gear TECHNOLOGY INDIA

VOLUME 3, ISSUE 5, 2025
September Edition

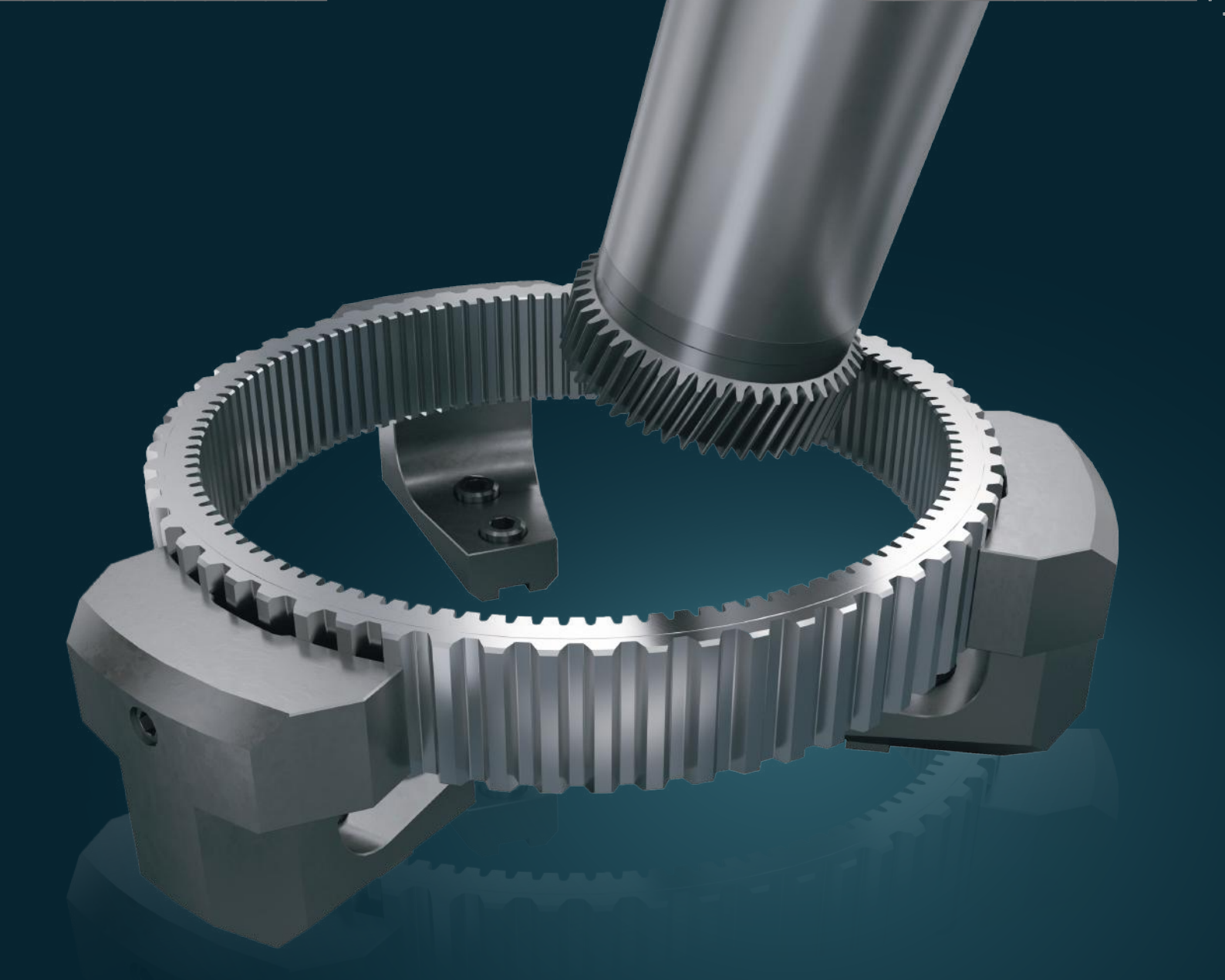
www.geartechnologyindia.com

CUTTING TOOL
Liebherr FlexChamfer Technology

TECH EXPERT COLUMN
Bearing failures under electrified conditions

INTERVIEW
From India to World: How ESGI has carved out its space among Global Players

In Association
AGMA
AMERICAN GEAR MANUFACTURERS ASSOCIATION



THE NEW PERFORMANCE STANDARD

LMT Fette‘s GearSkiving with process-safe simulation is the new performance standard for gear skiving. Thanks to their special combination of excellent cutting-edge preparation and individual process simulation, our high-performance tools guarantee top performance in the production of internal and external gears.

Exactly the best solution for your requirements.

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

www.lmt-tools.com

LMT • TOOLS

YOUR PARTNER IN **WIND POWER**

The automatic tool changer enables combined roughing and fine grinding processes. This ensures that **high quality and productivity requirements** can be fulfilled in the production of wind turbine gears.

TRUST IN TECHNOLOGY

KAPP NILES

Anitha Raghunath
Director
Virgo Communications and Exhibitions Pvt.Ltd

Dear Readers,

Welcome to **VOL 3 ISSUE 5 - 2025**

Gear Technology India is pleased to announce the release of Volume 3, Issue 5 (2025) with the theme Cutting Tools. This edition brings together a rich mix of technical insights, expert opinions, industry updates, and event previews that reflect the dynamic growth of the gear and allied industries. Readers will find a Tech Expert Column on bearing failures under electrified conditions, along with in-depth interviews including ESGI's journey to becoming a global player and Hitork's dual approach to manufacturing excellence and marketplace collaboration. We also present exclusive pre-event reports on Motion + Power Technology Expo 2025, Italian Tech India 2025, and a post-event report on VDMA Symposium on evolving machining technologies.

