July – Late registration period (85 €).

16 – 31 July – Final registration period (100 €).

1 – 15 August – Last Minute registration period (115 €).

Non Architecture will offer bundles discount for the competition series: get a 50% discount on the second competition OR get the third competition for free.

Prices are per team. Each team can be formed by up to 4 people.

Title: INTO THE WILD - COMPETITION SERIES

Type: Competition Announcement (Ideas)

Website: https://www.nonarchitecture.eu/into-the-wild/?utm_source=AD&utm_medium=Post&utm_campaign=AD_ITV

Organizers: Non-Architecture

Registration Deadline: August 15, 2021 03:26 PM

Submission Deadline: August 15, 2021 03:25 PM

Price: Starting for 40 €



INTRODUCTION



Point In Architecture

Point in architecture is an architecture competition organized by archiol in association with artuminate. Primary elements in architecture are the basics of architecture design. This competition aims at exploring point as an architectural element through the 'PERPECTIVES' in architecture.

Limited entries | Registration will close at the 200th participant.

SYNOPSIS

Submission requirements:
One image highlighting the Point (element) in architecture.
A description of not more than 300 words.

AWARDS



- Certificate of Achievement
- Exclusive Interview (Text & Video format)
- Publication (On Archiol Website + Archiol's EZine + Archiol's Yearbook)
- Publication on international architecture websites partnered with us
- (Global level Exposure)



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- Publication on international architecture websites partnered with us
- (Global level Exposure)

Winning Categories:
Top 3

Honourable Mentions:
Top 20



Certificates:

Certificate of Achievement will be awarded to acknowledge the excellent performance of all Winners, Honourable Mentions, and Top 20 entries.

Exclusive Interview:

The Top 3 Winners will get an exclusive interview in both – written and video formats. Photos, interviews, and more information about the winners will be published on our website.

Publication:

The Winners and Honorable Mentions and the top 20 will be published on the Archiol's website and other international architecture websites partnered with us. The best entries will be featured in Archiol's Ezine and Archiol's Yearbook.

All the participants will receive e-certificates.

ELIGIBILITY

- *Competition is open to all human beings, from every age and cultural background, working in groups or individually.*
- *Architects, Interior Designer and design students are perfectly suited for this competition.*

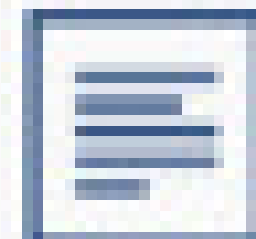
SUBMISSION DETAILS

- A zip folder with the image (jpeg./ jpg.)
- A docx. File with description.
- Please use the participation code as the name of the submission zip folder.
- Submissions to be mailed at submit@archiol.com
- Subject: Point_in_architecture – Participation Code
- Body : Link to the submission (Google drive / dropbox) / attachment.

Timeline



Registration
Deadline
20th July 2021



Submission
Deadline
21st July 2021



Result
Announcement
30th August 2021

REGISTRATION DETAILS

After completing the registration, you will receive a confirmation e-mail. Registration confirmation will be mailed to you within 24 hours. Please feel free to contact us for any queries.

FEES

Standard Registration fees:
International Registrants: \$10
Indian Registrants: ₹500



Intelligent JiaYuan Of Future

2021 WUPENiCITY

International Competition on Student Course Works of Urban Design

The theme of 2021 WUPENiCITY International Competition on Students Course Works of Urban Design is "Intelligent JiaYuan of Future", which requires contestants to analyze the connotation of the theme from a unique and novel perspective to carry out urban design with comprehensive and systematic professional quality.

Intelligent JiaYuan of Future

"JiaYuan" is the most basic and essential unit of urban social space for Chinese, and there is challenging but eternal efforts to coordinate human and nature, encourage the sharing among people, and the coexist the material and the spirit through resources reallocation in

WUPEN
WORLD URBAN PLANNING
EDUCATION NETWORK



the form of community planning to reach a better life.

"Intelligent" is the new trend on advent of technology revolution, which is also a term with complexity including smart living, smart transportation, smart education, smart medical care, smart scientific research, smart services, etc. It is of significant importance to truly realize the Intelligent JiaYuan(Community), solve the most caring problem for the people, and add up social value , which are critical for the transformation of the thinking modes and practical abilities of the planners and designers.

The Jury



Member of Chinese Academy of Engineering
The chairman of the National Steering Sub-Committee
of Urban and Rural Planning Education in China
The convener of the Academic Degree Evaluation
Committee of the State Council in the Discipline of
Urban and Rural Planning
Vice president of China Association of City Planning



Evaluation & Awards

The evaluation would combine the results of 3 rounds of Jury reviews and online voting; Winning works are awarded:

50 Gold Awards

150 Nomination Awards

20 Popularity Awards

Competition Timetable

Mar.29 2021 --Registration and Submission Opens

Jul.12 2021 (12 : 00PM Beijing time) -- Submission Closes

Early Sep.2021 --Finalist of Gold Awards and Nomination Awards

Late Sep.2021 --Popularity Award Voting opens

Dec.2021 --Finalist of Popularity Awards

REMOTE WORK CABIN : 1 DRAWING COMPETITION

SUMMARY

Our world is changing fast, while ambitions and challenges match in importance. In this context, design can play a huge role. How do we imagine the world to be? What range of possibilities we haven't discovered yet? What's a Non-Architecture for a World in crisis? In 2020 we started the second phase of competitions to address the issues of tomorrow.

WWW.INDUSTRIALGUIDEASIA.COM

In line with our style we propose 9+1 themes – ten critical topics to work on, but this time they come with a framework to make sure that each theme is explored from different design angles. Rather than a program, a research ecosystem composed of various competitions running in parallel and exploring the same theme from different perspectives.

Our exploration journey will continue with theme three: INTO THE WILD.

BRIEF IN SHORT

The “Remote Work Cabin” is a design competition developed to explore the creative potential of architectural design through one of the most iconic architectural drawings: the axonometric projection.

The aim of the “Remote Work Cabin” competition is to develop one drawing to communicate an architectural design. Participants are asked to create a design concept around the theme of nature and remote work. This time we challenge our designers to bring people back to nature, by designing a cabin as their ideal workplace in a natural environment. Designers are free to explore in a critical way the different interpretations of such topics, from practical approaches to more dystopian/utopian scenarios. No specific site is given.

This is a competition where you develop your skills as a communicator, designer, and space thinker.

We are not interested in the construction details, we want to see the space organization. The drawing can highlight functional aspects of the building, showing

GREAT OPPORTUNITIES

- a deep understanding of one or more design aspects. It can focus on the aesthetic qualities, showing space configuration and specific project characteristics, or it can only display structural elements and overall massing. The elements shown in the entry are flexible and adaptable to the participants' interpretation. The entry is completely flexible and adaptable to the participant's perception.

• ELIGIBILITY

- Non Architecture Competitions are open to all human beings, from every age and cultural background, working in groups or individually. The registration fee is paid per team, regardless of how many members form it. Personal information of all the team members can be uploaded during the submission procedure of the final drawing.

WHY PARTICIPATE

- Gain experience and recognition, request a participation certificate, and post it on your LinkedIn or CV!
- Design a new puzzle piece to be added to your Portfolio or Behance page, keep developing your assets!
- Give space to your creativity by solving a given challenge, it

is satisfying!

- Get to know better your team or your own design-thinking skills, it is fun!

PRIZES

WINNERS (1 Prize)

- 1.000 euros.
- Publication in the Non Architecture Competitions book and website.
- Reviews in digital magazines and several architecture blogs.

HONORABLE MENTIONS (7 Prizes)

- Publication in the Non Architecture Competitions book and website.
- Reviews in digital magazines and several architecture blogs.

EDITORIAL PICK (Up to 6 Prizes)

- Publication in the Non Architecture Competitions book and website.

FINALISTS (Up to 36 Prizes)

- Publication in the Non Architecture Competitions Journal.

SPECIAL PRIZE

- The organization might establish additional special prizes and awards during the competition development and in the evaluation phase.

Note: The appearance on the involved architectural platforms are subject to the agenda and availability of the external platforms involved.





JURY & CALENDAR

The jury will be composed by a pool of platforms and experts specialized in the theme addressed by the competition. They will act as partners in the competition and final jurors of your work.

Daniela Sánchez – Architect and Founder of Archez International

Hector Leon – Go Architecture

Juan Sebastian Obonaga & Leon Barona– Founders of Creative Mood magazine

Steven Rubio – Founder of Show it Better

Gaël Glaudel – Co-Director, Editor and Social Media Manager of Landscape First

Federica Sofia Zambeletti– Founder of Koozarch All of Archi

Entre Estilos Arquitectura

Urbandesign.lab

Architecture on Paper

1 May 2021 – Competition launch

1 – 14 May – Special registration period (40 €).

15 – 31 May – Early registration period (55 €).

1 – 14 June – Regular registration period (70 €).

15 – 22 June – Last Minute registration period (100 € – not available in a bundle).

15 June – Submission opens on our website

22 June, 11:59 PM – Submission closes.

15 – 16 July – Winner announcement.

The timing always refers to Central European Time (CET)

To avoid confusion, please check the countdown on the competition page.

Registration Bundles:

x2 Competitions: Second competition with 50% discount

x3 Competitions: Third competition for free

CONSTRUCTION STARTUP COMPETITION 2021 OPENS CALL FOR ENTREPRENEURS BUILDING THE NEW LEGENDS IN CONSTRUCTION



- CEMEX Ventures, Ferrovial, Hilti, VINCI Group's Leonard and NOVA by Saint-Gobain renew their alliance and are joined by GS Group, Korean business conglomerate focused on energy, retail and construction, and Haskell, leading American firm offering architecture, engineering, and construction solutions, in the search for the most promising startups.
- Carbon footprint mitigation, supply chain management, efficient job site, and built environment, advanced building materials, and new construction methods are the five categories of the 2021 competition.
- Construction Startup Competition, the biggest startup challenge in the industry, will accept applications for their fifth edition until June 27, 2021.

GREAT OPPORTUNITIES



CEMEX Ventures, open innovation unit and corporate venture capital of CEMEX, launches Construction Startup Competition 2021 and renews its alliance with Ferrovial, Hilti, VINCI Group's Leonard and NOVA by Saint-Gobain. Following the success of what has become the industry's most promising startup competition, GS Group, a leading Korean business conglomerate working in energy, construction and retail through its venture capital arm GS Futures, and Haskell, a leading fully integrated, single source design-build American firm delivering solutions for the architecture, engineering and construction sector globally through their venture arm Dysruptek, join the challenge in the search for the best solutions for the built sector. The application phase of the competition will remain open until June 27, 2021.

Multiple startups from the previous edition are already in the talks or piloting their solutions with CEMEX Ventures, Ferrovial, Hilti, VINCI Group's Leonard and NOVA by Saint-Gobain. This is one of the main reasons for the incorporation of GS Group and Haskell in the fifth edition of the competition.

"To participate in Construction Startup Competition 2021 means to knock directly on the doors of seven global leading companies in construction. Once again, this year we managed to reunite entities with great knowledge of the industry, not just in the areas of materials, machinery, infrastructure, and processes. These seven leaders cover the whole construction value chain and understand what the opportunity areas in the entire construction ecosystem are to find the best solutions and solve the main challenges of the industry" expressed Gonzalo Galindo, Head of CEMEX Ventures.

Under the slogan "Build your own legend", the seven companies that have been leading the evolution of construction since the last century, invite startups to participate through CEMEX Ventures website:

www.cemexventures.com/constructionstartup

They have identified five categories where startups can subscribe themselves to: carbon footprint mitigation, supply chain management, efficient jobsite and built environment, advanced building materials, and new construction methods.

The application phase closes on June 27, 2021. After a careful analysis from the seven organizing companies, the winners will be announced during the third trimester of 2021. By the end of the year, they will join the directors of the companies in a Pitchday event, along with other companies focused on construction, innovation, investment, and technology.

GREAT OPPORTUNITIES

This event will serve as the scenery for the entrepreneurs to present their solutions, begin conversation with investors and expand the projection of their businesses. Construction Startup Competition 2021 was launched during the final event of the previous edition of this challenge, where the startup Modulous was crowned the winner. Modulous is a modular construction solution that offers a standardized kit of parts that allows the design and delivery of healthy, sustainable, and affordable homes through a distributed network of local assembly partners. Because of the pandemic and following the sanitary guidelines, the previous Pitchday had to be celebrated online. Therefore, Modulous will be invited to this year's event, holding a privileged position and enjoying the opportunity to showcase its solution to relevant stakeholders.



ABOUT CONSTRUCTION STARTUP COMPETITION

Since its first edition in 2017, over a thousand startups from more than 80 countries have participated in the biggest challenge aimed at startups in the construction industry, Construction Startup Competition. Plenty of them have gone on to collaborate with the participating companies after applying for the competition. Given the global outreach of its partners, the 2021 edition expects to see an increase in the number of applications, allowing to identify the most innovative solutions around the world, continue growing the Contech ecosystem and implementing the innovative plans for the sector.

ABOUT CEMEX VENTURES

Launched in 2017, CEMEX Ventures focuses on helping overcome the main challenges and capitalizing on the opportunity areas in the construction ecosystem through sustainable solutions. CEMEX Ventures has developed an open collaborative platform to lead the revolution of the construction industry, engaging startups, entrepreneurs, universities, and other stakeholders to tackle the challenges in the construction environment and shape the industry's future. For more information on CEMEX Ventures, please visit: www.cemexventures.com



A joint initiative by Nanning Municipal D&R commission, Cloudbae, *SCAPE and StartupX with the objective to select the most innovative smart city ideas.

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From energy efficiency solutions for smart buildings to solutions tailored for vulnerable groups within our society, our top teams proved their mettle with their ingenious and meaningful smart city solutions.



Advance Canvas Industries Pte Ltd

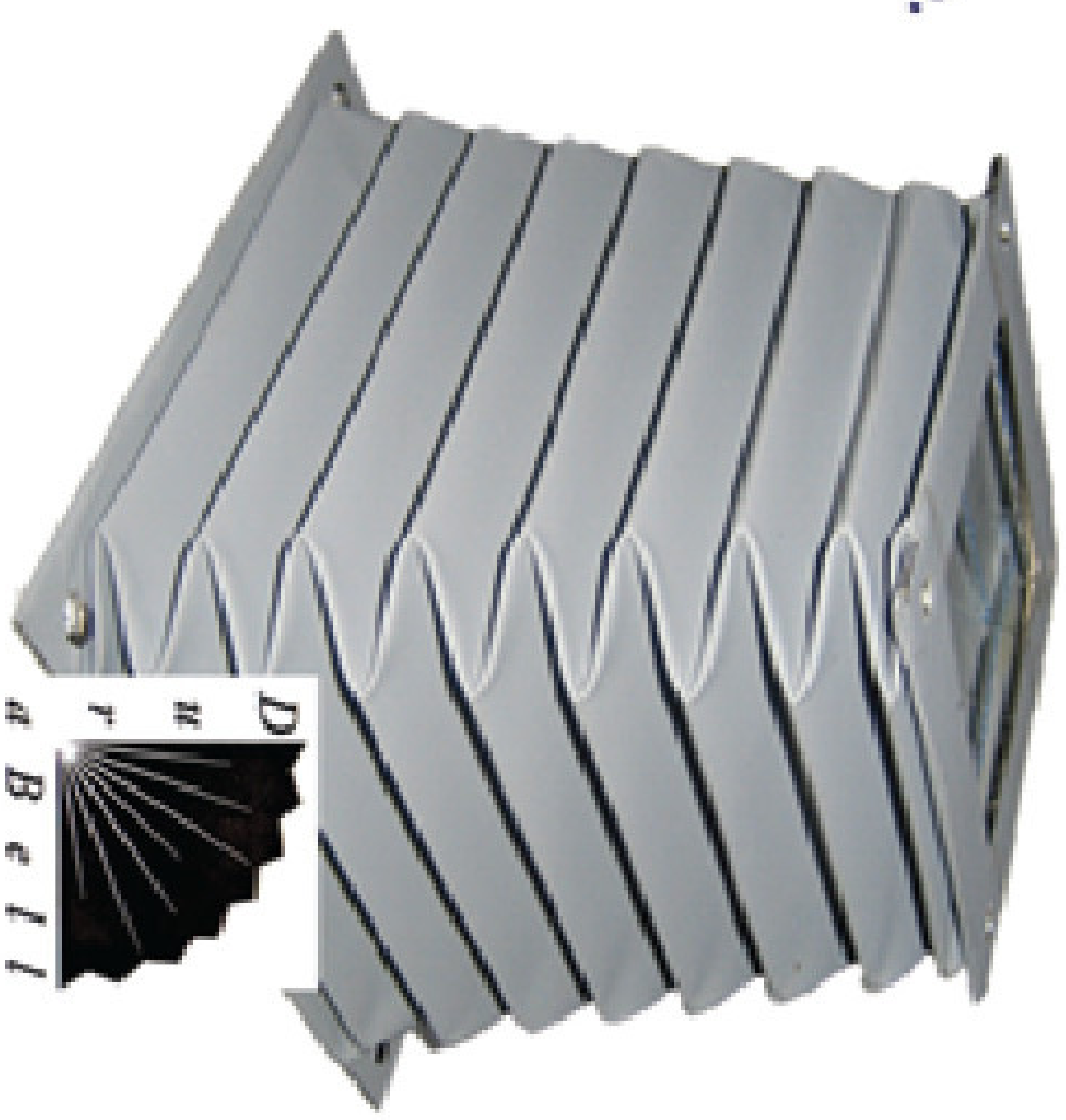
Fabric bellows provide maximum protection in rugged industrial environments and prevent foreign particles from entering the hydraulic or pneumatic systems of the precision equipment inside.

Special Advantages:

- Safety
- Flexibility
- Durability
- Dust-proof
- Heat and Cold Resistant
- Oil and Chemical Resistant
- Custom designed for your specific needs
- Completely manufactured in Singapore

Applications:

- Rods, shafts, screws and other cylindrical-shaped components.
- Industrial robots, automated machines, scissors lift table
- Linear guide machines
- Precision equipment and custom-built machines



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For tires with a better grip on mud and snow: Evonik launches highly dispersible low surface area silica



Source: Evonik

- **ULTRASIL® 4000 GR is the first low surface area silica with very good dispersibility**
- **Innovative product design enables very high filler levels and optimized rubber sheet appearance**
- **Improved traction in snowy, slushy, and wet conditions**

Evonik Industries has developed a new, active filler for the tire industry that significantly improves the traction of winter tires in snowy and slushy conditions, thereby increasing safety. ULTRASIL® 4000 GR is the first Low Surface Area (LSA) silica that also offers very good dispersibility. This enables very high filler levels in the tire tread, further improving traction compared to tires using conventional silica.

