

gear

TECHNOLOGY INDIA

VOLUME 4, ISSUE 4, 2026
July Edition

www.geartechnologyindia.com

NEERAJ BISARIA
MANAGING DIRECTOR & PRESIDENT
PREMIUM GROUP

EXCLUSIVE INTERVIEW

MOTION + POWER
MANUFACTURERS ALLIANCE™



American
Gear Manufacturers
Association



ABMA American Bearing
Manufacturers Association

High Performance Gear Cutting Tool Solutions



lmt.in@lmt-tools.com
+91 2135 614960

www.lmt-tools.com



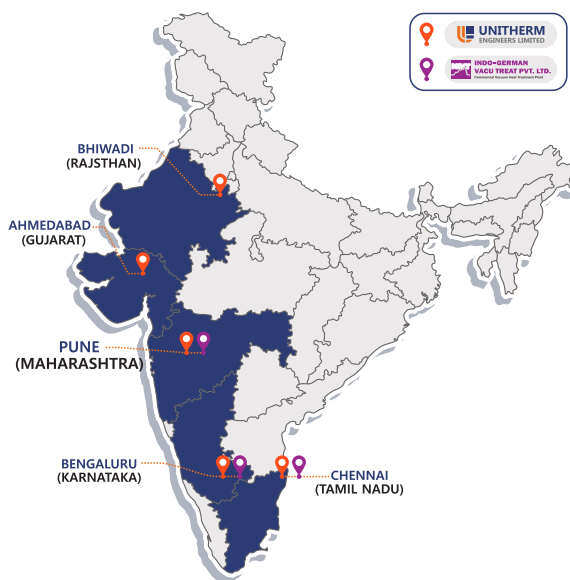
ONE GROUP. ONE UNITHERM. DELIVERING TRUST ACROSS INDIA!

**Complete Heat Treatment Expertise for Stronger,
Reliable & High-Performance Components.**

ENGINEERING OUTCOMES THAT DRIVE YOUR SUCCESS

-  Enhanced Gear & Component Reliability
-  Precision Heat Treatment with Minimal Distortion
-  Consistent Hardness & Accurate Case Depth
-  Complete Heat Treatment Solutions Under One Roof
-  On-Time Delivery with Optimized Lead Times
-  A Trusted Heat Treatment Partner for Long-Term Success

STRATEGICALLY LOCATED NEAR MAJOR INDUSTRIAL HUBS



WHY PARTNERING WITH UNITHERM GROUP

 30+ Years of Experience	 5 Strategic Locations
 100+ Heat Treatment Solutions	 Thousands of Components Processed Every Month
 Consistent Quality & On-time Delivery	 Expert Metallurgical Support

OUR GROUP COMPANIES & CAPABILITIES



COMMERCIAL ATMOSPHERIC HEAT TREATMENT

PROCESSES

- Carburizing
- Carbonitriding
- Gas Nitriding
- Gas Nitrocarburizing
- Hardening & Tempering
- Sub-Zero Treatment
- Annealing / Normalizing
- Stress Relieving

Plant-in-Plant (PIP) Heat Treatment Model



INDO-GERMAN VACU TREAT PVT. LTD. Commercial Vacuum Heat Treatment Plant

PROCESSES

- Vacuum Hardening
- Plasma Nitriding
- Vacuum Brazing
- Solution Annealing
- Ageing
- Stress Relieving

COMMERCIAL VACUUM HEAT TREATMENT

SERVING CRITICAL MANUFACTURING INDUSTRIES



Unitherm Engineers Limited : +91 76669 00438 | info@unithermfurnaces.com | www.unithermengineers.com |
 LinkedIn : <https://www.linkedin.com/company/unitherm-engineers-limited>

Indo German Vacu Treat Pvt Ltd : +91 8308 847069 | info@igvtvacutreat.com | www.igvtvacutreat.com |
 LinkedIn: <https://www.linkedin.com/company/indo-german-vacu-treat-pvt-ltd>



Anitha Raghunath
Director / Publisher
Virgo Communications and Exhibitions Pvt.Ltd

Dear Readers,

Global manufacturing is being reshaped by rapid technological advancements, shifting supply chains, and an increasing emphasis on self-reliance. For India's gear and mechanical power transmission industry, these changes create significant opportunities to enhance value creation, expand capabilities, and reinforce its standing as a competitive force in the global manufacturing ecosystem.

In this **Vol. 4, Issue 4 – 2026** edition of Gear Technology India, themed **Heat Treatment**, we explore the technologies and innovations that are enabling superior performance, reliability, and manufacturing excellence. The issue features exclusive interactions with industry leaders from **Premium Group, UNITHERM Group, and Pratap Tex-Chem**, along with in-depth coverage of emerging opportunities in **tunnel boring machines, aerospace, indigenous manufacturing, lubrication, maintenance, metrology, and industrial connectivity**.

We are also pleased to introduce four new editorial sections—**Industry Story, Market Outlook, Power Transmission, and Surface Finishing**—further broadening our coverage and providing deeper insights into the trends, technologies, and market dynamics shaping the future of manufacturing.

At Gear Technology India, our commitment remains steadfast: to serve as a knowledge platform that informs, connects, and inspires the gear and power transmission community. Industries across the globe are embracing new opportunities and navigating significant transitions, making collaboration, innovation, and continuous learning essential drivers of long-term, sustainable growth.

We extend our sincere gratitude to our readers, contributors, advertisers, and industry partners for their continued trust and support. Together, let us continue building a stronger, more resilient, and globally competitive manufacturing ecosystem.

Warm regards,

A handwritten signature in black ink, appearing to read 'Anitha', written over a light blue circular background.



Sushmita Das
Associate Editor
Gear Technology India

Heat treatment is often the defining factor between an average component and a high-performance one. From enhancing wear resistance and fatigue strength to ensuring dimensional stability and reliability, advanced heat treatment technologies continue to play a pivotal role in the evolution of gears and power transmission systems.

In this issue, we explore the latest developments in heat treatment while examining the broader trends shaping the manufacturing landscape. Our cover story uncovers the emerging opportunities that Tunnel Boring Machines present for India's gear industry, while exclusive interviews with leaders from Premium Group, UNITHERM Group, and Pratap Tex-Chem offer valuable insights into innovation, sustainability, and global competitiveness.

This edition also introduces four new sections—**Industry Story, Market Outlook, Power Transmission, and Surface Finishing**—to provide deeper perspectives on technologies, market dynamics, and industrial applications that are redefining manufacturing excellence.

Amid evolving market dynamics, rapid technological advancements, and emerging growth opportunities, we hope this issue provides valuable insights for engineers, manufacturers, and decision-makers committed to enhancing precision, productivity, and performance.

Happy Reading!

gear

TECHNOLOGY INDIA

Gear Technology India is a bimonthly publication created in collaboration between the Motion + Power Manufacturers Alliance (MPMA) and Virgo Communications & Exhibitions. It serves as the premier platform in the industry, offering latest innovations, information, interviews and technical articles related to gears.

PUBLISHER

Anitha Raghunath
anitha@virgo-comm.com

CONTENT CONTRIBUTOR

editorial@geartechnologyindia.com

ASSOCIATE EDITOR

Sushmita Das

TECHNICAL WRITERS

Nishant Kashyap
Neha Basudkar
Vishwajit Kothari
Sudhanshu Nayak
Vivek Singh

TECHNICAL EXPERTS

Soundararajan KP
Mahendran Muthu
Vishwajit Kothari

DESIGNER

Aneena AS

ADVERTISING, MARKETING & SALES

Sandiip Sudhir Shetye
sandiip@virgo-comm.com | M: 9833750284

CIRCULATION / SUBSCRIPTION

Selva Kumar
selvakumar@virgo-comm.com

ACCOUNTS

C Mahesh
accounts@virgo-comm.com

MANAGEMENT

Raghunath G
Matthew Croson

STAY CONNECTED



Join the Gear Technology India group at
www.facebook.com/geartechnologyindia



Follow us on Instagram
www.instagram.com/geartechnologyindia/



Connect with us on LinkedIn
www.linkedin.com/showcase/gear-technology-india



In Partnership With



FOUNDER

Michael Goldstein founded Gear Technology in 1984 and served as Publisher and Editor-in-Chief from 1984 through 2019. Thanks to his efforts, the Michael Goldstein Gear Technology Library, the largest collection of gear knowledge available anywhere will remain a free and open resources for the gear industry. More than 38 years' worth of technical articles can be found online at geartechnology.com. Michael continues working with the magazine in a consulting role and can be reached via e-mail at michael@geartechnology.com.

DISCLAIMER

Gear Technology India is a registered trademark. All rights reserved.

For permission to republish any portion of the magazine, please contact the publishers at Gear Technology India.

The views and opinions expressed in the articles published in the magazine belong to the respective authors and contributors. These views and opinions do not necessarily represent those of the publisher / management.

While we take utmost care and caution, the responsibility for the content of the articles published in the magazine and the opinions expressed on the website are exclusively of the authors(s) concerned. We do not assume any responsibility or liability for the accuracy, suitability or validity of the articles, or for any loss, damage or consequences arising from the same.

We make no representation that information published in the magazine and on the website is correct and accurate.

All copyright over the articles and connected artwork published in the magazine and on the website rests absolutely with, and belongs to Gear Technology India. Any publication or use of the whole or any part of the published content without prior written consent will violate the copyright of Gear Technology India and is actionable.

All disputes are subject to jurisdiction of courts in Bangalore only, and laws of India will prevail.



Table Of CONTENTS

INTERVIEW

- 08** Exclusive Interview: Premium Group's Next Chapter: Innovation, Sustainability, and Global Growth

COVER STORY

- 14** Underground Opportunity: Why Tunnel Boring Machines Could Become the Next Growth Frontier for India's Gear Industry- (Part 1)

INTERVIEW

- 17** UNITHERM Group's Journey Towards Global Manufacturing Leadership

INDUSTRY STORY

- 20** Transforming Aerospace Challenges into Success: The Four-Decade Partnership Between Bell and KAPP NILES

INTERVIEW

- 24** 27 Years of Excellence: Pratap Tex-Chem's Journey of Transformation and Innovation

GEAR FINISHING

- 29** Back to the Future: Kashifuji Reinvents Gear Honing with the KGH250

INDUSTRY EVENT

- 31** Beyond Machines: Celebrating the People Who Build Manufacturing: How Manufacturing Maestros is strengthening India's industrial community?

SURFACE FINISHING

- 34** Driving India's Gear Manufacturing Innovation: How Weiler's Next-Generation Ceramic Abrasive Technologies Enable Precision, Productivity, and Surface-Finishing Excellence

HEAT TREATMENT

- 40** CZECHmetal Invests in SECO/WARWICK Vacuum Furnace Technology to Enhance Heat Treatment Capabilities



42 MARKET OUTLOOK

State of India's Gear Industry 2026: Tariffs, Transition, and the Long Game: India's Gear Manufacturers Navigate a Shifting World

48 GUEST COLUMN: DEFENCE & AEROSPACE

Towards Atmanirbhar Bharat: The Gear Industry's Aerospace Mission

LUBRICANTS

- 50** Precision Beyond the Machine: How Advanced Metal Cutting Fluids are Transforming Gear Manufacturing

MANUFACTURING

- 54** Indigenous Innovation: Redefining the Economics of Global Transmission Manufacturing

POWER TRANSMISSION

- 58** Industrial Gearboxes Drive Modern Machinery Forward

METROLOGY

- 60** Why Advanced Gear Metrology Is Becoming Critical for Indian Manufacturing Competitiveness

MAINTENANCE

- 62** The Hidden Cost of Power Transmission Inefficiency: Why Bearings, Lubrication, and Reliability Practices Matter More Than Manufacturers Realise

INDUSTRY UPDATE

- 64** Gleason Corporation Appoints Bijal Thakkar President and Chief Operating Officer

PRODUCT UPDATE

- 66** HMS Networks Introduces New Ewon Edge & Cloud to Simplify Secure Industrial Connectivity

Exclusive Interview: Premium Group's Next Chapter: Innovation, Sustainability, and Global Growth

- By Sushmita Das



Neeraj Bisaria
Managing Director & President
Premium Group

Engineering excellence, customer-centricity, and a forward-looking approach to innovation have been the defining pillars of Premium Group's remarkable journey over the past six decades. From building a strong reputation in industrial power transmission solutions to expanding into renewable energy and lifecycle asset management services, the company has continually evolved to meet the changing needs of global industries. At a time when manufacturers are embracing digital transformation, intelligent asset management, and sustainable technologies, Premium Group is investing in advanced manufacturing capabilities and leveraging AI-driven solutions to create long-term value for its customers. The company's diversified portfolio, spanning Premium Transmission, Premium Motion, and Premium Care, reflects its vision of delivering integrated solutions that enhance efficiency, reliability, and sustainability.

In this exclusive interaction with Sushmita Das, Associate Editor of Gear Technology India, Neeraj Bisaria, Managing Director & President of Premium Group, discusses the principles that have shaped the company's growth, the future of gearbox manufacturing in an increasingly digital world, emerging opportunities in renewable energy and infrastructure, and the strategic roadmap that will guide Premium's next phase of global expansion.

1. Premium Transmission has evolved significantly over the years. What guiding principles have shaped the company's growth journey and market positioning?

For over six decades, Premium's growth has been guided by three core principles: customer-centricity, engineering excellence, and continuous innovation. These principles have enabled us to build long-term customer relationships, adapt to evolving market needs, and establish a position of trust across industries and geographies.

Our journey has been driven by a commitment to creating value beyond products. While Premium

Transmission continues to provide reliable mechanical power transmission solutions through its portfolio of gearboxes, geared motors, and fluid couplings, we have expanded our capabilities through Premium Motion in the renewable energy sector and Premium Care in lifecycle and asset reliability services.

A key factor in our evolution has been our ability to anticipate industry shifts and invest in technology, manufacturing capabilities, and talent. This has allowed us to continuously strengthen our offerings while remaining relevant in a rapidly changing industrial landscape.

As we look ahead, the fundamentals that have shaped our journey remain unchanged: putting customers first, leveraging engineering expertise, and delivering

sustainable long-term value

2. The recent commissioning of your advanced manufacturing facility is a major milestone. What capability gaps or future opportunities was this investment designed to address?

These investments are part of our long-term strategy to strengthen capabilities, enhance customer responsiveness, and position the Group for future growth.

As customer expectations evolve, there is increasing demand for higher precision, faster delivery, larger equipment capabilities, and stronger lifecycle support. Our recent investments have been focused on addressing these requirements while creating a platform for future opportunities globally.

Through Premium Motion, we have established a dedicated manufacturing facility to support the growing sunrise sector. As solar installations continue to expand, we see significant opportunities for integrated solar tracking solutions that help improve energy generation and operational efficiency.

At the same time, we are expanding our Premium Care footprint with advanced multi-brand care centres (MCC) in India and overseas, strengthening our ability to support customers with multi-brand refurbishment of mechanical power transmission products, maintenance, condition monitoring, and asset reliability solutions closer to their operations.

Within Premium Transmission, we have commissioned advanced manufacturing technologies that enhance precision, productivity, and our ability to deliver high-performance solutions for increasingly demanding industrial applications.

More importantly, these investments are not just about adding capacity. They are about building future-ready capabilities across manufacturing, renewable energy, and lifecycle services, ensuring that Premium is well-positioned to create long-term value for customers and capitalise on emerging growth opportunities.

3. As gearbox and power transmission systems become increasingly application-specific, how is Premium balancing standardisation with customer-driven customisation?

One of Premium's key differentiators is our ability to combine a strong portfolio of standard products with deep engineering and customisation capabilities.

While we offer a comprehensive range of geared

motors, worm gearboxes, helical gearboxes, planetary gearboxes, and fluid couplings, our approach goes beyond supplying products. We work closely with customers to understand their application requirements and operating environment, enabling us to customise our solutions to seamlessly fit their ecosystem and performance objectives.

In addition, we have developed a range of application-specific solutions, including extruder gearboxes, cooling tower gearboxes, and aerator gearboxes, designed to address the unique challenges of specific industries and applications.

This combination of standard offerings, application engineering expertise, and customer-centric customisation enables us to deliver solutions that enhance performance, improve reliability, and create long-term value for our customers.

4. What are the biggest engineering challenges today in designing transmission solutions for high-performance industrial applications?

Today's industrial customers expect transmission solutions that deliver higher efficiency, greater reliability, longer service life, and lower operating costs, often in demanding operating environments. At the same time, there is a growing need for application-specific solutions rather than standard products.

At Premium, we view these evolving requirements as opportunities rather than challenges. With decades of engineering expertise, a strong product portfolio, and deep application knowledge, we are well-equipped to develop solutions that meet the performance, efficiency, and reliability expectations of modern industries.

Our ability to combine standard offerings with customised engineering enables us to deliver solutions that fit seamlessly into the customer's ecosystem, creating long-term operational and lifecycle value.

We have also started incorporating AI, machine learning, digital engineering, and data-driven processes across various aspects of our operations. These technologies are helping accelerate design cycles, improve process efficiency, enhance decision-making, and create a more system-driven approach to engineering and manufacturing.

Going forward, the combination of engineering expertise and digital intelligence will be a key differentiator in developing smarter, more efficient, and high-performance industrial solutions.

5. Manufacturing excellence is often built on

hundreds of small improvements rather than a single breakthrough. What areas of production are currently receiving the most attention within Premium?

I completely agree that manufacturing excellence is a journey of continuous improvement rather than a single breakthrough. At Premium, our focus is on strengthening the fundamentals while leveraging technology to enhance quality, productivity, and responsiveness.

Today, we are prioritising precision manufacturing, lead-time reduction, and operational flexibility to meet evolving customer expectations. Investments in advanced machining technologies and process optimisation are helping us improve accuracy, consistency, and overall manufacturing efficiency.

Digitalisation is another key area of focus. We are increasingly leveraging AI-driven processes, automation, and data analytics to improve process visibility, enhance traceability, optimise workflows, and support faster, data-driven decision-making.

Equally important is the development of our people. Manufacturing excellence is ultimately driven by skilled teams supported by a culture of continuous improvement and operational discipline.

For us, excellence is not defined by a single innovation but by the cumulative impact of continuous improvements that strengthen quality, efficiency, and customer value. This mindset has been central to our journey for over six decades and continues to guide our future.

6. The industry is witnessing rapid adoption of automation, digital manufacturing, and data-driven quality control. Which of these developments do you believe will have the greatest impact on gearbox manufacturing?

While automation and digital manufacturing are transforming production, I believe the most profound impact will come from the increasing use of AI and data-driven intelligence across the entire asset lifecycle, adding tremendous value to the customers.

The industry is moving beyond conventional manufacturing practices towards connected and intelligent ecosystems, where data is no longer confined to the shop floor. Real-time monitoring, advanced analytics, and predictive capabilities are enabling manufacturers and end users to make better decisions, improve reliability, and optimise asset performance.



This shift is changing the way industrial equipment is managed. Instead of relying solely on scheduled maintenance, companies are increasingly adopting condition-based and predictive approaches powered by AI and digital technologies. The ability to capture critical machine data and convert it into meaningful insights will be a key differentiator in the years ahead.

At Premium, we have embraced this trend through our Asset Management System, which leverages strategically placed sensors and real-time performance tracking to provide continuous visibility into equipment health. By transforming machine data into actionable intelligence, the system helps customers optimise performance, improve reliability, and minimise unplanned downtime.

Going forward, I believe the convergence of advanced manufacturing, AI-driven analytics, and intelligent asset management will have the greatest impact on the gearbox industry. The focus will increasingly shift from simply manufacturing products to enabling smarter, more efficient, and more reliable operations throughout the life of the asset.



7. In your view, what differentiates a world-class Indian transmission manufacturer from a global competitor today?

I believe the distinction between an Indian manufacturer and a global competitor is becoming increasingly blurred. Today, world-class manufacturing is defined not by geography, but by engineering excellence, innovation, quality, and the ability to consistently create value for customers.

India's growth story is playing an important role in this transformation. As one of the fastest-growing major economies and the world's fourth-largest economy, India is emerging as a key manufacturing destination. The country offers a unique combination of engineering talent, a robust supplier ecosystem, and cost competitiveness, enabling companies to deliver high-quality solutions with strong value propositions.

What differentiates world-class manufacturers today is their ability to combine technology, manufacturing excellence, and application expertise with agility and customer responsiveness. Increasingly, customers are

looking for partners who can provide not just products, but complete solutions and lifecycle support.

Indian companies are particularly well-positioned in this regard. They are able to offer globally benchmarked products and services while maintaining cost effectiveness and shorter response times. This combination makes India an attractive hub for both domestic and international customers.

At Premium Group, our journey of over six decades has taught us that sustainable success is built on continuous investment in technology, people, and capabilities. Whether through Premium Transmission, Premium Motion, or Premium Care, our focus remains on delivering solutions that enhance reliability, efficiency, and sustainability.

8. As end-user industries pursue higher efficiency and lower operating costs, how are customer expectations reshaping the design and performance requirements of transmission systems?