In this edition, we are glad to introduce a new segment – Leader's Outlook – where industry leaders share their vision and perspectives. This issue features insights from L. Krishnan, Managing Director, TaeguTec India, and G. Giridhara Gopal, Director & Chief Executive, Addison & Co. Ltd., offering a deep dive into cutting tool technologies shaping the industry. Alongside, readers can explore focused features on cutting tool innovations such as Liebherr's FlexChamfer Technology and strategies for smart tool selection in India's gear industry, as well as articles on sustainable lubrication, financial discipline in gear manufacturing, and the future of smart tool manufacturing with the AIMS ecosystem. The edition is further enriched with industry updates and product news, including new solutions from NORD DRIVESYSTEMS and Nidec Machine Tool.

We are also delighted to announce that nominations are now open for the Gear Technology India Awards 2026 and the GTI Summit 2026, scheduled for 26–27 February 2026. These landmark events will celebrate innovation, leadership, and excellence in the gear and allied industries.

Warm regards,

gear TECHNOLOGY INDIA

Gear Technology India is a quarterly publication created in collaboration between the American Gear Manufacturers Association (AGMA) 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
C Selvaraj
Nishant Kashyap
KP Soundarajan
Cdr MS Srikant (Retd)
Vishwajit Kothari
Sudhanshu Nayak
Vivek Singh

TECHNICAL EXPERTS
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

Powered by AGMA

In Partnership With
virgo COMMUNICATIONS AND EXHIBITIONS (P) LTD

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

Table Of CONTENTS

ESGI
CUTTING EDGE PRECISION

ESGI Gear Tooling Solutions
At Upcoming Global Exhibitions

22-26 September 2025
Hannover, Germany

EMO HANNOVER

Hall 13
Stand E36

21-23 October 2025
Detroit, USA

MOTION+POWER TECHNOLOGY EXPO

Booth
No- 845


HOBS


ES-CUT HOBS


ES-H HOBS


GEAR SHAPER CUTTERS


GEAR SHAVING CUTTERS


MASTER GEARS


RACK MILLING CUTTERS


ROTARY CUTTERS


SPLINE ROLLERS

esgi@esgitools.com
www.esgitools.com

Bearing failures under electrified conditions

1.Brief Introduction:

Bearings are integral components in virtually all mechanical systems, playing a critical role in load support, motion facilitation, and friction reduction. Given their importance, bearings are a key focus area in the records and maintenance plans of reliability and maintenance engineers.

In the context of sustainable mobility—driven by the United Nations Sustainable Development Goals (UN SDGs)—there has been a marked transition from conventional internal combustion-based powertrains to cleaner alternatives such as hydrogen, ammonia, fuel cells, battery electric vehicles (BEVs), and hybrids. These advanced powertrains, particularly battery electric motors, operate in increasingly demanding environments characterized by high rotational speeds (up to 25,000 rpm) and torque loads reaching the kNm range, along with operating temperatures often exceeding 90°C [1]. These challenging conditions, especially in electric vehicles (EVs), place considerable stress on the motor bearings—not only due to mechanical loads but also due to electrification-induced damage.

The international standard ISO 15243:2017 / IS 17276:2019, "Rolling bearings – Damage and failures – Terms, characteristics and causes", outlines various bearing failure modes, including damage mechanisms resulting from electric current passage.

ISO 15243:2017/ IS 17276:2019 defines electric erosion as a change in the microstructure (localized) and material loss due to the passage of electric current. According to this standard, electric erosion in bearings is broadly classified into two types (Figure 1):

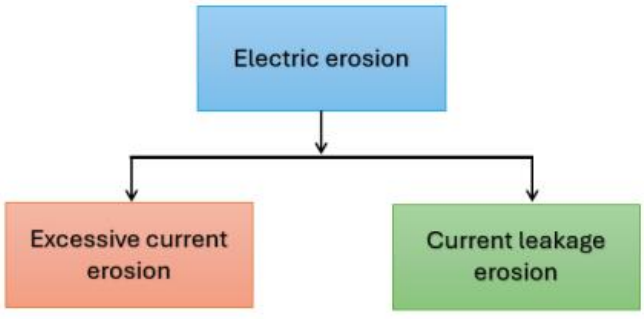


Figure 1. Classification of electric erosion

2.The Evil running in the System and its effects

Electric Vehicles (EVs) employ various types of electric motors, including induction motors, permanent magnet motors, and DC motors, to convert electrical energy into mechanical motion. Irrespective of the motor type, the rotating shaft connected to these motors often develops an electrical potential, commonly referred to as shaft voltage. This voltage induces stray electrical currents along the shaft, which then traverse the mechanical components in contact with it—most notably, the rolling element bearings. When these stray currents pass through the bearing, particularly under applied mechanical loads, they significantly increase the risk of premature bearing failure. Under conventional operating conditions, bearings are lubricated using grease formulations to reduce friction, enhance durability, and protect against surface damage. However, in electrified environments such as those found in EV motors, the presence of stray current compromises the performance of the lubricant.

3.Effects of Stray Current on Bearing and Lubricant Performance

Stray electrical currents lead to several degradation mechanisms within the bearing-lubricant system:

- Electrical Discharge Damage: Current discharges through the bearing elements result in phenomena such as fluting, electrical pitting, micro-cracking, ridge formation and tribo-corrosion on the raceways.
- Joule Heating: The passage of electric current causes localized heating at contact points due to resistive (Joule) heating, elevating the temperature within the bearing assembly.
- Lubricant Degradation: Elevated temperatures accelerate evaporation and oxidative degradation of the grease, leading to reduced film thickness and eventual loss of lubrication.
- Arc Erosion: As the lubricating film deteriorates, electric arcing may occur between asperities on the bearing surfaces, producing surface damage such as corrugation, ablation pits, and ultimately surface fatigue failure.