“Unique to ULTRASIL® 4000 GR is its product design that combines very good dispersibility and a low surface area, and this is what makes the high filler levels possible,” says Bernhard Schäfer, Senior Vice President Rubber Silica at Evonik. Despite its high filler quantity, this silica can easily be dispersed into the rubber compound. “Even after short mixing processes, it is possible to create compact rubber batches with good sheet appearance,” Schäfer explains. Not only in tire treads but also in sidewalls and non-tire applications such as mechanical rubber goods (MRG) or shoe soles, manufacturers benefit from the resource-saving processing and excellent product properties of the new member of the ULTRASIL® family.

“After all, its excellent dispersibility is a significant advantage in processing here, too, particularly when using high filler levels,” emphasizes Roland Krafczyk, Vice President Global Applied Technology Tire & Rubber.

Under the ULTRASIL® brand, Evonik offers a wide range of fillers all over the world, which have various properties and particle sizes and are tailored to different applications.

ULTRASIL® 4000 GR will initially be produced in a new precipitated silica line at the Adapazarı site in northern Turkey. The line started operations in fall 2019 with the goal of strengthening the company’s position as a global partner for the tire industry. The new

PRODUCT COMMUNIQUE

production line enabled Evonik to significantly expand its annual capacity for the manufacturing of silica and also created around 40 new jobs.

Silica is part of the Smart Materials division at Evonik and thereby constitutes one of the four strategic growth pillars at the company. These intelligent products increase the performance of many materials.

ABOUT SMART MATERIALS

The Smart Materials division includes businesses with innovative materials that enable resource-saving solutions and replace conventional materials. They are the smart answer to the major challenges of our time: environment, energy efficiency, urbanization, mobility and health. The Smart Materials division generated sales of €3.24 billion in 2020 with about 7,900 employees.



ESAB ANNOUNCES IMPROVED NEUTRAL OK FLUX 10.99 FOR INDUSTRIAL ENVIRONMENTS



ESAB has announced an improved OK Flux 10.99, an agglomerated neutral basic flux designed for submerged arc welding in heavy industrial environments like petrochemical plants, offshore construction, transport, LNG and LEG tanks, pressure vessel, and pulp and paper industries. The enhanced formula of the flux works, in combination with selected austenitic and nickel-based wires, performs equally well with either AC or DC+ current, and provides significantly improved slag release, increased productivity and better weld quality.

“The high basicity of OK Flux 10.99 provides superior impact and toughness,” says Paolo Torchiana, Global Product Manager, ESAB. Source: Esab “Its excellent weldability in 1G and 2G positions is very smooth with much easier detaching slag.”

PRODUCT COMMUNIQUE

The end result is a very clean bead shape and appearance with good wetting.”

As a neutral flux, it will not contribute any alloying elements to the weld metal. When combined with nickel-based products, such as ESAB’s OK Autrod NiCrMo-4, hot cracking is significantly decreased. Its low silicon content provides good mechanical properties and weld deposits especially impact toughness. OK Flux 10.99 achieves superior tie-in, toe angles and bead appearance on interior and exterior applications.

Welding with OK Flux 10.99 using an AC output increases productivity by up to 15 percent with the ability to use higher wire feed speeds. It provides moisture and corrosion resistance. In addition, its high weld quality reduces scrap and its increased slag release decreases clean-up time.

“We improved the performance of this flux so that its welds require less

cleaning and reduced repair work,” continues Torchiana. “There is no need to re-qualify welds and our customers are very pleased with the improvements. There is high operator appeal for this product.”

OK Flux 10.99 has a grain size of 0.2 to 2.0 mm and a basicity index of 2.1, making it ideal for pressure vessel, chemical and petrochemical plant applications and other industrial environments requiring multi-run welding and unlimited plate thicknesses. It combines well with many submerged arc wires, OK Autrod 308L, 309L, 316L, 316LMn and NiCrMo-4.

OK Flux 10.99 is available in 25 kg bags. For

increased moisture protection and decreased risk of packaging damage, 25 kg steel buckets are also available. There is no need to redry the flux prior to use onsite because the packaging protects the flux from any moisture absorption during transport and storage.



OK Flux 10.99 provides superior impact and toughness with selected austenitic and nickel-based wires for submerged arc welding in heavy industrial environments.



ADLINK Releases Industry-first Embedded MXM Graphics Modules on NVIDIA Turing™ Architecture

Embedded MXM graphics modules based on Turing architecture for edge AI

Summary:

- Embedded MXM graphics modules based on Turing architecture for edge AI
- ADLINK embedded MXM graphics modules empower edge computing and embedded AI, accelerating compute required of SWaP-constrained applications
- Embedded graphics modules comply with the Mobile PCI Express Module (MXM) standard

ADLINK Technology Inc. introduced the industry's first embedded MXM-based graphics modules based on NVIDIA's Turing architecture, to accelerate edge AI inference in SWaP-constrained applications. GPUs are

increasingly used to provide AI inferencing at the edge, where size, weight and power (SWaP) are key considerations. The embedded MXM graphics modules offer high-compute power required to transform data at the edge into actionable intelligence, and come in a standard format for systems integrators, ISVs and OEMs, increasing choice in both power and performance.

“The new embedded MXM graphics modules provide the perfect balance between size, weight and power for edge applications, where the demand for more processing power continues to increase,” said Zane Tsai, director of platform product center, ADLINK. “Leveraging NVIDIA's GPUs based on the Turing

architecture, our customers can now increase their edge processing performance with ruggedized modules that are fit for any environment, while remaining inside their SWaP envelope.”

ADLINK's embedded MXM graphics modules accelerate edge computing and edge AI in a myriad of compute-intensive applications, particularly in harsh or environmentally challenging applications such as those with limited or no ventilation, or corrosive environments. Examples include medical imaging, industrial automation, biometric access control, autonomous mobile robots, transportation and aerospace and defense. The need for high-performance, low-power GPU modules is increasingly critical as AI at the edge becomes more prevalent.

The ADLINK embedded MXM graphics modules:

- Provide acceleration with NVIDIA® CUDA®, Tensor and RT Cores
- Are one-fifth the size of full-height, full-length PCI Express graphics cards
- Offer more than three times the lifecycle of non-embedded graphics
- Consume as low as 50 watts of power

Olympus Launches Line of Airway Mobilescopes

All-in-one Design Allows Use by Anesthesiologists, Pulmonologists, and ICU Caregivers for a Range of Recordable, Sharable Airway Management Procedures.

Olympus announced the new FDA 510(k) clearance of its Airway Mobilescopes, the MAF-TM2, MAF-GM2, and MAF-DM2, enabling providers to perform a variety of upper and lower airway management procedures.

Anesthesiologists, pulmonologists and providers of critical care and intensive care will appreciate the anytime/anywhere benefits, the digital capture capability, and small footprint of the MAF models' all-in-one design.

"We are proud to present to the market the only flexible mobilescope models with a video camera on the tip," said

Lynn Ray, Vice President and General Manager of the Global Respiratory Business Unit for Olympus Corporation. "The lower procedure cost, excellent usability and maneuverability and an outstanding image quality, when compared to other mobilescopes, will mean more options and agility for providers in ensuring excellence in respiratory care."

Benefits of the Olympus Airway Mobilescopes include:

- Flexible, portable airway management: The MAF-DM2/GM2/TM2 gives the operator the versatility to perform a variety of airway management procedures, such as observation of the airway, normal, and difficult intubation methods. The high-resolution images, shown on the incorporated LCD monitor, are obtained without an additional

processor tower or external display and can be shared for remote consult.

- Versatility: Useful for a variety of airway management procedures, such as observation of the airway and to place and confirm standard and double-lumen endotracheal tubes during normal and difficult intubation. The working channel of the Airway Mobilescopes can be used during intubation to provide suction and continuous air supply by using optional channel adapters. The MAF-TM2 can be used for therapeutic procedures in the airway such as biopsy, aspiration, lavage, and transbronchial needle aspiration (TBNA) without having to connect video endoscopy equipment.
- Excellent Viewing with Large Monitor: The MAF-GM2/TM2 monitors are 1.0-inch wider than the previous models. The titling function of the LCD monitor enables

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clinicians to adjust the monitor angle during procedures.

- **Secure Digital (SD) Card Image Recording:** The built-in digital imaging unit enables recording of still and movie images onto the SD card. Clinicians can transfer digital images to another device for storage and management.
- **Training:** The all-in-one monitor is more suited to intubation and bronchoscopy training than traditional eyepiece design.
- **Compatible with Standard Reprocessing Methods:** The Olympus Airway Molescopes can be cleaned, disinfected and sterilized using the same options as flexible intubation and bronchoscopes.

FANUC's Popular Lr Mate ROBOT series NOW features 10 model variations



The Latest Addition to the Tabletop Robot Family has a 14kg Payload

FANUC America, the leading supplier of CNCs, robotics, and ROBOMACHINES has introduced the LR Mate 200iD/14L, the tenth model variation of the popular LR Mate series of tabletop industrial robots. Since the LR Mate series was launched nearly 30 years ago, it has become one of FANUC's biggest sellers, with over 70,000 units installed across the globe. The popularity of the LR Mate robot series is due to FANUC's world-renowned reliability along with a number of unique features including its lightweight, tabletop size, which is often compared to the size of a person's arm. In addition, the LR Mate can process or handle parts weighing up to 14kg in the automotive, e-commerce and warehousing, food and beverage, medical device, pharmaceutical, and many other industries.

Ten models include clean room and wash proof versions, each with various wrist speeds and reaches to accommodate even the most limited workspace.

"The LR Mate was introduced in 1992, and has been deployed in a variety of traditional manufacturing and service applications. Some of the most interesting things we've seen this robot do include serving coffee, fulfilling orders in retail stores, and even preparing fast foods," said Carolyn Chase, product manager, LR Mate robot series, FANUC America.

FANUC LR Mate 200iD Robots

The LR Mate 200iD robots offer a "best in class" work envelope for both upright and invert mount installations. The LR Mate 200iD robot series also offers an ISO Class 4 clean room/food-grade variant for food handling and healthcare packaging applications.

PRODUCT COMMUNIQUE

These small tabletop robots can be equipped with a variety of intelligent features including robot vision and force sensing functionality for even higher levels of accuracy and productivity.

LR Mate 200iD Features and Benefits

- Slim arm and compact footprint minimizes interference to peripheral devices in tight spaces.
- Available in three variations: standard, short, and long arm.
- 4kg to 14kg wrist load capacity with up to six-axis articulation.
- Best in class work envelope simplifies system layout.
- Fastest joint axes speeds maximize system throughput.
- Integrated 24VDC power, signal and air for easy end-of-arm-tool connection.
- Integrated thru-arm cable option for iRVision, force sensing, Ethernet and auxiliary axes.
- Flexible mounting (upright, invert, angle).

- High rigidity and the most advanced servo technology enable smooth motion at high speeds.
- Easy integration into machines.
- Features lightest mechanical unit in its class.
- Standard IP67 rating allows operation in factory environments with dust and oil mist; many variants have an optional IP69K rating for wash proof, clean room or food grade environments.

XK10 Alignment Laser System

Measure and align geometric and rotational axes on machine tools

The XK10 alignment laser system has been developed to measure geometric and rotational errors of machine tools. Used with the XK10 machine tool fixturing kit, it enables faster and easier measurements over traditional methods, such as dial gauges, autocollimators and metrology artifacts. It can be used on linear rails to ensure that they are straight, square, flat, parallel and level, as well as to assess spindle direction and coaxiality of rotary machines.

Measuring geometric and rotational errors during machine build, maintenance and service, enables accurate alignment and adjustment of machine axes to achieve optimum performance. This reduces time during machine assembly processes and on-site service, including regular maintenance or following a collision.



The XK10 can be used to measure and record a range of geometric error types using a single system. Live error readings allow adjustments to be made to the machine during the alignment process.

PRODUCT COMMUNIQUE

System overview

- The launch is the primary method of laser transmission for the majority of measurement types. It is used with the M unit for geometric measurements up to 30 m.
- The S unit and M unit contain both transmitters and receivers and can be set up in different configurations depending on the error type under test.
- The display unit is used to take and record measurements, as well as display live readings allowing for easy adjustment. Powered by a rechargeable battery, it allows portable operation up to 30 hours.



- The XK10 system includes a machine tool fixturing kit that has been designed specifically to improve repeatability and accuracy in measurements.

Key features and benefits

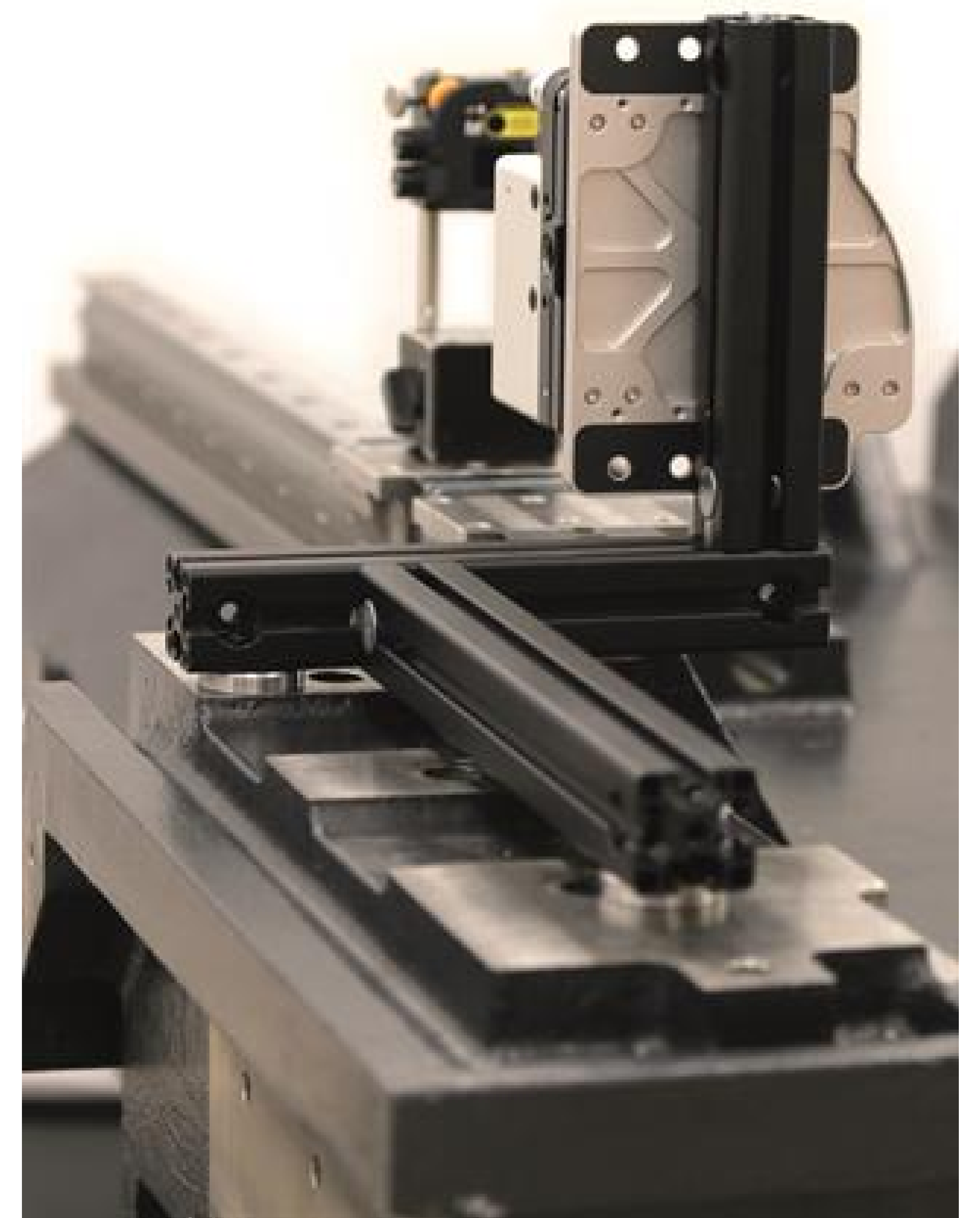
Configured to provide flexible measurement solutions for machine tools. The kit allows for variations in machine sizes and configurations.

- **Rotating head** - allows easy beam pointing from the launch unit with the capability to measure flatness using a series of grid points.
- **Intuitive software** - guides you through the setup and measurement process, quickly and easily.
- **Create custom reports** - straightness and parallelism analysis feature in CARTO Explore provides reliable results to check and correct machine alignment.
- **Wireless connectivity** - no cables ensures flexibility within the setup and measurement.

- **Easy fixturing** - designed for repeatable and accurate results and to reduce setup time.

- **Flexibility** - multiple measurements for different machine configurations from a single kit.

- **Automatic analysis** - immediate results following measurement, with live displays for adjustment.



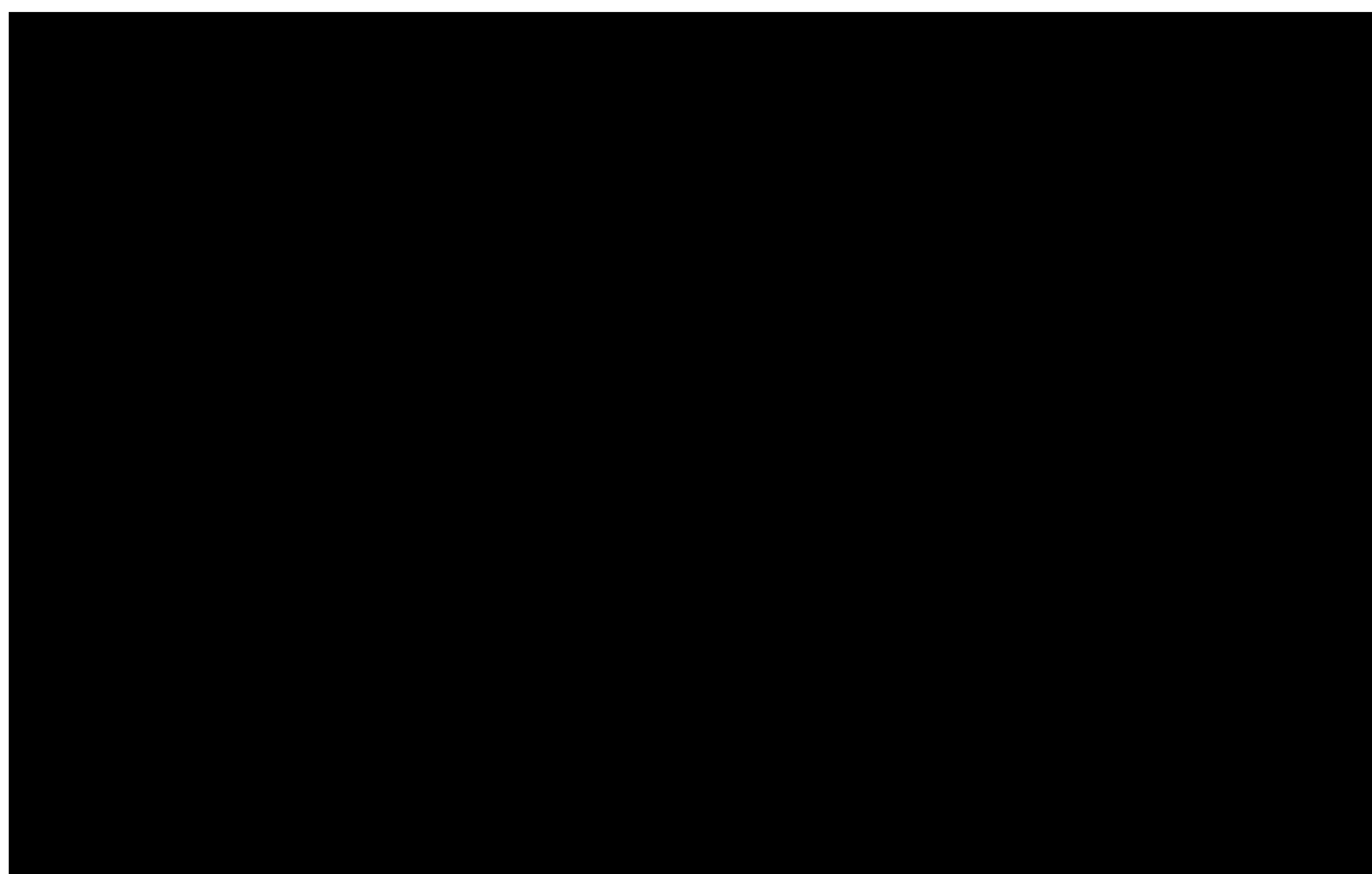
XK parallelism kit

The XK parallelism kit is an additional accessory required to carry out parallelism measurements. It allows two nominally parallel straightness measurements to be carried out without moving the launch.