Customer expectations have evolved considerably over the years. Today, the focus extends well beyond product performance. End users are looking for solutions that deliver higher efficiency, lower operating costs, consistent quality, faster delivery, and dependable support throughout the life of the equipment.

This shift is driving the industry towards more efficient, reliable, and application-specific transmission systems. Customers are increasingly evaluating the total cost of ownership rather than just the initial acquisition cost. As a result, reliability, ease of maintenance, energy efficiency, and uptime have become equally important considerations.

Another notable change is the growing emphasis on responsiveness and after-sales support. Customers expect their partners to not only deliver high-quality products but also provide timely service and the expertise needed to maximise asset performance. This is leading to greater adoption of condition monitoring, predictive maintenance, and digital solutions that help improve reliability and minimise unplanned downtime.

At Premium Group, these evolving requirements are influencing the way we design, manufacture, and support our solutions. Alongside our focus on delivering high-quality transmission products with shorter lead times and application expertise, we have strengthened our lifecycle support capabilities through Premium Care. By combining service expertise with digital asset management solutions, we are helping customers enhance equipment reliability and extract greater value

from their assets.

Ultimately, I believe the industry is moving from a product-centric approach to a performance-centric one, where customers are seeking long-term partners who can deliver not just products, but sustained value throughout the lifecycle of their equipment.

9. Premium serves a wide range of industries. Which emerging sectors do you believe will create the next wave of demand for advanced power transmission solutions?

While our traditional markets continue to offer strong opportunities, we see the next phase of growth being driven by a number of sunrise sectors that are benefiting from global trends such as energy transition, infrastructure development, automation, and digitalisation.

Renewable energy is one of the most promising areas. The rapid expansion of utility-scale solar projects is creating demand for intelligent and reliable tracking systems, and through Premium Motion, we are supporting this sector with integrated solar tracking solutions designed to enhance energy yield and system performance.

We also see significant opportunities in material handling, warehousing and logistics, water and wastewater treatment, mining, and infrastructure. These sectors increasingly require high-performance gearboxes, geared motors, and fluid couplings that deliver efficiency, reliability, and long service life under demanding operating conditions.

Another area gaining momentum is asset reliability and lifecycle management. As industries focus on maximising asset utilisation and minimising downtime, there is a growing demand for refurbishment, condition monitoring, predictive maintenance, and digital asset management solutions. This is where our Premium Care business is helping customers improve equipment performance and extend asset life.

India's emergence as a major manufacturing and infrastructure hub, coupled with increasing investments in clean energy and industrial modernisation, is expected to further accelerate demand for advanced power transmission solutions.

At Premium Group, we believe these opportunities align well with our strengths. Our portfolio today spans industrial gearboxes, geared motors, fluid couplings, integrated solar tracking solutions, and lifecycle services, enabling us to support customers across sectors that are shaping the future of industry.

10. Looking ahead, where do you envision Premium Transmission five years from now, and what role will innovation play in achieving that vision?

Over the next five years, we see Premium Transmission further strengthening its position as a global industrial solutions group. While power transmission will continue to be the foundation of our business, we see significant opportunities in renewable energy and lifecycle services.

We expect Premium Motion to become an established player in the sunrise sectors globally, particularly renewable energy, through its integrated solar tracking solutions. At the same time, we will continue to strengthen our lifecycle solutions business and bring our service capabilities closer to customers, helping them improve asset performance and reliability.

Innovation will continue to be a key enabler of our growth. By combining engineering expertise with advanced manufacturing and digital technologies, we aim to deliver reliable and customised solutions that create greater value for our customers.

Ultimately, our goal is to be known not just for manufacturing high-quality products but for delivering integrated solutions that improve efficiency, reliability, and sustainability for customers across industries and geographies. We believe this will define the next phase of growth for Premium Group.

EVERY GRIND DESERVES **PERFECTION.** **KÜHLUB 360 G**

CARBIDE GRINDING OIL

Advanced grinding oil engineered for carbide applications that **demand more.**



EXTENDED TOOL LIFE & SUPERIOR FINISH

Reduces wear. Delivers better quality finishes.



PREVENTS COBALT LEACHING

Maintains tool hardness & extends fluid life.



CLEANER & SAFER OPERATIONS

Low mist, low odour & operator friendly.

Lubeco®

GREEN FLUIDS

**ENGINEERED FLUIDS.
EXCEPTIONAL RESULTS.**



ADVANCED
TECHNOLOGY



RELIABLE
PERFORMANCE



SUSTAINABLE
SOLUTIONS



**CHOOSE LUBECO.
CHOOSE ENGINEERED EXCELLENCE.**



For Tool
Rooms &
Manufacturers



For High
Performance
Grinding Applications



For Better
Productivity
& Lower Costs

Underground Opportunity: Why Tunnel Boring Machines Could Become the Next Growth Frontier for India's Gear Industry- (Part 1)

- By Sushmita Das

India's infrastructure ambitions are no longer confined to highways and flyovers. Beneath the country's busiest cities and most challenging terrains, a silent revolution is taking shape. Metro rail corridors, high-speed rail, road tunnels, hydropower projects, water conveyance systems and underground utility networks are driving unprecedented demand for Tunnel Boring Machines (TBMs)—among the most sophisticated engineering systems ever built.

For the gear manufacturing industry, this represents an emerging market that has received far less attention than automotive, wind energy or industrial automation. Yet every TBM depends on highly engineered gear systems capable of transmitting millions of Newton-metres of torque under some of the harshest operating conditions imaginable.

As India accelerates underground infrastructure development over the next decade, the question is no longer whether demand for TBM gears will grow—but whether Indian manufacturers will be prepared to capture it.

A New Infrastructure Era

India is investing heavily in underground construction. Projects such as the Mumbai Metro expansion, Delhi Metro Phase IV, Pune Metro, Bengaluru Metro, the Mumbai Coastal Road tunnel, and the Mumbai–Ahmedabad High-Speed Rail corridor are pushing TBM deployment to record levels. Government initiatives focused on metro expansion, rail connectivity, highway tunnels and water infrastructure are expected to sustain demand well into the next decade.

Unlike conventional construction equipment, TBMs require exceptionally reliable power transmission systems. A single machine may weigh more than 2,000 tonnes and operate continuously for months underground without requiring major maintenance opportunities. Every component must deliver maximum reliability because even a minor drivetrain failure can halt an entire infrastructure project.

Where Gears Become Mission-Critical

The cutterhead is the heart of a TBM. Rotating

slowly—typically only a few revolutions per minute—it generates enormous torque to excavate rock and soil.

This requires multiple high-performance gear systems, including planetary gearboxes, large internal ring gears, heavy-duty pinions, helical and bevel gear stages, slewing drives, and auxiliary conveyor gearboxes.

Main drive gearboxes often deliver output torques exceeding 2–3 million Nm while maintaining precise load sharing among multiple planetary stages. Modern designs also integrate liquid cooling, overload protection and compact architectures to maximise power density.

These are among the most technically demanding gear applications outside mining and offshore industries.

The Market Opportunity for Indian Gear Manufacturers

India currently imports most TBMs or assembles them locally using imported critical components. The drivetrain, including main gearboxes, bearings and precision gears, continues to be dominated by global suppliers.

Companies such as SEW-EURODRIVE, Flender, David Brown Santasalo, Liebherr, Zollern, and Bonfiglioli remain the preferred partners for global TBM OEMs due to their decades of experience in heavy-duty planetary drive technology.

However, this dependence also highlights an opportunity.

Indian manufacturers have already demonstrated capabilities in producing large-diameter ring gears, wind turbine gearbox components, steel mill gears, mining gearbox components, cement industry gear systems and marine propulsion gears.

Many of these manufacturing capabilities overlap with the requirements of TBM gearing.

Companies such as Elecon Engineering, Premium Transmission, Bharat Gears and David Brown Santasalo India possess expertise in large industrial gearing that could potentially be extended into tunnelling applications through strategic partnerships and technology



development.

Beyond Manufacturing—An Engineering Challenge

Producing TBM gears is not simply a matter of machining larger components.

These gears demand extremely high load capacity, uniform load sharing across planetary systems, low vibration, exceptional fatigue resistance, advanced case carburising, precision profile grinding, stringent quality validation and long operational life under abrasive environments.

Reliability becomes more valuable than production speed because gearbox replacement inside an active tunnel can cost millions of dollars in downtime.

Consequently, qualification requirements are considerably higher than those of many conventional industrial gearbox applications.

Localisation: India's Next Strategic Step

Recent geopolitical disruptions exposed India's dependence on imported TBMs and critical drivetrain components. Delays in securing specialised machines

for major infrastructure projects highlighted the risks associated with global supply chains.

As policymakers continue to promote manufacturing self-reliance, the localisation of high-value TBM components, including gearboxes, gears, bearings, and drive assemblies, is expected to receive greater attention.

Rather than manufacturing complete TBMs immediately, India may first develop domestic capability in critical subsystems, where the gear industry can play a central role.

Technology Trends Reshaping TBM Gears

Future TBM gear systems will increasingly incorporate higher torque-density planetary drives, integrated condition monitoring sensors, digital twin technology, predictive maintenance algorithms, improved lubrication management, advanced surface engineering, lightweight yet stronger alloy steels and hybrid drive architectures.

Digital monitoring will become particularly important as infrastructure owners seek to maximise machine availability while reducing unplanned maintenance.



For gear manufacturers, this means moving beyond supplying components toward delivering intelligent transmission systems.

Challenges Ahead

Several barriers remain before Indian companies can compete globally in this niche.

The sector demands significant investment in large-scale grinding, heat treatment, metallurgical validation, endurance testing and application engineering. Qualification cycles are long, while production volumes remain relatively low compared with automotive gears.

Global suppliers also possess decades of accumulated field experience, making technology partnerships and collaborative development essential for new entrants.

Nevertheless, India's growing domestic demand provides an ideal testing ground for developing indigenous capabilities.

GTI Outlook

Tunnel boring machines represent more than another industrial application—they signal the emergence of a new market segment for precision heavy-duty gearing.

As India's underground infrastructure pipeline expands, opportunities will extend beyond supplying replacement gears. OEM partnerships, aftermarket

services, remanufacturing, digital monitoring and localised gearbox production could collectively create an entirely new business ecosystem.

For gear manufacturers seeking diversification beyond automotive and traditional industrial sectors, tunnelling offers an attractive combination of high engineering value, premium margins and long-term demand.

Companies that begin investing today in heavy-duty planetary technology, advanced metallurgy and application-specific engineering may well become tomorrow's preferred partners for India's underground infrastructure revolution.

GTI Outlook: While the TBM gear market will remain relatively niche compared with automotive or wind energy, it is strategically significant. As India moves towards greater self-reliance in critical infrastructure equipment, precision gear manufacturers have an opportunity to position themselves at the core of the nation's next phase of underground development.

Stay tuned for the second part of the same!



Sushmita Das
Associate Editor
Gear Technology India

UNITHERM Group's Journey Towards Global Manufacturing Leadership

- By Sushmita Das



Aditya Bakshi,
Managing Director,
UNITHERM Group

India's manufacturing sector is rapidly progressing towards higher levels of precision, performance, and global competitiveness, placing advanced heat treatment and surface engineering technologies at the centre of industrial innovation and manufacturing excellence.

Over the past three decades, UNITHERM Group has emerged as one of the country's leading metallurgical and surface treatment solution providers, building a diversified ecosystem that spans atmospheric and vacuum heat treatment, furnace technology, PVD coatings, and specialised engineering services.

Under the leadership of Aditya Bakshi, Managing Director, UNITHERM Group has consistently focused on technological innovation, customer-centric solutions, and operational excellence while aligning its growth strategy with the emerging needs of industries such as automotive, aerospace, defence, renewable energy, and electric mobility.

In this exclusive interview with Gear Technology India, Sushmita Das, Associate Editor, interacts with Aditya Bakshi about UNITHERM Group's remarkable journey, its integrated approach to delivering customer value, the role of digitalisation and sustainability in shaping its growth, and the company's vision for advancing India's manufacturing competitiveness through metallurgical excellence and continuous innovation.

improvement.

At UNITHERM Group, we work closely with customers to understand the application and performance requirements of every component. Our focus is on enhancing wear resistance, fatigue life, dimensional stability and overall reliability while maintaining process consistency and delivery commitments.

By combining metallurgical expertise with advanced process control, we help customers improve product quality, reduce lifecycle costs, and enhance manufacturing efficiency.

1.UNITHERM Group has grown from a single company into a diversified group with multiple businesses, joint ventures, and specialised capabilities. What has been the vision driving this journey over the past three decades?

Our vision has always been to create a world-class surface treatment solutions group that enables Indian manufacturing to compete globally. What began as a single business has evolved into a comprehensive ecosystem covering atmospheric heat treatment, vacuum heat treatment, furnace technology, surface engineering, and metallurgical solutions.

The guiding principle has remained unchanged: understand customer challenges, invest in technology and continuously expand our capabilities. Every business and partnership within the Group has been built with the objective of delivering greater value to our customers while strengthening India's manufacturing ecosystem.

2.Today, manufacturers are looking for partners who can improve component performance, reliability, and productivity. How does UNITHERM Group create value for its customers across different industries?

Modern manufacturing demands far more than process execution. Customers expect consistency, technical expertise, shorter lead times, and continuous

3. UNITHERM Group has built expertise across heat treatment, vacuum heat treatment, surface engineering, metallurgical testing, and allied services. How does this integrated ecosystem benefit customers?

Customers increasingly prefer strategic partners rather than multiple vendors. Through our Group companies and joint ventures, we offer a broad range of metallurgical and surface engineering solutions under one umbrella.

This integrated approach enables customers to access specialised expertise, faster technical support, reduced development cycles and consistent quality standards across different processes. It also helps us support customers from prototype development through full-scale production.

Ultimately, our goal is to become a trusted partner in improving component performance and manufacturing excellence.

4. As manufacturing technologies continue to evolve, what are the key technological advancements and innovations that are shaping the future of UNITHERM Group?

Technology is transforming every aspect of manufacturing, and surface treatment is no exception. We continue to invest in advanced furnace technologies, process monitoring systems, automation, digital process control, and data-driven quality management. Precision, traceability and repeatability are becoming increasingly important, especially in sectors such as automotive, aerospace, defence, and electric mobility.

Going forward, innovation will focus on higher process capability, enhanced energy efficiency, improved metallurgical outcomes, and smarter manufacturing systems.

5. Digitalisation, automation, and Industry 4.0 are transforming industrial operations worldwide. How is UNITHERM Group leveraging these developments to enhance operational excellence and customer experience?

Digitalisation is helping manufacturers achieve greater visibility, control and consistency.

Across the Group, we are adopting advanced monitoring systems, process automation, data analytics, and digital reporting tools to improve operational efficiency and process reliability. These initiatives help us

minimise variability, optimise productivity and strengthen quality assurance.

For customers, this translates into greater confidence, enhanced traceability, faster response times and more reliable process outcomes.

6. Quality, consistency, and process reliability are critical for sectors such as automotive, aerospace, defence, engineering, and energy. How does UNITHERM Group maintain the highest standards across its operations?

Quality is deeply embedded in our culture and operations.

Our facilities operate through rigorous process controls, standardised operating procedures, continuous monitoring and highly skilled metallurgical teams in every facility. We continuously invest in training, testing infrastructure, process validation and customer-focused quality systems.

Our commitment to excellence is reinforced through internationally recognised standards such as ISO 9001 and IATF 16949, with our heat treatment processes aligned to CQI-9 requirements. As part of our continuous improvement journey and commitment to serving global aerospace and high-precision industries, we are also progressing towards NADCAP accreditation.

Beyond certifications, our greatest strength lies in our people and our relentless focus on delivering metallurgical excellence that consistently exceeds customer expectations.

7. Sustainability is becoming a strategic priority for both manufacturers and service providers. What initiatives has UNITHERM Group undertaken to improve energy efficiency, optimise resources, and reduce its environmental footprint?

Sustainability is no longer optional—it is a business imperative. We continuously focus on improving energy efficiency, optimising furnace performance, reducing process waste, and adopting environmentally responsible operating practices. Alongside these initiatives, we are actively exploring and increasing the use of renewable energy across our operations to reduce our carbon footprint and build a more sustainable manufacturing ecosystem.

As manufacturing evolves, we believe sustainable operations will become a key differentiator, and we remain committed to supporting both our customers' sustainability goals and our own environmental

responsibilities.

8. Emerging sectors such as electric mobility, aerospace, defence, renewable energy, and advanced manufacturing are creating new opportunities. How is UNITHERM Group positioning itself to support these industries?

These sectors represent some of the most exciting opportunities for Indian manufacturing.

They require advanced materials, specialised surface treatment processes, strict quality requirements and complete process reliability. UNITHERM Group has been actively investing in technology, capabilities and expertise to support these evolving needs.

Our diverse portfolio of services and technical capabilities positions us well to serve both established industries and next-generation manufacturing sectors as they continue to grow.

9. Building a skilled workforce is essential in a highly specialised field like metallurgical engineering and surface treatment. How does UNITHERM Group attract, develop, and retain talent while fostering a culture of innovation and excellence?

People are the foundation of our success!

We focus on creating an environment where employees can learn, grow and contribute meaningfully. Continuous training, leadership development, technical learning and cross-functional exposure are key elements of our people strategy.

We are proud to foster a culture built on trust, collaboration, ownership and continuous improvement. By investing in our people, we ensure that the organisation remains innovative, agile and future-ready.

10. Looking ahead, what is your vision for UNITHERM Group over the next decade, and what role do you see the Group playing in advancing India's manufacturing competitiveness on the global stage?

Our vision is to establish UNITHERM Group as a leading brand in metallurgical and surface treatment solutions.

Over the next decade, we will continue investing in technology, talent, capacity expansion and strategic partnerships. We aim to strengthen our leadership position while supporting customers across emerging and established industries.

India is rapidly becoming a global manufacturing hub, and we see UNITHERM Group playing an important role in enabling that growth through technical excellence, innovation and a commitment to delivering trust through metallurgical excellence.

Group Companies:

- UNITHERM Engineers Limited – Atmospheric Heat Treatment – www.UNITHERMengineers.com
- Aichelin UNITHERM – Heat Treatment Furnace Manufacturers – www.au-india.com
- Indo German Vacu Treat India Pvt Ltd – Vacuum Heat Treatment – www.igvtvacutreat.com
- UNITHERM Nova Coating – PVD Coating Solutions – www.unc-india.com

“The future of power transmission is built on precision heat treatment.”

Transforming Aerospace Challenges into Success: The Four-Decade Partnership Between Bell and KAPP NILES

By Gear Technology India

In the aerospace industry, where precision, reliability, and safety are paramount, long-term partnerships built on trust and innovation often become the foundation of technological progress. One such enduring collaboration is that between German grinding machine manufacturer KAPP NILES and American vertical-lift aircraft pioneer Bell Textron Inc. For more than four decades, the two companies have worked together to overcome complex manufacturing challenges, setting new benchmarks in aerospace gear production.



A Shared Commitment to Quality

Bell has been at the forefront of aviation innovation since 1935. Renowned for its helicopters and tiltrotor aircraft, the company serves a diverse range of sectors, including civilian transportation, emergency medical services, search and rescue, and military operations. Many of Bell's aircraft operate in some of the world's most demanding environments, where component reliability is not merely desirable—it is essential.

"Bell is an innovative, very quality-conscious company. We make the finest gears in the world, and we depend on KAPP NILES machines to do that," says Kyle Kendall, Principal Equipment Engineer at Bell.

The company's uncompromising focus on quality stems from a simple but critical objective: ensuring that customers return safely home after every mission.

Machines Built to Endure

The relationship between Bell and KAPP NILES dates back to the late 1980s, when Bell acquired a VAS-type grinding machine, a predecessor to today's VX series. These profile grinding machines were specifically suited to aerospace applications, where extremely tight tolerances are mandatory.

Throughout the 1990s and 2000s, Bell expanded its manufacturing capabilities by installing nearly a dozen

additional KAPP NILES machines. Remarkably, many of these machines remained operational for more than three decades.

"When your machines last over 30 years, that's a pretty good stamp of approval for a quality machine," Kendall remarks.

As production requirements evolved, Bell gradually modernised its facilities by replacing older machines with new VX 59 models. The decision was straightforward. The longevity and performance of the earlier systems had already proven their value.

Scott Phillips, machinist at Bell, highlights the versatility of the VX machines: "All our helicopter models from the past four decades have been fitted with gears ground on KAPP NILES machines. Most of these parts are now produced on VX 59s within the tolerances we expect."

The latest VX generation incorporates advanced features such as an optional zero-point clamping system, significantly reducing setup times for grinding spindles and auxiliary grinding heads. Bell reports setup time reductions of approximately 85 per cent, while also eliminating operator-to-operator variability through a more standardised, plug-and-play approach.



Machinist Scott Phillips, Principal Equipment Engineer Kyle Kendall (both from Bell), and Area Sales Manager Arnt Lachetta during the pre-delivery inspection of a VX 59 from KAPP NILES at the company headquarters in Germany.

Pioneering Measurement Innovation

While machine reliability remains crucial, Bell values another equally important aspect of its relationship with KAPP NILES—responsive service and technical support.