4.Electrical Conductivity Transition of Lubricants

During bearing operation under electrified conditions, the lubricant may undergo a transition from an insulating to a conductive state, driven by thermal and electrical factors:

- Dielectric Breakdown: Initially, the lubricant behaves like a capacitor, preventing current flow. However, as the temperature increases due to Joule heating, the

lubricant can exceed its breakdown voltage, becoming electrically conductive and allowing charge transfer across the bearing.

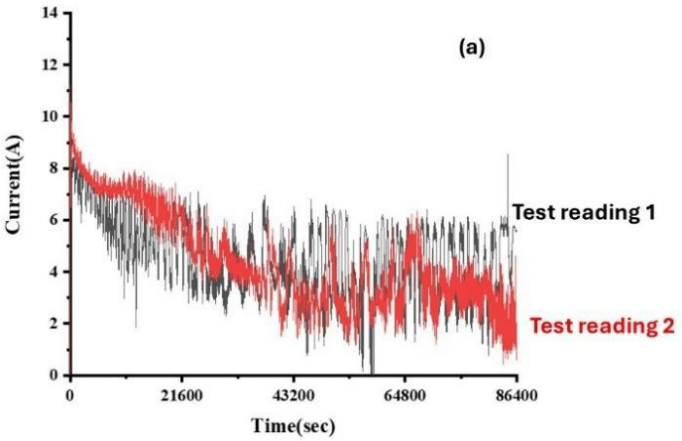
- Film Thickness Influence: A thick lubricant film resists current flow by acting capacitively, whereas a thin lubricant film acts as a resistor, promoting current conduction.
- The breakdown voltage threshold is not fixed; it varies with shaft speed and applied load, both of which influence the lubricant film thickness and contact pressure.

5.Indicators of Bearing Failure

Early detection of electrical bearing failures can be achieved through continuous monitoring of several critical parameters:

- Bearing Temperature: A gradual increase in operating temperature suggests excessive current-induced heating or loss of lubrication.
- Vibration Levels: Elevated vibration signals potential surface damage or loss of lubricant film.
- Acoustic Emissions: An increase in operational noise levels may indicate fluting or roughening of bearing surfaces due to arc erosion.

Bhaumik et. al. [2] investigated the failures of grease lubricated bearings in a full bearing test rig and reported that the choice of the lubricants plays an important role in controlling the damage of bearings under electrified conditions. Figure 1 indicates the current and vibration readings of two different greases using a full bearing test. The indicators, such as the bearing temperature, vibration levels, and acoustic emissions, serve as practical diagnostic tools for identifying the onset of bearing degradation in EV motors operating under electrified conditions. Apart from the degradation of lubricants, the passage of electric current also results



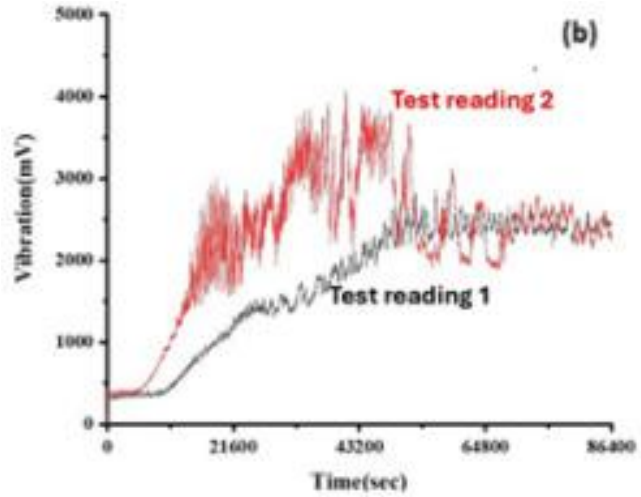


Figure 2. Experimental analysis of the grease using two greases under electrified conditions, 496N , 1500rpm with 10A (A.C) (a) Grease 1 – Test reading 1 (b) Grease 2 (Test reading 2)