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- **Accurate** - 90° deflection of the laser beam. Versatile adjustments allow ease of alignment.

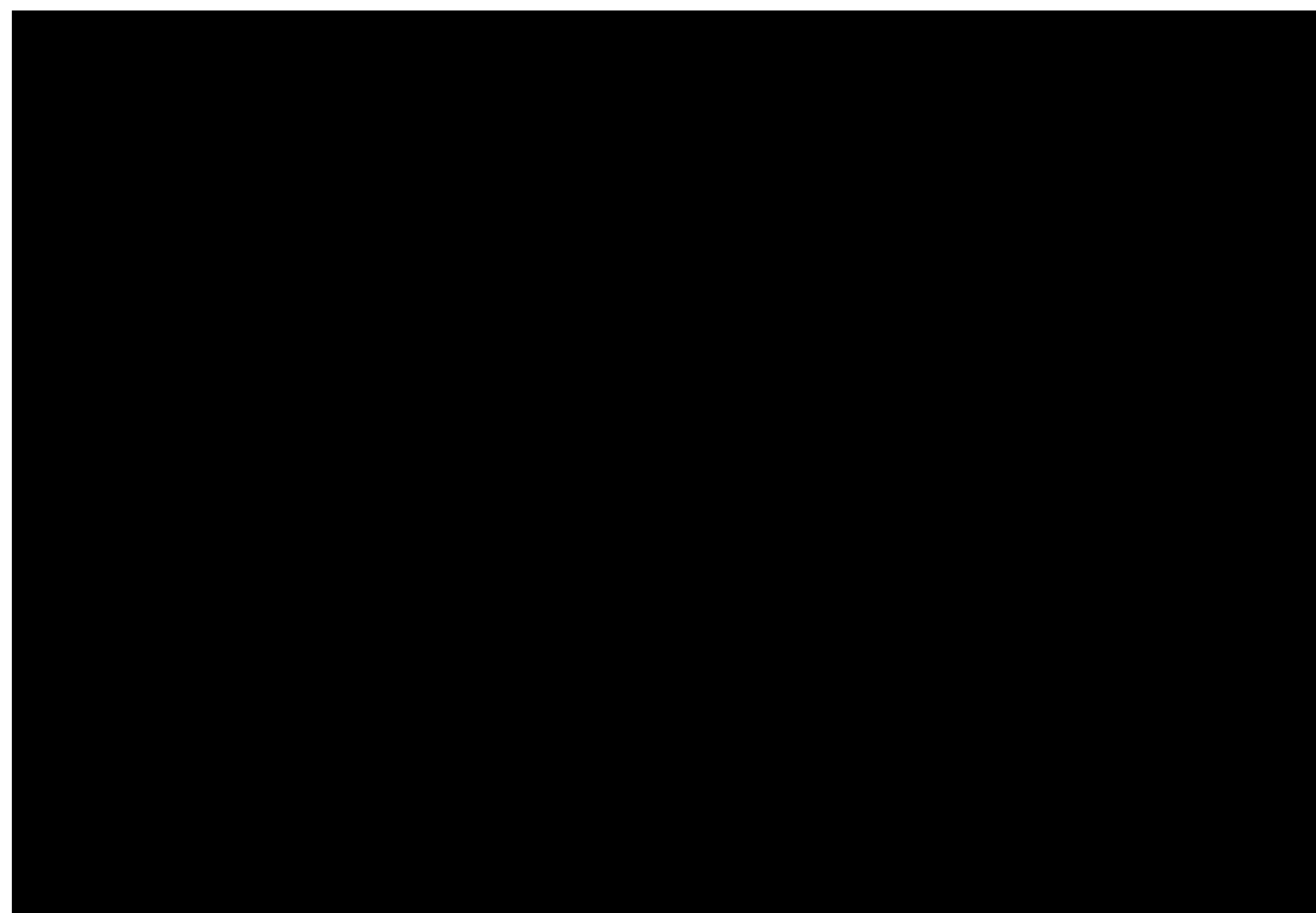
An optional tripod mount kit is available for use with a tripod when there is no space to directly mount the launch.



Straightness measurement

Measure vertical and horizontal straightness along an axis with the XK10 alignment laser system.

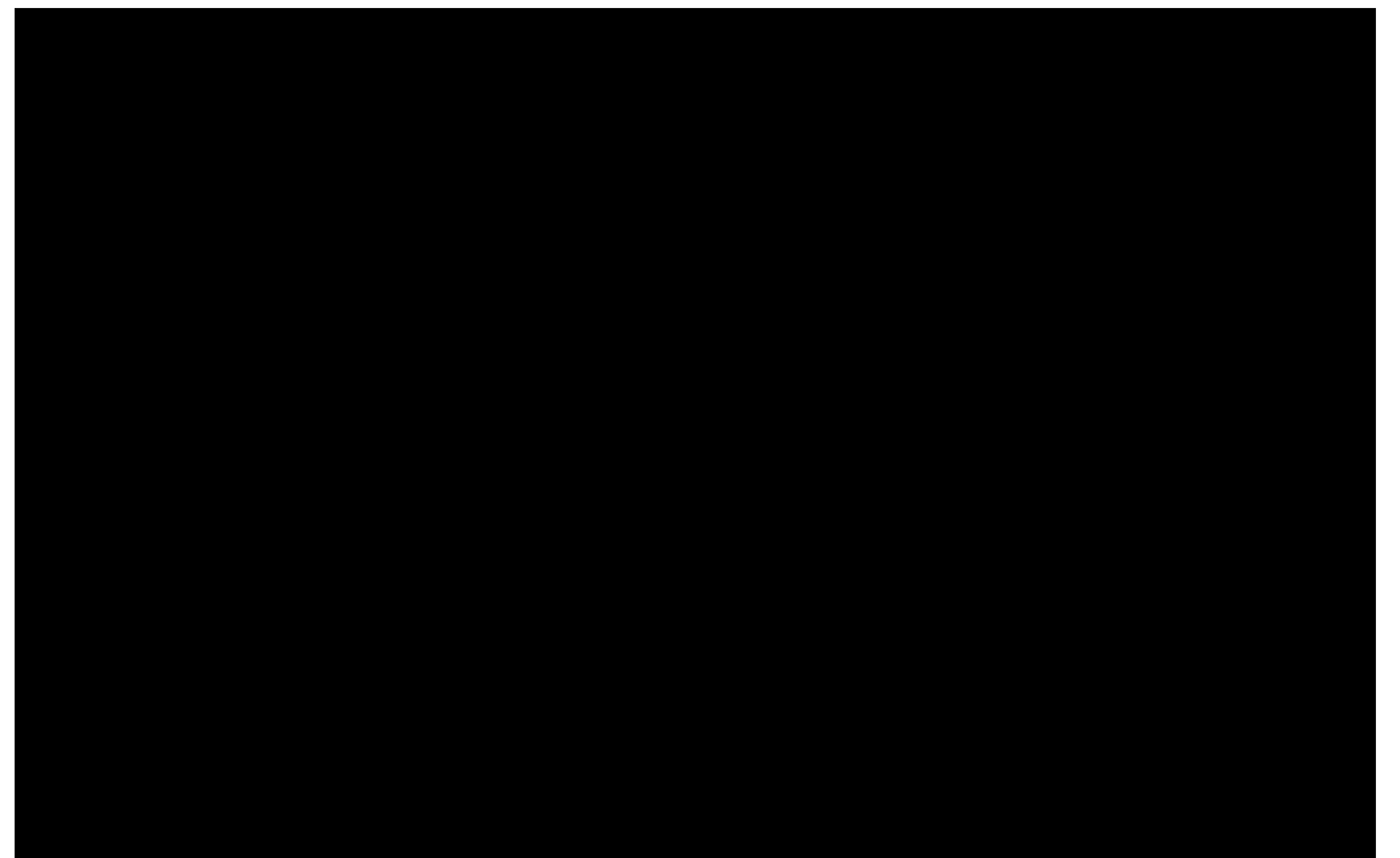
Used during the machine build process to ensure accuracy when mounting and aligning stages and guideways.



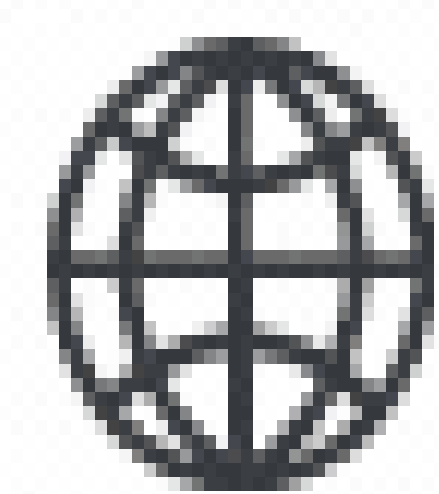
Spindle direction measurement

XK10 measures the angle at which a spindle or chuck is pointing.

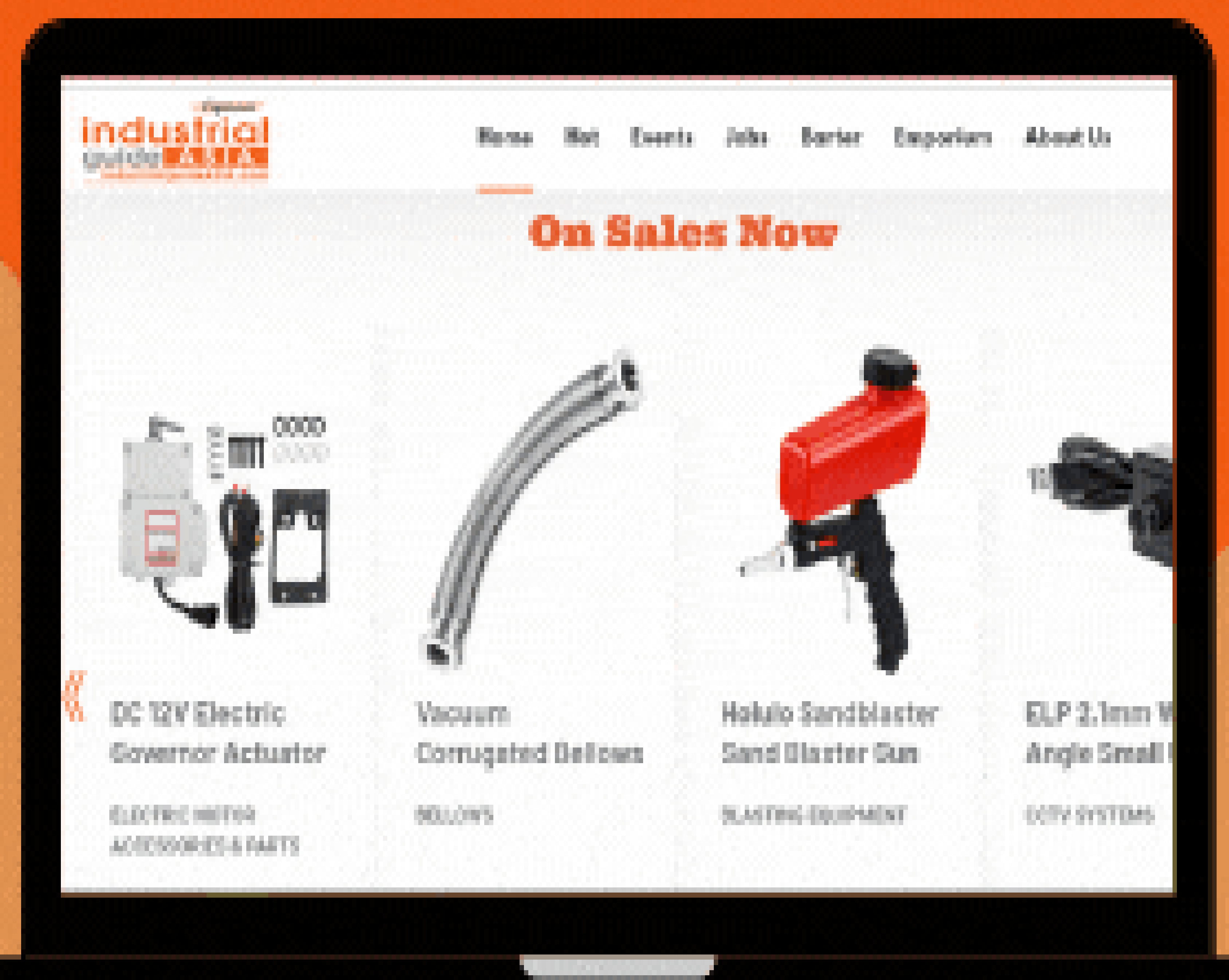
This can be used for any spindle or chuck alignment, to ensure that it points in the same direction through a full 360° rotation.



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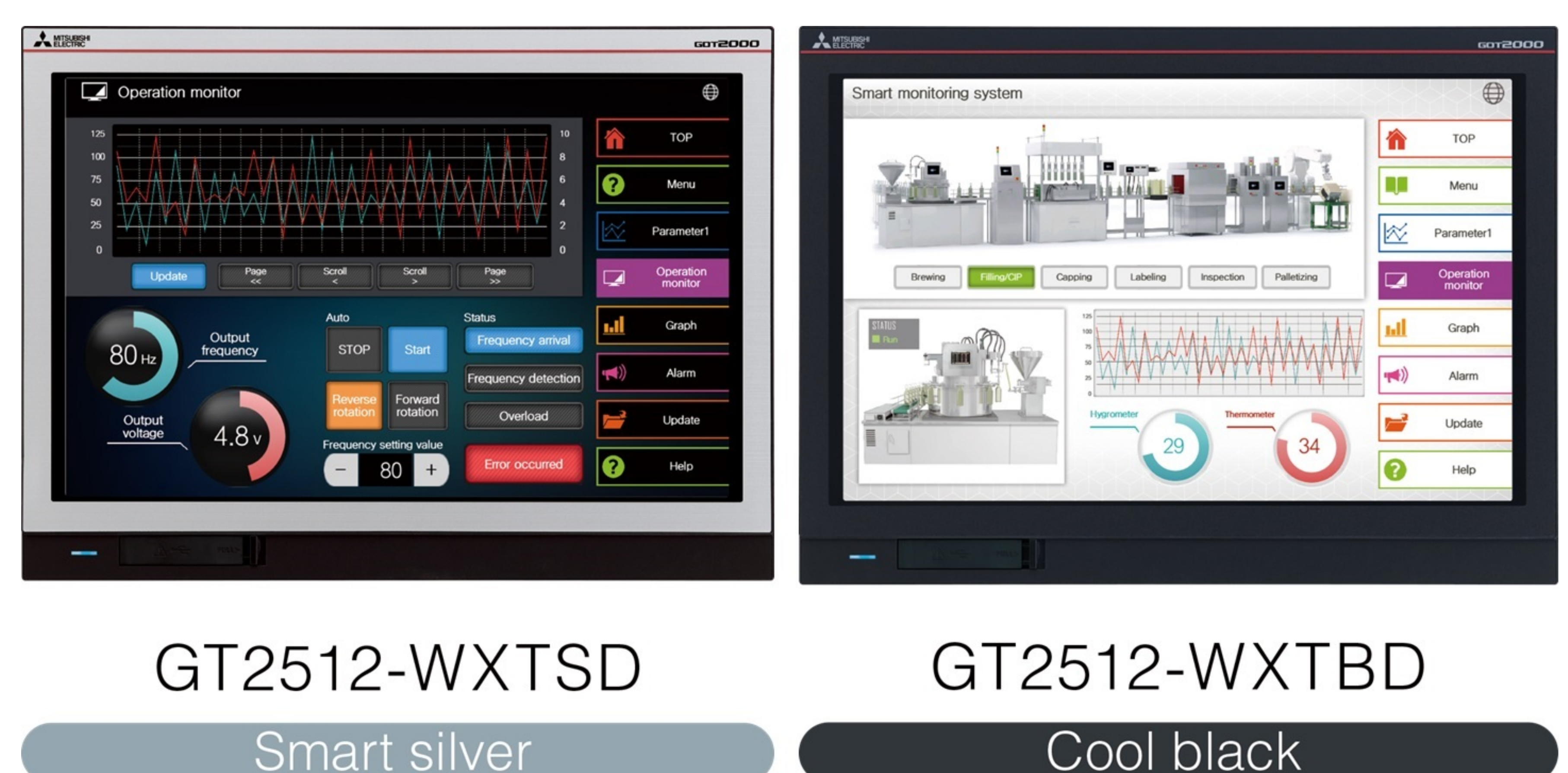
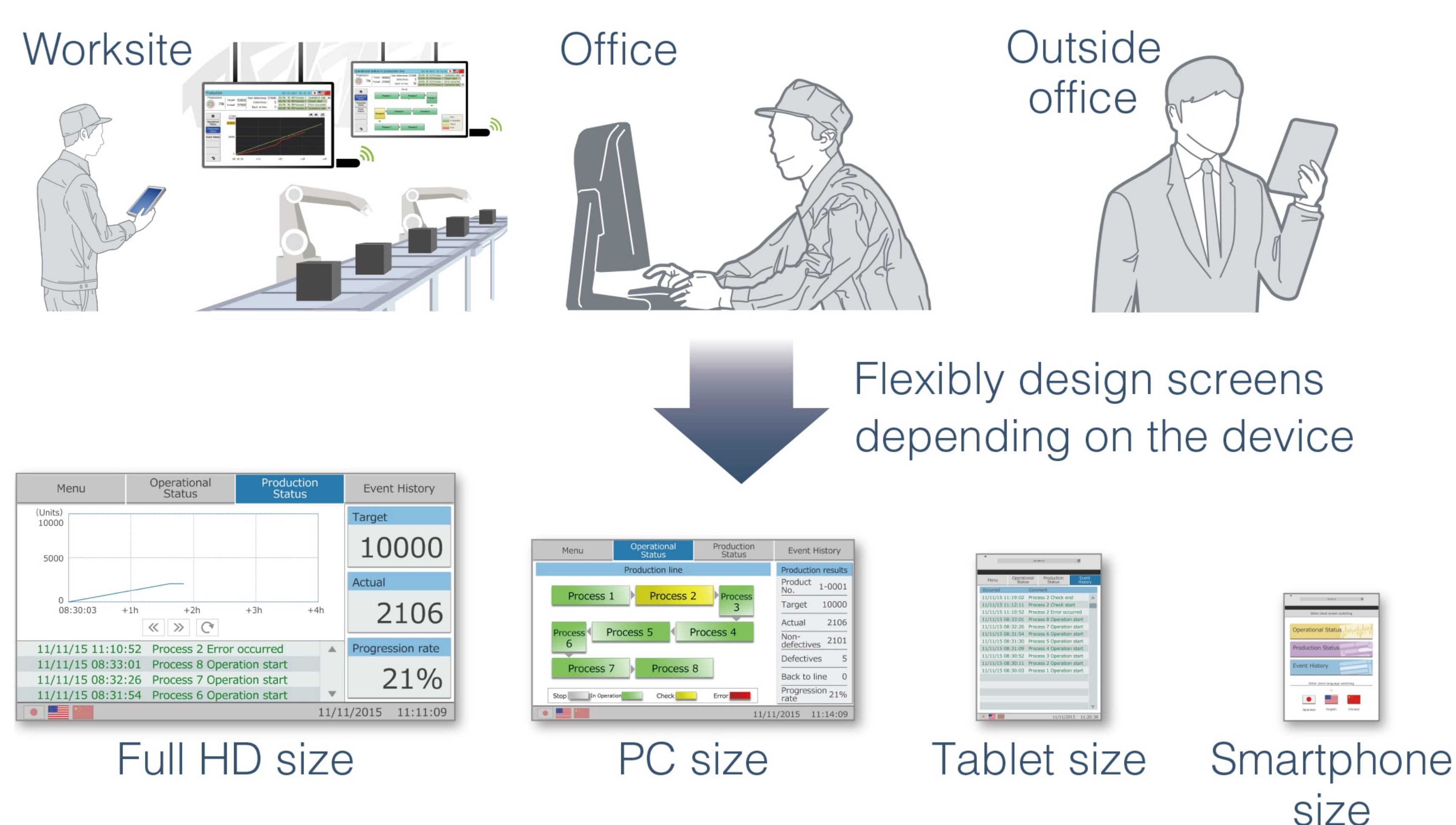
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New Graphic Operation Terminals from Mitsubishi Electric