One of the most transformative outcomes of this collaboration emerged during the 1990s with the development of the integrated measurement system known as AMS.

Bell initially approached KAPP NILES with a requirement for a machine-integrated solution capable of measuring and documenting gear characteristics directly on the grinding machine. Working closely together, both companies developed the AMS functionality, which has since become an industry-leading solution.

The system employs an onboard Renishaw measuring device to inspect multiple points along the profile and lead direction of a gear, both before and after grinding. This ensures that every gear surface is correctly finished while preventing excessive removal of material from the hardened layer.

"AMS was an important development. Pretty much every gear that we grind nowadays is AMSed," says Phillips. "It brings reliability and significant time savings. As we've been using AMS for more than 30 years, the time saved isn't measured in hours or days, but in months."

The success of AMS has extended well beyond Bell's facilities. The concept has gained widespread acceptance across the aerospace sector, helping establish new standards for integrated process control and quality assurance.



"Thanks to the AMS function developed for us, we can measure workpieces directly on the machine – saving months of time over the past 30 years," says machinist Scott Phillips.

Increasing Productivity Through Generating Grinding

Five years ago, Bell further expanded its machining capabilities by investing in a KX 500 FLEX machine, marking the company's first venture into generating grinding technology.

Bell sought a solution capable of increasing productivity for planetary gears produced in relatively large batches while maintaining the stringent quality requirements mandated by aerospace applications. However, existing production regulations required final finishing through CBN profile grinding.

KAPP NILES responded with an innovative hybrid approach. Using the KX 500 FLEX, rough machining is performed through generating grinding, dramatically reducing machining times, while final finishing is completed using CBN profile grinding wheels to achieve the required surface quality.

The results have been significant.

"Changing from profile grinding to a combination with generating grinding has been a game changer," Phillips explains. "We've reduced runtime by about 70 per cent, which is huge. At the same time, the KX 500 FLEX is very consistent. We're saving a lot of time without losing the quality we're accustomed to."

Encouraged by the machine's performance, Bell is already considering the addition of a second KX machine.

The Right Machine for Every Application

Bell's KAPP NILES machine fleet also includes two systems from the KNG master series, specifically designed for large gears and heavy workpieces. According to Phillips, combining multiple machine platforms enables Bell to optimise final gear machining for every component. "Having the right machine type for every workpiece is key to success," he says.

Supporting this extensive installed base is KAPP TECHNOLOGIES L.P., the company's U.S. subsidiary based in Boulder. The local presence is particularly valuable given the strict requirements imposed by U.S. ITAR regulations, which limit access to certain technical information. Additionally, local manufacturing of tools significantly reduces delivery times and enhances service responsiveness.

Growing Through Challenges

The collaboration between Bell and KAPP NILES extends beyond supplier-customer dynamics.

It represents a partnership in which both organisations continually challenge each other to innovate.

"Sometimes Bell comes with requirements that are challenging for us," says Arnt Lachetta, Area Sales Manager at KAPP NILES. "These tasks push us to our limits—and beyond. This is incredibly valuable because we not only support our partner, but also grow through these challenges ourselves."

KAPP NILES acknowledges that Bell's demanding requirements have played an important role in strengthening its capabilities and establishing its position as a leader in aerospace gear grinding technology.

For Bell, the relationship is built on shared values and mutual commitment.

"We set high standards for ourselves and our products. That's why we sometimes require special solutions," says Kendall. "Bell does unique things, and we need a partner who truly cares. With KAPP NILES, we feel supported by a team that values our goals and growth as much as we do. We know we can rely on them, and that's why we keep coming back."

As aerospace manufacturing continues to evolve, the Bell-KAPP NILES partnership stands as a compelling example of how collaboration, innovation, and a relentless pursuit of excellence can transform industry challenges into lasting success.



"Bell is an innovative, very quality-conscious company. We make the finest gears in the world", emphasises Kyle Kendall, Equipment Engineer at Bell, with a CBN tool in his hand.

GEAR SHAPER CUTTERS



- Disc-Hub-Shank types
- Accuracy: Upto toAA as per DIN1829
- Component Types
 - Internal & External Gears
 - Spur & Helical Type
 - Semi-Topping & Protuberance
 - Corrected profiles
- PCD up to 300mm
- Material M35, ASP2052, ASP2030
- 0.5-25 Module



27 Years of Excellence: Pratap Tex-Chem's Journey of Transformation and Innovation

- By Sushmita Das



Kunal Marathe
CEO and Director
Pratap Tex-Chem Pvt. Ltd

Over the past 27 years, Pratap Tex-Chem Pvt. Ltd. has transformed itself from a textile-based enterprise into a diversified and technology-driven organisation serving industries through advanced lubrication solutions, speciality chemicals, agricultural products, and fluid management technologies. Guided by a strong foundation of customer trust, technical expertise, and continuous innovation, the company has steadily expanded its footprint while remaining committed to sustainability and operational excellence.

As the industrial landscape undergoes rapid transformation driven by automation, digitalisation, and evolving sustainability requirements, Pratap Tex-Chem continues to position itself at the forefront of change through its flagship brand, Lubeco Green Fluids, and a growing portfolio of specialised solutions.

In this exclusive interview with Gear Technology India (GTI), Sushmita Das, Associate Editor, GTI, interacts with Kunal Marathe, CEO and Director, Pratap Tex-Chem Pvt. Ltd., about the company's remarkable journey, the milestones that have shaped its growth, and its ambitious vision for the future. Marathe shares valuable insights on innovation, sustainable manufacturing, emerging opportunities in industrial lubrication, and how the company is building a stronger, smarter, and globally respected organisation for the next generation of manufacturing.

1. Pratap Tex-Chem recently celebrated 27 years of excellence and its 28th Foundation Day. Looking back, what have been the defining milestones that have shaped the company's journey and growth over these years?

Our journey has always been about continuous evolution, technical excellence, and building trust through consistent performance. The foundation of this journey goes back to 1979, when our business was first established in Mumbai as a textile manufacturing company. A significant transformation happened in 1999, when we incorporated Pratap Tex-Chem Pvt. Ltd. in Pune and our entry into industrial lubricants – a move that marked the beginning of our focused journey in the chemical and lubrication industry. Over the years, we strengthened our capabilities through systematic

investments in technology, infrastructure, and people. Some important milestones include achieving ISO 9001:2015 certification in 2008, establishing our advanced manufacturing facility at Pirangut in 2011, and setting up our in-house Microbiology Lab in 2014 to enhance product development and quality control capabilities.

The launch of Lubeco Green Fluids in 2015 was another important step, enabling us to create a stronger identity in metalworking fluids and speciality lubrication solutions. Later, we expanded our portfolio with Supergen for automotive lubricants, Krushagra for organic agricultural solutions, and Lubeco Futuristic Greases with nano-technology additives. Today, PTCPL operates with an installed manufacturing capacity of 6,000 KL annually, backed by advanced R&D, tribology expertise, and a team of over 100 professionals across functions.

We continue to grow with the same entrepreneurial spirit. However, the milestone I value most is the confidence our customers have placed in us over the years. That trust has been the foundation of our growth and continues to inspire our next phase of innovation.

2. The company has evolved from its roots in textiles to become a diversified player across lubricants, speciality chemicals, agriculture, hygiene, and fluid management. What has been the guiding philosophy behind this transformation?

Our transformation has been driven by a simple but powerful philosophy: identify changing industry needs and create solutions that deliver measurable value. We focused on areas where our core strengths in chemistry, formulation expertise, and application understanding could create a meaningful impact. The values established by my father and the founder of the company, Mr Pratap Marathe—discipline, consistency, and customer-centric thinking—have guided every stage of this journey. Those values are not just words on a wall; they are reflected in how we select markets, design products, and build teams.

Our expansion across industrial lubricants, speciality chemicals, agriculture solutions, hygiene products, and fluid management has been carefully built around customer requirements and emerging market opportunities. For example, our flagship brand Lubeco Green Fluids has grown into a comprehensive industrial solutions brand with more than 150 products, catering to metalworking fluids, speciality lubricants, cleaning solutions, and corrosion protection applications.

This growth has been supported by strong technical teams across R&D, manufacturing, quality and sales, allowing us to develop products that are not only technically advanced but also practical for real-world applications. Our objective has always been clear: build businesses that create long-term value and remain relevant to customers as industries continue to evolve.

3. As the parent company, how does Pratap Tex-Chem foster innovation and synergy across its diverse portfolio of brands while maintaining a unified corporate vision?

At PTCPL, we believe innovation happens when different functions work together with a common purpose. Although each brand serves a specific market segment, they are connected through one shared vision—developing reliable, high-performance solutions for our customers.

Our R&D, manufacturing, quality, sales, and service

teams work closely together to ensure that customer feedback, technical insights, and market requirements are quickly converted into practical solutions. The experience gained from one segment often strengthens another. Formulation expertise developed through Lubeco Green Fluids contributes to our understanding of lubrication performance, which supports innovations in greases, automotive lubricants, and other speciality applications.

We have also strengthened our internal systems through digital platforms such as Lubeco Smart, ERP, CRM, and HRMS, which improve coordination, data visibility, and operational efficiency. These tools help us connect field insights with lab development and ensure that what we design is what the market actually needs.

The biggest advantage we have built over the years is a culture where every team member takes ownership while staying aligned with the larger organisational goal. That combination of technical expertise, collaboration, and execution discipline helps us innovate faster and deliver consistently across all our brands.

4. Lubeco has emerged as the flagship brand of the group. What factors have contributed to its success, and how do you see the brand evolving in the coming years?

Lubeco's growth has been built on a strong understanding of customer challenges and a commitment to delivering dependable performance. In industrial manufacturing, customers are not only looking for a lubricant supplier—they are looking for a technology partner who understands their processes, improves productivity, reduces downtime, and supports operational efficiency.

Lubeco Green Fluids has grown by addressing these expectations through a broad portfolio covering: Metalworking fluids, soluble & neat cutting oils, synthetic fluids, rust preventives, washing and degreasing solutions, speciality lubricants

Today, with more than 150 product variants, Lubeco represents our capability to combine formulation expertise with application-based solutions. This depth allows us to support industries ranging from automotive and engineering to aerospace and heavy manufacturing.

Going forward, we see significant opportunities in advanced manufacturing, sustainable formulations, and performance-driven lubrication solutions. Our focus will remain on strengthening our technical support, expanding our industry presence, and creating products that help customers achieve higher efficiency and reliability.

Our ambition is to establish Lubeco as one of

the most trusted brands in industrial lubrication through continuous innovation, customer-focused solutions and consistent performance on the shop floor.

5. Sustainability is becoming increasingly important across industries. How is Pratap Tex-Chem integrating sustainability into its products, processes, and long-term business strategy?

For us, sustainability is not a separate initiative—it is an essential part of responsible manufacturing and future growth. We approach sustainability through three key areas: product development, manufacturing practices, and long-term business decisions.

At the product level, our focus is on developing solutions that improve efficiency, reduce waste, and enhance equipment life. This includes: Sustainable metalworking fluids, Water-based solutions, Bio-based formulations, Biodegradable products, Biocide-free and bio-stable coolant technologies, and Advanced lubrication solutions designed to reduce environmental impact. Through brands like Lubeco Green Fluids, Lubeco Futuristic Greases, Supergen, Krushagra, and Fluidmate, we continue to develop solutions that support both industrial productivity and environmental responsibility.

A concrete example is our Lubeco Green Fluids range of water-based industrial washing chemicals, designed to deliver excellent cleaning performance at ambient temperature. By eliminating the need for heated washing processes, these solutions help customers reduce energy consumption significantly.

In one application at a leading automotive component manufacturer, our SUPRACLEAN M 9555 LT was successfully implemented in an intermediate spray and rotary washing system. The customer achieved excellent cleaning results while eliminating nearly 15 hours of heating every day, resulting in power cost savings of approximately ₹5 lakh over six months, along with a substantial reduction in carbon emissions.

Similarly, our advanced water-soluble metalworking fluids, such as LUBECUT 2300 EA and LUBECUT 3510 KM, are engineered for extended sump life, lower coolant consumption, reduced disposal frequency, and lower effluent treatment (ETP) load. By extending coolant life and reducing waste generation, these products help manufacturers conserve water, reduce disposal costs, and improve overall sustainability without compromising machining performance.

Inside our manufacturing operations, we continue to improve safety standards, process efficiency, automation, and resource optimisation. Our investments

in R&D, quality systems, and technical infrastructure help us ensure that sustainability is integrated from formulation to final delivery. We believe responsible growth means creating solutions that benefit customers today while protecting opportunities for future generations.

6. The industrial lubrication market is undergoing rapid change, driven by automation, advanced manufacturing, and evolving customer expectations. How is Pratap Tex-Chem preparing to address these emerging trends?

The industrial lubrication industry is moving towards higher performance expectations, smarter manufacturing practices, and more application-specific solutions. Customers today are not only evaluating product performance but also looking at productivity improvement, sustainability, operational efficiency, and technical support.

At PTCPL, we are preparing for this transformation by continuously strengthening our technical capabilities and staying closely connected with customer requirements across industries. Our approach is focused on combining product innovation with application expertise.

Through our R&D capabilities, field experience, and customer interactions, we work towards developing solutions that address real manufacturing challenges—from improving tool life and machining efficiency to reducing maintenance requirements.

Digital transformation is also playing an important role in our growth journey. Platforms such as Lubeco Smart, along with our ERP and CRM systems, help us improve fluid monitoring, internal coordination, and customer responsiveness. Lubeco Smart, in particular, enables data-based coolant monitoring, helping customers track concentration, pH, and contamination levels, which leads to better coolant life and reduced waste.

Going forward, we see significant opportunities in advanced manufacturing, automation-driven industries, and sustainable lubrication technologies. Our objective is to remain agile, technically strong, and capable of supporting customers as their manufacturing needs continue to evolve.

7. Your portfolio today includes brands such as Lubeco Greases, Supergen, Krushagra, and Fluidmate. Could you share the strategic importance of these brands and the growth opportunities you foresee for each segment?

Each brand within the PTCPL portfolio has been developed with a clear purpose and addresses a specific market opportunity.

- Lubeco Green Fluids remains our core industrial brand, built around metalworking fluids, cutting solutions, rust protection, cleaning chemicals, and speciality lubricants that support manufacturing industries. It represents our deep expertise in industrial applications and customer-focused solutions.
- Lubeco Futuristic Greases extends this expertise into advanced lubrication solutions, including nanotechnology-based high-performance greases designed for demanding operating conditions and improved equipment reliability. This segment is critical for industries where equipment runs under extreme pressure, temperature, or speed.
- Supergen strengthens our presence in the automotive lubricant segment with products such as engine oils, gear oils, coolants, brake fluids, and speciality automotive solutions developed around modern performance requirements. With the automotive sector evolving towards higher efficiency and stricter emission norms, Supergen is positioned to support both conventional and newer vehicle technologies.
- Krushagra represents our entry into sustainable agricultural solutions with biofertilizers, biopesticides, adjuvants, and related products supporting responsible farming practices. This brand aligns with the growing demand for eco-friendly, crop-yield-enhancing solutions in Indian agriculture.
- Fluidmate adds a technology-driven dimension to our portfolio by focusing on smart fluid management solutions that help industries improve coolant life, reduce consumption, and optimise machine performance.

Together, these brands create a diversified ecosystem where each business contributes to our larger vision—delivering reliable, technology-driven solutions across industrial, automotive, and agricultural sectors.

8. Innovation has been a key pillar of Pratap Tex-Chem's growth. Could you highlight some recent product or technology developments that are helping the company strengthen its market position?

Innovation at PTCPL has always been closely connected with practical customer needs. Over the years, we have focused on strengthening our formulation expertise, manufacturing systems, quality processes, and technical capabilities to develop solutions that deliver

measurable performance improvements.

One important area of focus has been the development of advanced lubrication and fluid management solutions that help customers improve productivity, enhance equipment life, and optimise operating costs. Our digital initiatives, including Lubeco Smart, have also helped us improve data-based fluid monitoring and customer support, making our service approach more proactive.

One of our recent innovations is the development of compostable VCI packaging solutions, designed as an environmentally responsible alternative to conventional plastic packaging. These non-toxic, reusable, and compostable packaging materials protect components against moisture, humidity, condensation, salt exposure, and corrosion during storage and transportation.

After use, the packaging naturally decomposes into soil, carbon dioxide, and biomass within a year, helping reduce plastic waste and carbon footprint while supporting the principles of a circular economy. The solutions are designed to comply with global sustainability standards, including ASTM D6400, ASTM D6868, Extended Producer Responsibility (EPR) guidelines, and evolving single-use plastic regulations.

Internally, initiatives such as 4M, Kaizen, OEE improvement programs, and structured audits have helped us improve operational excellence and consistency. During the recent year, we strengthened our systems further through multiple internal audits and achieved recognition through ACMA.

These improvements may not always be visible to customers directly, but they contribute significantly to product reliability, service quality, and confidence in our solutions.

For us, innovation is not only about creating new products—it is about continuously improving everything we do.

9. During the recent Annual Operations Meet, you outlined an ambitious vision for the next three years. Could you share some of the key priorities and strategic initiatives that will drive this vision?

The next three years will be an important phase of structured growth for PTCPL. Our focus is to expand with discipline—strengthening our capabilities while maintaining the quality and reliability that customers expect from us.

One of our key priorities is increasing our

manufacturing capacity through our upcoming modern facility with an annual capacity of 12,000 KL. This expansion will support future growth while enabling greater flexibility, efficiency, and better segregation of product categories.

We also plan to strengthen our presence across domestic and international markets through exhibitions, partnerships, channel development, and deeper customer engagement. Our goal is to deepen relationships with existing customers while systematically entering new markets and segments.

Along with physical expansion, we are investing in automation, process excellence, compliance systems, and organisational development to build a stronger foundation for the future. We are also focusing on specialised product categories, including: Sustainable metalworking fluids, Biocide-free coolant solutions, VCI technologies, Application-driven lubrication systems

Our long-term objective is aligned with our Vision 2030—building a technology-focused, ZED-aligned organisation and achieving sustainable growth while maintaining strong profitability. The goal is not just to become larger, but to become a stronger, smarter, and more respected organisation in the industries we serve.

10. As Pratap Tex-Chem enters its next phase of growth, what message would you like to share with customers, channel partners, employees, and other stakeholders who have been part of this 27-year journey?

I would like to express my sincere gratitude to every customer, channel partner, employee, supplier, and well-wisher who has been a part of the PTCPL journey. Our growth over the last 27 years has been built on the

trust of our customers, the support of our partners, and the commitment of our employees.

A company is not built by one individual or one family alone—it is built over time through shared values, collective efforts, and the confidence people place in it. This journey has reinforced our belief that long-term success comes from staying committed to our principles while continuously evolving with industry needs.

As we enter the next phase of growth, our focus remains clear—to deliver reliable solutions, strengthen innovation, and create sustainable value for all our stakeholders. We will continue investing in technology, processes, and people to build a stronger organisation capable of addressing the future needs of our customers and industries.

Equally important is our commitment towards creating an environment where our employees can learn, grow, and contribute meaningfully. We believe that a strong organisation is built by empowering people, encouraging collaboration, and maintaining a culture of excellence, respect, and continuous improvement.

Our vision is to continue being a trusted long-term partner by delivering not just products, but complete solutions supported by technical expertise, consistent quality, and customer-focused service. At the same time, we aim to build PTCPL as a Great Place to

Work organisation—a workplace that promotes equal opportunity, combines experience with new ideas, encourages innovation, and inspires every individual to strive for excellence.

The journey ahead is about growing responsibly, creating value, and strengthening the relationships that have made PTCPL what it is today.



Powering engineered motion

#Gears Driving Performance Across Core Sectors

Back to the Future: Kashifuji Reinvents Gear Honing with the KGH250

By Kashifuji Group

Approximately 50 years ago, in 1970, Kashifuji Works, Ltd. developed the KGH300 external gear honing machine, which efficiently polishes gears using an externally threaded elastic honing wheel based on the concept proposed by the late Professor Masato Ainoura of the National Institute of Technology, Kurume College. Sales of the machine began in 1972 (Fig. 1). The machine received the Japan Society of Mechanical Engineers Award in 1979.

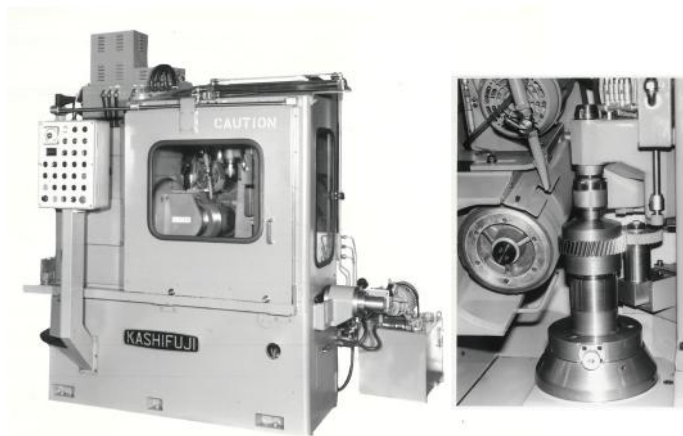


Fig. 1 KGH300 Gear Honing Machine

Immediately after its launch, the machine was well received because it enabled economical and efficient polishing of tooth flanks while removing dents. However, demand for external gear honing machines gradually declined as gear grinding machines capable of higher-precision machining through tooth profile and lead modifications became more widespread. As a result, the KGH220, sold in 1992, became the final model in the series.