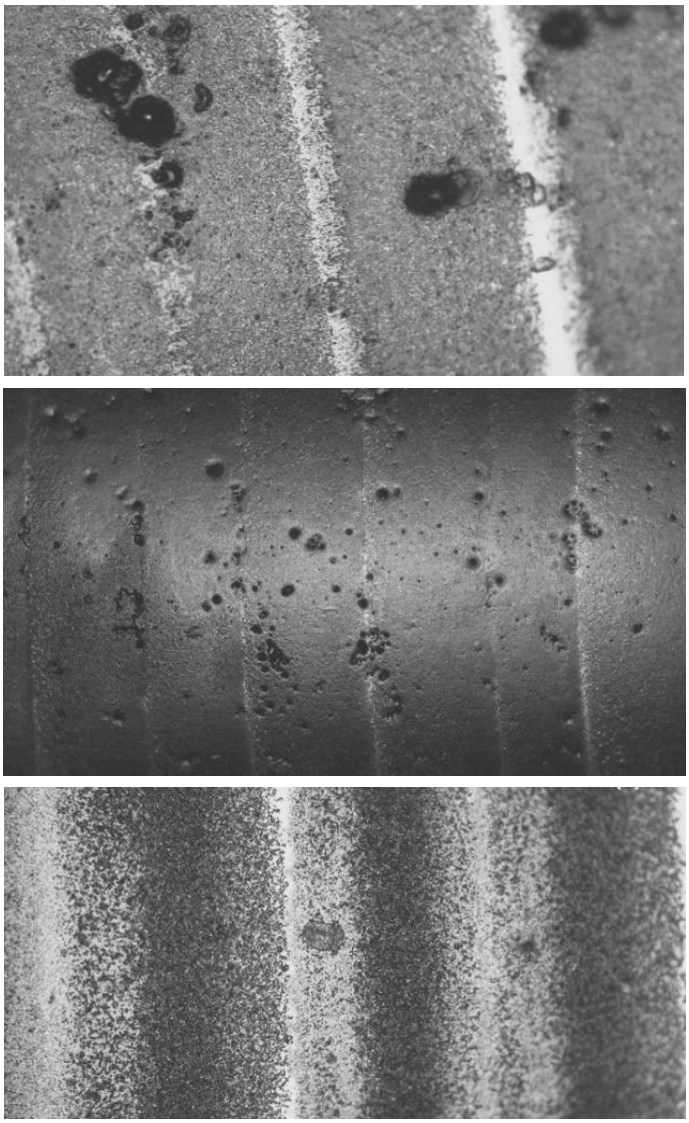


Figure 3. Microscopic images of failures of grease lubricated bearing raceways under electrified conditions (a) white etching areas (b) electric pitting (c) surface melt leading to rough surfaces

in changes in the microstructure of the bearings. These microstructural changes are considered to be the initial stage of white etching areas. The passage of electric current through the bearing also results in the formation of electric pits and micro-welds. During the process of electric passage through the bearings, a significant number of conductive particles are also generated. Thus, these third-body particles get entrapped between the two mating pairs, which melt due to the heat generated and get welded to the surface [3]. Figure 3 indicates the damage of the bearing surfaces under electrified conditions.

6.Conclusion:

The rising demand of the Electric Vehicles and the transition towards electric mobility will demand not only heavy duty bearings but also high performance lubricants. Conventional lubricants may not be the able to cater only the elevated mechanical loads but also the presence of the stray currents. The degradation of the lubricant, dielectric breakdown of the lubricant film and subsequent damages of the bearing surface must be the focus of the upcoming researches in the field of lubrication and bearing technology.

Additionally, early detection of the bearing failures due to the stray current such as the rise in temperature, vibration and acoustic signatures will definitely enhance the life of the bearings, thus paving a way to incorporate the systems involving Industrial Internet of Things and Artificial Intelligence (AI).

In doing so, future research will focus on tailor-made lubricant formulations and incorporating advanced AI failure prediction systems to prevent bearing damage and enhance bearing life in electrified conditions. Thus, the tribology of electrified bearings can evolve to meet the sustainability and reliability targets of the next generation mobility.

Reference:

1. 1.Khan T, Armitage JL, Bryant MG. The effects of alternating current (AC) electrification on the tribological performance of gear materials with internal combustion engine (ICE) and electric vehicle (EV) transmission lubricants. Tribology - Materials, Surfaces & Interfaces. 2024;18(4):270-283. doi:10.1177/17515831241301166

2. 2.Bhaumik S, Yunus M, Jothikumar S, Hareesh G, Paleu V, Sharma AK, Mavani S. Exploring the Failures of Deep Groove Ball Bearings Under Alternating Electric Current in the Presence of Commercial Lithium Grease. Technologies. 2025; 13(7):275. Doi: 10.3390/technologies13070275

3. Biswanath Bai, Linto Davis, P. Ramkumar, Electrical current effects on white etching areas formation in bearing steel under dynamic loading, Wear, 570, 2025, 205977. Doi: 10.1016/j.wear.2025.205977.

Assoc. Prof. Dr. Shubrajit Bhaumik Centre Head, Tribology and Interactive Surfaces Research Laboratory (TRISUL) Amrita School of Engineering, Amrita Vishwa Vidyapeetham, Chennai, India 601103.

Email: s_bhaumik@ch.amrita.edu

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

From India to World: How ESGI has carved out its space among Global Players

- By Sushmita Das

1.ESGI has been manufacturing precision gear cutting tools since 1991. How has the company's mission and market positioning evolved over the years?

For this, it is important to understand the journey of ESGI. Mr. Sushil Gupta was the technical brain, and CA Naresh Gupta was the commercial brain behind the success of the company.

The company is now led by Mr. Naresh Gupta, who serves as its Managing Director. We lost Mr. Sushil Gupta along the way.

I joined the company more than 25 years ago, and the joining of the 2nd generation of Mr. Abhishek Gupta & Mr. Harshit Gupta, leading the way forward.

ESGI started with making hobs and then diversified to other tools such as Shaper Cutters, Shaving Cutters, and Master Gears. It was after a lot of persistent efforts and trials that ESGI was able to start supplying to OEMs and their vendors, a space dominated by big groups, having started with technology transfer from foreign partners.

The big shift happened in 2008, when ESGI started investing in CNC machines, and this greatly enhanced the quality standards and manufacturing capability. Since then, the investments in machines and technology have not stopped.

Our focus changed from Product selling to 'Solution Provider" and thereby focusing on quality-conscious customers, which explains our evolution of customers.

2.Your client base spans industries from automotive and railways to wind energy and industrial gears. How do you customise your solutions for such diverse sectors?

The capability to produce the tools has been developed consciously with the objective of becoming a Single source for Gear Cutting tools needs, irrespective of customers. It has taken a lot of our efforts to develop the technology, which includes machines, design software, material selection, and inspection facilities. The learning hasn't even stopped now, and we continue to strive for excellence.