Mitsubishi Electric has launched two new Graphic Operation Terminals (GOTs), which come as the latest addition to its GOT2000 Series Wide Model lineup. The 12.1-inch widescreen models, which feature narrow bezels and come in frame colors of smart silver (GT2512-WXTSD) or cool black (GT2512-WXTBD), will help meet customers' needs for a wider screen to show more information in factory, process, utility and other automation applications.

Monitor at the production site, from inside or outside the office simultaneously



The new models feature two Ethernet ports, facilitating the connection of Ethernet cables

New Antibacterial, Antiviral Protection Sheets Available as Options for Standard GOTs

In further enhancements to support safe-working practices, there are also new antibacterial, antiviral protection sheets as options for standard GT27 and GT25 GOTs in sizes of 12.1, 10.4 and 8.4 inches. These sheets help reduce disinfection work for virus countermeasures by adopting "SIAA" certified sheets with anti-virus and anti-bacterial features. These sheets, which use RIKEN TECHNOS' RIKEGUARD®, have proven to inactivate 99.99% of viruses and reduce bacterial growth to less than 1/100, with 10+ years of performance in typical environments.



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Mitsui Seiki GSH 200A Thread Grinding Machine



Mitsui Seiki's GSH 200A Thread Grinding Machine combines flexibility of application, high processing speeds, and consistent precision to complete an extensive selection of threading jobs. The GSH 200A is engineered to handle a wide variety of workpiece sizes. Maximum diameter swing over the machine table is 480mm and distance between centers is 2250mm, enabling the machine to grind a maximum screw length of 2000mm and maximum workpiece diameter of 200mm.

The machine's capabilities include a 15 kW direct-drive motor that produces maximum wheel spindle speed of 6000 m/min. X-axis stroke of 330mm features a rapid feed rate of 5m/min, Z-axis stroke is 2150mm with 10m/min rapid feed, and maximum work spindle speed is 200 rpm.

Sliding machine surfaces are hand-scraped to maximize precision. In addition, multiple systems minimize thermal displacement that can affect thread accuracy and consistency. Lubricant in the table feed lead screw and shaft core stabilizes temperatures of those components. A main coolant nozzle cools, lubricates, and removes sludge at the grinding point, while separate work area and bed coolant showers equalize internal machine temperatures. Oil and air lubricate and cool grinding wheel axis bearings. The GSH 200A machine is compatible with both oil-

based and water-soluble coolant, selectable when the machine is produced.

The GSH 200A permits users to apply CBN as well as standard grinding wheels, facilitating grinding of hardened steels as well as unhardened workpieces. CBN can grind more than 2 times faster than standard wheels while providing longer grinding life, which extends the dressing interval and reduces dressing time per workpiece. Mass production scenarios multiply those benefits. Maximum diameter for standard wheels is 460mm and peripheral speed is 60m/sec



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sec while maximum CBN wheel diameter is 380mm and peripheral speed 120 m/sec.

The machine's 3-axis NC dresser employs 2 linear axes (U,W) and 1 rotary axis (B) to produce highly accurate profiles in both CBN and standard wheels. A disc-type rotary diamond dresser provides significantly longer dresser life than single point diamond.

Automation features on the GSH 200A include an automatic phase adjuster, automatic notch position adjuster and automatic effective diameter adjuster. Together, the features permit an operator to leave the machine rather than remaining there to adjust the steady rest and oblique diameter during the operation. The auto effective diameter adjuster uses a touch probe to contact the thread groove and measure change in diameter by scanning.

An acoustic emissions (AE) sensor built into the wheel spindle. An optional heavy grinding wheel replacement support mechanism facilitates safe and easy grinding wheel and flange changeovers.

The machine's FANUC 31i-B control features a 375mm touch panel LCD with the newest HMI (Human Machine Interface) technology. Users can move the panel to where it is most convenient to operate.

Schneider Electric Releases EcoStruxure Micro Data Center C-Series 43U with Intelligent Cooling Technology

- New edge computing solution eliminates need for a purpose-built IT room, saving IT organizations up to 48% on CapEx and 20% faster time to market
- Designed for IT solution providers and end users to save up to 40% in field engineering costs and reduce maintenance costs by 7%
- Switches automatically between three cooling modes for enhanced energy efficiency for low-to-medium density applications and environments without 24/7 precision cooling

Schneider Electric, announced an expansion of the EcoStruxure™ Micro Data Center C-Series with the new 43U, offering the greatest capacity in the company's commercial and office line of micro data centers. Featuring intelligent cooling technology for enhanced protection and energy efficiency, the new 43U C-Series is the only solution on the market that automatically switches between three cooling modes depending on the real-time needs of the system.

By helping customers deploy IT simply, securely, and reliably in any edge computing or commercial

PRODUCT COMMUNIQUE

environment, the new solution is our largest, fully equipped model, eliminating the need for a purpose-built IT room, saving up to 48 percent on CapEx in 20 percent less time. In addition, users will save up to 40 percent in field engineering costs and reduce maintenance costs by 7 percent.

A complete edge management solution

The new 43U C-Series offers a complete edge management solution that can be remotely monitored with EcoStruxure IT Software and Digital Services. Schneider Electric's portfolio of software and digital services provides the power and flexibility for customers to seamlessly manage critical infrastructure devices on their own, with a partner, or to leverage Schneider Electric's expert service engineers to manage it on their behalf.

The 43U C-Series was designed for IT solution providers, distributors, and alliances as well as IT

professionals across vertical segments including banking, financial services, retail, healthcare, government, and education. The 43U C-Series is designed for low-to-medium density applications and environments without 24/7 precision cooling for sensitive IT such as supply rooms, IT closets, and office spaces.

Benefits of the new 43U C-Series:

- **Energy Efficient Cooling Technology:** Switches automatically between three cooling modes - active, eco, and emergency – based on real-time needs of the system for enhanced energy efficiency and added protection against static buildup and overheating.
- **More space:** Offers the greatest capacity within our Commercial (C-Series) EcoStruxure Micro Data Center line - up to 36U useable space.
- **Suitable for indoor, commercial environments:** Withstands the challenges of dust, power fluctuations, moderate temperature

changes, and unsecure locations that are not purpose-built for sensitive IT equipment.

Available in select countries today

The 43U C-Series is currently available in South America, Middle East, Africa, India, and Southeast Asia, and Pacific.

With EcoStruxure Micro Data Centers, users can standardize the design across multiple environments and order as a single, all-in-one solution, making it simpler to deploy and easier to maintain.



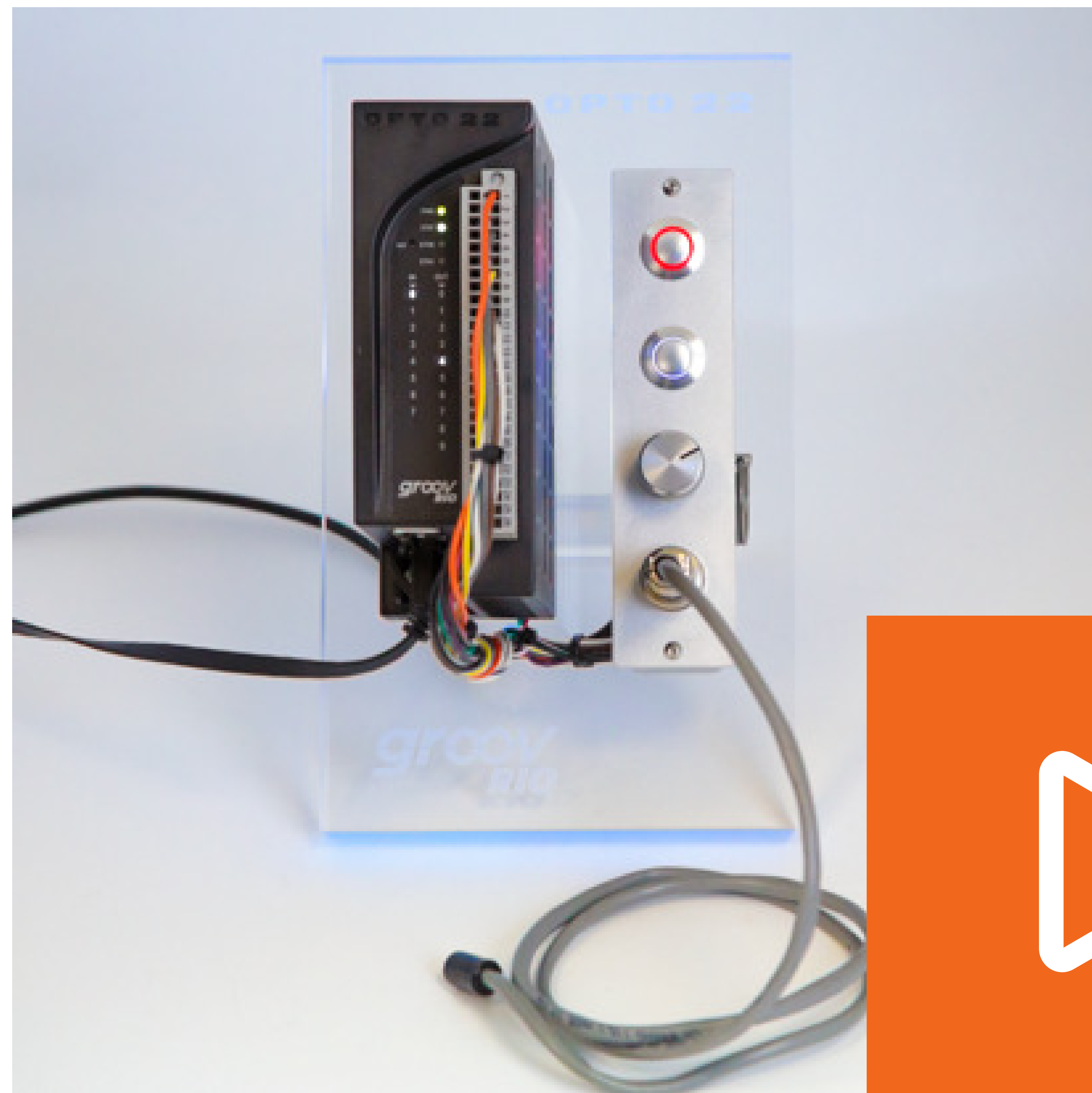
Get hands-on experience with the groov RIO Learning Center

Learn more about edge I/O technology and the capabilities of the groov RIO module with the new learning center unit.

groov RIO is the revolutionary I/O that offers over 200,000 unique, software-configurable I/O combinations in a single, compact, PoE-powered industrial package.

Ready to learn about and experiment with groov RIO? Now you can with the groov RIO Learning Center (GRV-RIO-LC).

A learning center is the perfect way to get hands-on experience using the product, and it also functions as a demo unit or an effective tool for Proof-of-Concept projects. The GRV-RIO-LC is a complete package of fully functional *groov* RIO hardware and software, designed to work with downloadable examples from the Opto 22 website.



What's included?

Hardware:

- 1 groov RIO mixed-signal multifunction module (GRV-R7-MM1001-10)
- 1 DIN rail
- 2 illuminated push buttons
- 1 potentiometer
- 1 temperature probe connector
- 1 single-color backlight LED
- 1 ICTD temperature probe with resistor (for PID loop control)
- 1 plexiglass stand

Software:

- groov Manage
- MQTT with Sparkplug
- Node-RED
- Secure Shell (SSH)

BIG KAISER Introduces BIG CAPTO Rough Boring Tool



BIG KAISER Precision Tooling has introduced the Series 319 SW rough boring head with the BIG CAPTO connection. The new SW BIG CAPTO Rough Boring Head makes it possible to perform rough and finish boring processes seamlessly with the finishing heads it has offered for years. BIG KAISER currently offers the widest range of rotating BIG CAPTO tooling of any provider.

In accordance with ISO 26623-1, the polygon shape of the taper and one-piece body construction provides for highly repeatable accuracy and torque transmission, an ideal fit for rough boring work. The SW BIG CAPTO achieves high repeatability, in part, thanks to the flush fit of the polygon taper with the spindle. The combination of a self-centering 1:20 taper and the long taper edge ensures stable runout accuracy. The SW BIG CAPTO is available in sizes C3, C4, C5, C6 and C8. The diameter range is \varnothing .984"-8.000".



Bosch Rexroth's Smart Function Kit



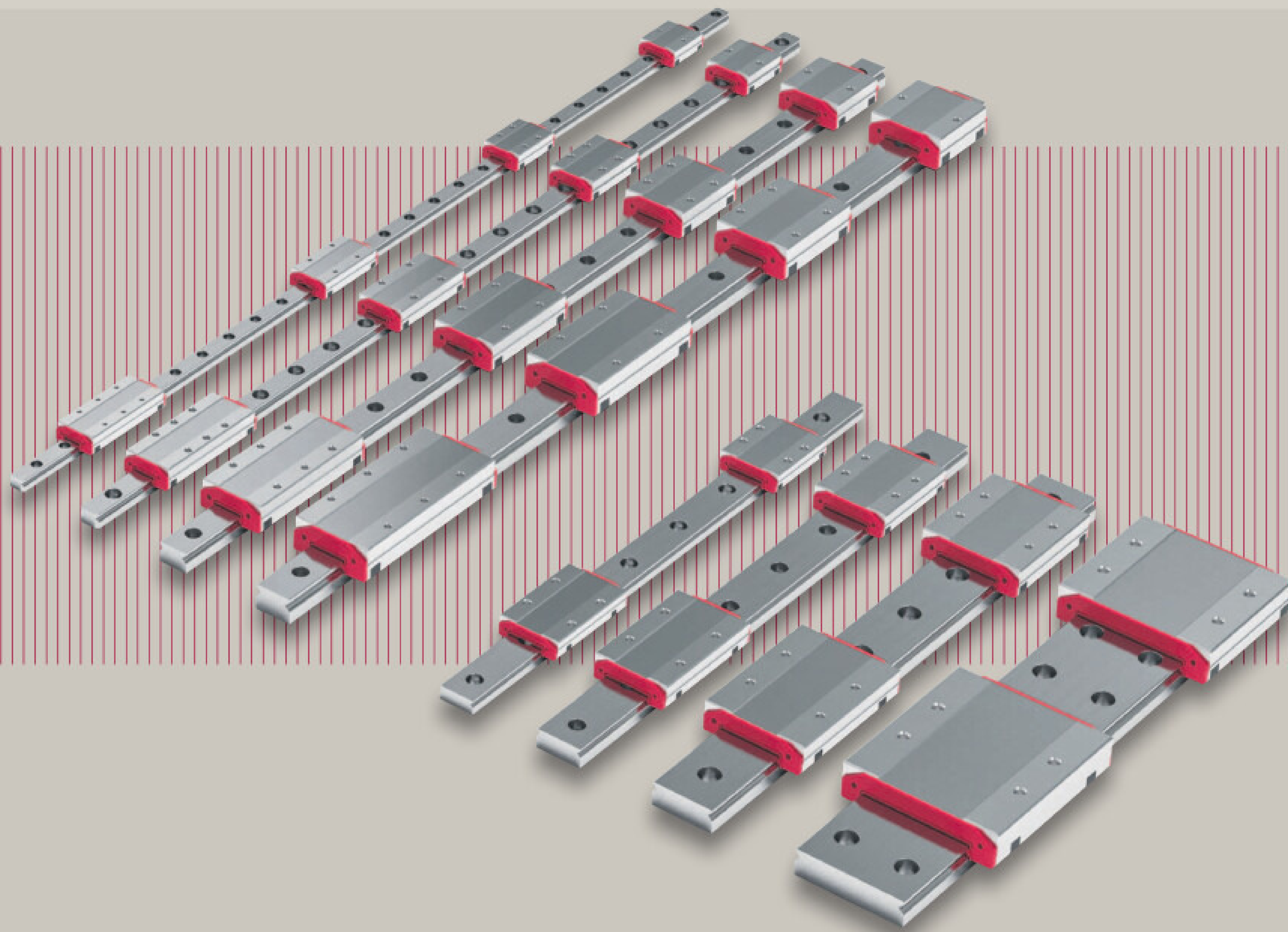
Bosch Rexroth's Smart Function Kit is your plug-and-produce, no-coding-required solution to make many standardized pressing and joining applications smarter, faster and more productive.