More than 30 years later, especially for automotive gears, tooth surface roughness requirements have become more stringent to improve transmission efficiency and reduce meshing noise. Therefore, Kashifuji has newly developed the KGH250, which supports both conventional dent removal and post-grinding tooth surface finishing for surface roughness improvement (Fig. 2).



Fig. 2 KGH250 Gear Flank Finisher

The machine structure is simple. Similar to conventional models, the workpiece axis is not actively driven; instead, only a brake is used to generate an appropriate contact force between the honing wheel and the workpiece. Consequently, unlike gear grinding machines, it cannot actively control tooth profile or lead geometry, but operation is simple, and process difficulty is low.

Although the basic processing principle remains unchanged from previous models, automation has been achieved through the adoption of an electromagnetic brake with fine adjustment capability, automatic tooth alignment between the workpiece and honing wheel, and servo control of all axes. The honing wheel is not particularly restricted and can be selected according to the intended application. Honing wheels used in previous Kashifuji machines can also be utilised.

The primary applications of this machine are: (1) removal of tooth flank dents and simple tooth flank finishing after heat treatment, and (2) improvement of tooth surface roughness after gear grinding.

Although many automotive gears undergo gear grinding, gears used in many other industries are incorporated into products without post-heat-treatment tooth flank finishing. This is not because there is no demand for finishing, but because no finishing method currently provides an acceptable balance between performance and cost.

Dents on tooth flanks caused by heat-treatment processes and subsequent handling can generate abnormal noise if gears are assembled without additional finishing. As a result, products may need to be disassembled and parts replaced, resulting in unnecessary cost and waste. Defective gears can also be screened through visual inspection; however, small

dents that are difficult to detect visually may still generate abnormal noise, making complete prevention difficult.

By processing gears with the KGH250 before assembly, abnormal noise caused by dents can be minimised while reducing waste. Noise during meshing caused by dents is generally attributed to raised material surrounding the damaged area. Processing with the KGH250 removes this raised material (Fig. 3, removal of

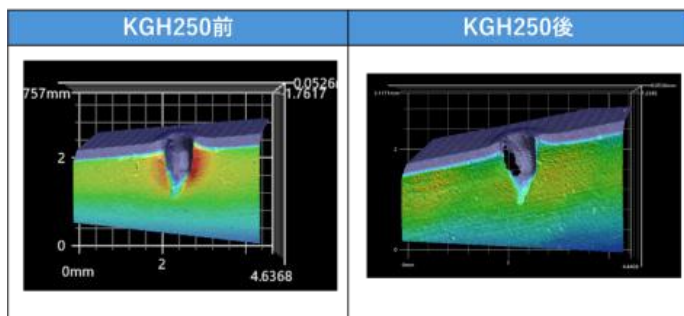


Fig. 3 Comparison before and after processing of dented areas. The raised material surrounding the dent (red region) was removed through KGH250 processing.

approximately 50 μm raised areas around dents). Feed marks generated during hobbing can also be removed (Fig. 4), contributing to improved meshing quality.

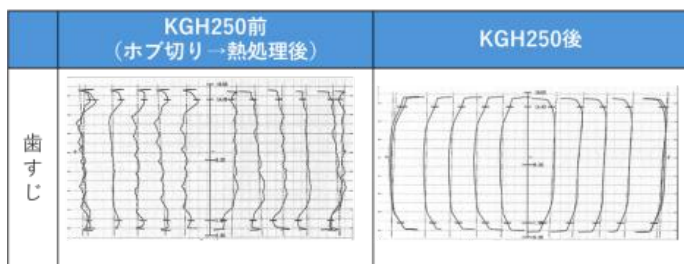


Fig. 4 Example showing removal of hobbing feed marks through KGH250 processing

The KGH250 is also effective for improving the tooth surface roughness of ground gears. In addition to improving meshing efficiency for automotive transmission gears, reduced surface roughness contributes to increased strength and lower noise levels. Figure 5 shows an example of tooth flank finishing using a softer wheel than that used for dent removal. Tooth surface roughness improved from $R_z 2.0 \mu\text{m}$ after gear grinding to $R_z 0.6 \mu\text{m}$ after KGH250 processing.

When improving the tooth surface roughness of ground gears, it is important to minimise changes to tooth profile and lead geometry. In the example shown in Fig. 5, both the tooth profile and lead profile are largely maintained except for slight rounding at both ends of the lead. Although this rounding can be considered a geometric change, it may reduce contact severity with the mating gear and contribute to improved tooth flank strength.

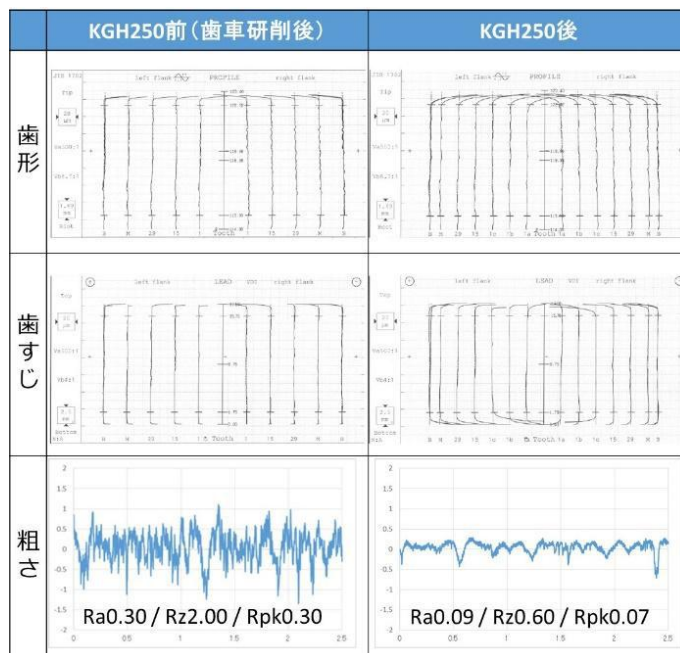


Fig. 5 Example comparing gear accuracy and tooth surface roughness after gear grinding and subsequent machining with the KGH250.

In this article, Kashifuji presented examples involving gears processed after hobbing, followed by heat treatment and after gear grinding; however, the process is also expected to be effective for gears produced through shaving, followed by heat treatment.

Although 50 years have passed since the development of the original machine, the KGH250 has been redesigned through a comprehensive review and improvement, to achieve high-efficiency mirror finishing of tooth flanks in addition to conventional low-cost tooth flank finishing and dent removal. Kashifuji expects the KGH250 to be adopted across an even wider range of applications than previous models.



Beyond Machines: Celebrating the People Who Build Manufacturing: How Manufacturing Maestros is strengthening India's industrial community?

- By Hari Shanker, Founder, Machine Maker



India's manufacturing story is most often narrated through production figures, export numbers, investment announcements and the inauguration of new factories. Each arrival of an advanced machine tool, an automation line, a robot or a digital manufacturing platform is celebrated as another milestone in the country's ambition to become a global manufacturing powerhouse. Yet behind every successful manufacturing company stands an individual whose journey rarely finds a place in this public conversation.

It is the entrepreneur who mortgaged family land to buy the first machine. It is the engineer who spent decades perfecting a machining process, the technologist who quietly solved production challenges no textbook had prepared him for, and the first-generation businessman who built customer confidence one component at a time. These are the people who have strengthened India's industrial foundation over decades, and yet their stories

have largely remained confined within factory walls. As India moves steadily towards becoming a preferred global manufacturing destination, it is perhaps time to acknowledge a simple truth: manufacturing excellence is built by people before it is built by machines. Policies create opportunities, technology enables productivity, and capital builds factories, but it is people – with their courage, discipline, curiosity, resilience and relentless pursuit of improvement – who transform those opportunities into globally competitive manufacturing enterprises.

It was this conviction that led Machine Maker, India's B2B media platform dedicated to the manufacturing sector, to launch Manufacturing Maestros in 2025. The initiative was never conceived as another award function. It was envisioned as a platform to document and celebrate the journeys of manufacturing entrepreneurs who have quietly contributed to India's industrial growth – not merely to felicitate successful business leaders, but to preserve their journeys, inspire future generations and create stronger connections across India's manufacturing ecosystem.

Over the past year, that vision has grown into a nationwide movement. Travelling through six industrial cities – from Chhatrapati Sambhaji Nagar and Coimbatore to Ahmedabad, Hyderabad and Ludhiana – Manufacturing Maestros brought together more than 750 entrepreneurs, manufacturing leaders, technology providers, industry associations and manufacturing professionals, and documented the remarkable journeys of 49 Manufacturing Maestros representing diverse sectors of Indian manufacturing.

Each story has reflected a different dimension of India's industrial transformation. Some Maestros began with a single conventional lathe; others emerged from farming families, government schools or modest workshops. Several survived economic downturns, technology disruptions and changing market demands before becoming globally respected manufacturers, and many today export to Europe, the United States, Japan and other demanding markets, quietly proving that Indian manufacturing can compete with the very best. What makes these journeys distinctive is that none of them is a story of overnight success. They are stories measured in decades – of continuous improvement, of learning



through failure, and of the patience that manufacturing alone teaches.

Every Maestro featured by Machine Maker goes through an extensive storytelling process. Long-format interviews are carefully researched, documented and transformed into documentary-style films, print features and digital stories. Rather than dwelling only on business achievements, these narratives explore childhood struggles, technical learning, entrepreneurial risks, customer relationships, technology adoption and the personal philosophies that shaped each leader's journey. Interestingly, the impact of these stories has travelled well beyond readers. Many Maestros admitted that revisiting their own journeys reminded them of how far they had come; employees discovered stories they had never heard about their founders; customers gained a deeper appreciation of the companies they work with; and young engineers found role models whose beginnings closely resembled their own aspirations. Recognition became reflection, reflection became inspiration, and that inspiration has begun to spread through the manufacturing community.

For readers of Gear Technology India, it is worth noting that several of the 49 Maestros represent the quiet evolution of India's gear manufacturing ecosystem. Gears may remain hidden inside vehicles, wind turbines, machine tools, industrial equipment and aerospace systems, but they constitute one of the most demanding disciplines in manufacturing, calling for exceptional levels of engineering capability, process discipline, tooling expertise, metrology, heat treatment and quality control. Behind these capabilities stand entrepreneurs who have devoted their entire careers to precision engineering.

One of them is Ashok Kumar Sen, founder of TASA Micro SPM. Mr Sen began his career in tool design at Escorts before establishing his company in Faridabad in 1995, starting with special-purpose jigs and fixtures. Three decades later, TASA has grown into one of India's most respected builders of special-purpose machines, with broaching systems and post-hobbing solutions – gear-tooth deburring, chamfering, rounding and pointing – that serve gear manufacturers across the automotive, defence and aerospace sectors. With more than 400 machines in service across India, and the company recently showcasing indigenous engineering at EMO Hannover 2025, his journey demonstrates how home-grown machine building can raise productivity while reducing dependence on imported technology.

Every precision gear, however, begins with a precision cutting tool, and it is on this critical link in the value chain that Naresh Gupta, Managing Director of ESGI Tools, has quietly built his life's work. From Patiala in Punjab, the company he leads has, since 1991, supplied gear hobs, shaper cutters, shaving cutters, master gears



and rack milling cutters to more than 300 customers in over 20 countries, backed by coating and re-sharpening services and a culture of close collaboration with users. Through continuous improvement in gear-cutting tool technology, ESGI has enabled manufacturers to achieve higher productivity, longer tool life and better machining performance – a reminder that manufacturing leadership is often built on technical depth rather than public visibility.

In Bengaluru, Sulaiman Jamal, Managing Director of Bevel Gears (India), part of the Jamal Group, reflects yet another dimension of this evolution. The company is a composite bevel gear manufacturer supplying everything from prototypes to production volumes for applications across industries – its gears have even flown aboard India's Chandrayaan missions, placing Indian gearing, quite literally, on the moon. Like many enduring enterprises, his journey has been shaped not by dramatic moments but by thousands of disciplined decisions taken consistently over many years, and it is that consistency which has become the foundation of customer confidence in specialised gear manufacturing.

The story of Harish Mehta of Emmbros Autocomp reinforces the same philosophy from the foothills of Himachal Pradesh. A first-generation entrepreneur, Mr Mehta founded the company in 1991 and built it into a trusted manufacturer of differential, driveline and transmission components – spindles, sprockets, spools and rear axle shafts – for leading global OEMs. Across more than four decades in the automotive industry, he has focused on earning trust through quality, delivery performance and manufacturing discipline, demonstrating that long-term customer relationships are built not through aggressive marketing but through years of dependable engineering.

These leaders represent different businesses, different technologies and different markets, yet they are united by one common belief – that manufacturing excellence is built patiently, over time.



Manufacturing Maestros has equally recognised the technology providers who enable manufacturers to keep raising their capabilities. One such example is Nimble Machines, the gear machinery vertical of the UCAM Group and a strategic partner of the initiative. Launched in 2015 and operating from Dobaspet on the outskirts of Bengaluru, Nimble Machines builds the VAJRA series of CNC gear hobbing machines – spanning workpieces up to module 8 and 400 mm diameter – and the TARANG-325 five-axis spiral bevel gear generator, giving Indian gear manufacturers access to world-class machines built at home. Its association with Manufacturing Maestros reflects another objective of the initiative: bringing manufacturing companies and technology partners onto a common platform where ideas, experience and innovation can be shared openly.

That, perhaps, is the initiative's most lasting impact. Manufacturing Maestros has become much more than a recognition platform; it has become a community. Every event has created opportunities for entrepreneurs to meet machine tool builders, tooling companies, metrology experts and automation specialists, and conversations that begin on stage have continued over dinner tables, factory visits, collaborative projects and long-term professional relationships. In many ways, the initiative has demonstrated that storytelling itself can become an enabler of manufacturing – every documented journey becomes a source of learning, every recognised entrepreneur becomes a mentor, and every gathering strengthens the industrial network that ultimately drives collaboration, innovation and growth.

As India continues its journey towards becoming a global manufacturing powerhouse, initiatives like Manufacturing Maestros remind us that industrial growth

cannot be measured only in exports, production volumes or investment announcements; it must also be measured by the strength of the people who build the ecosystem. Machines may define capability, factories may define scale, and technology may define competitiveness – but it is people who define manufacturing. The first season celebrated 49 such individuals, and as the initiative enters its second season across Bengaluru, Pune, Noida, Vadodara, Chennai and Kolhapur, with more than 55 Maestros to be recognised, its purpose remains unchanged: to honour those who quietly build the nation, preserve their journeys for future generations and inspire the next wave of manufacturing entrepreneurs.

Because behind every gear that transmits power, every precision component that enables motion and every machine that drives industry, there is a human story waiting to be told. And those stories deserve to be celebrated.



Hari Shanker is the Founder, Publisher and Managing Editor of Machine Maker, India's leading B2B media platform dedicated to manufacturing. A media professional with over 28 years of experience – 24 of them exclusively covering manufacturing – he began his journey with Industrial Business MART in 2004 and reshaped Machine Maker in 2018 as a storytelling platform built around the people, products and processes behind Make in India. He is the creator of industry initiatives, including Manufacturing Maestros and Womanufacturing, which celebrate India's manufacturing entrepreneurs and women in industry. He can be reached at hari@themachinemaker.com.

Driving India's Gear Manufacturing Innovation: How Weiler's Next-Generation Ceramic Abrasive Technologies Enable Precision, Productivity, and Surface-Finishing Excellence

- By Nagesh Mhasal

A typical Indian OEM tends to opt for lower-cost abrasive tools, but in the bargain, the quality does not meet global standards. The machine cost (including labour, consumables, electricity, and coolant) is higher, and as a result, the company tends to lose major global contracts. Ultimately, despite purchasing cheaper abrasive tools, the production cost ends up being significantly higher. However, smart companies understand the difference and use smart grinding solutions, thus optimising costs.

India's gear-manufacturing ecosystem is undergoing a decisive transformation. With the rapid expansion of EV platforms, export-oriented transmission programs, and the rising precision requirements of auto, wind, and industrial gear applications, manufacturers are under intense pressure to deliver **higher throughput, tighter tolerances, and world-class surface finishing**—all while managing cost pressures and workforce constraints.

In this environment, the grinding process has become a strategic differentiator. The ability to grind gears faster, cooler, and more consistently with better accuracy directly impacts:

- Cost per component, Machine throughput, Quality stability, NVH performance
- Export competitiveness

Across global case studies—including Decrease Cycle Time to Meet Production Demands, Gaining Efficiency to Meet Customer Demands—Weiler Abrasives has demonstrated that the next leap in gear-grinding performance comes from **Grinding force-stabilised abrasive technology, self-sharpening grains, engineered surface-finishing solutions, and intelligent process automation.**

This article presents a deep technical and market-specific perspective on how Weiler Abrasives India is enabling this transformation.

1. Weiler Abrasives: A Global Surface-Finishing Leader Since 1879

Founded in 1879, Weiler Abrasives has evolved



over nearly 150 years into one of the world's most respected abrasive manufacturers. From its origins in Germany to establishing in the United States to its global footprint across Europe and Asia, Weiler has built a reputation for:

- Advanced materials science
- Precision bond engineering
- Application-specific abrasive design
- Process-optimisation expertise

Today, Weiler supports industries such as:

- Automotive and EV
- Aerospace
- Heavy engineering
- Metalworking
- Oil & gas
- Power transmission

Weiler in India: Technology + Application Engineering = Smart Grinding

Through Weiler Abrasives India and its technical partner network- Prativ Technology, Weiler brings:

- Local inventory
- On-site application support
- Fast trial execution
- Customised wheel development
- Process-optimisation expertise

This combination of **global innovation + local engineering** is enabling Indian manufacturers to achieve world-class grinding and finishing performance.

2. Surface Finishing & Accuracy: The New Competitive Advantage for Indian Gear Manufacturers

Surface finishing has become one of the most critical performance parameters in modern gear manufacturing.

Manufacturers must now deliver not only dimensional accuracy but also:

- Micro-geometry stability
- Surface integrity
- Low roughness ($Ra\ 0.15\text{--}0.8\ \mu\text{m}$)
- Controlled Rz and peak-to-valley consistency
- Burn-free surfaces with minimal residual stress

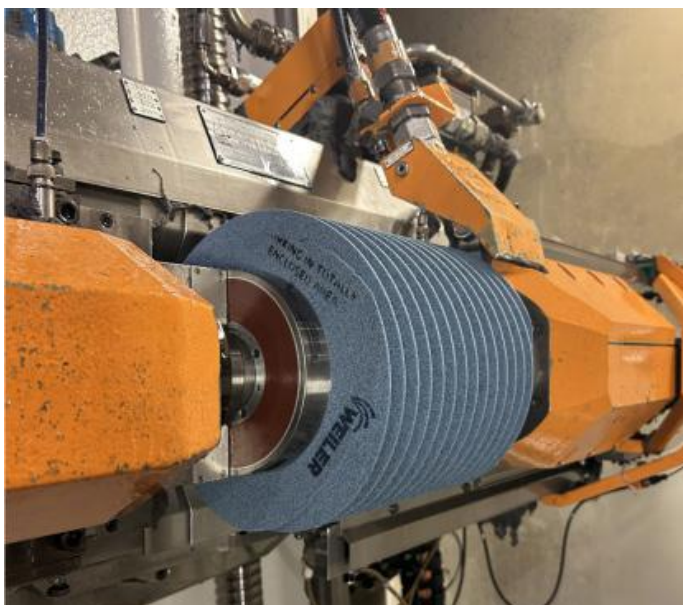
Why? Because surface finishing is now a functional requirement, not a cosmetic one.

EVs have eliminated engine masking noise. Even minor surface deviations on gear flanks now translate into tonal noise. Similarly, modern industrial drives operate at:

- Higher RPM
- Higher torque density
- Lower lubrication film thickness

This increases sensitivity to:

- Roughness
- Waviness
- Thermal damage



- Micro-geometry variation

A stable finishing process directly improves durability, efficiency, and NVH behaviour.

3. Weiler Abrasives: Engineering the Future of Gear-Grinding and Finishing = Smart Grinding

Weiler's strength lies in combining **advanced abrasive technology, precision bond systems, and application-specific engineering**. The company's 24 types of vitrified, resin, hybrid, metal-bonded, and electroplated super abrasive wheels deliver predictable, repeatable finishing performance across:

- Gear grinding
- Gear honing
- Tool grinding
- Roll grinding
- High-precision machining

Innovation for India – for Indian EV gears, Weiler Abrasives has developed 150 grit gear grinding wheel, so instead of using a complicated sandwich wheel with 2 different grades, the job can be done by 1 grade only.