3.ESGI's in-house metallurgical lab, CNC machining, and quality control systems form a strong backbone. How do these capabilities translate into better customer satisfaction and product reliability?

We realised along the way that there was no way we could make the quality tools, which would perform at par with international suppliers, unless all the excellence manufacturing capabilities were built in-house. We have developed the process to suit our needs and strive for manufacturing excellence. The strenuous work to develop each process has made our company a force to reckon with in international competition, despite no technology transfer.

Our customised solutions with the ability to adapt to the needs of customers ahead of the standard procedures being followed by other companies. This not only greatly enhanced customer satisfaction but also increased our business share.

4.You have also developed proprietary software for tool design and reverse engineering. How does this in-house innovation give ESGI a competitive advantage?

As I explained that all the technology was built in-house, and software development was key to this approach. With our software, we can modify the software according to the evolving needs of components.

5.ESGI offers various gear hob profiles—like involute, spline, sprocket, and worm gear. Which product lines are seeing the fastest demand growth and why?

To be able to supply all the business segments, we have gradually developed our capabilities to supply the hobs for all involute and non-involute profiles. In fact, we are one of the few companies in the world to supply the tools for worm gears and other profiles with the same excellence.

6.Could you explain the benefits of ES-Cut and ES-H-Cut hobs in improving cutting speed, tool life, and production efficiency?

The range of ES-Cut and ES-H hobs were introduced in 2013 after taking extensive trials of advanced materials around the world. The objective of these high-performance tools is to reduce the cycle time and increase the lifetime of tools.

The tool specifications are carefully selected based on the machine capability, component geometry,

and the customer's target cutting time.

It helped us in our transition from Product Selling to a Solution provider.

7.You provide detailed technical guidelines—from RPM settings to hob sharpening. How does ESGI support customers in optimising these parameters for maximum performance?

Our regional engineers based in the whole of India are technically equipped to share with the plant for the problems faced by customers. Our team, consisting of design & application, then studies the challenges and advises the best possible solution, including cutting parameters.

8.Sustainability is gaining importance in manufacturing. What steps is ESGI taking toward eco-friendly tooling processes and materials?

Excellence in manufacturing cannot be achieved without a focus on sustainability and eco-friendly processes. We have cut down the waste, built an excellent environment for working, and invested in Solar Power.

9.Do you see potential for technologies like additive manufacturing to disrupt or complement the traditional gear-cutting tool segment?

In our customised solutions and high-performance tools, we don't see additive manufacturing posing a threat. This is more for prototype work for components, but not for tools.

10.Looking ahead, which emerging sectors, like EVs, renewable energy, or aerospace, do you expect to drive the next wave of growth for precision gear tooling?

Evolving and development of tools, as per the new needs, has become an integral part of our business. We are already supplying the tools for New energy vehicles and are investing in developing even higher-performance tools.

Sanjay Gupta

Director, ESGI Tools Pvt Ltd

Motion + Power Technology Expo 2025: Witness the Innovation Transpiring in the Power Transmission Industry

- By Sushmita Das

Gear Technology India is proud to put the spotlight on one of the most anticipated global events in the power transmission industry — the Motion + Power Technology Expo (MPT Expo) 2025, taking place from October 21–23, 2025, in Detroit, Michigan. For three days, the heart of American manufacturing will transform into a hub of innovation, collaboration, and business opportunities, uniting the world's leading gear, electric drive, and power transmission companies.

A Premier Platform for Growth

The MPT Expo 2025 promises an unparalleled opportunity for professionals across the mechanical power transmission, fluid power, and electric drive sectors to experience the latest advancements under one roof. Attendees can compare innovative products and services side by side, explore breakthrough technologies, and take away actionable insights to gain a competitive advantage.

Whether you're an engineer, manufacturer, supplier, or business leader, the event provides tailored opportunities from Expo-only tickets to comprehensive learning packages to ensure maximum value for every participant.

Explore the Show Floor

At the core of MPT Expo is a dynamic show floor featuring more than 300 global exhibitors, including some of the biggest names shaping the future of gears and motion technology. Visitors will find innovations from industry leaders such as Timken Power Systems, Meritor, EMAG LLC, Gleason Corporation, Kapp Group, Nidec Machine Tool America LLC, and many more.

The show floor is not just about displays; it's a marketplace of ideas, solutions, and opportunities. Attendees can evaluate products firsthand, watch live demonstrations of advanced manufacturing processes, and interact directly with experts to inform their key purchasing decisions.

Knowledge, Education, and Expertise

MPT Expo 2025 goes beyond being just a trade show. It is also a learning destination. Technical education sessions, taught by subject-matter experts, are designed to enhance skills, expand technical knowledge, and boost career growth.

The speaker lineup will address a broad spectrum of industry-relevant themes, from solving technical challenges to applying creative business solutions. These sessions are structured to give attendees actionable strategies that can be implemented immediately in their operations.

Networking and Business Opportunities

In an industry built on trust and collaboration, networking is the bedrock of the Expo. The event offers numerous opportunities to connect with colleagues and decision-makers from around the world. Whether during one-on-one supplier meetings, receptions, or on the buzzing show floor, attendees can foster partnerships, share insights, and strike deals that drive business forward.

Why Detroit?

Known as the "Heart of Manufacturing", Detroit provides the perfect backdrop for MPT Expo. The city's robust industrial base — spanning automotive, aerospace, biotechnology, chemicals, energy, food and beverage manufacturing, telecommunications, off-highway transportation, and more — makes it a natural hub for showcasing power transmission innovations.

For participants, Detroit offers both a thriving ecosystem of industry leaders and a rich manufacturing heritage, setting the stage for an inspiring and impactful event.