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Delivery Hero Creates a Global On-Demand Economy



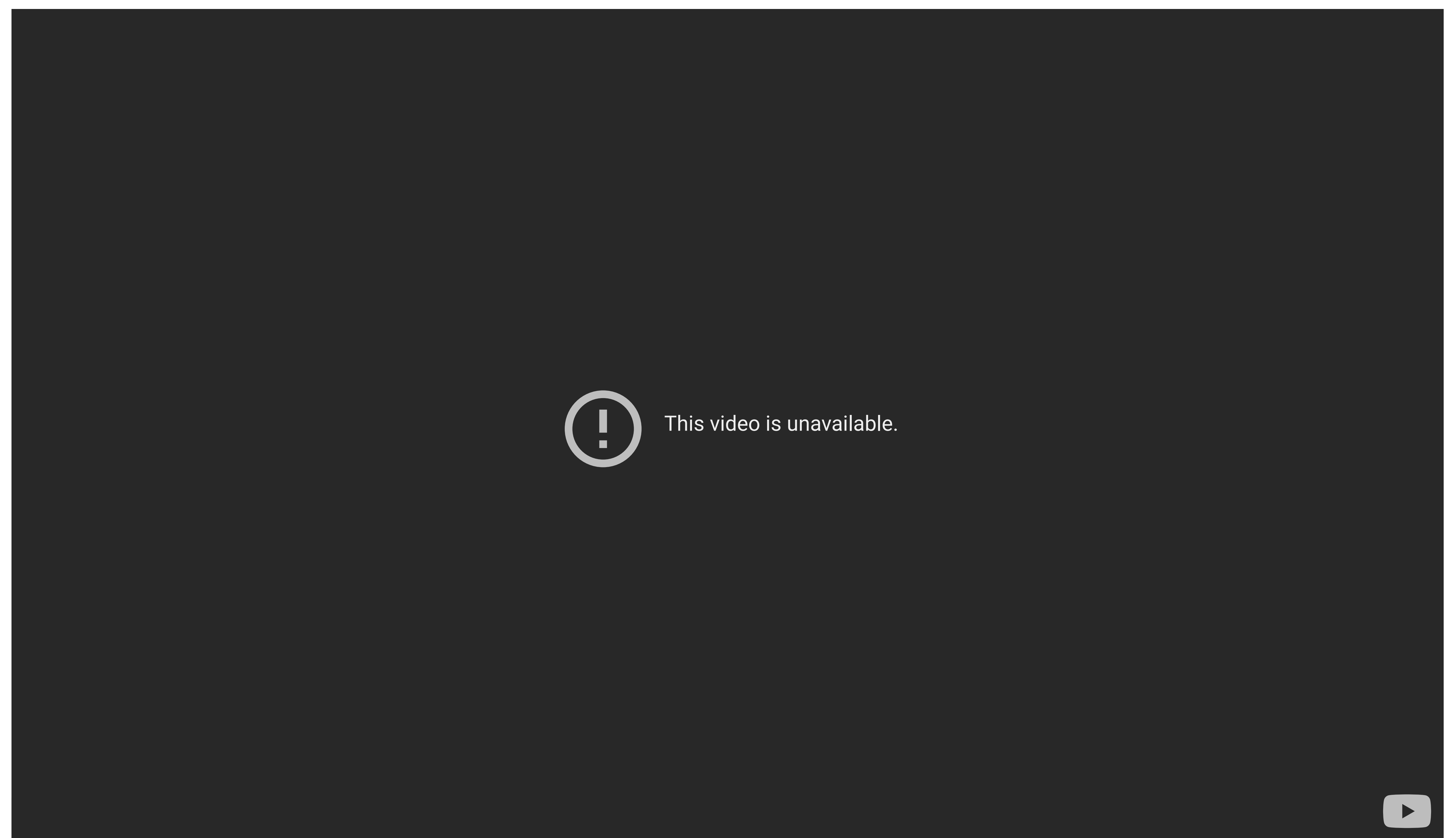
Empanadas, a dozen roses, diapers, flat-screen televisions: What ties this seemingly random list of items together is Berlin-based Delivery Hero, which began as a food delivery startup in 2011.

Nine years later, the company owns subsidiaries operating in 44 countries that offer everything on demand — from kitty litter to pizza. Each quarter, €2 billion of merchandise pass through its systems and in the third quarter of 2019 it reported year-over-year growth of 117 percent.

As it expanded quickly through acquisitions, the company encountered some road bumps, according to Johannes Langguth, the senior director of Finance Systems: ***“A key challenge we confront is how to balance localized service with global service.”***

Some of these challenges were not IT related. “We have a brand called foodpanda that’s big in Singapore and the whole market approach and brand is different because customers look for something different in every region and each country,” says Langguth.

In addition, as Delivery Hero grew, timely payment became challenging for the publicly traded company (Xetra: DHER) with a growing roster of partners. That’s when executives decided to put in place a robust, centralized software infrastructure that could adapt to the specific needs of each market.



Building a Global, On-Demand Ecosystem

To do this, Delivery Hero worked with SAP to deploy the cloud-based intelligent enterprise resource planning (ERP) suite SAP S/4HANA as its enterprise backbone on top of Amazon Web Services. The company now runs invoices on finance applications for SAP S/4HANA, helping to ensure that restaurants and retailers get paid on time.

“Our customers include restaurants, grocery stores, pharmacies, and flower stores. We want to create an on-demand ecosystem, but to do that we need to keep this community happy,” says Langguth. If suppliers don’t get paid quickly, they will work with another delivery service, which would mean Delivery Hero offering consumers less choices. “It used to take the whole weekend to run receipts, now [with SAP S/4HANA] we do it in just a few hours.”

With the cloud ERP solution, SAP S/4HANA up and running, Delivery Hero has integrated other SAP applications, including cloud-based analytics and SAP Ariba software for procurement. Langguth’s team also used SAP governance, risk, and compliance solutions to create a digital boardroom that helps executives stay on top of internal audits, comply with global reporting and accounting requirements, and identify business risks.

Intelligent ERP Helps Asia-Based foodpanda

As Delivery Hero rolls out the solution globally, it is benefiting subsidiaries like foodpanda, which operates in Europe, Canada and Asia.

Luc Andreani, managing director of the Singapore branch, explains, “One of our two main sources of revenue is the commission we charge restaurants for the services we provide, including the generation of orders, delivery, and marketing.” foodpanda processes the customer charge and then distributes payment to vendors, minus its commission.

Previously, it used a billing solution created in-house with support from an IT services provider, “but there were some stability issues, so we moved to SAP a few months ago and it’s allowed us to have a much more stable billing environment,” Andreani says.

The company currently pays vendors every two weeks, but since standardizing its financials on SAP S/4HANA, Andreani believes it can

consider increasing payment frequency.

Delivery Hero works with almost 8,000 food providers ranging from Hawker Centers (the Singapore equivalent of food courts) to upscale restaurants; and aims to provide “hyper-express delivery” within 25 minutes (compared to Amazon’s same- or next-day delivery.) More seamless integration across business processes will help them get there. Andreani says:

“The vision at the end of day is to move away from a collection of disconnected, or manually connected systems, to SAP as the main system that backs our processes starting with finance and potentially extending to more processes further down the road.”

For Delivery Hero, Customer Experience Is Everything

For a digital marketplace, customer experience is everything. Langguth installed Experience



Deep insight with light revolution

How do you make a car rim glow without melting the tyre? Patrick Llewelyn-Davies does it with light, and thereby creates an unusually enlightening picture of this everyday object. His Light Revolution System redefines the contrast of light and shadow, as it uniformly irradiates the object from a complete circular path. A precision motor from FAULHABER ensures the uniform movement of the lamps and exact adherence to 360 degrees.



Most photographs have the snapshot noise in common: whether a smartphone selfie or an artistic professional photograph – the shutter allows the light to pass through the aperture for just a fraction of a second. Fittingly, the analog shutter noise is even simulated by fully digital cameras to acoustically mark the brief moment in which

the image is captured.

But there is also a long tradition of light painting, in which the aperture remains open for an extended period of time and moving lights leave their trace on the negative or image sensor.

Fascinating images and views can be created using this technique. A familiar example is the red and white streaks of light from headlights and tail lights that can be seen on long-exposure images of motorways at night. Unlike with “normal” photography, movement is not stopped, but rather captured.

Plastic glow

British photographer Patrick Llewelyn-Davies bridges the gap between “moving” light painting and still life. In his images, the resting object is at the centre, and he uses the moving

light like a pen for colouring in. Only that he adds no additional colour to his images. Instead, he causes the objects to glow and illuminate. His use of light also allows for the creation of new and sometimes X-ray-like glimpses into the photographed objects. They take on a quasi three dimensional plasticity even though they never optically leave the 2D world.

The secret to the light-painted still lives is a seemingly simple apparatus called “Light Revolution System”, which has two meanings. Revolution here means both rotation as well as a fundamental renewal. Two intensely bright LED lights complete a cycle around a round table on which the object of the photographic efforts has been placed. It generally takes six seconds for them to complete their rotation. The time can be varied, however, depending on the desired light effect. The system does not just travel a round path but rather opens completely new possibilities for photographic image composition – there has never before been anything like it on the market.



Maximum precision during rotary motion

The lights are fastened to two arms and can be adjusted in height to achieve different angles of incidence. The arms are firmly attached to the rotating central axis. At first glance, this arrangement does not call for any spectacular technology, but in detail, maximum precision and extremely smooth operation are decisive. “Any pause or jerk in the rotation, regardless of how short, would result in uneven illumination,” explains Patrick Llewelyn-Davies. There would be brighter and darker patches that would affect or destroy the intended effect. The same applies for travelling the complete circle. The arms must not move one degree more or less than 360 degrees. And they should accomplish this in precisely the specified amount of time.”



The inventor/photographer reports of earlier attempts with simpler components that were not able to meet these requirements. The greatest challenge was in moving the central axis of the system both very precisely as well as jerk-free. At the same time, the portable device needed to be as light as possible. When making the selection of the right drive, the experts of the British FAULHABER sales partner EMS provided assistance. “The support from EMS was great,” explains Patrick Llewelyn-Davies. “They provided the necessary technical expertise for the drive and the controller. It is decisive for the high quality of the product. Moreover, motors from FAULHABER have proven themselves in highly critical areas such as aerospace. That’s how I knew that they would have the accuracy and reliability required by the Light Revolution System.”

The experts from EMS identified the brushless motors of the BX4 series as the optimum solution. They were able to ensure the desired precision and repeatability of the sequence. “Once we selected a motor family, we could try different sizes without intervening in the programming”, explains Dave Walsh, Commercial Development Officer at EMS, with regard to the joint development work. “As a result, we were able to

respond very flexibly to changes to the system.” Thanks to the compact and lightweight design of the BX4 motors, the “ideal weight” was also maintained.



Detailed 3D models of museum objects

Of course, the photographer thoroughly tested his Light Revolution System himself. In his online gallery, you can admire examples of the unique light effects that he has achieved with his system. The “glow” that he elicits from unassuming everyday objects like a chicken egg or a fishhook is created by placing the circling LED lamps very low above the table. Because part of the light is laterally reflected by the objects onto the base, a

a glowing aura is created that appears to emanate from within the objects.

The system is currently being tested in various application areas. Instead of the lights, a camera can also be attached to one of the arms. If it is attached to an arc-shaped arm, the object can be photographed at a uniform distance from various angles. This method is used, e.g., by museums to calculate high-resolution 3D models of their valuable objects from image data. Researchers can then exchange this data worldwide and use it for their studies. Furthermore, precise replicas can be created using 3D printing. “Up to now, a considerable amount of hand work was associated with the creation of such images,” says Patrick Llewelyn-Davies. “With the Light Revolution System, the process can be largely automated and greatly accelerated.”



 **FAULHABER**

Swiss-Style Machines Simplified

For shops that produce smaller components—say anything under 1.5" (38.1 mm) or so in diameter—there's no shortage of reasons to invest in Swiss-style CNC lathes. Reasons include:

- Dual spindles and independent tool slides make it possible to perform several machining operations simultaneously.
- Compact work zones mean cutting tools don't have to travel far to the workpiece, while fast rapid traverse rates get them there faster.
- High spindle speeds eliminate the cutting speed restrictions of larger lathes, improving tool life and part quality.
- Dozens of cutting tools and extensive milling capabilities reduce the need for secondary operations and make lights-out machining easier.

Add to this list advanced capabilities like laser

machining, thread whirling, oscillation cutting, and the option to switch between fixed and sliding headstocks, and it's clear that these efficient, capable machine tools can complete most parts in less time than all but the less-flexible, far more expensive alternatives—rotary transfer equipment and multi-spindle screw machines.

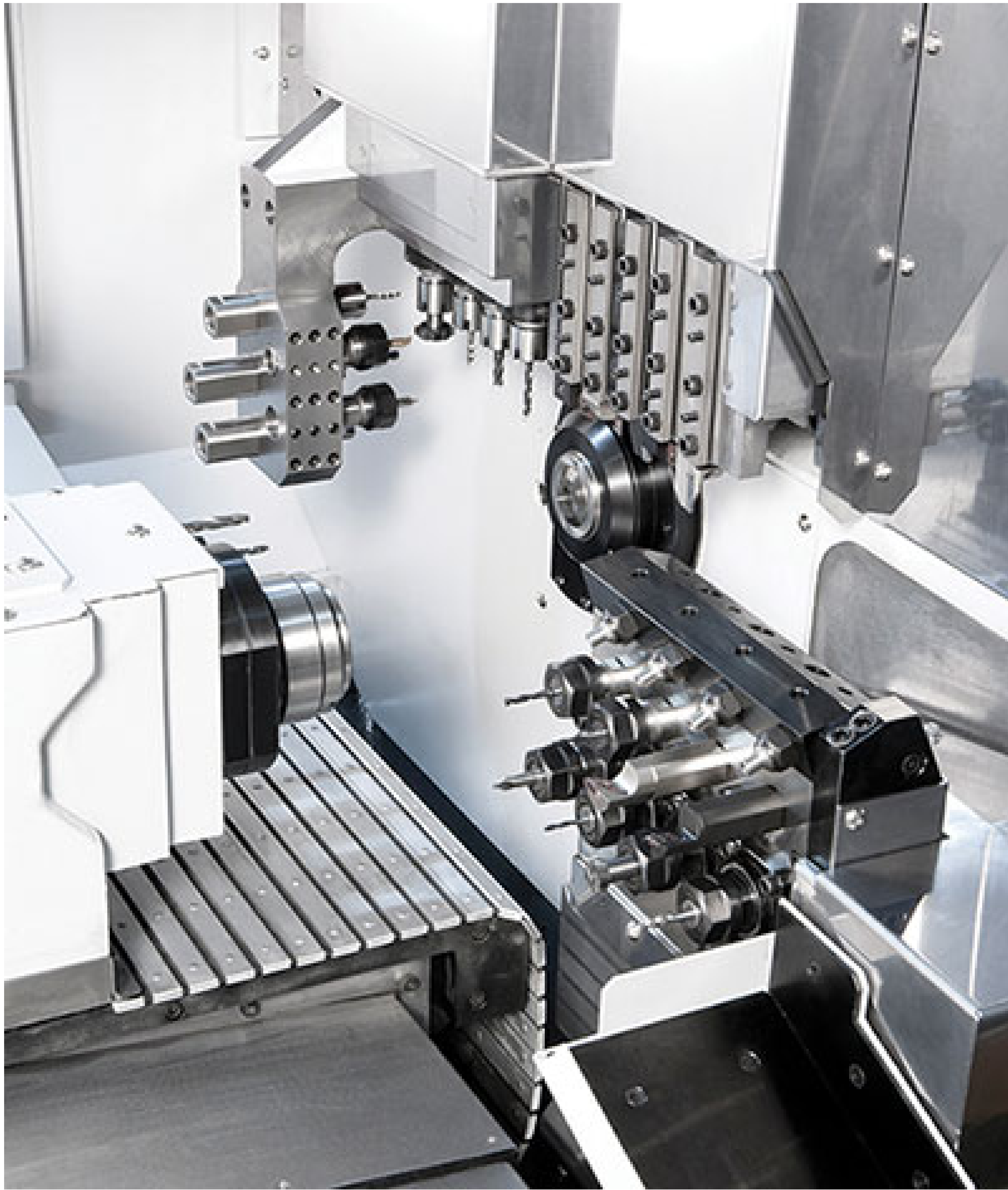
Facing the Challenges

There is a catch. With these awesome capabilities comes complexity. Each of the slides, spindles, and cutting tools just mentioned must be programmed separately, then synchronized using special G-codes. To avoid damaging the workpiece and machine, there must be perfect alignment of the main and sub-spindle during part transfer. The compact work zone that helps give Swiss machining its short cycle times can make tool changes a bit troublesome, with operators using tiny

screws while reaching past, around, and under other cutting tools. Worse, all those tools in tight quarters tend to catch long, stringy chips, which, if left unattended, can spell disaster.

The good news is that Swiss-style machine tool builders recognize these challenges, and ever since the invention of the sliding headstock lathe in 1872 have been working to make their wares easier to operate. One of these is Absolute Machine Tools Inc., Lorain, Ohio, where Greg Knight, vice president of sales for production turning products, suggests that ease of use begins with a capable CAM system.

"Aside from our Nexturn line of CNC Swiss lathes, we offer a broad line of milling, turning, and EDM equipment, and wanted a programming system that works well with all of them," he said.



Absolute Machine Tools' eight-axis Nexturn PYII series has a second Y axis, up to eight sub-spindle tools, and a maximum of 27 tools in total. Additional tooling options allow more live tools to be used on both the main and sub spindles for complex and intricate part geometries. (Provided by Absolute Machine Tools)

"After extensive evaluation, our applications department recommended we go with ESPRIT [developed by DP Technology]. It provides the graphical collision detection needed to avoid crashing an expensive machine tool, and because we work very closely with them on post-processor development, our customers can be assured they'll get quality G-code. And, like I said, it's quite easy to use, especially for novice programmers."

Training for Success

Yet even the best programming software does little for inexperienced employees who lack a grasp of machine functionality, which is why Absolute Applications Engineer Scott Petrisko stresses the importance of operator training. "There's definitely room for improvement out there," he said. "Too many shops limp by, relying on their machinists' ability to read the machine manual and pick things up on their own. If they were to spend some time and money on regular training, they could get so much more out of their machine tools. It pays for itself very quickly."

Petrisko suggested that a more complex Swiss-style lathe, one with plenty of available tool stations and generous spindle capacity, is in many situations a better choice than one that just meets the minimum requirements for a part or family of parts. Having additional stations means there's a greater likelihood that whatever cutting tool is needed for any given job will be resident in the machine, reducing changeover time, just as a larger spindle opens the door to additional work.

For the tools that do need to be changed—and there are always a few with every setup—Petrisko is a big fan of quick-change tooling, suggesting that these systems help maximize machine uptime. John Kollenbroich, head of product management for Horn USA Inc., Franklin, Tenn., agrees. He noted that quick-change helps reduce setup times, and speeds in-process tool replacement as well, which can be a leading contributor to machine downtime. In addition, it makes offline tool presetting a possibility, further increasing

productivity and reducing the chance of operator error during tool touch-off.