A message from Weiler India

"Surface finishing & accuracy is no longer just a process step; it is a competitive advantage. Our mission is to help Indian manufacturers achieve world-class grinding performance with accuracy, consistency, stability, and measurable productivity gains."



4. Why Force Stability Is the New Benchmark for Grinding Performance = Smart Grinding

In continuous grinding, the most critical variables are:

- Normal grinding force (F_n)
- Tangential grinding force (F_t)

- Specific material removal rate (Q'W)
- Chip thickness (hcu)
- Thermal load at the flank

Increasing the feed rate increases Q'W, but also increases Fn and Ft.

If the wheel cannot maintain stable forces, the result is:

- Burn
- Profile distortion
- Higher wheel wear
- Increased dressing frequency
- Inconsistent quality across shifts

Weiler's engineered vitrified ceramic wheels maintain stable forces across a wider Q'W range, enabling higher feed rates without thermal instability.

This is the foundation of Weiler's performance advantage.

5. Inside the Wheel: How Weiler Engineers Abrasive Microstructure for India's Needs

Weiler's gear-grinding wheels are engineered systems designed around three pillars:

A. Advanced Ceramic Grain Technology

Weiler uses high-performance ceramic grains with controlled micro-fracturing behaviour.

Benefits include:

- Continuous self-sharpening
- Lower grinding forces
- Reduced heat generation
- Stable chip formation
- Improved surface finish

B. High-Stiffness, Thermally Stable Bond Systems

Weiler's vitrified bonds are engineered to:

- Maintain profile under high load
- Resist thermal softening
- Absorb micro-vibrations
- Deliver predictable wear behaviour

C. Engineered Porosity for Cool Cutting

Porosity is designed, not random. Weiler's pore architecture improves:

- Coolant penetration
- Chip evacuation
- Thermal stability

- Wheel cleaning behaviour

In a US Gear case study, engineered porosity reduced grinding forces by 12–15%, enabling higher feed rates without burn.

6. Dressing Optimisation: The Most Under-Leveraged Productivity Lever in India = Smart Grinding

Dressing directly influences:

- Wheel sharpness
- Chip thickness
- Force behaviour
- Profile accuracy
- Wheel life

Yet, in many Indian plants, dressing is treated as a fixed parameter rather than a process variable.

Common issues in India:

- Over-dressing to avoid burn (customers remove 260 to 300 microns, can it be reduced? This increases wheel life)
- Inconsistent overlap ratio (Ud) across shifts
- Worn dressing rolls were not replaced on time
- No correlation between dressing and force behaviour
- Excessive wheel consumption due to conservative dressing

Weiler's approach:

Weiler's application engineers optimise:

- Dressing overlap ratio (Ud)
- Dressing depth (ad)
- Dressing speed ratio (qd)
- Dressing roll geometry
- Dressing frequency based on force feedback

In the Gaining Efficiency to Meet Customer Demands case study, optimising dressing alone delivered:

- 14% cycle time reduction
- 30% reduction in dressing frequency
- 40% improvement in wheel life

7. Process Automation: Moving India from Operator-Dependent to Data-Driven Grinding

Automation in grinding is not limited to robotic loading. The real gains come from **process intelligence**.

A. Adaptive Feed Control

Machines adjust feed rate based on real-time force feedback.

B. Force-Based Dressing Trigger

Dressing is triggered when F_n exceeds a threshold.

C. Closed-Loop Profile Compensation

Integrates:

- Gear inspection data
- Machine correction parameters
- Wheel wear models

D. Thermal Compensation Algorithms

Stabilizes:

- Profile slope
- Lead deviation
- Tooth-to-tooth variation

Weiler's role:

Weiler's grinding force-stable wheels are designed to work seamlessly with these automation systems.

8. Case Study Insights: What Indian Manufacturers Can Learn

Case Study 1: Automotive Gear – Cycle Time Reduction

- 18% cycle time reduction
- Burn eliminated
- 30% longer dressing interval

Case Study 2: Industrial Gear – Surface Finish Stability

- R_a improved from 0.6 to 0.35
- Wheel life increased by 40%
- Process became shift-independent

Case Study 3: Atlantic Gear – High Stock Removal

- 22% reduction in profile error
- Stable forces across wheel life

9. CBN vs. Vitrified: Choosing the Right Technology for India

Vitrified Wheels

Best for:

- Medium-to-high volume
- Automotive gears
-

Vitrified CBN Gear grinding Wheels (A new in Gear grinding)

Best for:

- EV gears – Mass production
- Export-grade precision

Weiler's CBN-V wheels deliver up to **80% reduction in dressing frequency**.

10. The Weiler India Advantage: Technology + Application Engineering

Weiler Abrasives India brings:

- Next-generation vitrified and CBN wheels
- Engineered porosity and advanced grain technology
- Dressing optimisation and force-based process tuning
- On-site application engineering
- Support for automation and closed-loop grinding

Conclusion: Weiler Abrasives India Is Enabling the Next Productivity Leap

With Weiler's **147-year legacy (est. 1879)** and India's manufacturing ambition, the next decade of gear-grinding and surface-finishing productivity will be defined here.

Key Learning for India

For heavy-duty gears, the bond stiffness and thermal stability of the wheel are more important than grain type alone.

Weiler's engineered vitrified systems allow Indian manufacturers to:

- Remove more stock
- Maintain profile accuracy
- Reduce dressing cost
- Improve machine availability.

Apart from Gear grinding wheel offerings, Weiler also has one of the widest ranges of Abrasives:

- Vitrified bonded Conventional Wheels – 24 bond systems for predictable wear & stable G-ratio.



For those who value productivity-enhancing solutions for the toughest cleaning, grinding, cutting, deburring and finishing challenges – Weiler Abrasives is your Productivity Partner.

- Resin-bonded Hot-pressed & Cold-pressed Wheels (up to 1250 mm) – Thermal stability & uniform performance under heavy loads. Mainly for the steel industry, roll grinding.
- CBN & Diamond Tools in Vitrified, Electroplated, Hybrid, Resin and Metallic Bonds in different cores – Ceramic, Duralumin, Steel, Aluminium, CFK (Carbon fibre composite) and others – Results in Longer geometry retention, fewer dressings, speeds up to 125 m/s.
- Cut-Off Wheels & Conditioning Fabrics – Clean cuts and uniform finishing.
- Industrial Brushes & Robotic-Ready Tools – Repeatable, automation-friendly finishing.



Nagesh Mhasal

Business Development Manager – India, Weiler Pacific Abrasives

gear
TECHNOLOGY INDIA

Your gateway to India's exclusive magazine for the Gear & Allied sectors

Gear Technology India is India's first and only multifaceted Web Platform catering to the Indian Gear Industry

Scan To Subscribe



For Advertisement:

Sandiip Shetye | sandiip@virgo-comm.com | +919833750284

For Editorials: editorial@geartechnologyindia.com



www.geartechnologyindia.com



SUPER HOBS & BROACHES PVT. LTD.

COMPREHENSIVE RANGE OF

PRECISION GEAR CUTTING TOOLS & BROACHES



GEAR HOBS



SPLINE HOBS



**CHAIN SPROCKET
HOBS**



**TIMING PULLEY
HOBS**



SHANK TYPE HOBS



**RACK
HOBS**



**SOLID CARBIDE
HOBS**



**WORM GEAR
HOBS**



**GEAR
SHAVING CUTTERS**



**POWER SKIVING
CUTTERS**



**MASTER
GEARS**



**GEAR
SHAPING CUTTERS**



**HELICAL
BROACHES**



**FORM RELIEVED
MILLING CUTTERS**



**SIDE & FACE
MILLING CUTTERS**



SPLINE BROACHES

SUPER HOBS & BROACHES PVT. LTD.

B-22, FOCAL POINT, PATIALA - 147003. (PUNJAB) INDIA

+91 73072-90772 | 99142-87540

WWW.SUPERCUTTINGTOOLS.COM

INFO@SUPERHOBS.IN

CZECHmetal Invests in SECO/WARWICK Vacuum Furnace Technology to Enhance Heat Treatment Capabilities

- By Gear Technology India

Czech commercial heat treatment specialist CZECHmetal s.r.o. has invested in advanced vacuum furnace technology from SECO/WARWICK, selecting a custom-built horizontal, two-chamber CaseMaster Evolution vacuum furnace equipped with an oil quenching system and vacuum carburizing capabilities.

The new system will be installed at CZECHmetal's production facility in Olomouc, Czech Republic, replacing an older furnace and significantly increasing the company's heat treatment capacity. The investment is expected to improve production efficiency, process cleanliness, and repeatability while enabling the company to meet growing customer demand for advanced heat treatment services.

Custom Solution for Existing Infrastructure

The supplied system is a two-chamber CaseMaster Evolution-D (CMe-D) vacuum furnace featuring SECO/WARWICK's FineCarb vacuum carburizing technology and low-pressure carbonitriding (LPCN). The furnace includes a specially designed heating chamber measuring 700 × 1200 × 700 mm, enabling installation within the existing production space without requiring modifications to the plant's infrastructure.

The furnace design incorporates a heating chamber and a charge loading and unloading vestibule with an integrated oil quench tank. The system offers dual cooling capabilities, allowing components to be cooled either dynamically in inert gas above the oil surface or directly immersed in quench oil, ensuring greater process flexibility and efficiency.

"The Czech Republic is a very important market for vacuum technologies. We see increasing demand for modern carburizing and hardening processes, particularly in the machinery, automotive and tooling sectors," said Maciej Korecki, Vice President of the Vacuum Segment at SECO/WARWICK. "We are pleased that CZECHmetal is joining the group of our partners in the region."

Advanced Technologies for Precision Heat Treatment

The furnace is equipped with advanced process technologies designed to deliver precise control over steel

surface properties and achieve high-quality carburized layers. Its heating system enables rapid and uniform heating of loads, even at lower temperatures, significantly reducing cycle times. Additionally, a high-performance oil circulation system ensures excellent load penetration and uniform quenching.

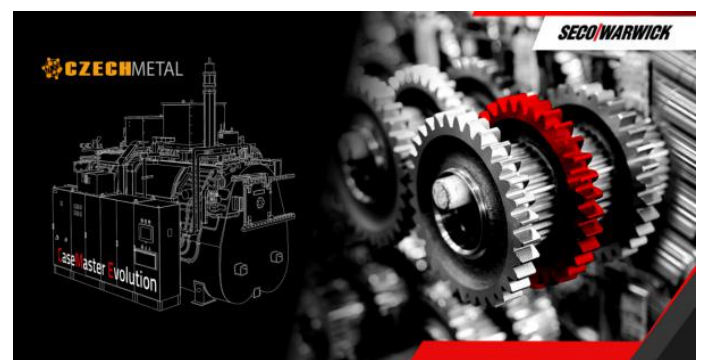
"This solution combines the proven design of our CaseMaster Evolution furnaces with customization for customer needs," said Łukasz Chwiałkowski, Sales Manager at SECO/WARWICK. "The non-standard chamber made it possible to fit the system into the existing production space perfectly while maintaining all the advantages of our technology – process stability, high efficiency and operational reliability."

Strengthening Competitive Advantage

For CZECHmetal, the investment represents a strategic step toward enhancing operational efficiency, reducing order lead times, and delivering greater consistency in heat treatment processes.

"From the very beginning, our development has been based on investing in technologies that enable us to offer increasingly advanced heat treatment processes," said Adam Petrecký of CZECHmetal s.r.o. "The new vacuum furnace will allow us to increase efficiency and introduce even more precise carburizing technologies. Excellent cooperation and a real response to our needs best summarise this project."

The order also highlights the growing adoption of premium vacuum technologies among commercial heat treaters across Central Europe, particularly in the machinery, automotive, and tooling industries, where advanced heat treatment capabilities are increasingly becoming a key competitive differentiator.



India's Leading Exhibition on Gear, Grinding & Power Transmission Technologies



2 - 4 March 2028

Chennai Trade Centre | Hall no. 1A, 1B, 2 & 3A

CONCURRENT EVENTS



SCAN HERE TO EXHIBIT



ORGANISED BY



BOOKINGS OPEN

WWW.IPTEX-GRINDEX.COM

State of India's Gear Industry 2026: Tariffs, Transition, and the Long Game: India's Gear Manufacturers Navigate a Shifting World

- By Sudhanshu Nayak

When Gear Technology's annual survey named tariffs the defining challenge of 2026 for the global gear industry, manufacturers in the US had a particular kind of headache in mind - imported machinery, disrupted supply chains, chaos in planning cycles. For India's gear and power transmission sector, the tariff story cuts differently. The pain isn't just incoming. It's bilateral, complex, and arrives at a moment when the industry was beginning to believe it had finally found its footing.

The Tariff Problem - India's Version

India's auto component sector exports roughly \$6.2 billion annually to the US, with auto parts alone accounting for \$2.2 billion, nearly 29% of total Indian auto part exports globally. Since May 2025, those exports have faced a 25% US tariff. By August 2025, that rate doubled to 50% on most Indian goods. ACMA, the Automotive Component Manufacturers Association of India, warned that operating margins across component manufacturers would compress by 125 to 150 basis points as a direct result. For the tier-2 and tier-3 gear and transmission suppliers sitting behind the tier-1 names, the impact is indirect but real: when large listed auto component companies pull back on US-bound orders, the volume reduction cascades down.

The frustration familiar to global respondents, that you can absorb cost increases, but you cannot absorb chaos, resonates here too. A gear manufacturer supplying a US-bound drivetrain program for three years cannot get a clear answer on whether the program continues, shifts sourcing, or moves production to a lower-tariff country. The spec sheet hasn't changed. The geometry hasn't changed. Only the political weather has.

India's own import side adds a separate layer of pressure. High-quality gear cutting machines - hobbing, grinding, profile-checking equipment from Germany, Japan, and Switzerland, carry GST and customs duties that push landed costs 18 to 28 per cent above invoice price. When an SME in a precision engineering cluster wants to upgrade from a 1990s-era hobbing machine to a modern CNC setup with closed-loop compensation, that capital decision looks very different from it does for a competitor in Thailand or Vietnam operating under more favourable trade regimes.

The combined effect: planning cycles have

stretched. Investment decisions that should have been made in late 2025 are sitting in review. One shop owner supplying gears to an agricultural machinery OEM put it plainly: "We are waiting to see which way the wind blows before we sign the machine purchase order. That has never been our practice before."

Where Demand Is Real

Within the uncertainty, certain pockets of Indian demand are unambiguously strong, and they mirror the global pattern the Gear Technology survey identified.

Defence and aerospace are the clearest bright spots. India's Ministry of Defence received its highest-ever budget allocation of 7.85 lakh crore (~\$93.5 billion) in FY 2026-27, a 15.2% increase over the prior year. Of this, 1.39 lakh crore is earmarked specifically for procurement from domestic defence industries, with 75% of the capital acquisition budget reserved for Indian manufacturers. Defence production itself reached a record 1.54 lakh crore in FY 2024-25, nearly 174% higher than a decade ago.

With approximately 16,000 MSMEs now participating in the defence supply chain, the demand for precision drive systems, actuation components, and geared mechanisms for armoured platforms, drones, and naval systems is funded, contracted, and growing faster than most precision engineering shops can qualify for.

For gear manufacturers with AS9100 and DGQA certifications, this is not speculative demand. The Defence Acquisition Council cleared proposals worth over 3.60 lakh crore in the twelve months through March 2026 alone, the largest procurement pipeline in the country's history.

Wind energy has become a structurally significant gear market, largely without the fanfare of automotive or defence. India crossed 56 GW of installed wind capacity in FY 2025-26 after adding a record 6.05 GW in the year, a 46% jump over the prior year and the highest single-year addition in the country's history. The government targets 100 GW by 2030 and 156 GW by 2036. India already has domestic manufacturing capacity for gearboxes rated at 8,000 MW annually, and indigenisation levels in wind equipment have reached 70-80%. Every 1 GW of new wind installation requires roughly 400 to 600 large gearboxes.



The math is visible. The order volumes are predictable in a way that automotive supply rarely is, and the geometry is demanding enough that price competition from commodity suppliers is limited.

Overhaul and repair - a theme running through global survey responses- is equally relevant here. In a market where imported capital equipment carries heavy landed costs and plant managers run machinery well past Western replacement timelines, a 15-year-old gearbox gets rebuilt rather than replaced. Replacement gear sets, reworked shafts, precision-rematched bearings: this segment has grown steadily as new equipment costs have risen, and it requires exactly the kind of reverse-engineering and tight-tolerance capability that skilled Indian precision shops possess.

Robotics represents the emerging frontier. As Indian manufacturing upgrades under the PLI scheme, beneficiaries across electronics, pharmaceuticals, and automotive, demand for compact, high-precision gearboxes for robotic joints and servo systems is growing. Most of this currently goes to imported units. The specifications, low backlash, low noise, and high repeatability are demanding, but the gap for domestic precision gear manufacturers who can meet them is visible, and the opportunity is significant.

The EV Question, More Complex Than Global Headlines Suggest

Globally, the EV transition has splintered by

region. India's picture is genuinely distinctive and requires careful reading.

Two-wheelers dominate the story. Over 1.88 million EVs were supported under FAME-II and PLI schemes by June 2025, and the overwhelming majority were scooters and motorcycles. Two-wheelers use far simpler transmission systems than passenger cars; the gear content per vehicle is substantially lower. For manufacturers who have historically served the four-wheeler drivetrain supply chain, this transition reduces unit complexity and per-vehicle gear content at the same time that volumes in the two-wheeler segment are rising.

Four-wheeler electrification is real, but concentrated in the premium segment and fleet operations. Penetration in the mass market remains limited. Hybrid vehicles, particularly strong hybrids, are gaining policy momentum for the mainstream segment, and hybrids use substantially more gearing than battery-electric vehicles. GST rationalisation on hybrid components was under active government review as of early 2026.

The net effect for gear manufacturers: the transition is not a cliff. It is a gradual slope that retains meaningful content. The manufacturers at risk are those narrowly positioned for ICE-only, high-volume gear cutting with no premium finishing capability. Those positioned for the NVH demands of EV reducers, e-axes, and hybrid transmissions are finding new inquiry volumes with customers specifying tolerances and surface finishes that were considered exotic five years ago.

One signal worth tracking: noise. Global survey respondents mentioned “noiseless gears” as a customer specification rippling back through design, cutting, and finishing. In India’s EV context, this is arriving faster than most mid-tier manufacturers anticipated. The shops that invested in gear grinding capability three to five years ago look prescient today. Those who deferred that investment are discovering the gap the hard way.

Automation - The Business Case Has Arrived

India’s gear manufacturing sector has talked about automation for a decade. The difference in 2026 is that the economics have finally aligned with the aspiration.

Labour costs in skilled machining have risen significantly post-COVID. A trained CNC operator now commands wages that were unimaginable five years ago, and retention remains difficult as other industries compete for the same profile. Meanwhile, robotic cells for loading and unloading gear cutting machines, cobots for deburring and handling, and automated CMM-integrated inspection cells have come down in cost sufficiently to produce positive returns on medium-volume production runs.

Export-oriented precision engineering clusters are seeing the fastest adoption. Closed-loop grinding with auto-compensation is reducing inspection-to-correction

time by 30 to 40% at shops that have implemented it. Tolerances held below ± 2 microns consistently, not occasionally, are becoming the baseline expectation for export conversations rather than a differentiator.

The constraint is not technology availability. The constraint is the same one appearing in every global survey: skilled people to commission, run, and maintain integrated automated systems. Setting up a robotic cell is one thing. Having a person on the floor who understands the integration between the robot, the CNC controller, the in-process gauging, and the ERP system is another. That profile is genuinely scarce, and the shops that have invested in developing it internally are beginning to pull measurably ahead.

Manufacturing PMI stayed above 50 every single month in 2026, registering 56.9 in February, and total manufacturing CAPEX reached 2.98 trillion in FY 2025-26, up from 2.45 trillion the prior year. For automation vendors and machine tool makers, this macro backdrop means the conversations are happening. Converting them to orders requires demonstrating ROI in Indian operating conditions, not just quoting European case studies.

The Skilled Labour Problem Is Structural, Not Cyclical

India’s gear industry faces a different version of the workforce problem than the US or Germany, but it is



equally severe, and equally unlikely to self-correct.

The issue is not a shortage of people. India's engineering graduate output is enormous. The issue is the pipeline of people willing to commit to precision machining as a career, willing to develop deep, slow expertise over years rather than move to software roles, and capable of combining mechanical intuition with digital literacy. MSMEs employ over 32.82 crore people across 7.47 crore enterprises and contribute 35.4% of manufacturing output; the sector cannot afford a talent pipeline built for yesterday's shop floor.

The cultural dimension is real. Parents of technically capable young people in manufacturing towns actively steer their children away from the shop floor. The perception problem is stubborn, even though a skilled CNC programmer at a Tier-1 auto supplier earns more than many entry-level technology roles. ITI and polytechnic curricula have improved, but the connection between formal training and live shop-floor requirements remains loose.