Two Ways to Experience MPT Expo

- **Attending:** Gain access to hundreds of exhibitors, explore proven solutions, preview emerging technologies, and connect with suppliers face-to-face. Attendees can interact directly with experts and leave with actionable takeaways for the year ahead.
- **Exhibiting:** Companies can showcase their latest technologies and solutions to thousands of decision-makers actively seeking new partnerships and products. From finalizing deals on the spot to strengthening brand presence, exhibiting at MPT Expo ensures visibility within the entire power transmission supply chain.

Mark Your Calendar

The MPT Expo is more than just an exhibition; it's a platform to shape the future of gears, motion, and power transmission.

Location: Detroit, MI
Dates: October 21–23, 2025

Register here:
https://motionpowerexpo.com/

1. What major technological shifts are currently driving innovation in the cutting tool industry?

The most defining shift is the push toward high-performance machining for new-age materials like titanium alloys, composites, and high-strength steels used in aerospace, EVs, and renewable energy sectors. Traditional carbide solutions are evolving rapidly into hybrid tool technologies—coated carbides, cermets, PCD, and ceramics—designed to handle both extreme temperatures and the demand for near-net-shape machining.

Equally important is the rise of multifunctional tooling—cutting tools that can mill, drill, and chamfer in a single setup. This is not just a design evolution; it's a direct response to customers asking for fewer tool changes, lower cycle times, and higher productivity on the same machine platform.

2. How are digitalisation and automation changing cutting tool manufacturing and usage?

In India, we are in the early but decisive stages of this transformation. On the manufacturing side, at TaeguTec India, we already run automated grinding and coating systems that give us micrometer-level consistency. These are critical because Indian customers expect global-level precision at competitive costs. Automation helps us meet that expectation.

On the usage side, digitalisation is more evolutionary than revolutionary in India. Full-scale IoT-enabled toolholders are still rare, but we see growing adoption of CNC-integrated tool monitoring, adaptive controls, and centralised data logging in progressive industries—automotive, aerospace, and large Tier-1 suppliers. In most cases, customers begin with tool presetting, RFID-based tool identification, and tool-life monitoring modules on CNCs, which are practical steps that deliver immediate ROI.

What this means is, digitalisation for Indian cutting tool users is less about futuristic gadgets and more about incremental, affordable solutions that directly cut downtime, reduce rework, and extend tool life. From our perspective as a supplier, the conversation is moving from just providing an insert to providing application know-how, tool management systems, and measurable productivity gains. That's where Indian industry is today—bridging the gap between manual tracking and fully automated smart factories."

3. What strategies are most effective for extending tool life without compromising performance?

From experience, three strategies stand out:

- Optimised geometry and micro-edge preparation: Even a micron-level edge honing can double life in hard milling.
- Advanced coatings: Nano-layered PVD coatings now allow cutting at 20–30% higher speeds without chipping.
- Application engineering at the customer site: This is often underestimated. When we sit with a customer, optimise coolant pressure, adjust toolpath, or reduce tool overhang, tool life improves more than any catalogue specification could promise. Tool life is never just about the insert—it's about the system.

4. 4.How do you see sustainability influencing material selection and manufacturing processes for cutting tools?

Sustainability is becoming a non-negotiable. Tungsten and cobalt, which are critical for carbide tools, are finite resources and geopolitically sensitive. The future will see two parallel tracks:

- **Increased recycling and reconditioning:** We already

Leader's Outlook – Cutting Tools

Mr. L Krishnan
Managing Director, TaeguTec India

recover tungsten carbide through closed-loop recycling. I see this becoming mainstream, not optional.

- **Shifts to alternative materials:** PCD, ceramics, and even advanced steels are being looked at more closely for applications where carbide isn't the most resource-efficient choice.
  On the process side, sustainability will push us toward low-energy coating technologies, dry machining compatibility, and more efficient logistics. Customers increasingly ask not only about performance but also about the carbon footprint of the tooling.

5. **What skills and capabilities will be most critical for cutting tool professionals in the next decade?**

Tomorrow's tool engineer cannot just be a metallurgist or a machinist. They must be a hybrid professional:

- Strong in materials science to deal with exotic workpiece alloys.
- Fluent in digital tools and data analytics to interpret cutting-edge data and optimise processes.
- Equipped with application engineering skills—the ability to walk into a shopfloor, understand bottlenecks, and translate them into tooling solutions.

Above all, the mindset must shift from "selling inserts" to delivering productivity and sustainability outcomes. The cutting tool professional of the future is as much a consultant and technologist as they are a toolmaker.

Sustainability, Efficiency, Precision, and Customer-Centric Innovation in Cutting Tools

As the cutting tools industry enters a new era, sustainability, and customer value stand as our foremost priorities. At Addison & Co. Ltd., with over 150 years of legacy and close to 7 decades of specialized expertise, we are committed to developing solutions that are environmentally responsible, operationally efficient, and uncompromisingly precise. Every innovation we pursue is customer-centric—designed to enhance productivity while supporting a more sustainable future for global manufacturing.

Today, the sector is experiencing rapid transformation, fuelled by advances in materials, digitalization, and environmental responsibility. This transformation is not only about creating better products—it is about crafting tools that are smarter, longer-lasting, and aligned with customer needs. In this Outlook, we like to share how sustainability, operational efficiency, customer focus, and innovation are shaping our work at Addison, and what the future holds for our industry.