Tooling Up

“We’ve partnered with W&F Werkzeugtechnik out of Germany, and they offer a quick-change tooling system for both rotary and square shank toolholders,” he said. “It’s activated with a single screw in the side of the holder that gets tightened down to a specific torque of four Newton-meters, and seats like an HSK-style holder does, with dual face and taper contact. There’s also an alignment pin in the square shank tools that assures perfect centerline.”

For a more comprehensive tooling approach, Kollenbroich said the company offers the WF Micro Linear Gang Plate, which works with the W&F Micro stick tools just described or a shop’s existing square shank tooling. Chris Foschaar, application and sales engineer for Horn, explained that the modular attachment replaces a Swiss-style machine’s existing gang plate and is plumbed for an integrated, high-pressure coolant management system (CMS).

This eliminates the need for individual plastic or copper coolant lines that are easily snagged by passing chips, he said, or that the machine operator inadvertently knocks out of position when changing a cutting tool, possibly with catastrophic results. “The main advantage of the plate is interchangeability. It allows an operator to index or change tools quickly and



Offline measurement of cutting tools does not require any special equipment, as shown in this example using a presetting block from National Machine Products.
(Provided by Tsugami/REM Sales)

accurately, a task that can be difficult on most Swiss machines due to the close quarters. Between that and the fact that you don’t have to worry about the coolant lines, it’s a big time saver.”

Derek Briggs, Swiss product manager for Tsugami/Rem Sales LLC, Windsor, Conn., seconded the need for quick-change tooling and integrated high-pressure coolant. He pointed to the GWS-Tooling system from German manufacturer Goeltenbodt as a preferred solution for Tsugami and other brands of CNC Swiss-style lathes. “One of its biggest benefits is the ability to use standard, off-the-shelf toolholders,” he said. “You loosen one screw, pop out a cartridge containing the stick tool, and either change the insert on the bench or install a preloaded cartridge. And since there’s a presetter that comes with the system, there’s no need to ever touch off in the machine, saving more time.”

Admittedly, these systems are a pricey option—depending on the manufacturer, the machine tool, and the number of tooling stations needed, a shop might expect to spend \$50,000 or more to tool up each of its lathes. And yet, given the continuing shortage of skilled machine operators along with every shop's desire to achieve high OEE (overall equipment effectiveness) levels, such investments are easily justified.

All Aboard

Briggs suggested that some of this investment can be offset by using Tsugami's Abile programming software, which comes free with its Swiss-style machines. He said it's very simple to use, supports all but very complex machining operations, and provides machine-specific simulation and code generation. It also generates the tool offsets, further simplifying setup. And while Abile might not be as powerful as ESPRIT or other commercially available CAD/CAM systems, it is perhaps "a good starting point" for shops with less sophisticated machining needs. "It's especially great for new users, as it helps them gain confidence while they learn how to program."

Gonzalo Serrano has a similar suggestion. An applications engineer at Index Corp., Noblesville, Ind., he said the company's WinFlexIPS and WinFlexIPSPPlus programming and simulation software is designed specifically

for the Traub line of Swiss-style lathes. The first of these comes standard on all machines, while the "plus" version can be installed on a PC or laptop and supports higher-level machining functions like engraving, 3D simulation, and complex milling cycles.



The Index iX Center automated cell is intended for lights-out manufacturing, and utilizes a pallet system for material management and a FANUC robot to pass parts to a Renishaw gauge or CMM. (Provided by Index)ding

Both simulate using the post-processed G-code, and both make it easy to apply the correct cutter compensation values, or insert the "synch" codes needed to perform turning or milling on up to four axes simultaneously. "This last part—synchronization—is something that a lot of lathe machinists struggle with, at least until they find out how easy it actually is," said Index Proposals Engineer Randy Carlisle. "That's why training is so important, and why shops should invest in equipment from a distributor that offers excellent applications support. Doing so can have a dramatic effect on both the productivity and profitability of these very capable machine tools."

And although it might seem to have nothing to do with making Swiss operation any easier, Industry 4.0-type functionality goes a long way towards achieving the two goals just mentioned. According to Serrano, the latest iteration of the Mitsubishi control used on Traub equipment supports bi-directional data sharing with external software systems, and provides helpful information for the machine operator, such as programming tips and maintenance reminders.

Industry 4.0 and remote monitoring systems also serve to alert management if there's a problem, Carlisle noted. "They allow you to see real-time production figures, like how many parts were machined during a specified time period, and whether there were any rejects. Obviously, you need a measuring system to capture that data, which is something we offer with our Index iXCenter automated cell. It uses a FANUC robot to pass parts to a Renishaw gauge or CMM, for example, that can measure certain dimensions and then make offsets to the relevant cutting tools as necessary."

Check it Out

Brian Such, executive vice president at Marubeni Citizen-Cincom Inc., Allendale, N.J., lists a slew of time-saving features such as in-line probing on new machines from his company. Also, grammar check quickly proofreads machine programs for syntax errors, reducing validation time. Cutting tools used on two or more machine

"channels" can be controlled using the same offset. The "free axis control system" makes it easy to relabel the X-axis as the Y-axis, for example, and is used to increase machining precision in some applications.

Perhaps most valuable to setup people is the on-machine program check function, which transfers the traditional feed rate and rapid overrides to the manual pulse handle and allows operators to instantly slow all axes down to a snail's pace or ramp back up to full speed. This avoids the white knuckle "riding the e-stop" approach with which so many CNC machinists are familiar. And if an error is found or collision is about to occur, it's possible to pause program execution, make a live edit, and pick up where you left off.



This Cincom machine is equipped with the latest NC model to drastically reduce the startup and screen switching time compared to conventional machines with advanced functions. (Provided by Marubeni Citizen-Cincom)

Such went on to point out the ease with which an operator can synchronize the main and sub-spindle, a task that has long been challenging on some machines. "Anyone with a milling-capable Swiss

machine will at some point find themselves trying to pass a non-round, irregularly-shaped part to the sub-spindle. On a Citizen, you just wheel the sub over to the main, rotate the spindle by hand until it's aligned, close the collet on the workpiece, and push a button called 'phase set' that zeroes out the encoders. You're now able to pass the part on the fly at any rpm."

As for the probing mentioned earlier, the company is set to release this feature on its L-series machines. "We introduced an ATC (automatic tool changer) on some of our machines last year, and some of our customers began asking for a faster, more automated way of setting tools than with a presetter," Such said. "So we will soon have a probing system available that has a probe in the ATC and one next to the sub-spindle, which shops can use to touch off tools during the setup process as well as measuring parts while machining. It's pretty cool."

The Fix is In

Star CNC Machine Tool Corp., Roslyn Heights, N.Y., is another machine builder with an extensive lineup of Swiss-style lathes and proprietary technology. Yet it's the company's new fixed headstock machine that has National Sales Manager Ed Garber most excited. That's because the SK51—a mill-turn lathe with twin-turrets, twin-spindles, and 51-mm bar capacity—boasts FANUC's iHMI (intelligent human machine interface)

Such went on to point out the ease with which an operator can synchronize the main and sub-spindle, a task that has long been challenging on some machines. "Anyone with a control, which Garber suggests changes the playing field in terms of operator usability.

"The turrets on the SK51 have identical X, Y, and Z travels and can each carry up to 32 tools, so there's a lot going on here," he said. "Because of this, we needed a control with excellent simulation capabilities, one that can display the tools, milling attachments, and workpiece in 3D and identify any potential interference before the operator pushes cycle start."



The SK-51 type A CNC Swiss automatic lathe from Star comes with FANUC's iHMI control, offering ease of use and advanced graphics. (Provided by Star)

As with the other machine suppliers interviewed for this article, Star wanted a control that's powerful yet easy to use. The iHMI meets both requirements, with cycle time estimation capabilities, graphical tool libraries, maintenance reminders, and machine troubleshooting functions, including visibility to servo and spindle operating values. "We've also made it simpler to touch off tools, and have several other features that help

shorten both setup and cycle times,” said Garber.

He agreed with his peers that quick-change tooling systems are a vital piece of any machine tool optimization strategy, Swiss or otherwise, and mentioned Exsys Automation and its DECOFLEX system as a top contender. And like others, Garber noted as well the increasing role that Industry 4.0 is playing for manufacturers of all stripes, machine shops among them. For Star and other brands of CNC equipment that use FANUC controls, that means the SMOOSS-i, short for Star Monitoring & Operator Support System.

“A customer puts this on their server, connects the machine tools to the network and has instant, real-time access to machine status, part counts, tool life values, scheduling information, and so on,” Garber said. “It will send e-mail notifications if there’s a problem and can be used to back up machine parameters and SRAM data. We find that it’s a great tool for management to keep a proactive eye on things, but for those manufacturers who display production information on a big screen TV out on the shop floor, it serves to get the machine operators and programmers more involved. Because everyone has access to the same data, they now take greater ownership and responsibility for the metrics shown there.”



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SUCCESS STORY

Machine tool probing increases FMS productivity by 60%



One of Trevisan's longest-standing clients, a multinational provider of valves for the oil and gas sector, invited Trevisan to provide a flexible manufacturing system (FMS) that could produce valves with high precision and productivity, with minimal manual intervention. Trevisan turned to an array of Renishaw machine tool measurement solutions to provide the enhanced levels of process control the system required.

Background

Founded in 1963, Trevisan Machine Utensili (Trevisan) located in Italy, is recognised as a global leader in the design and production of stationary-part turning machines. They are used in a variety of industries, including aerospace, agriculture, automotive, energy and marine.

Trevisan has always been characterised by extremely high quality and engineering standards. Its machines are designed and manufactured in-house, ensuring complete control over each step of the production process.

Committed to continuous technological advancement, the company also offers

customers complete state-of-the-art FMS solutions, integrating multiple Trevisan machining centres, pallet management systems and automated tool stores.

Challenge

Trevisan's FMS proposal to its client comprised a production line of four of its DS600/200C machining centres, backed by a double-height,



Massimo Marcolin, Commercial Director of Trevisan Machine Utensili

SUCCESS STORY

40-place multi-pallet system and a robot-controlled 600-position tool store capable of tackling a range of metals including special steels, stainless steel, alloys and inconel.

Working as the lead contractor, Trevisan engaged with Renishaw for the supply of measurement systems to control and verify parts and tools, as well as other specialist suppliers for the provision of the pallet-handling system and robotics. Trevisan had used Renishaw equipment on its own machine tool production lines for many years, and the valve manufacturer approved of the choice.

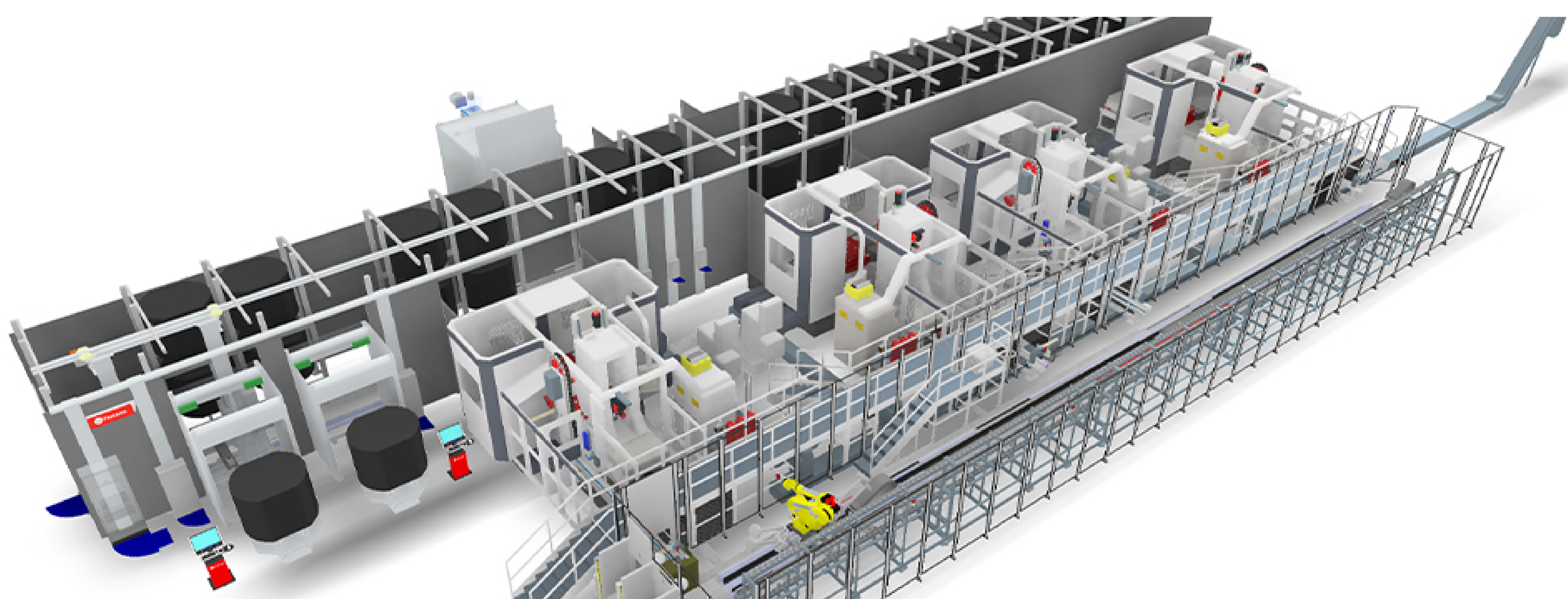
For valves used in the international oil and gas sector, the quality of production is paramount. Not only do valves need to ensure the safety of workers, they also need to be relied upon to interrupt oil or gas flows without fail. Perfect tightness is an absolute fundamental requirement for a valve, since even the tiniest of cracks or the minutest of flaws can result in an escape of oil or gas that can pollute and endanger the surrounding

environment.

Massimo Marcolin, Sales Director of Trevisan Macchine Utensili said, “To avoid any risk of hazards, valve manufacturing requires maximum precision. For the internal parts of the valve, where flow interception occurs in the core, we cannot allow the slightest inaccuracy. This would render the whole valve unusable.”

Achieving the high levels of accuracy and part quality required presented a series of part and tool measurement and verification challenges:

- **Pre-process part verification and set-up:** determining the precise position of the raw part on a pallet, its exact dimensions and any stock allowance enables optimised roughing, milling and turning processes.
- **In-process part verification:** in-cycle measurement of machined features to verify and control performance.
- **In-process tool measurement:** automated checking of tool health, guarding against tool wear and breakage.
- **Finishing tool verification:** checking cutting tools for wear or damage prior to final finishing processes.



Trevisan's Flexible Manufacturing System for valve production

SUCCESS STORY

Marcolin explained, “The FMS is designed such that each valve is processed on a single machining centre, with the aim of producing a valve that's perfectly ready to be fitted and used. This requires that all of the finishing work is completed within the machine and means the finishing tool has to be perfect in its precision.”

Solution

Inspection probe technology

Each raw part arriving at a machining centre on a pallet is measured automatically on the machine tool using a Renishaw RMP40 radio transmission spindle probe. This ultra-compact touch-trigger probe allows easy access to all part features, enabling repeatable measurement of part dimensions, position and alignment on the pallet within 1 µm accuracy.

The probing system communicates with the machine tool CNC via a Renishaw radio machine interface, RMI-Q.

Measurement results are used to align the part and work co-ordinate systems and set-up the machine tool for precision turning, milling and grinding operations.

By using frequency hopping spread spectrum (FHSS) communication, the radio probe overcomes the line-of-site difficulties associated with large multi-task machining centres. Constructed from the highest-grade materials, the probe ensures robust and reliable performance in the harshest environments, tolerating shock, vibration, temperature extremes and constant coolant exposure.

Operating in the recognised 2.4 GHz ISM waveband, the probe complies with all international radio regulations. This means multiple radio probes can operate within the same FMS without interfering with one another.

The RMP40 is also employed throughout the valve machining process for dimensional checks on roughed and finished features, to ensure process operations remain in control.

Non-contact tool measurement

With a part's dimensional accuracy dependent on multiple variables, including tool size deviation and run-out, accurate tool measurement and verification throughout the valve manufacturing process is a vital consideration. To achieve the accuracy required, while maintaining fast machining centre throughput, Trevisan elected to use the Renishaw NC4 non-contact laser tool setting system.

Passing a beam of laser light between a transmitter and receiver, the NC4 system is installed inside the machining centre so that cutting tools can be passed through the beam. A tool interrupting the beam causes a reduction in the amount of laser light reaching the receiver, generating a trigger signal. This records the machine position, a process that enables accurate determination of tool dimensions, geometry and any breakage.

Suitable for all types of machining centre, the NC4 system supports a wide range of operating gaps and

SUCCESS STORY

and configurations and features an integral air blast and MicroHole™ and PassiveSeal™ technologies to protect its precision optics. It measures and detects tools or features as small as 0.03 µm in diameter and to a repeatability of +/-1 µm.

High-precision tool setting arms
Also part of the FMS' tool set-up operations, Renishaw's high-precision motorised arm (HPMA) was used for in-process tool measurement and broken tool detection on the finishing CNC lathe.

The HPMA comprises a motorised tool setting arm, a RP3 3-axis probe, stylus kit and the TSI3 machine interface (used to communicate with the CNC machine controller).

The arm is available for machine chuck sizes from 6 in to 24 in, with stylus configurations for all standard tooling sizes between 16 mm and 50 mm.

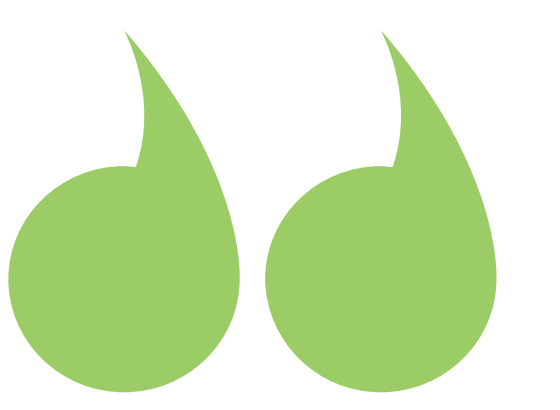


Left to right: RMP40 radio transmission probe, NC4 non-contact laser tool setting system, high-precision motorised arm



For us, it seemed logical to offer our client Renishaw probes and tool setting systems on the FMS as this was what we already knew well and used with great satisfaction. At the same time our client, like us, has also been working with Renishaw for many years and even suggested the use of Renishaw technology themselves.

Trevisan Macchine Utensili (Italy)



Results

By integrating Renishaw machine tool probing systems for the set-up and measurement of valve parts and cutting tools, Trevisan Macchine Utensili has created a flexible manufacturing system for its client that succeeds in maximising precision and productivity.

By automating previously manual operations, the FMS has eliminated both the risk of human error and the risk of scrappage caused by excessive tool wear or tool breakages. Measurements are made with greater accuracy without sacrificing production throughput.