Some companies are solving this by making the machine do more of the work, if auto-compensation handles tool wear, if inspection is embedded in the grinding cycle, if setup documentation lives in a visual tablet interface, then the learning curve for a new operator shortens considerably. This is the same logic machine tool makers globally are articulating: embed 30 years of expertise into the software and the interface rather than waiting for the operator to accumulate it.

The National Apprenticeship Promotion Scheme exists but remains underutilised by precision engineering MSMEs, many of whom cite administrative burden as the deterrent. The companies that have built formal apprenticeship pipelines have measurably better operator depth than those relying on lateral hiring. This difference will compound over the next five years.

AI and Digitalisation - Cautious but Moving

India's gear industry is at roughly the same stage the global survey described: AI adopted at the edges, sceptical at the core, and moving in a predictable direction.

The use cases gaining traction are familiar: scheduling optimisation, quality documentation, and ERP reporting that previously required painful manual effort. A handful of companies have implemented AI-assisted data extraction, pulling trend analysis on tool wear, rejection rates, and machine utilisation from systems where that data existed but was never visible. The value is clear. The trust required to let AI influence gear geometry decisions, tooth profile corrections, and grinding cycle parameters is not yet there. That scepticism is earned.

The larger obstacle in India is data readiness. Most mid-tier gear manufacturers do not have clean, structured digital records of process parameters, rejection history, and tooling lifecycle. Before AI can optimise anything, the data infrastructure must exist. This is not an AI problem; it is a digitalisation-readiness problem that predates the AI conversation by years.

The shops that address data infrastructure now will have a compounding advantage. Once process data is captured systematically, the path to predictive maintenance, closed-loop quality control, and AI-assisted setup optimisation shortens significantly. Medium- and high-technology industries already contribute 46.3% of manufacturing value added in FY 2025-26. The direction is clear, and gear manufacturers who are not moving in it are choosing to compete at the commodity end of a market that is rationalising away from commodity suppliers.

Consolidation, Quiet but Accelerating

India's gear industry has not seen the private equity-driven consolidation visible in the US and Europe, yet. But consolidation is happening through a different mechanism: OEM rationalisation of supplier bases.

Large automotive OEMs have been systematically reducing their supplier counts, concentrating volume with fewer, larger, more technically capable Tier-1 partners. For the Tier-2 and Tier-3 gear suppliers, this means the direct relationship with the OEM increasingly routes through an integrator. Pricing leverage declines. Specification ownership blurs. Volume predictability, already difficult, becomes harder.

The shops that navigate this consolidation successfully are those with genuine technical differentiation, proprietary process capability, a customer-specific product qualification, or an application niche (defence, wind, robotics) that large integrators do not serve efficiently. A gear shop producing to the same drawing as three competitors, differentiating only on price, has a diminishing future regardless of how well it runs operationally.

The countervailing force: as India's industrial base expands, infrastructure, renewable energy, defence, electronics manufacturing, the diversity of gear applications is growing faster than any single OEM's rationalisation can offset. The opportunity is real. Capturing it requires deliberate positioning rather than waiting for the phone to ring with the same orders it always has.

What the Next Five Years Require

Indian gear manufacturers aiming to thrive in

2031 must address multiple challenges simultaneously.

Technology currency is a threshold, not a differentiator. Not necessarily the most advanced machine in every category, but at minimum, the capability to grind, inspect submicron tolerances, and integrate quality data across a production run. Customers' domestic and export are raising the baseline faster than shops running 1990s-vintage equipment can follow. This is no longer about getting ahead; it is about staying in the conversation.

Export diversification is not optional. The US tariff situation clarified something always true: concentration in a single export market is a strategic vulnerability. Europe, Southeast Asia, and the Middle East all offer genuine opportunities for precision gear suppliers with strong quality credentials. India's manufacturing exports hit a record \$447.46 billion in FY 2022-23, but the auto component sector's 29% US dependence has proven fragile. Building diversified export relationships requires upfront investment in certification and qualification that many SMEs have deferred. The cost of starting is real, but the cost of not starting is becoming clearer.

The workforce pipeline must be viewed as a strategic asset rather than merely an HR function. Gear manufacturers that invest in structured apprenticeship programmes, documented operating procedures, and clearly defined career pathways today will develop the skilled workforce needed to operate automated production cells efficiently over the next few years. Those relying on the labour market to resolve the skills shortage on its own are likely to face the same production bottlenecks in 2029 as they do today.

New application positioning is urgent. Defence, wind, robotics, EV drivetrain components - these are not future markets sitting on a horizon. They are present markets with active tenders and purchase orders on the table right now. The qualification processes are demanding, and the relationships take time to build. The manufacturers who began that work two years ago are pulling ahead. The window for newcomers is narrowing, but it has not closed.

Clarity beats certainty. Tariffs will not become predictable. The EV transition timeline will continue to shift. Policy will change in ways no survey can anticipate. Global competition will intensify in some segments and recede in others. The manufacturers building decision-making systems that can act confidently on 70% information, rather than waiting for certainty that will never arrive, will consistently outperform those still searching for a stable environment to plan from.

India's gear industry is not navigating a crisis. It is navigating a structural transition — in trade patterns,

in end markets, in technology requirements, in workforce demographics. The global survey puts tariffs at the top of the challenge list. In India, tariffs are one chapter in a longer, more consequential story. The manufacturers who understand all the chapters and are building capability rather than waiting for conditions are the ones writing the next one.

References and Data Sources

1. Gear Technology — "State of the Gear Industry 2026" (Aaron Fagan, March 2026): Survey of 137 global respondents; tariffs identified as the defining challenge. [geartechnology.com](https://www.geartechnology.com)
2. ACMA / Business Standard (August 2025): US 50% tariff on Indian goods; operating margin compression of 125–150 bps for auto component manufacturers. [business-standard.com](https://www.business-standard.com)
3. Deccan Herald / GTRI (March–August 2025): India exported \$2.2 billion in auto parts to the US in 2024, representing 29.1% of total Indian auto part exports globally. [deccanherald.com](https://www.deccanherald.com)
4. Whalesbook / ACMA (February 2026): India's total auto component exports to the US reached \$6,225 million in FY 2024–25. [whalesbook.com](https://www.whalesbook.com)
5. Press Information Bureau, MoD (February 2026): Defence Ministry allocation of 7.85 lakh crore in Union Budget 2026–27; 1.39 lakh crore for domestic procurement; 75% capital acquisition budget reserved for Indian industry. pib.gov.in
6. PIB / Tribune India (October 2025): Record defence production of 1.54 lakh crore in FY 2024–25; approximately 16,000 MSMEs in the defence supply chain; 65% of defence equipment now manufactured domestically. pib.gov.in, tribuneindia.com
7. Defence Standard (April 2026): Defence Acquisition Council cleared proposals worth over 3.60 lakh crore in the twelve months through March 2026. defencestandard.com
8. Enerdata / PIB MNRE (April 2026): India added 6.05 GW of wind capacity in FY 2025–26, crossing 56 GW cumulative — an all-time annual record and a 46% increase over the prior year. enerdata.net, pib.gov.in
9. PIB MNRE (April 2026): India's domestic wind manufacturing ecosystem capacity exceeds 24 GW annually; indigenisation levels 70–80%; gearbox domestic manufacturing capacity 8,000 MW. pib.gov.in
10. GWEC India Wind Report 2025 (August 2025): India

is the 3rd-largest wind manufacturing hub globally; installed capacity could double to 107 GW by 2030; target of 156 GW by 2036. gwec.net

11. IMARC Group (2025–2026): India industrial gearboxes market reached \$1.1 billion in 2025; projected to reach \$1.5 billion by 2034 (3.91% CAGR). imarcgroup.com
12. IMARC Group (2024): India precision gear manufacturing market reached \$20.92 million in 2024; projected to reach \$36.07 million by 2033 (6.24% CAGR). imarcgroup.com
13. Market.us (June 2026): India manufacturing sector market size \$1,541.2 billion in 2025; CAGR of 7.5%; manufacturing PMI above 50 every month in 2026, reaching 56.9 in February; CAPEX at 2.98 trillion in FY 2025-26 (up from 2.45 trillion); medium- and high-tech industries contributing 46.3% of manufacturing value added. market.us
14. Invest India / PIB (June 2025): Over 1.88 million EVs supported under FAME-II and PLI schemes; ~9,400 EV public charging stations installed. investindia.gov.in

15. Gear Technology India (January 2026): Closed-loop cylindrical grinding automation reducing inspection-to-correction time by 30–40% at export-serving precision shops. geartechnologyindia.com
16. Mordor Intelligence (2025): India's manufacturing exports reached a record \$447.46 billion in FY 2022-23. mordorintelligence.com
17. Tata NexArc / SME Street (2025): Vadodara identified as a power transmission gear export corridor; 5,000+ engineering SMEs in Rajkot producing CNC components, castings, and agricultural machinery. tatanexarc.com, smestreet.in



Sudhanshu Nayak
Technical Writer
Gear Technology India



Your gateway to India's exclusive magazine for the Gear & Allied sectors

Gear Technology India is India's first and only multifaceted Web Platform catering to the Indian Gear Industry

Scan To Subscribe



For Advertisement:

Sandiip Shetye | sandiip@virgo-comm.com | +919833750284

For Editorials: editorial@geartechnologyindia.com



www.geartechnologyindia.com

Towards Atmanirbhar Bharat: The Gear Industry's Aerospace Mission

- By Sqn Ldr Shailesh Pol (IAF veteran)

Recently, I had the opportunity to address the GearTech Summit 2026 and interact with stakeholders from the gear fraternity under the banner of IPTEXGRINDEX 2026. What particularly encouraged me was the growing interest of the gear and power transmission industry in the aerospace and defence sector. This signals that India's journey towards self-reliance is entering a new phase, with second- and third-tier suppliers increasingly exploring opportunities in high-precision defence manufacturing.

The evolution of the aerospace and defence industry has historically been closely tied to industrial progress. The World Wars and the subsequent Cold War accelerated advancements in materials engineering, propulsion systems, precision machining and manufacturing technologies. These developments gave rise to sophisticated military-industrial ecosystems, particularly in the United States and the former Soviet Union, whose technologies continue to influence global defence systems even today.

India's journey has been different. Since Independence, the country has had to balance economic development with complex geopolitical and security challenges. The vision of military self-reliance was recognised early through the establishment of institutions such as HAL and DRDO. However, immediate operational requirements and security imperatives often necessitated the import of military hardware.

Rather than criticising the pace of self-reliance, it is important to acknowledge the incremental efforts made over the decades, including the licensed production of several defence platforms in Indian factories. These initiatives helped create manufacturing capabilities, develop supplier ecosystems and build a foundation upon which today's Atmanirbhar Bharat mission is progressing.

The Challenge of Critical Technologies

India's remarkable achievements in space exploration stand in contrast to the continuing challenges of achieving complete self-reliance in critical technologies such as aero-engine development. In the space sector, limited access to foreign technologies compelled Indian scientists and engineers to innovate and build indigenous capabilities.

The defence and aerospace ecosystem, however, has followed a different trajectory, influenced

by technology-denial regimes, bureaucratic processes, long development cycles and the strategic use of defence procurement as a diplomatic instrument. Nevertheless, there have been notable successes. The BRAHMOS missile programme, developed jointly with Russia, stands as a compelling example of how collaborative development and indigenous manufacturing can create globally respected capabilities.

Encouragingly, initiatives under Atmanirbhar Bharat are beginning to yield tangible results, with India's defence exports witnessing significant growth and domestic industries increasingly participating in advanced manufacturing programmes.

Opportunities for the Gear Industry

For the gear and power transmission sector, aerospace and defence present a significant opportunity. Modern military platforms require highly specialised gears and transmission systems that operate under extreme conditions and demand exceptional precision and reliability.

Applications include:

- Helicopter main and tail rotor transmission systems
- Aircraft accessory gearboxes
- Precision gears for unmanned aerial vehicles (UAVs)
- Gear trains in missile actuation systems
- Transmission components for armoured fighting vehicles
- Turbine engine gear systems and accessory drives
- Naval propulsion and weapon-handling systems
- Manufacturing of turbine blades for jet engines
- Complex transmission and gearing systems in Tanks and Artillery guns
- Complex gearing and transmission within the jet engine and ancillary systems
- Complex manufacturing process and assembly of jet engines and military aircraft

The aerospace sector requires complex alloys with tested structural integrity.

Unlike conventional industrial gears, aerospace gears are required to operate at high rotational speeds, elevated temperatures and varying load conditions. Consequently, they demand advanced manufacturing capabilities, including:

- High-precision gear grinding and finishing
- Controlled heat treatment processes
- Specialised coatings and surface engineering
- Tight geometric tolerances and low-noise characteristics
- Advanced inspection and non-destructive testing methods
- Use of high-performance alloy steels and lightweight materials

These requirements closely align with the capabilities that India's leading gear manufacturers are already developing for automotive and industrial applications.

Learning from Existing Models

The Cold War era offers important lessons. Russian equipment has traditionally been recognised for its robustness and simplicity, while NATO systems are known for their sophistication and operator-friendly interfaces. India's unique advantage lies in having operated equipment from both ecosystems.

This experience provides Indian engineers, military veterans and manufacturers with valuable insights into performance expectations, maintainability and operational requirements. Such knowledge can be leveraged to develop products that combine reliability, affordability and advanced engineering.

Lessons from India's Space Programme

India's space programme has demonstrated that world-class engineering can be achieved through cost-effective innovation. The same philosophy can be applied to defence manufacturing.

Rather than attempting to reinvent every technology from the ground up, Indian industry can focus on developing competitive manufacturing processes, precision engineering capabilities and efficient supply chains that enable the production of globally competitive aerospace components.

The Changing Nature of Warfare

The nature of warfare is evolving rapidly. Recent conflicts have demonstrated how low-cost drones, autonomous systems and precision-guided technologies can significantly alter the battlefield.

For Indian manufacturers, this shift presents new opportunities. Components for UAVs, electric actuators, precision transmissions, miniature gear systems and advanced mobility platforms are likely to witness increasing demand. Companies that invest in precision manufacturing, automation, digital inspection and advanced materials today will be well-positioned to participate in future defence programmes.

The Indian gear and grinding industry has already demonstrated its capabilities in serving demanding sectors such as automotive, energy and industrial machinery. The next frontier lies in aerospace and defence.

The ecosystem brought together by Gear Technology India has the experience, manufacturing expertise and technological foundation to contribute meaningfully to India's vision of Atmanirbhar Bharat.

The time has come for the industry to shift into a higher gear and play a pivotal role in building a globally competitive aerospace and defence manufacturing ecosystem.



Sqn Ldr Shailesh Pol
(IAF veteran, Fighter and UAV pilot)
Director: Shail Aerospace and Defence Consulting

Precision Beyond the Machine: How Advanced Metal Cutting Fluids are Transforming Gear Manufacturing

- By Pratap Tex-Chem Group

As gear manufacturers strive for higher productivity, tighter tolerances, and sustainable operations, metal cutting fluids have evolved from being simple machining consumables into critical process enablers. Backed by over 27 years of expertise in metalworking fluids, Pratap Tex-Chem Pvt. Ltd. is helping industries unlock higher machining performance through its flagship brand, Lubeco Green Fluids.



The gear manufacturing industry is undergoing one of its most significant transformations in recent years. The rapid rise of electric vehicles, industrial automation, renewable energy systems, robotics, aerospace, and precision engineering has increased the demand for gears that offer exceptional accuracy, durability, and reliability. Whether it is an automotive transmission, wind turbine gearbox, industrial reducer, or precision powertrain component, today's gears are expected to perform under increasingly demanding operating conditions.



Meeting these expectations requires more than advanced CNC machines and premium cutting tools. Every stage of gear manufacturing—from gear hobbing and shaping to broaching, drilling, grinding, honing, and finishing—depends on one often overlooked but essential factor: the performance of the metal cutting fluid.

During machining, extreme pressure, friction, and heat are generated at the cutting zone. If not managed effectively, these conditions lead to accelerated tool wear, inconsistent surface finish, dimensional inaccuracies, higher coolant consumption, machine downtime, and increased production costs. In contrast, an advanced cutting fluid not only cools and lubricates but also improves chip evacuation, extends tool life, protects components against corrosion, and contributes significantly to overall process stability.

In modern manufacturing, lubrication is no longer just about reducing friction—it has become a strategic contributor to productivity, quality, and sustainability.

Engineering Lubrication Solutions for Modern Manufacturing

For more than 27 years, Pratap Tex-Chem Pvt. Ltd. (PTCPL), through its brand Lubeco, has been dedicated to helping manufacturers improve machining performance through advanced lubrication technology. Established in Pune, the company has grown into a trusted manufacturer of industrial lubricants and speciality chemicals, serving industries such as automotive, engineering, precision machining, aerospace, defence, agriculture, and general manufacturing.



The company's strength lies in combining technical expertise with application knowledge. Operating from an ISO 9001:2015 certified manufacturing facility, PTCPL has an installed production capacity of 6,000 KL annually, supported by an in-house R&D, Tribology, and Microbiology laboratory. These capabilities enable the company to develop products that are not only technically advanced but also validated under real machining conditions.

Over the years, PTCPL has expanded its portfolio with brands including Lubeco Green Fluids, Lubeco Futuristic Greases, Supergen Automotive Lubricants, Krushagra for Agricultural Solutions and Fluidmate for Smart Fluid Management Systems. Each brand addresses a distinct market segment while sharing the company's core philosophy of delivering reliable, performance-driven, and sustainable solutions.

Among these, Lubeco Green Fluids has become the flagship industrial brand, offering more than 150 specialised products designed for metalworking, industrial lubrication, corrosion protection, cleaning, and maintenance applications.

Addressing the Real Challenges of Gear Manufacturing

Gear manufacturing presents unique machining challenges. Processes such as gear hobbing, gear shaping, broaching, spline cutting, grinding, honing, thread rolling, and deep-hole drilling demand consistent lubrication under high cutting loads and elevated temperatures.

Manufacturers frequently encounter issues such as premature tool wear, poor chip evacuation, thermal distortion, coolant degradation, rust formation, foam generation, bacterial contamination, and operator discomfort caused by smoke or mist. These problems not only affect component quality but also increase machine downtime and operating costs.

Lubeco Green Fluids has been developed specifically to address these challenges through carefully engineered formulations that improve machining stability while reducing the total cost of production.

Rather than offering generic lubricants, Lubeco provides application-specific solutions supported by technical consultation, coolant monitoring, laboratory analysis, and process optimisation. This collaborative approach allows manufacturers to maximise machining efficiency while maintaining consistent quality.

Water-Soluble Metal Cutting Fluids: Delivering Cooling, Cleanliness, and Consistency

Water-soluble cutting fluids remain the preferred choice for a wide range of machining operations due to their excellent cooling characteristics and versatility.



The Lubeco Green Fluids portfolio includes Semi-Synthetic Water-Soluble Coolants, Synthetic Coolants, Soluble Cutting Oils, and Carbide Grinding Coolants, formulated for demanding operations involving ferrous and non-ferrous metals.

These products are extensively used in gear hobbing, gear shaping, milling, turning, drilling, boring, reaming, tapping, grinding, and other high-speed machining applications where heat control and dimensional accuracy are critical.

Their advanced formulations provide excellent heat dissipation, superior flushing properties, long sump life, excellent corrosion protection, high bio-stability, and resistance to bacterial growth. Manufacturers also benefit from cleaner machines, reduced maintenance requirements, stable coolant performance, and improved operator comfort.

The result is a machining environment that supports higher productivity while lowering overall coolant consumption and maintenance costs.



Neat Metal Cutting Fluids: Built for Heavy-Duty Performance

While water-soluble fluids excel in cooling-intensive operations, certain machining processes require exceptional lubricity under extreme pressure conditions. For these demanding applications, Lubeco Green Fluids offers a comprehensive range of Neat Metal Cutting Fluids, including Broaching Oils, Gun Drilling Oils, Honing Oils, Carbide Grinding Oils, Vegetable-Based Cutting Oils, Synthetic Neat Cutting Oils, Tapping Oils & Pastes, and Aluminium Rolling Oils.

These products are widely used in gear cutting, broaching, spline machining, precision turning, threading, deep-hole drilling, honing, and finish machining, where maintaining tool integrity and surface quality is essential. Their high lubricity, excellent thermal stability, superior chip evacuation, low smoke generation, and outstanding surface finish help manufacturers achieve longer tool life, improved dimensional consistency, reduced downtime, and better machining economics.

Performance Proven on the Shop Floor

Technical specifications are important, but actual shop-floor performance is what builds confidence.



One of Lubeco's recent projects involved a global leader in power transmission and drive solutions, where the customer wanted to improve coolant performance while reducing operating costs in ferrous machining applications. After studying the machining conditions, Lubeco recommended a specially developed semi-synthetic water-soluble coolant, LUBECUT 2300 EA, designed for excellent bio-stability, superior flushing, and multi-metal compatibility. The outcome was significant. The customer achieved a 27% reduction in coolant consumption, along with a projected 21% annual cost saving per machine. Machine cleanliness improved noticeably, coolant performance remained stable even under tramp oil contamination, sump life increased, and housekeeping standards were enhanced through better washability and corrosion protection.