Addison is the only company offering the complete range of HSS, Carbide, and PCD/CBN cutting tools. Our portfolio covers diverse applications—hole making (drills), hole perfecting (reamers), threading (taps and thread milling tools), and surface preparation (end mills, cutters, and other shank tools including tool bits). With this breadth, Addison stands as a true one-stop solution provider for the complete spectrum of cutting tools.

In gear machining, Addison, in collaboration with its sister company L. M. Vanmoppes Diamond Tools India Pvt Ltd., can supply CBN turning tools and CBN internal grinding wheels for bore finishing of gears. It also provides broaches, specialized tools, and reamers for the gear industry. Additionally, if required, gears can be PVD coated using Addison's newly installed in-house coating machines.

1. Sustainability: Redefining Material Selection and Processes

At Addison, sustainability is integrated into every aspect of our operations, ensuring that our tools are both environmentally responsible and high performing:

- **Solar Power Integration:** We use renewable energy and are soon installing an in-house solar plant to further cut our carbon footprint and dependence on non-renewables.
- **Centralized Coolant Filtration:** Our systems recycle and purify coolants, reducing waste and extending their usable life while maintaining machining efficiency.
- **Eco-Friendly Raw Materials:** We carefully select and source materials to minimize ecological impact without compromising quality.
- **Energy-Efficient Manufacturing:** Advanced manufacturing techniques are implemented to reduce energy consumption while maintaining precision and output.
- **Reconditioning & Regrinding:** We offer in-house reconditioning and regrinding services to extend tool life and optimize raw material usage.
- **Reduced Use of Rare Materials:** Rare materials are applied only where critical for performance, lowering

Leader's Outlook – Cutting Tools

By G. Giridhara Gopal
Director & Chief Executive, Addison & Co. Ltd.

environmental impact.

- **Dust-Free Grinding:** By employing super-abrasive grinding wheels, we achieve dust-free, dry cutting that ensures the environment is not polluted.

2. Operational Efficiency: Extending Tool Life and Driving Productivity

At Addison, efficiency is about maximizing performance with minimal waste. Our practices ensure that every tool delivers consistency, durability, and value:

- Alloyed HSS and Carbide: We engineer and source materials with the right alloy composition to balance hardness and toughness.
- Precision Edge Preparation: Our edge-prep techniques ensure longer tool life, fewer changeovers, and stable performance.
- Optimized Heat Treatment: Using both salt bath and vacuum processes, we strengthen tools to resist wear and extend durability.
- Customized Geometries: Each tool is designed to match specific materials and machining requirements for optimal output.
- Automation in Production: We focus both on digitisation and digitalisation , installed robotics where ever to eliminate human fatigue. Also ensures to reduce cost of manufacturing and landing cost at customers.
- Real-Time Monitoring: Our digital systems track processes end-to-end, ensuring consistency and zero-defect output.
- Smart Machining & Predictive Analytics: By applying analytics and smart sensors, we forecast tool wear, minimize downtime, and support proactive decisions.

3. Customer-Centric Initiatives: Delivering Reliability and Performance

Our innovations are always designed to deliver measurable value to customers. In today's context every customer wants to be unique, hence seeks unique solution from tool manufacturers. Hence, we are compelled to give customized tooling geometries.

- Engineered Geometries: Addison designs intricate tool geometries that meet complex machining challenges, enhancing productivity for customers.
- High-Precision Gear Machining Tools: Our hobs, broaches, and specialized cutting tools are produced on high-precision machines, ensuring reliability in critical applications.
- Comprehensive Inspection and Testing: We perform Eddy Current Testing, XRF Analysis, and Pre-roll Forging Checks to guarantee every tool meets strict standards of hardness, material quality, and dimensional accuracy.
- In-House PVD Coating: With high precision sputtering technology base coating machine from Germany, we control the coating process end-to-end to deliver optimal performance.
- Customer-Centric Problem Solving: Our team works closely with customers to understand challenges and provide tailored, solution-oriented tools.
- Customer Service: Dedicated customer relationship team, dedicated portal, even dedicated chatbots for technical guidance , trained field staff for application.

4. Future-Oriented Innovation: Building the Next Era of Cutting Tools

We are shaping the future of cutting tools through advanced materials, intelligent design, and workforce readiness:

- Advanced Substrates & Nano-Coatings: Cutting-edge coatings that extend tool life and reduce wear.
- PCD & PCBN Super-Hard Tools: In-house production supports high-speed, high-volume machining with lower costs and improved quality.
- Metallurgical Expertise: Advanced knowledge of materials and alloys drives high-performance tool design.
- Raw Material Collaboration: Partnering with raw material manufacturers to co-develop specialized substrates and alloys that meet emerging machining needs.
- Workforce Development: Continuous skill-building ensures our teams are prepared for emerging challenges.
- Proactive Design Support: We anticipate customer needs by introducing geometries inspired by global technologies, rather than waiting for customer requests.
- Faster Delivery: Shorter lead times and quicker response cycles enhance customer competitiveness.
- Collaborative Development: Customers can directly engage with our design teams for specialized requirements, such as in paint industries.
- Minimal Manpower Contact: Process innovations and automation are enabling reduced human dependency, ensuring consistency, safety, and scalability.