Since operating the FMS at full capacity, the valve manufacturer has reported a significant increase in overall productivity of 60% and a defect count of zero. It is producing more high precision valves for the oil and gas sector, more reliably and without any wastage.



Integrated Robotics Increases Productivity for LaserBond



Challenge

- To improve the productivity of LaserBond's laser cladding system using integrated robotics

Solutions

- Integrated Architecture - Allen-Bradley® Compact GuardLogix® controllers delivered high-level robotic control with integrated motion and safety
- Allen-Bradley Kinetix® Servo Drives provided integrated motion on EtherNet/IP
- Allen-Bradley UPS Power Supplies
- Stratix® switches provided switching capabilities
- Information and Visibility - Studio 5000® reduced commissioning time. FactoryTalk® View SE provides real time visibility and remote access is provided by FactoryTalk ViewPoint

Results

- **Reduced Component Wear** - LaserBond's customers experience four to five times more life from their components
- **Improved Productivity** - The average time required for robot set-up has been reduced by approximately 6-fold. Improved connectivity provides access to operational and diagnostic data.
- **Enhanced Usability** - The new system is easy to use and delivers an enhanced user experience

Capital-intensive industries rely on plant and equipment performing at peak efficiency, which is often reduced by wear and corrosion of essential components. Laser cladding can be effective in improving the performance and longevity of equipment that is prone to wear and corrosion in industrial environments.

Laser cladding is an additive manufacturing process. It allows the addition of high performance metal or composite layers with a metallurgical bond to new or remanufactured components to provide enhanced protection against wear and corrosion.

The wear of components can have a profound effect on the productivity and total cost of ownership of capital equipment.

Equipment and components are subject to material removal through a number of mechanisms including abrasion, erosion, corrosion, cavitation, heat and impact, and any combinations of these wear mechanisms – therefore a tailored surface metallurgy will extend a component's life and enhance its performance.

SUCCESS STORY

LaserBond is an Australian specialist surface engineering company that has developed innovative laser cladding solutions and systems for use in a range of industries.

The company recognised the value of investing in new technology to improve the productivity of the robotic laser cells used in the laser cladding process.

Simplifying set-up

The drivers for automation vary depending on the application but are commonly focused on improving manufacturing efficiency and productivity. In the case of laser cladding, automation is essential as the process is only possible with the precise control of robotic motion and therefore cannot be conducted manually.

Wayne Hooper CEO LaserBond, explains that, “Every laser cladding job is different, so we really need to have automation systems that are user friendly for operators.

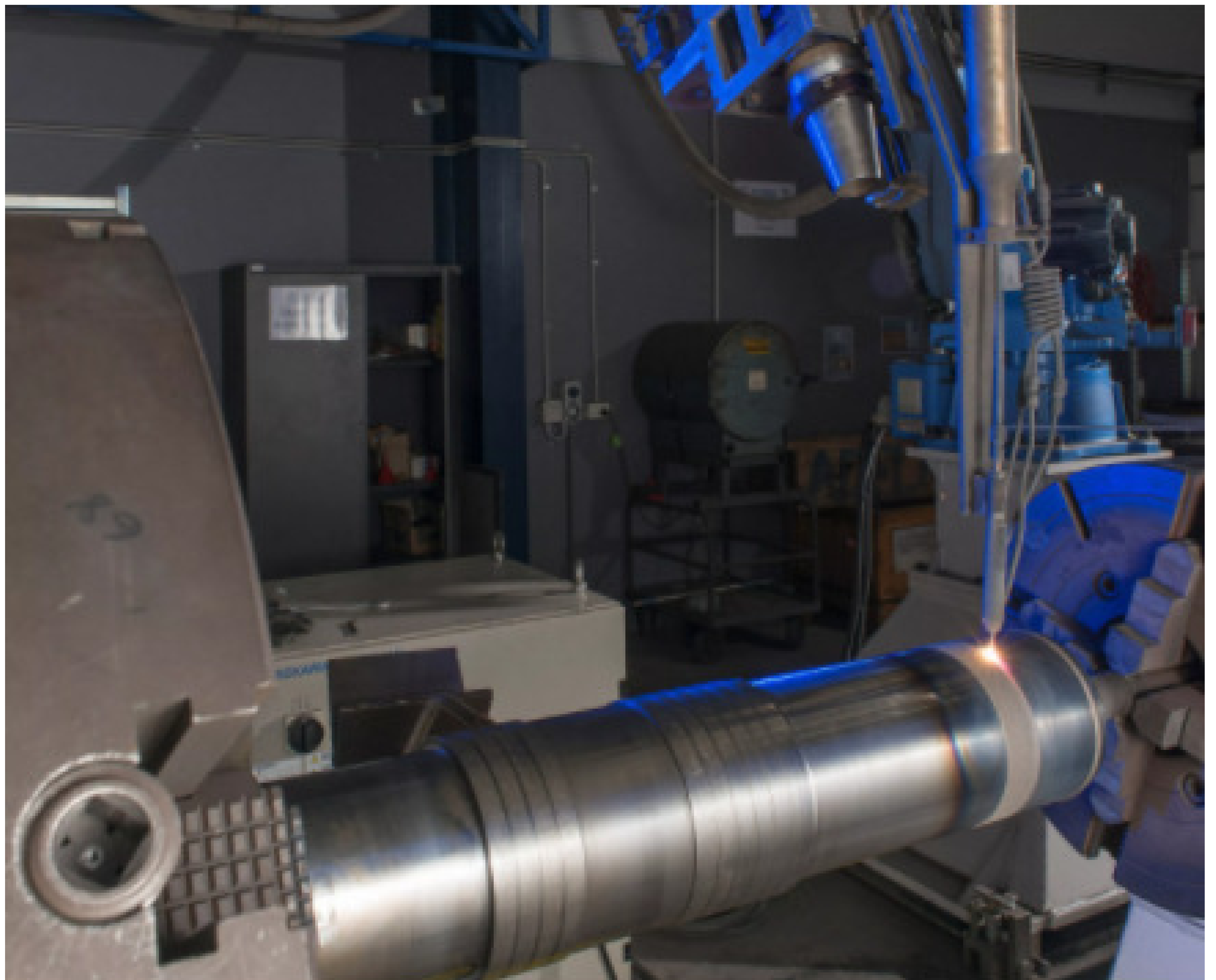
They need to be an easy set-up, with clear instructions to safely drive the robot, drive external axes, control the laser and control associated equipment.”

To improve the speed and accuracy of the set-up process for different jobs, LaserBond tasked Rockwell Automation to provide the hardware and systems to assist in the development of user-friendly controls that reduce set-up time, therefore increasing productivity.

The challenge was to make each robotic laser cladding cell easier to operate so the operator can set up each job without having to edit robot code.

Integrated robotics

The new solution involved the Rockwell Automation Integrated Architecture® control and information portfolio using Allen-Bradley® Compact GuardLogix® controllers and Allen-Bradley Kinetix® Servo Drives with integrated safety and motion on EtherNet/IP. This helps deliver the capability to create intelligent equipment that reduces set-up time and provides access to information.



Laser cladding produces very high performing surfaces

SUCCESS STORY

With all coding developed in the PLCs for robot control, this simplified integration and assisted with increased operational efficiency for robot design and development. Furthermore, commissioning time was reduced by using the Studio 5000® environment, which also provided remote access to the system through FactoryTalk® View Site Edition and also FactoryTalk TransactionManager.

There are significant safety issues when working with lasers and robots. A very high power laser is used for laser cladding making it critical that people are not in the vicinity of the process and helping to mitigate safety risks. By having inbuilt safety in the PLC, the safety of the system was streamlined and the need to wire safety components separately was avoided.

Rockwell Automation

Encompass™ Product Partner, Burkert Fluid Control Systems, provided flow controllers on EtherNet/IP. Mass flow control allows for repeatability and consistency throughout the process so it is measured and managed appropriately.

“The completely integrated solution works well with the entire robotic laser cell, and operator usability was enhanced with FactoryTalk® View Site Edition (SE). By integrating safety and control the system was greatly simplified and set-up time for each application was reduced,” said Wayne Hooper.



Automation is essential in the laser cladding process as it is only possible with the precise control of robotic motion

Improved usability, speed and accuracy

Laser cladding is an effective way to improve the performance of equipment that is prone to wear and corrosion in industrial environments. “Our customers typically get greater extended life out of their components because we are able to produce very high performing surfaces,” explained Hooper.

SUCCESS STORY

“The main saving for most of customers is not so much the cost of the part itself but the cost of the downtime associated with changing that part,” he added.

The key objective of this project was to improve the productivity of the laser cladding process by reducing the set-up time required for each particular application.

Thanks to the new control system, the control program set-up time has been reduced from typically 30 minutes to less than 5 minutes for most jobs. In addition, LaserBond can now save more data,



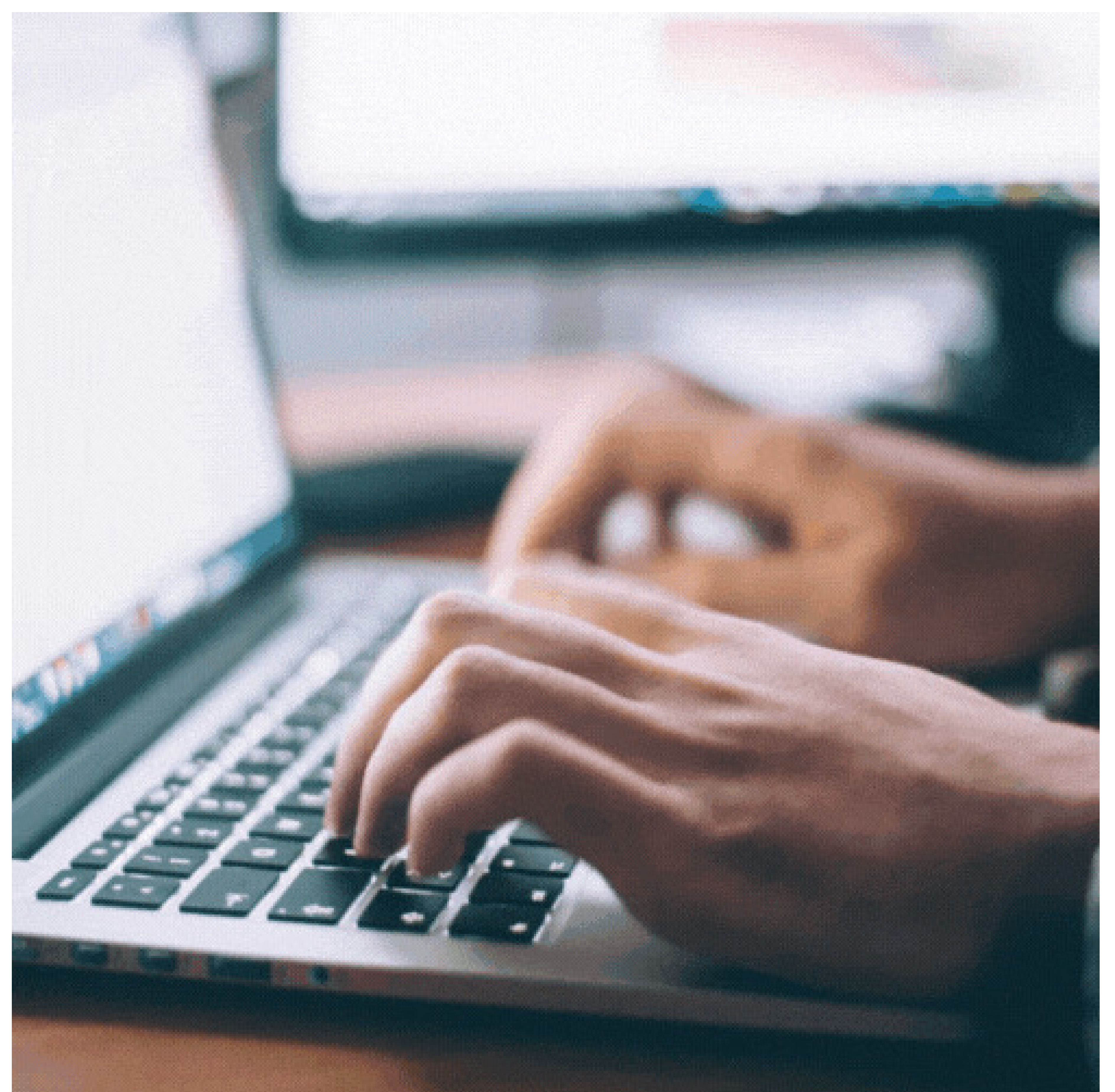
Laser cladding improves the performance of equipment that is prone to wear and corrosion in industrial environments

building a library so that if there is a similar job, there is no need to start the programming process from scratch, introducing further time savings.

“Given the inherent variability in application requirements we needed a system that was quick to set up with enhanced usability. The new systems are very much in line with Industry 4.0, providing access to operational and diagnostic information from the machine. They have improved the connectivity of our robotic systems and enabled us to improve productivity significantly,” concludes Wayne Hooper.



**Rockwell
Automation**



SUCCESS STORY

Yumi At The Heart Of Copan Microbiology Labs



Copan, a leading multinational manufacturer of sampling and storage systems for clinical microbiology has successfully tackled the world of automation for microbiology labs with their WASP® ecosystem, designed and developed in 2008 by the division of the same name.



Their collaboration with ABB has led to the integration of the collaborative robot YuMi within their automated ecosystem. With its compact size, adaptability and precision arms and grippers, YuMi is perfectly aligned with Copan WASP's mission: to make automation a benchmark and industry norm for microbiology labs, thereby revolutionising analysis processes and providing an even faster and more efficient medical response, to help protect people's health and well-being.

Summary

The challenge

Copan wanted a highly accurate solution that could

automate lab processes not already dealt with by their own WASP® solutions. The aim was to reduce waiting times, deliver reliable results and improve the safety of lab technicians by reducing the risk of them coming into contact with dangerous substances, such as samples at risk of contamination with SARS-CoV-2.

The solution

To implement YuMi, a small robot with a high degree of adaptability, directly within the WASP® ecosystem. Its precision arms perfectly replicate human tasks, allowing numerous routine processes within the laboratory to be standardized and automated.

Application

Laboratory analysis with standardized movements, allowing a higher level of precision and a reduced number of errors.

SUCCESS STORY

Technology and automation at your service

Founded in 1979 as a small local company in Mantua, Copan (an acronym for “Collection and Preservation for Analysis”) grew over the years to become a major multinational. This is thanks to the countless introductions of innovations in the preanalytical sector, such as transport media for microbiological samples and revolutionary swabs. To maintain high standard levels and exceptional performance, the company has always relied on automation.

In 2008 the company developed COPAN WASP®, a revolutionary system that automates various stages of bacteriological specimen processing: from seeding to incubation, image analysis to colony picking through to gram plate preparations and broth medium inoculation. “Designed to run 24/7, WASP allows labs to optimise their workloads

and get analysis results back more promptly” explains Mario Savarese, CEO of Copan WASP. “Time is a key factor in microbiology. The ability to obtain analysis results back in less time allows us to act quicker for the patient”.

The challenges in this field are not just time-limited. Each laboratory is highly individualized and the type of specimen to be analyzed varies from case to case. Over the years, Copan has strongly focused on customer demand to be able to offer a flexible, modular solution that can be tailored to specific requirements, whatever those might be. From there began the search for a trusted partner who could maintain their technological automation theme, whilst allowing for a quick and easy delivery of customisable solutions. The choice fell on ABB and YuMi.

Precision and health protection, how YuMi has revolutionized laboratory life

The collaboration with ABB is part of Copan’s long-running use of robotics, as it looked for a small,

flexible, collaborative assistant, capable of perfectly mimicking human movements. “Copan’s vision for its automation line is to continually introduce new functionality and application modules to respond to client needs and maintain our technical market leadership” says Savarese. “With its versatility, precision and ease of use, YuMi has been an indispensable ally in achieving our goal”.

A collaborative robot is no substitution for a lab technician, but it can be an excellent ally when dealing with hazardous samples that could put workers’ health at risk. “Our customers have to analyze everything; sometimes the samples handled by the lab are dangerous, and no matter how carefully the technicians handle them, it is difficult to fully eliminate the risks associated with their physical handling” explains Mario Savarese. “But YuMi, with its mechanical arms and precision grippers, allows us to carry out these actions without the lab technicians coming into contact with the samples, thus protecting their health”.

SUCCESS STORY

The benefits of implementing YuMi within the WASP system don't stop there: "Standardization is another key aspect of microbiological analysis" continues the WASP CEO. "In order to be able to compare analysis data from different laboratories, it is important that the samples are all treated in the same way. This level of precision would be unobtainable without the help of an advanced collaborative robot like YuMi".

A strong partnership to meet the challenges of the future

The COVID-19 pandemic has required non-stop and ever-faster analysis of swabs, the main means of viral diagnosis and screening, challenging microbiology laboratories with unprecedented levels in both the peaks in demand and their volatility. Once again, YuMi is also proving to be a valuable ally, alongside Copan WASP and its new UniVerse system:

"Laboratories around the world are working tirelessly to process samples due to this pandemic," says Mario Savarese. "This is one of those cases where automation plays a vital role, both because it allows you to keep the laboratory actively processing samples 24/7, and because it allows us to protect the health of lab technicians. For this new project, YuMi has also been an indispensable tool for us and its ease of programming has been of great help throughout the research and development phases".

Copan & ABB are connected by a continual information exchange with one single purpose: to transform and improve the support to people through meaningful use of the latest advances in technology. In one example of this extremely close collaboration, Copan has been looking into types of automation that could expand the potential capabilities with YuMi, and creating prototypes. One of the solutions being explored by Copan is to make YuMi mobile by fitting it with

wheels to allow by fitting it with wheels to allow it to be moved around the laboratory and enable it to interface with other automated equipment such as UniVerse that are used in transporting samples between machines.

"Both our employees and customers are very enthusiastic about YuMi; from the engineers who have worked directly on it, through to lab technicians who have been given the space and time to undertake more interesting activities. In short, YuMi has changed the way we manage our most valuable resources: our people, their time and their health".