In another application, a leading gear transmission system manufacturer producing high-precision transmission components evaluated nine cutting oils from international and domestic suppliers to benchmark machining performance. Several competing products experienced issues such as excessive smoke, poor chip evacuation, sticky machine deposits, inconsistent surface finish, and rapid tool wear. Lubeco's fully synthetic neat cutting oil SUPERCOOL NEAT 260 X consistently outperformed all competing products by delivering 20–25% longer tool life, mirror-quality surface finish, virtually smoke-free machining, faster chip removal, cleaner machines, and improved operator comfort. Based on the trial results, the product was selected as the customer's preferred solution for continuous production.

These examples demonstrate that the right lubrication strategy can deliver measurable improvements in productivity, operating costs, and process reliability.

Sustainability Driving the Next Generation of Metalworking Fluids

Manufacturers today are expected to balance productivity with environmental responsibility. This has accelerated the demand for cutting fluids that reduce waste without compromising machining performance.

Lubeco Green Fluids supports this transition through RoHS-compliant formulations, bio-based technologies, biodegradable alternatives, water-based rust preventive solutions, bio-stable coolant technologies, and products designed



for longer service life. Longer sump life means fewer coolant replacements, reduced disposal costs, lower fluid consumption, and improved resource efficiency. Better machine cleanliness and optimised coolant performance also contribute to lower maintenance requirements and a safer working environment. For manufacturers, sustainability is no longer simply an environmental objective—it has become an operational advantage.

Looking Ahead

As the manufacturing industry embraces Industry 4.0, automation, digital monitoring, and smarter production systems, lubrication technology must continue to evolve alongside machine tools.

At Pratap Tex-Chem, innovation extends beyond product development. Through continuous research, tribology expertise, laboratory support, coolant health monitoring, and digital fluid management tools like Lubeco Smart, the company continues to help manufacturers improve machine reliability, maximise productivity, and reduce total operating costs.

After more than 27 years in the metalworking fluids industry, the PTCPL's mission remains unchanged: to develop lubrication solutions that solve real manufacturing challenges while supporting cleaner, safer, and more efficient machining operations.

For gear manufacturers, every improvement in tool life, surface finish, coolant stability, and machining efficiency directly contributes to competitiveness. Choosing the right metal cutting fluid is therefore not simply a maintenance decision—it is a strategic investment in manufacturing excellence.

Lubeco Green Fluids continues to partner with manufacturers who believe that precision is engineered not only through machines and tools, but through every element of the machining process.

To know more about our solutions or to discuss your application requirements, visit www.lubecogreenfluids.com or write to us at info@lubecogreenfluids.com



Indigenous Innovation: Redefining the Economics of Global Transmission Manufacturing

- By Murali .R

As global industries accelerate toward electrification, automation, and energy-efficient operations, the demand for high-performance transmission components is growing at an unprecedented pace. From electric vehicle drivetrains and industrial automation systems to heavy lifting equipment and fluid power applications, manufacturers are under increasing pressure to deliver greater precision, efficiency, and reliability while remaining cost-competitive. This shift is exposing the limitations of traditional manufacturing models that depend heavily on imported, application-specific machine tools. In response, indigenous innovation is emerging as a strategic enabler, allowing manufacturers to achieve world-class quality with greater flexibility and lower operational costs. The development of advanced domestic machine tool platforms such as the WM 40100 Universal Worm and Gear Milling Machine represents a significant step in redefining the economics of transmission manufacturing and strengthening self-reliance in high-precision engineering.

The global power transmission sector is experiencing a period of unprecedented transformation. Driven by structural shifts—including the rapid rise of electric vehicles (EVs) with a projected segment growth rate of 6.9% CAGR, the intense automation of material handling corridors, and clean-energy tracking infrastructure—the demands placed on transmission components have reached a critical bottleneck. Modern gearboxes, actuators, and speed reducers must deliver higher torque density, minimise mechanical backlash, and operate extremely quietly.

For manufacturing shop floors, this technical evolution presents a tough dual challenge: achieving stringent, micron-level tooth profiles while aggressive global competition forces a reduction in capital expenditure. Historically, Tier-1 automotive suppliers and heavy industrial OEMs have had their hands tied. High-precision manufacturing of specialised components, particularly worm shafts and heavy-duty gear profiles, has been completely dominated by expensive imported machinery from Europe, China, or Taiwan.

A breakthrough in domestic machine tool engineering is disrupting this reliance on imports. Developed on a highly stable, field-proven industrial platform, the **WM 40100 Universal Worm and Gear Milling Machine** marks a significant milestone in ground-up indigenisation. By matching

the stringent performance benchmarks of international manufacturers while introducing unparalleled structural flexibility, this new platform is poised to rewrite the operational economics of the transmission industry.

The Single-Application Trap vs. The Universal Solution

In traditional transmission manufacturing layouts, rigidity has been a costly norm. European and Asian machine tool manufacturers typically design their equipment to be highly specialised and application-specific. If an industrial gear factory needs to produce high-lead worm shafts for automated elevator winches, it must invest in a dedicated worm milling machine. If that same factory receives an order for medium-sized spur gears, helical gears, or splines, they are forced to route those components to entirely separate Hobbing or shaping lines.

This single-application approach ties up enormous capital in fixed, single-purpose machinery, introduces massive material handling overheads, and leaves the floor vulnerable to under-utilised machine capacity during market shifts. The WM 40100 completely shatters this paradigm by introducing a universal architecture. Engineered specifically to serve as a multi-application hub, it handles diverse roughing and semi-finishing operations on a single unified asset.



At the heart of this agility is a uniquely designed, heavy-duty swivel milling head featuring automatic orientation. With a remarkably versatile cutter orientation angle of **-30° to 210°** relative to the horizontal plane, and a maximum helix angle capacity of **45° Left Hand (LH) & Right Hand (RH)**, the machine can transition effortlessly

between radically different gear geometries.

Rather than maintaining isolated production lines, a manufacturer can utilise the same machine to mill a high-reduction worm shaft in the morning, and pivot to a high-speed helical gear, a transmission spline shaft, or a dual-screw compressor rotor in the afternoon. This structural flexibility directly addresses the fast-evolving product portfolios of modern transmission suppliers.

Cross-Sector Applications: From Automotive EVs to Heavy Industrial Lifters

The technical versatility of the WM 40100 translates directly into specialised solutions across a wide array of high-growth transmission verticals. Because different industries prioritise distinct mechanical characteristics, a truly universal machine must adapt its cutting performance accordingly.



Worm Shaft being machined on WM 40100

1. Automotive and Next-Generation EV Drivetrains

The automotive segment demands extreme geometric consistency and exceptional surface finishes, particularly as the industry pivots toward electric vehicles. EV transmission systems operate at much higher rotational speeds than internal combustion engines, meaning any microscopic pitch error translates into unacceptable cabin noise and accelerated mechanical wear. The WM 40100 provides the precision torque and rigid multi-axis synchronisation required to cut steering systems, power transfer mechanisms, and precision actuators with repeatable accuracy.

2. Heavy Material Handling, Cranes, and Elevators

For construction hoists, winches, industrial cranes, and urban elevators, transmission components are defined by three absolute mandates: massive torque transfer, rapid speed reduction, and critical self-locking

safety capabilities. Manufacturing these massive worm drives and large-module spur or helical gears requires immense structural rigidity. The WM 40100 delivers the raw cutting power needed to process these substantial profiles without inducing structural deflection or tool chatter.

3. Fluid Power, Compressors, and Industrial Pumps

The industrial pump and compressor sectors rely heavily on specialised transmission profiles, including precision twin rotors, supercharger screws, vacuum screws, and progressive cavity pump shafts. Machining these complex, interlocking helical shapes requires complex, continuous multi-axis pathing. The four-axis simultaneous motion control of the WM 40100 enables high-speed, uniform metal removal along these continuous profiles, eliminating the production bottlenecks that often stall pump component manufacturing.

Deep-Dive into Engineering Architecture and Scale

A closer look at the technical specifications of the WM 40100 reveals why it stands toe-to-toe with elite global counterparts while maintaining a highly optimised footprint and lower energy consumption.

The machine accommodates substantial industrial components, offering a maximum workpiece diameter capacity of **400 mm** and a generous maximum cutting length of **1000 mm**, alongside a total distance between centres of **1300 mm**. The work head spindle (C-Axis) is configured with an A2-11 nose, boasting a large **105 mm bore through the spindle** and a maximum bar capacity of **90 mm**. This allows long transmission shafts to be passed securely through the work head, supported by a heavy-duty hydraulic quill tailstock that delivers up to **1180 kg of programmable quill thrust** to prevent deflection during heavy cuts.

When it comes to raw metal removal, the cutting capacity spans an impressive range of modules. The system cleanly cuts a **0.5 to 6 module profile in a single pass** and can scale up to module 22 for spur/helical gears and **module 16 for worm shafts using multi-pass programming**. This is made possible by a high-capacity cutter spindle motor that delivers **26 to 35 kW of continuous power**, paired with a BBT-40 taper tool interface that ensures zero tool slippage under maximum load.

A key highlight of this data is the machine's efficiency. Operating at a highly optimised **50 kW of total connected power**, the WM 40100 cuts energy demand in half compared to European models requiring 100–120 kW, dramatically slashing daily utility costs on the shop floor. Furthermore, with a rapid X-axis travel speed of **20,000 mm/min**, it doubles the positioning speeds of its Western

competitors, vastly reducing non-cutting cycle times.

Optimising Shop Floor Economics: The Grinding Allowance Advantage

Beyond raw specifications, the machine delivers a profound financial advantage directly to the bottom line of transmission manufacturers: it fundamentally alters post-processing workflows.

In traditional gear lines, conventional rough milling or shaping leaves a relatively large, uneven margin of stock material on the gear teeth. This large grinding allowance must be laboriously removed on specialised gear grinding machines to correct errors and achieve final accuracy tolerances. Gear grinding is notoriously slow, capital-intensive, and generates high consumable wheel costs.

Controlled by a high-resolution Fanuc 0i TF Plus system with precise rotary encoder feedback (Fanuc 1024iCZ), the WM 40100 achieves a high level of rough-machining precision. It holds a **Class 7 to 8 Lead & Pitch accuracy** while maintaining an excellent workpiece surface quality of **Ra 1.6 µm**.

By delivering a highly consistent tooth profile straight off the milling tool, transmission shops can **significantly reduce their grinding allowance or eliminate post-milling grinding operations entirely** for medium-tolerance industrial gearboxes. This optimisation slashes cycle times, decreases grinding wheel wear, and effectively removes a classic production bottleneck.

Additionally, this level of CNC automation directly solves a looming demographic crisis on the shop floor. The transmission industry has long relied on ageing, highly specialised artisans to operate conventional gear shaping and Hobbing machinery. As these skilled workers retire, factories face a severe operational vacuum. Migrating to a streamlined CNC gear milling environment allows a single trained operator to manage multiple automated cells, protecting production continuity from skilled labour shortages.

Conclusion

The future of transmission manufacturing will be defined not only by precision and productivity but also by adaptability and economic efficiency. By combining multi-application capability, high machining accuracy, energy-efficient operation, and reduced dependence on imported technologies, the WM 40100 demonstrates how indigenous machine tool innovation can address the evolving needs of modern manufacturers. Beyond delivering technical performance, it enables transmission producers to optimise capital investment, streamline production workflows, and overcome skilled labour



Helical Gear being gashed on WM 40100

challenges. As global markets continue to demand greater agility and competitiveness, such homegrown engineering solutions are poised to play a pivotal role in strengthening manufacturing resilience and positioning India as a significant contributor to the global transmission industry.



Murali .R

Product Management for Emerging Sectors, Ace Designers Ltd

Murali R is a seasoned Sales & Marketing Strategist with over two decades of experience in the machine tool industry, having built expertise across Application Engineering, Service, Sales, Marketing, Market Development, and Product Management. A graduate of

the specialised Machine Tool Technology program at C.M.Kothari Technological Institute (CMKTI), he has consistently driven business growth, product innovation, and customer-centric manufacturing solutions. Currently heading Product Management for Emerging Sectors at Ace Designers Ltd, he plays a pivotal role in shaping product strategy and developing productivity-enhancing solutions for customers. One of his most notable achievements is spearheading the development of India's first indigenous Worm Milling Machine for the transmission industry, creating a successful import substitute through extensive market research and customer engagement. Passionate about mentoring, he has guided more than 100 young professionals throughout his career and remains committed to developing future industry leaders. A dedicated machine tool professional, he is also working on his autobiography with the vision of inspiring and shaping the next generation of machine tool engineers.

MRAM **EXPO 2026**

7-9 October BEC, Mumbai

India's only trade fair for
Maintenance, Reliability and Asset
Management

EXHIBIT
WHERE INDUSTRY
PERFORMANCE IS
REDEFINED!

Maintenance is no longer a cost center — it is the backbone of reliability, efficiency, and profitability.

At MRAM Expo 2026, showcase your solutions to the leaders who are transforming asset performance across industries.



Contact Us

Niketh Mandal

+91 9945216539

niketh@virgo-comm.com

www.mramindia.com



Organized by

virgo COMMUNICATIONS AND
EXHIBITIONS (P) LTD

Knowledge Partner



Exhibit Now

Industrial Gearboxes Drive Modern Machinery Forward

An industrial gearbox is an enclosed mechanical system that transfers energy from a motor to a machine, adjusting torque, speed, and direction to meet operational demands. By multiplying torque and reducing speed, gearboxes allow machines to perform heavy-duty tasks smoothly and efficiently. They are the silent force behind countless industrial applications, from conveyors and crushers to turbines and material handling systems.

Industrial gearboxes are indispensable across industries. They improve productivity, reduce energy loss, and extend equipment life. In sectors where machines run continuously, the right gearbox minimises downtime and maintenance costs. By controlling torque and speed, gearboxes also enhance workplace safety, preventing mechanical failures that could lead to accidents. With rising automation and the growth of smart factories, gearboxes are evolving beyond mechanical parts. They are increasingly integrated into intelligent systems, contributing to predictive maintenance, energy efficiency, and digital monitoring.

What Is an Industrial Gearbox?

At its core, an industrial gearbox is designed to control motion. Motors often run at speeds too high for practical use, and gearboxes reduce this speed while increasing torque, ensuring machines can handle heavy loads without overheating or breaking down. Every gearbox is made up of several key components: gears that transfer and adjust motion, shafts that connect the motor to the machine, bearings that reduce friction and support smooth gear movement, housing that protects internal parts from dust and heat, and lubrication systems that keep moving parts cool and prevent wear. Together, these elements ensure machines operate safely and efficiently, even in demanding environments.

Types of Industrial Gearboxes

Different applications require different gearbox designs. Helical gearboxes are known for smooth, quiet operation thanks to angled teeth that engage gradually, making them common in conveyors, crushers, and mixers. Bevel gearboxes use conical gears to change drive direction, ideal for right-angle power transmission in printing machines and power plants. Planetary gearboxes are compact yet powerful, distributing load across multiple gears, and are widely used in robotics, aerospace, and packaging. Worm gearboxes provide high reduction ratios with self-locking ability, making them suitable for elevators and conveyors. Shaft-mounted

- **By Neha Basudkar Ghate**

speed reducers, or SMSR gearboxes, mount directly on the driven shaft, saving space and simplifying alignment, which makes them popular in mining and construction. Spur gearboxes, with straight-cut gears, offer simple and cost-effective power transfer in food processing and low-load applications.

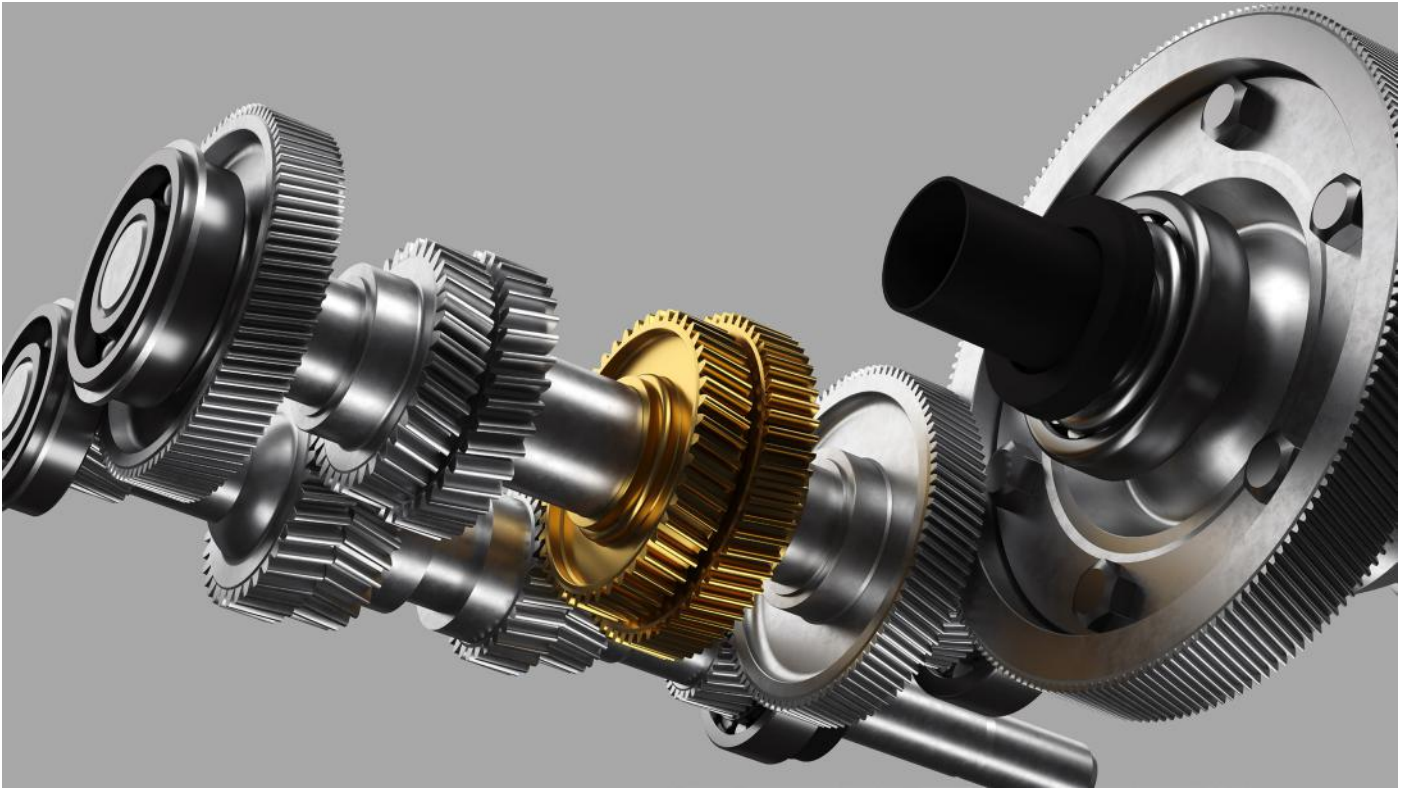
Benefits of Industrial Gearboxes

Industrial gearboxes deliver several key benefits. They multiply torque, allowing smaller motors to achieve higher output. They reduce speed to match operational needs, improving efficiency and preventing damage. They balance motor inertia with load inertia, ensuring responsive systems and reducing overshoot. And they cut costs by enabling the use of smaller motors and drives, lowering energy consumption and equipment expenses. These benefits make gearboxes essential for industries seeking efficiency, reliability, and long-term savings. Choosing the Right Gearbox

Selecting the right gearbox requires careful consideration of several factors. The type of application and load is critical: heavy-duty industries like mining need gearboxes that withstand shock and high loads, while packaging requires precision. Speed and torque requirements must be matched correctly, since choosing the wrong ratio can cause inefficiency or failure. Efficiency and maintenance needs also matter, as gearboxes with strong materials and advanced lubrication systems last longer and reduce downtime. Finally, environmental and safety conditions must be accounted for. Gearboxes must be sealed and durable in dusty, moist, or high-temperature environments, while meeting safety standards to prevent failures or accidents. A well-chosen gearbox ensures smooth operations, lower costs, and improved safety.

Industrial Applications

Industrial gearboxes are used across diverse sectors. In manufacturing plants, they are essential for machines performing cutting, stamping, and assembly tasks, ensuring precise motion and consistent speed. In mining, gearboxes are built to handle extreme loads and harsh conditions in drills, crushers, and loaders. Conveyor systems rely on gearboxes to regulate belt movement and manage load handling in factories, warehouses, and airports. Power plants use gearboxes in turbines, pumps, and fans to manage mechanical energy, while renewable energy systems depend on them in wind turbines to adjust blade speed for efficient power generation.



Common Gearbox Problems

Despite their durability, gearboxes can face issues over time. Overheating is often caused by poor lubrication or excessive load. Noise and vibration usually indicate misalignment, wear, or resonance. Lubrication failures, such as poor oil quality or contamination, accelerate wear and increase noise. Preventive maintenance is key to avoiding breakdowns. Regular inspections, oil analysis, and vibration monitoring help extend gearbox life and reduce costs compared to reactive repairs.