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17 – 23 JUNE 2021

International Machine Tool And Manufacturing Technology Exhibition (IMTEX) 2021
BIEC Bengaluru International Exhibition Centre, Bengaluru, India

22 – 25 JUNE 2021

Ceramics China 2021
China Import and Export Fair(Canton Fair Complex), Guangzhou, China

15 – 17 JUNE 2021

Sepem Industries Est Colmar 2021
China Import and Export Fair(Canton Fair Complex), Guangzhou, China

05 – 06 JUNE 2021

International Conference On Medical, Medicine And Health Sciences
The Federal Kuala Lumpur, Kuala Lumpur, Malaysia

30 JUNE– 02 JULY 2021

International Facility Management Expo
Sands Expo and Convention Centre, Singapore

30 JUNE – 02 JULY 2021

Archxpo
Sands Expo and Convention Centre, Singapore

12 JUNE – 13 JULY 2021

Canadian International Conference On Advances In Education,Teaching & Technology
Sands Expo and Convention Centre, Singapore

15 – 18 JUNE 2021

Malaysia International Plastic, Mould & Tools Exhibition
The Federal Kuala Lumpur, Kuala Lumpur, Malaysia

29 JUNE – 02 JULY 2021

East China Fair
Shanghai New International Expo Center, Shangai, China

21 – 24 Jun 2021

Arab Health
Dubai World Trade Centre, Dubai

30 JUNE– 02 JULY 2021

INMEX Vietnam
Saigon Exhibition & Convention Center (SECC), Ho Chi Minh, Vietnam

23 – 25 JUNE 2021

8th Highly-Functional METAL EXPO OSAKA
Osaka, Japan

JULY

21 – 23 JULY 2021

Indo Renergy 2021 Expo & Forum
Jakarta Convention Center (JCC), Jakarta - Indonesia

28 – 30 JULY 2021

Intex South Asia Colombo
Bandaranayaike Memorial International Conference Hall, Colombo

14 –16 JULY 2021

Green Architecture And Construction Materials Expo
Shanghai New International Expo Centre(SNIEC), Shanghai, China

20 – 22 JULY 2021

Texworld USA
Javits Center, New York City, USA

07 – 08 JULY 2021

BuildTech Asia 2021

Singapore Expo, Singapore

22 – 24 JULY 2021

Korea Smart Device Trade Show 2021

Ko-Egseu, Seoul, South Korea

07 – 10 JULY 2021

MTA Vietnam 2021

Saigon Exhibition & Convention Center (SECC), Ho Chi Minh, Vietnam

28 – 30 JULY 2021

PROPAK VIETNAM 2021

Saigon Exhibition & Convention Center (SECC), Ho Chi Minh, Vietnam

15 – 18 JULY 2021

The 31st Malaysia International Machinery Fair (MIMF 2021)

Federal Kuala Lumpur, Kuala Lumpur, Malaysia

AUGUST

26 – 28 AUGUST 2021

Plastech Expo Vietnam 2021

Saigon Exhibition & Convention Center (SECC), Ho Chi Minh, Vietnam

19 – 22 AUGUST 2021

Taiwan 3D Printing & Additive Manufacturing Show

Taipei Nangang Exhibition Center Nangang District, Taipei City

5 – 8 AUGUST 2021

International Printing, Paper, Packaging Machinery Exhibition

World Trade Centre, Kuala Lumpur, Malaysia

25 – 27 AUGUST 2021

INAMARINE 2021

Jakarta International Expo (JIExpo) Kemayoran, Jakarta – Indonesia

06 – 08 AUGUST 2021

Baoan Industry Development Expo

Shenzhen International Convention & Exhibition Center, Shenzhen, China

27 – 28 AUGUST 2021

Techpoint Build

Event Centre Lagos, Nigeria

25 – 27 AUGUST 2021

Intertextile Shanghai Apparel Fabrics

National Convention & Exhibition Center, Shanghai, China

20 AUG – 06 SEPT 2021

Canadian National Exhibition

Exhibition Place, Toronto, Canada

24 – 28 AUGUST 2021

China International Industry Fair 2021

National Convention & Exhibition Center, Shanghai, China

10 – 12 AUGUST 2021

Pacific Design & Manufacturing

Anaheim Convention Center, Anaheim, USA

19 – 21 AUGUST 2021

IIAE 2021

Jakarta International Expo (JIExpo) Kemayoran, Jakarta – Indonesia

26 – 29 AUGUST 2021

EAST PACK SURABAYA 2021

17 – 19 AUGUST 2021

SEMICON Southeast Asia

PARKROYAL COLLECTION Marina Bay, Singapore

07 – 10 AUGUST 2021

Thailand International Electrical Appliances Expo

Bangkok, Thailand

SEPTEMBER

10 – 11 SEPT 2021

National Imprint Canada Show 2021

The Toronto Congress Centre,
Toronto, Canada

22 – 25 Sep 2021

Automation Expo Mumbai

Nesco Centre Hall, Mumbai,
India

29 SEPT – 02 OCT 2021

**International Natural Stones,
Design & Technology Exhibition**

Veronafiere, Verona, Italy

30 SEPT – 02 OCT 2021

INAGREENTECH 2021

JIExpo Kemayoran, Jakarta-
Indonesia

23 SEPT – 26 SEPT 2021

**Philippine World Building And
Construction Exposition**

World Trade Center Metro
Manila, Manila, Philippines

23 SEPT – 25 SEPT 2021

**China (Shenzhen) International
Logistics And Supply Chain Fair**

Shenzhen International
Convention & Exhibition
Center ,Shenzhen, China

15 SEPT – 17 SEPT 2021

InterCHARM Korea

COEX Mall, Seoul, South Korea

19 SEPT – 21 SEPT 2021

**The Leading International
Footwear Industry Trade Fair**

Istanbul Expo Center, Turkey

03 SEPT – 05 SEPT 2021

Shenzhen E-Cig Expo2021

Shenzhen Convention &
Exhibition Center,Shenzhen,
China

12 SEPT – 15 SEPT 2021

**The Big 5: International Building
And Construction Show**

13 SEPT – 16 SEPT 2021

Koplas 2021

Daehwa-dong, Goyang-si, South
Korea

10 SEPT – 12 SEPT 2021

MegaBuild 2021

Jakarta International Expo
(JIExpo) Kemayoran, Jakarta –
Indonesia

08 SEPT – 11 SEPT 2021

Oil & Gas Indonesia 2021

Jakarta International Expo
(JIExpo) Kemayoran, Jakarta –
Indonesia

OCTOBER

12 – 14 OCT 2021

**Trade Fair For Deburring
Technologies And Precision
Surfaces**

DeburringEXPO Karlsruhe,
RheinstettenAnd Precision
Surfaces

11 – 13 OCT 2021

INMEX SMM India Mumbai

INMEX SMM India, Mumbai,
India

20 – 22 OCT 2021

**TAITRONICS 2020 (46thTaipei
International Electronics Show)**

Taipei Nangang Exhibition
Center, Hall 1 (TaiNEX
1) Taipei, Taiwan

13 –15 OCT 2021

**International Metal Technology
Indonesia 2021**

Jakarta International Expo,
Kemayoran, Indonesia

15 – 19 OCT 2021

**Canton Fair International Pavilion
- Phase 1**

China Import and Export
Fair(Canton Fair Complex),
Guangzhou, China

15 – 16 OCT 2021

The Property Investor Show

ExCeL London - UK

DECEMBER

06 – 10 OCT 2021

**VIETNAM INTERNATIONAL
INDUSTRIAL FAIR 2021**

Hanoi International Center for
Exhibition (I.C.E.), Hanoi,
Vietnam

28 – 30 NOV 2021

**International Apparel & Textile
Fair**

Jakarta Convention Center
(JCC), Jakarta - Indonesia

4 – 16 DEC 2021

Automechanika Dubai

Dubai World Trade Centre,
Dubai

27 – 29 OCT 2021

Japan IT Week Autumn

Osaka, Japan

03 – 06 NOV 2021

VINAMAC EXPO 2021

Saigon Exhibition and
Convention Center, Ho Chi
Minh City, Vietnam

06 – 08 DEC 202

**Middle East Organic And
Natural Product Expo - Dubai**

Dubai World Trade Centre,
Dubai

27 – 29 OCT 2021

Automotive World Nagoya

Nagoya International
Exhibition Hall, Nagoya, Japan

16 – 19 NOV 2021

**The Leading International Trade
Fair For The Medical Sector**

Düsseldorf, Germany

09 – 11 Dec 2021

China Machinex India 2021

Bombay Exhibition Centre,
Nesco Complex, W.E.
Highway, Goregaon East,
Mumbai

19 – 21 OCT 2021

KORMARINE 2021

BEXCO, Busan, South Korea

30 NOV – 01 DEC 2021

Be 4.0 Industries Du Futur 2021

Parc Expo de Mulhouse,
Mulhouse, France

04 – 07 DEC 2021

**Vietnam International Electrical
Appliances ExpoFair**

International Pavilion - Phase 1

Saigon Exhibition and
Convention Center, Ho Chi
Minh City, Vietnam

NOVEMBER

04 – 07 NOV 2021

Philconstruct

SMX Convention Center
Manila, Manila, Philippines

17 – 20 Nov 2021

**The 33rd International Plastics
& Rubber Machinery,
Processing & Materials
Exhibition**

Jakarta International Expo
(JIE expo) Kemayoran, Jakarta –
Indonesia

14 – 27 NOV 2021

India International Trade Fair

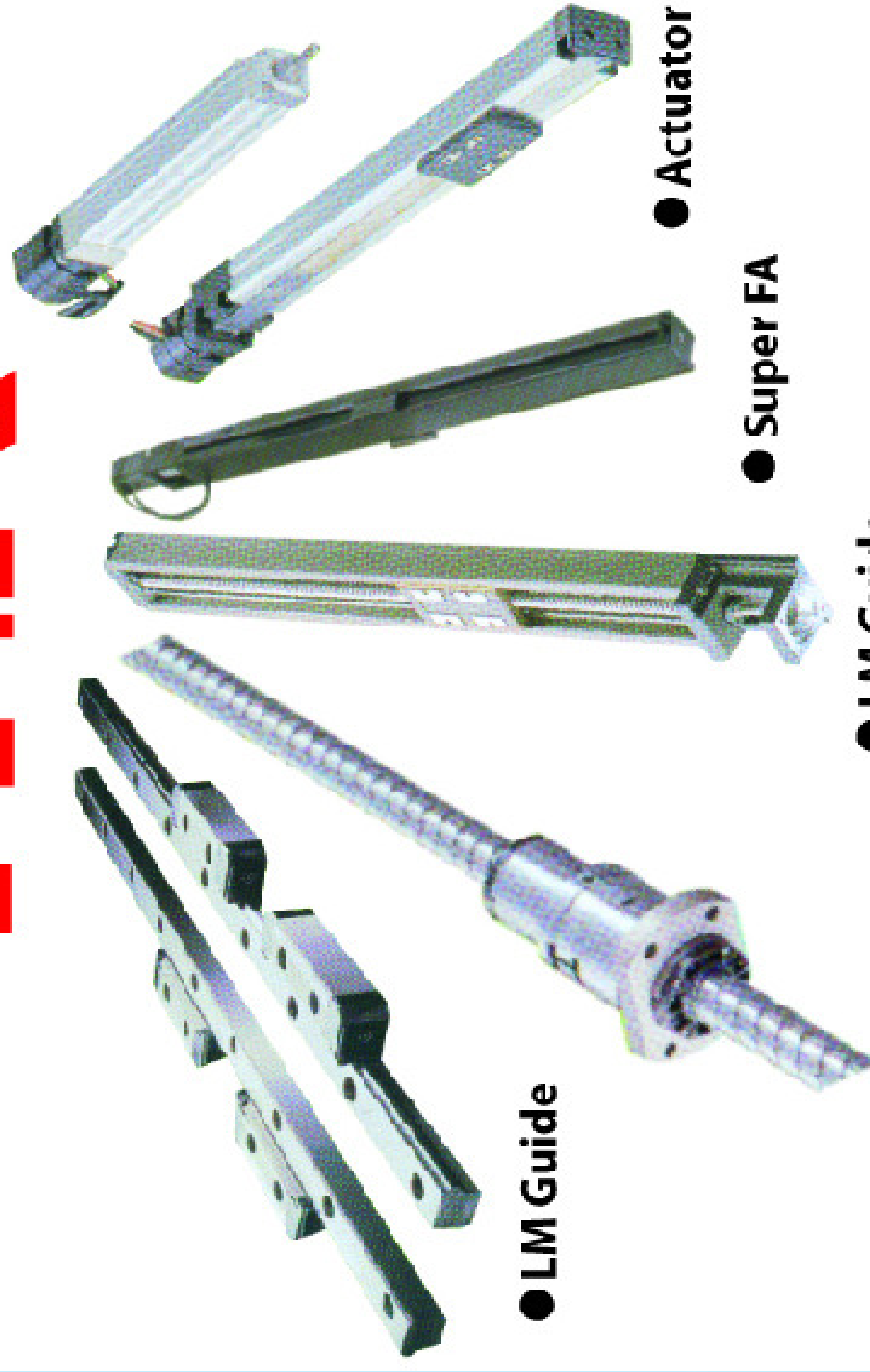
Pragati Maidan, New Delhi,
India.

10 – 12 Nov 2021

Electric & Power Vietnam 2021

Saigon Exhibition and
Convention Center, Ho Chi
Minh City, Vietnam

THK



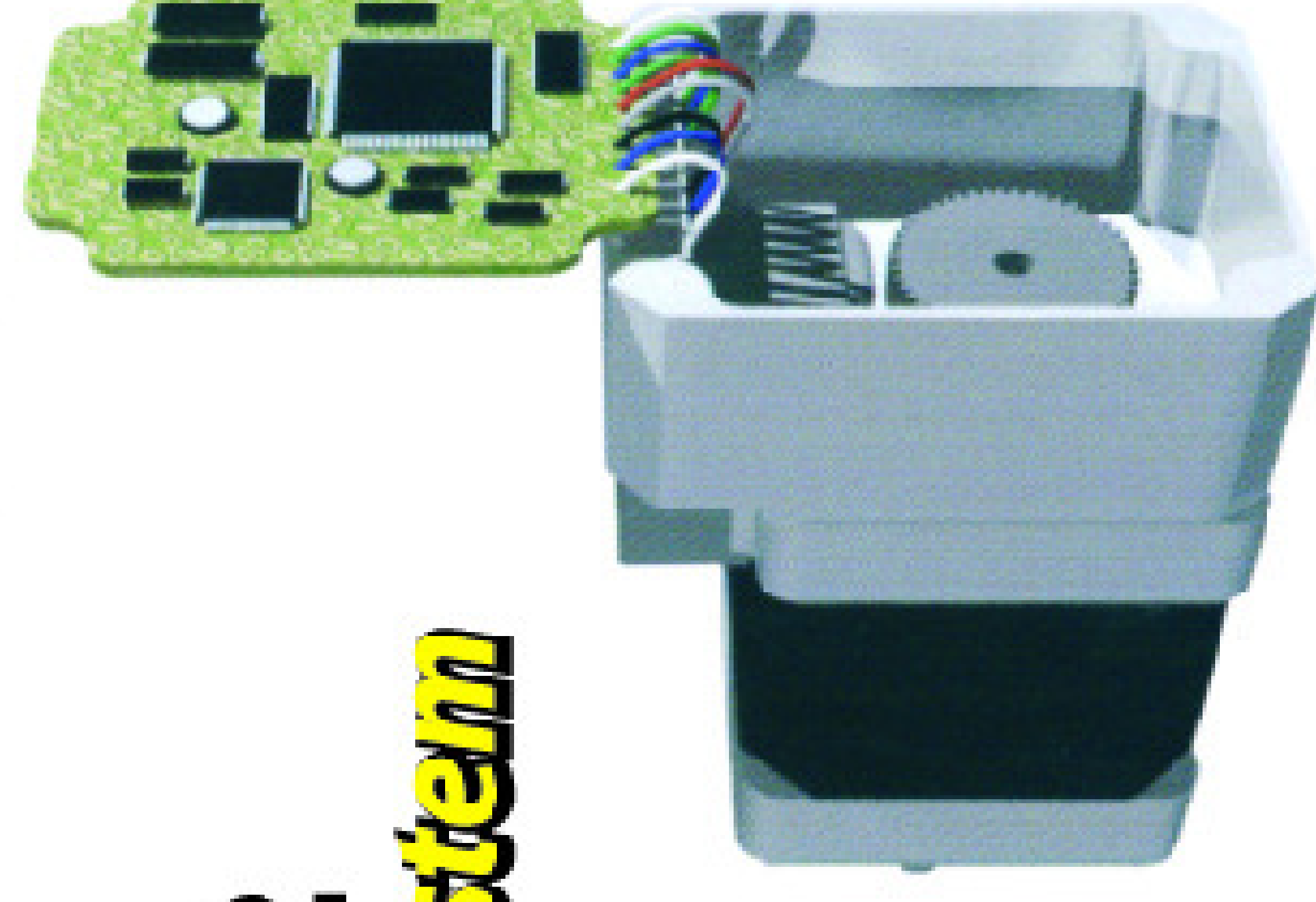
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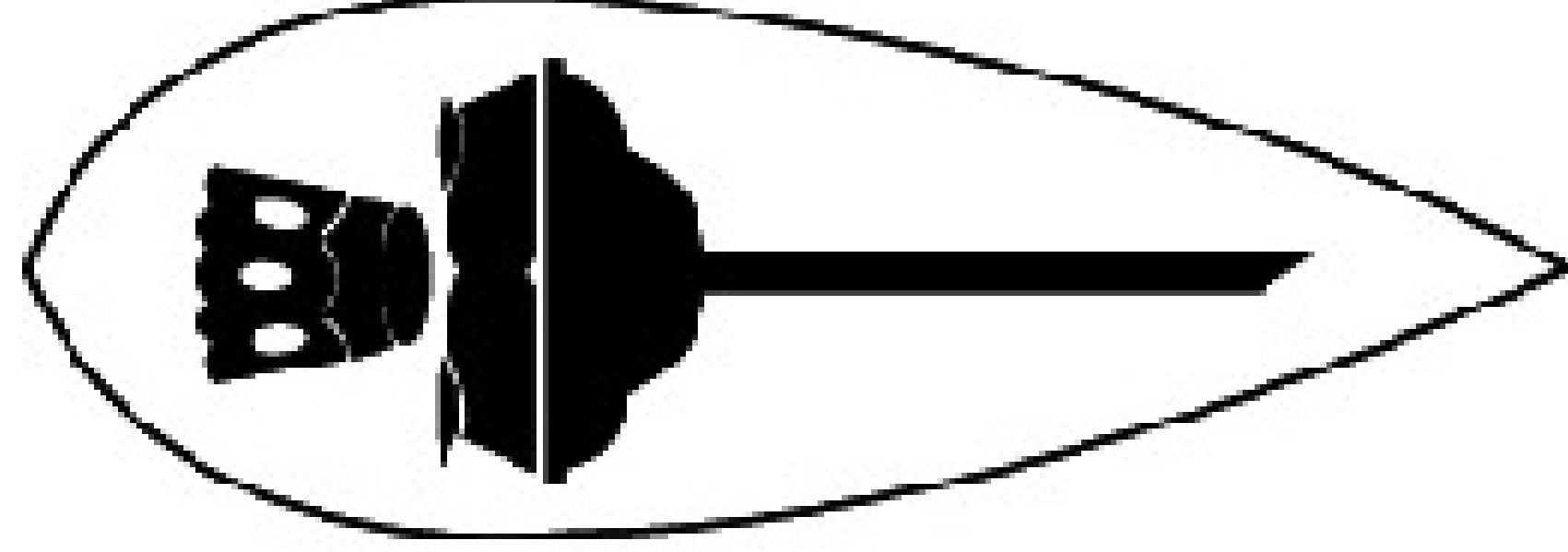
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