Maintenance Best Practices

To ensure long-term performance, maintenance should focus on verifying lubricant type, viscosity, and levels, inspecting mounting bolts and alignment, monitoring temperature and vibration trends, and replacing worn gears or bearings before failure. Predictive maintenance strategies, including condition monitoring and oil analysis, detect problems early and prevent downtime.

Conclusion

Industrial gearboxes are the backbone of modern machinery. They multiply torque, reduce speed, and balance inertia, enabling machines to operate safely and efficiently across industries. From manufacturing and mining to power generation and material handling, gearboxes ensure smooth operations and long-term reliability. As industries move toward automation and

smart factories, gearboxes are evolving into intelligent components of larger systems. The demand is no longer just for power but for precision, durability, and energy efficiency. Choosing the right gearbox, maintaining it properly, and adopting predictive strategies are essential for success in today's industrial landscape. With advanced designs and better materials, industrial gearboxes are more reliable than ever, ensuring that the machines driving global industry remain powerful, efficient, and quiet.

References:

<https://nisukaindustries.com/the-ultimate-guide-to-industrial-gearboxes/>

<https://www.superiorgearbox.com/role-industrial-gearbox/>



Neha Basudkar Ghate
Technical Writer
Gear Technology India

Why Advanced Gear Metrology Is Becoming Critical for Indian Manufacturing Competitiveness

- By Vivek Singh

What Gear Metrology Actually Measures

Understanding why metrology matters requires knowing what it is that is being measured. Gear inspection is not a measurement of a single aspect; it is a suite of parameters that together describe how accurately a gear was manufactured relative to its theoretical geometry. The most critical of these are lead and profile. Lead describes how accurately the tooth runs along its length and whether the helix is consistent across the face width. The profile describes the shape of the tooth flank in cross-section and whether it follows the correct involute curve. Errors in either of these parameters cause uneven load distribution and elevated noise. For EV drivetrains or aerospace gearboxes, lead and profile deviations must be held to single-digit micron levels.

Pitch accuracy: the uniformity of spacing between consecutive teeth is equally important. Pitch errors create repeating excitation forces as gears mesh, driving vibration at specific frequencies. In a quiet drivetrain, these show up as gear whine. In a high-speed aerospace gearbox, they can initiate fatigue cracks.

Runout, or eccentricity, refers to how well-centred the gear is relative to its bore or shaft. A gear with significant runout will create a once-per-revolution load variation that shows up as a low-frequency vibration and accelerates bearing wear.

Individually, each of these parameters tells a partial story. Together, measured on a CNC gear measuring machine with precision probe systems and analytical software, they give a complete picture of a gear's quality and a direct indicator of its in-service behaviour.

The CNC Measurement Shift

The technology itself is not new. Klingelnberg and Gleason, the two dominant names in gear metrology, have produced CNC gear measuring machines for decades. What is new is the urgency with which Indian manufacturers are being pushed to adopt them and the sophistication being demanded.

Customers are calling for higher product performance and reliability, driving manufacturers to maintain more stringent quality management practices. Complex geometries and tighter tolerances are pushing multi-sensor 5-axis CMMs to the forefront for inspecting custom and high-performance gears. And traditional gauges and CNC equipment used in isolation are increasingly insufficient; the majority of gear-checking

There is a quiet shift happening on Indian shop floors, and it does not involve a new machine tool or a government scheme. It involves a measurement machine. Specifically, it involves the growing realisation among Indian gear manufacturers that getting a gear to the right dimension is no longer enough. Proving it repeatedly, traceably, and to international standards is what now separates suppliers who win global contracts from those who do not.

This is the reality of advanced gear metrology, and for India's precision engineering industry, its importance is arriving at exactly the right moment.

The Inspection Gap Nobody Advertised

India's gear manufacturing sector is at a genuinely interesting point. The Indian precision gear manufacturing market reached USD 20.92 million in 2024 and is projected to reach USD 36.07 million by 2033, growing at a CAGR of 6.24%, driven by demand from automotive, aerospace, and industrial sectors. Export orientation is rising. Considering that OEM relationships with global companies are deepening, we can expect promising investments in CNC gear grinding.

But there is a gap that sits uncomfortably alongside this growth. India's gear manufacturers quietly power some of the most demanding sectors: electric vehicles, defence systems, aerospace actuators, and robotic joints. Yet behind the growing automation and CNC investment, many shop floors still face a complicated reality. It is no longer just about cutting gears to tolerance; it is also about decoding international standards and dealing with a lack of application-specific metrology.

That gap is the inspection gap. And it is becoming expensive to ignore.

The existing quality inspection approach of most of the Indian shop floors involves dial gauge-based manual gear roll testers, basic runout measurement tools, and operator-dependent attribute checks. All of these are becoming inadequate for industrial supply chains where tolerances were forgiving. They are simply not adequate for the industries we are aiming to serve, such as aerospace actuators, EV reduction drives, or precision robotics, where even a few microns of error in tooth profile or pitch translates directly into vibration, premature failure, or rejection at the OEM's incoming inspection bay.

machines historically lacked the ability to perform multi-sensor inspections or feed data into closed-loop process control.

The shift is from attribute-based inspection pass or fail, based on a go/no-go gauge, to variable, data-rich inspection that tells you not just whether a gear passed, but by how much and in which direction the process is drifting. This data-driven approach is what global OEMs now expect as a condition of supply. They want measurement reports, not just conformance declarations. The demand for reliable testing solutions stems from the necessity to comply with exacting standards such as DIN, AGMA, and ISO while optimising production costs. High-precision gear testing enables manufacturers to detect deviations early, reducing scrap rates and ensuring the quality that sectors like aerospace and automotive critically require.

AGMA and DIN: The Standard Behind the Standard

AGMA (American Gear Manufacturers Association) and DIN (Deutsches Institut für Normung) quality grades are the lingua franca of precision gear supply chains globally. An AGMA Q13 or DIN 5 gear is a fundamentally different product from an AGMA Q8 or DIN 9 gear, not just in the tolerances it holds but in the manufacturing processes and inspection rigour required to achieve and verify them.

For Indian manufacturers targeting aerospace, high-end robotics, or European automotive OEMs, compliance with these standards is not optional. It is the qualification threshold. Without the ability to measure to, and report against, AGMA or DIN criteria with full traceability of instruments, calibration records, and measurement uncertainty documentation, a supplier simply cannot enter the conversation.

This is where Indian manufacturers are making the most investment right now and where the gap is most visible. RACL Geartech, which supplies precision drivetrain components to BMW, KTM, and ZF, operates at this level by necessity; its OEM customers require measurement data traceability and gear accuracy standard compliance as a baseline, not a differentiator. Shanthi Gears, having achieved NADCAP accreditation in 2024 as the first Indian gear manufacturer to do so, has demonstrated that aerospace-grade quality management is achievable from an Indian facility. But these companies represent the leading edge, not the norm.

Why It Is an Ecosystem Problem

Gear metrology is not just a machine purchase. It sits at the centre of an engineering ecosystem with trained operators who interpret measurement data, software that integrates results with process control on the grinding machine, calibration infrastructure to maintain instrument

accuracy, and, lastly, the quality management systems make everything traceable and auditable.

This is where India's precision engineering sector still has ground to cover. While global competitors push ahead with closed-loop production systems where the grinding machine receives corrective data directly from the measurement system without human intervention, many Indian facilities are still building the foundational layer: the right machines, the right software, and the right trained people.

Indian innovation is appearing here. CalibroMeasure Equipments, a Pune-based company, has developed the CNCtize platform, transforming existing gear quality inspection fixtures into digital, data-driven systems capable of measuring PCD runout, pitch, and profile deviations with full traceability. The approach recognises commercial reality: not every Indian gear manufacturer can immediately invest in a Klingelnberg P65. But most can upgrade their existing inspection workflow to produce quantified, traceable data rather than operator-dependent attribute calls.

The Competitive Logic

The business case is straightforward even if the technology is complex. First-time quality rates improve. Scrap and rework costs fall. OEM qualification timelines shorten. And export conversations become possible that were previously closed.

India aims to be a trusted global manufacturing centre, but for that ambition to translate into gear supply chain participation at the highest tier, measurement capability must match machining capability. The two cannot diverge indefinitely. India's global manufacturing export share currently sits around 1.8%; the gap between production ambition and international quality recognition is real. In precision gear manufacturing, that gap closes one measurement report at a time.

The companies that understand that metrology is not a cost centre but a market access tool are the ones writing the next chapter of Indian gear manufacturing's global story.

Sources: IMARC Group, Gear Technology India, CalibroMeasure Equipment, Gear Solutions Magazine, RACL Geartech (ICICI Direct / Mangal Keshav Research), Shanthi Gears, Whalesbook / India manufacturing standards analysis.



Vivek Singh

Technical Writer

Gear Technology India

The Hidden Cost of Power Transmission Inefficiency: Why Bearings, Lubrication, and Reliability Practices Matter More Than Manufacturers Realise

- By Mukesh Jain

Most manufacturers don't ignore bearings, lubrication, or maintenance. They simply underestimate their impact. These activities are often treated as routine maintenance tasks rather than as factors that directly influence energy use, equipment reliability, and production continuity. That assumption creates costs that are easy to miss because they build gradually rather than all at once.

Power transmission systems are designed to move mechanical power efficiently from one component to another. They do that well only when every part of the system works as intended. A bearing that begins to wear, a lubricant that loses its effectiveness, slight shaft misalignment, or delayed maintenance can quietly reduce that efficiency. The machine keeps running, so the problem appears harmless. In reality, it has already started consuming more energy, placing additional stress on connected components and shortening the life of the equipment.

That is why the hidden cost of power transmission inefficiency extends far beyond replacing a failed bearing or repairing a gearbox. It appears in higher electricity bills, repeated maintenance work, unexpected downtime, reduced equipment life, and production losses that often develop long before the root cause is identified.

Poor Lubrication Quietly Increases Energy Consumption and Operating Costs

Lubrication is one of the simplest maintenance practices, yet it has one of the biggest influences on equipment performance. It directly influences how efficiently power moves through rotating equipment. The lubricant film separates moving metal surfaces and reduces friction during operation. When lubrication becomes inadequate, contaminated, or unsuitable for operating conditions, that protective film begins to fail. Poor lubrication contributes to 54% of bearing failures and 43% of mechanical failures. Metal surfaces experience greater contact, friction increases, and the motor requires more energy to maintain normal performance.

A good lubricant reduces friction and allows rotating parts to move smoothly. When lubrication becomes inadequate, contaminated, or unsuitable for the application, friction begins to increase. The motor

compensates by using more energy, temperatures rise, and wear accelerates across the drive system.

Too much grease can be just as harmful as too little. Incorrect lubricant selection or contamination can also reduce the protection bearings need during operation. Recent industry analysis continues to show that lubrication-related issues remain one of the leading causes of bearing and mechanical failures, even though lubrication accounts for only a small share of maintenance spending.

A Bearing Failure Is Often the Final Outcome

When a bearing fails, replacing it restores production. It does not always solve the problem. Most bearing failures are linked to conditions that develop much earlier. Poor lubrication, contamination, misalignment, and excessive loading gradually increase friction and heat inside the bearing. By the time failure becomes visible, the equipment has already spent weeks or months operating below its intended efficiency.

The bearing itself is often the least expensive part of the problem. The bigger expense comes from wasted energy, damaged neighbouring components, emergency repairs, and production losses caused by unplanned downtime. Replacing the bearing without addressing the reason behind the failure simply allows the same cycle to repeat.

Misalignment Increases Costs Long Before It Causes Failure

Misalignment rarely attracts attention in its early stages because machines usually continue running without obvious signs of trouble.

Even a slight change in shaft alignment or coupling position changes the way loads move through the system. Bearings carry uneven loads, vibration increases, and lubricants deteriorate faster. These conditions reduce efficiency, increase wear, and force the motor to work harder than necessary.

Correcting alignment early is far less expensive than dealing with damaged bearings, worn seals, gearbox repairs, and unplanned shutdowns later. It is one of

the simplest examples of how proactive maintenance protects both equipment and operating costs.

Reliability Practices Keep Machines Efficient

Many organisations still measure maintenance success by how quickly equipment is repaired after a failure. A better approach is to prevent the conditions that lead to failure in the first place.

Practices such as condition monitoring, vibration analysis, lubricant analysis, and precision alignment help identify small problems before they affect production. They reduce unnecessary energy losses, extend equipment life, and make maintenance more predictable instead of reactive.

Manufacturers looking to improve productivity often focus on new technology or larger capital investments. Those initiatives certainly have value, but lasting improvements also depend on the fundamentals. Bearings, lubrication, and reliability practices determine how efficiently power moves through every rotating machine and how consistently production continues. The hidden cost of power transmission inefficiency is not created by one major failure. It develops through small issues that remain unnoticed until they become expensive.



Mukesh Jain

Managing Director, Bearing Traders (I) Pvt. Ltd.

Mukesh Jain is the Managing Director of Bearing Traders (India) Pvt. Ltd., one of India's established distributors and suppliers of industrial bearings and power transmission products. With over two decades of leadership experience, he has been instrumental in expanding the company's presence across industries, including automotive, manufacturing, engineering, steel, cement, mining, and heavy machinery.

Under his leadership, Bearing Traders has strengthened its position as a trusted partner for premium bearing brands, offering a comprehensive portfolio of bearings, lubrication solutions, and industrial power transmission products. The company has built a strong nationwide distribution network, delivering reliable engineering solutions backed by technical expertise and customer-centric service.

Built for Torque, Engineered for speed

#Gears Driving Performance Across Core Sectors



Gleason Corporation Appoints Bijal Thakkar President and Chief Operating Officer

By Gear Technology India

Gleason Corporation has appointed Bijal Thakkar as President and Chief Operating Officer, effective July 6, 2026.

With Bijal Thakkar's appointment, Gleason reinforces its commitment to long-term growth while remaining focused on delivering innovative solutions that help customers succeed in an increasingly dynamic global marketplace.

John J. Perrotti, Gleason Chairman and Chief Executive Officer, stated, "Bijal brings deep experience, strong energy, and a proven track record of leadership working for different multi-national manufacturing companies. I am confident she will play an important role in advancing Gleason's global leadership in gear technology and other key markets."

Bijal commented, "I am honored to assume the role of President and COO of Gleason Corporation. Gleason has a remarkable legacy of technological leadership and customer focus. I look forward to working with our talented employees around the world to build on that success, deliver value for our customers and advance our strategic objectives."

Bijal Thakkar has more than 20 years of experience in senior strategic and business development positions across a broad range of manufacturing organizations. Most recently, she served as Vice President and General Manager of a major division at TE Connectivity. Earlier in her career, she held roles at Trane Technologies, Johnson Controls, Siemens, and General Electric.



Bijal Thakkar
*President and Chief Operating Officer,
Gleason Corporation*



Flawless Motion

Fine Results

#Gears Driving Performance
Across Core Sectors

International Trade Fair for Stainless Steel Materials, Products & Processing Technologies

The Future is Stainless!

Key Highlights

250+
GLOBAL
EXHIBITORS

12,000+
TRADE
VISITORS

20,000+
SQM.
EXPO AREA

12+
INTERNATIONAL
COUNTRIES

200+
CONFERENCE
SPEAKERS

1000+
BUYER-SELLER
MEETINGS

BOOKINGS OPEN NOW!

Contact Us

Augustine J W
Business Vertical Head
Virgo Communications and Exhibitions (P) Ltd
+91 9945695390, augustine@virgo-comm.com



To Exhibit!



Download Brochure!

Concurrent Events

**STAINLESS STEEL
SUMMIT 2027**

**WELDING & FABRICATION
WORKSHOPS**

Organised By

virgo COMMUNICATIONS AND
EXHIBITIONS (P) LTD

Official Media Partner

STAINLESS TODAY
The Premier Source of News & Insights

HMS Networks Introduces New Ewon Edge & Cloud to Simplify Secure Industrial Connectivity

- By Gear Technology India

HMS Networks introduces the new Ewon Edge & Cloud, a unified industrial connectivity platform that combines plug-and-play edge gateways with a cloud-based subscription service to deliver simple, secure remote access from day one.

The solution enables machine builders and end users to get started quickly and progressively expand into data services, advanced analytics, and fleet management, providing deeper insights into machine performance as their digitalisation needs and business models evolve.

A Shift Toward Service-Driven Industrial Models

Industrial connectivity has become crucial in driving performance and securing a competitive edge.

Market data clearly reflects this shift:

- Aftermarket services are growing more than 10% annually, outpacing new equipment sales
- Service gross margins can be up to 2x higher than those of new machine sales
- For complex equipment, service EBIT margins can be almost 4x higher
- Only 4% of machine builders generate recurring revenue from digital services

Source BGC: Aftermarket Services: Industrial Manufacturer Growth | BCG

Source McKinsey: How digital can grow revenue from aftermarket services | McKinsey

At the same time, expectations among machine operators continue to evolve. They need instant remote support, real-time visibility of machine performance, and long-term, service-oriented relationships rather than one-off transactions.

The growing disconnect between market expectations and industrial capabilities highlights the need for secure, scalable connectivity as a critical foundation for modernisation. In this environment, user experience is becoming an increasingly important factor in technology adoption.

To address these evolving needs, HMS Networks introduces a scalable platform that simplifies secure remote access and lays the foundation for future digital

services and industrial applications.

A New Generation of Industrial Remote Access

Industrial companies face increasing pressure to maintain uptime, manage complex machine fleets, and comply with stricter cybersecurity requirements, including IEC 62443, NIS2, and ISO 27001.

The new Ewon Edge & Cloud platform addresses these challenges with:

- **Secure, IT-aligned remote access** with VPN, SSO (Single Sign-On), MFA (Multi-Factor Authentication), and comprehensive audit logs
- **High-speed remote access** delivering up to three times faster performance than the previous generation
- **Centralised access governance** for internal teams and external partners
- **Standardised connectivity** across machines, production lines, and sites
- **Scalable deployment** from a single machine to global operations
- **Seamless edge-to-cloud integration** for future analytics and digital services

"Industrial companies need remote access that is secure, simple, and built for real operational environments," said Marco Bulacher, Strategic Product Manager - Access at HMS Networks. "With Ewon Edge & Cloud, we are delivering a platform that aligns with IT expectations while remaining true to the realities of OT."

Designed for Machine Builders - Trusted by End Users

Ewon Edge & Cloud has been engineered to meet the needs of both machine builders and industrial end users.

For Machine Builders

- Faster troubleshooting and reduced service costs
- Secure, controlled access for service teams
- A scalable platform that grows with evolving machine builder needs
- A unified architecture that eliminates fragmented tools

For End Users

- Full control over third-party access



- Standardised connectivity across multi-vendor environments
- Improved uptime through faster diagnostics
- Compliance support for modern cybersecurity frameworks
- A user-centric platform that provides full control over user access and permissions

"Machine builders want a reliable service tool. End users want control and security. The new Ewon platform finally brings both together," added Marco Bulacher.

A Future-Ready Foundation

The Ewon Edge & Cloud platform is designed to evolve alongside customers' digitalisation journeys.

Organisations can start with secure remote access and expand toward:

- Advanced edge computing
- Machine data collection
- Predictive maintenance
- Integration with IIoT platforms
- Fleet-wide machine performance insights

This modular approach ensures organisations can scale without replacing their existing systems.

Built over 20 Years of Industrial Expertise

With more than 600,000 Ewon gateways deployed worldwide, HMS Networks brings decades of expertise in industrial connectivity and secure remote access. Supported by more than 23 offices worldwide and a global industrial support network, HMS delivers local expertise with international reach.

Ewon Edge & Cloud builds on this foundation with:

- A unified Edge & Cloud architecture
- Industrial-grade hardware designed for harsh environments
- Development processes backed by HMS Networks, certified to ISO 27001
- Structured security lifecycle management
- Long-term product and cloud support
- Continuous platform evolution

The result is a secure and scalable platform that is robust enough for OT, aligned with IT, and ready for the next generation of industrial digitalisation.

About Ewon: Ewon is a Business Unit of HMS Networks specialising in industrial remote access and data collection. To enable secure connections worldwide, HMS has built a global infrastructure with servers across tens of data centres all over the world. With this solution, a worldwide coverage with redundancy can be provided to customers.

HMS Networks AB (publ) is a market-leading provider of solutions in industrial information and communication technology (Industrial ICT). HMS develops and manufactures products under the Anybus®, Ewon®, Intesis® and Ixat® brands. Development takes place at the headquarters in Halmstad, and in Ravensburg, Nivelles, Igualada, Wetzlar, Buchen, Delft, Sibiu, Rotterdam, and Bilbao. Local sales and support are handled by branch offices in Germany, the USA, Japan, China, Singapore, Italy, France, Spain, the Netherlands, India, the UK, Sweden, South Korea, Australia, and the UAE, as well as through a worldwide network of distributors and partners. HMS employs over 780 people and reported sales of SEK 2,506 million in 2022. HMS is listed on the NASDAQ OMX in Stockholm, in the Large Cap category, within the Information Technology sector.

gear
TECHNOLOGY **INDIA**



JOIN US TODAY