Addison at a Glance

- 150 Years of Legacy | Close to 7 Decades of Cutting Tool Expertise
- Member of the Amalgamations Group
- HSS, Carbide, PCD/PCBN and Gear Machining Tools
- Complete In-House Manufacturing, Coating, and Inspection
- Machine Tools for Special Applications

A Legacy of Precision and Innovation

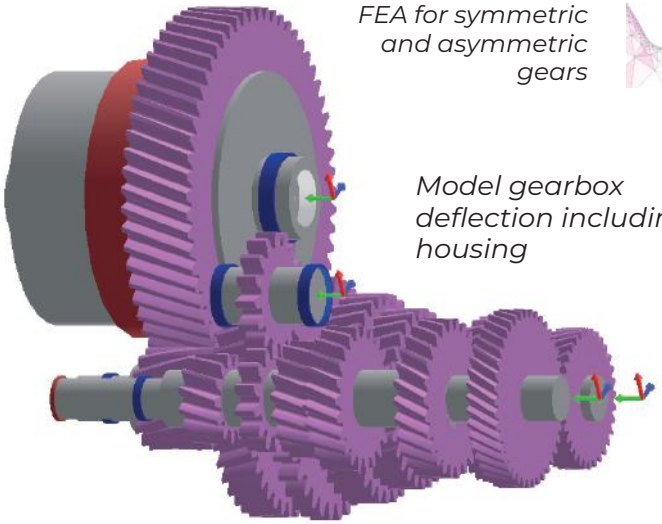
At Addison, we remain true to our promise of delivering “Tools for a Changing World”—solutions built on sustainability, defined by efficiency, and trusted for their precision. As part of the Amalgamations Group, we draw strength from a diversified industrial ecosystem that enables us to serve customers with confidence and consistency.

Looking ahead, we will continue placing customers at the center of every innovation—designing tools that not only address today's challenges but anticipate tomorrow's needs. With each step forward, we shape the future of machining to be smarter, greener, more efficient, and uncompromisingly precise, ensuring Addison remains a trusted partner worldwide.

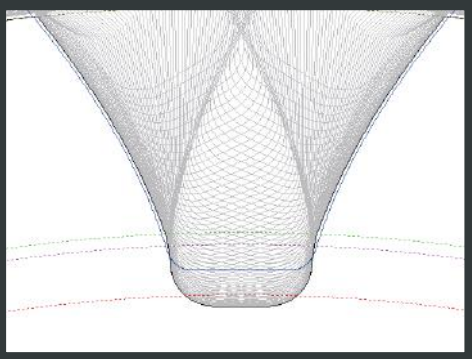
Dontyne
Systems

Automatic tool designs and simulations for Hobbing, Continuous Grinding (with dressing),Shaping, Shaving, Profile Grinding, Skiving, Honing, End Mill or Face Mill, Forging, Injection Moulding.

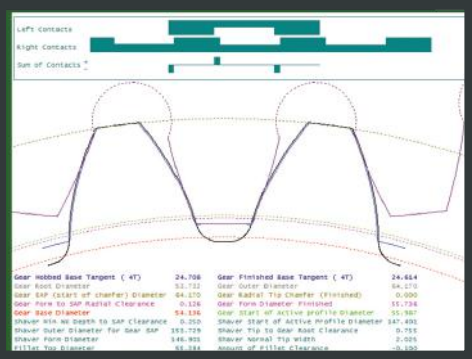
FEA for symmetric and asymmetric gears



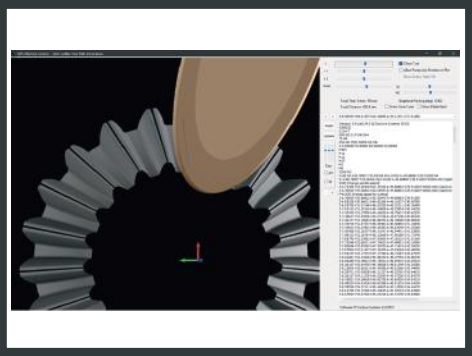
Model gearbox deflection including housing



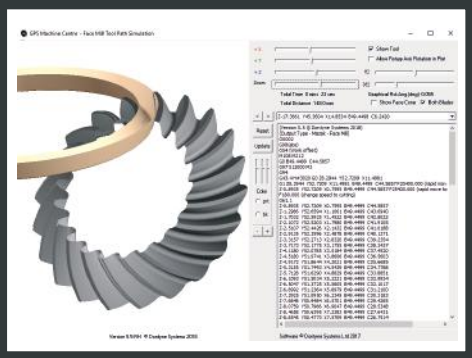
Hob / Grind Roll Out



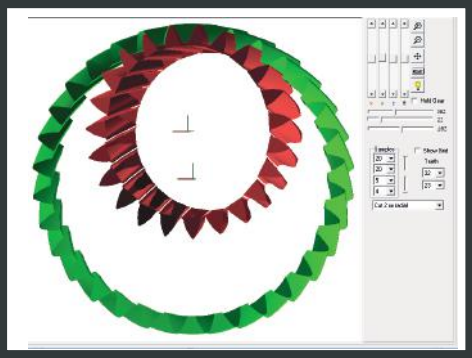
Shaving' and Shaping



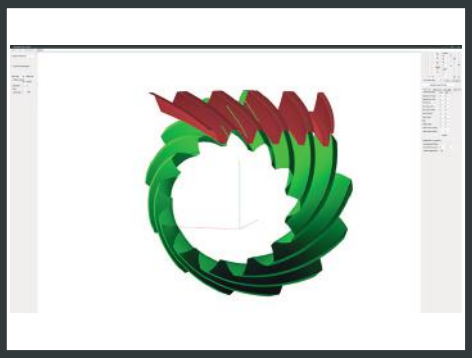
Coniflex CNC



End Mill / Face Mill CNC



Skiving



Hypoid

HIMSHIV Machines PVT. LTD, NEW DELHI , MOBILE-+91-9810410447.

india@dontyneststems.com www.dontynesystems.com

Dontyne Systems, 2 Turbine Way, Washington, England. +44-191570 0052

Experience Italian Innovation at Italian Tech India 2025 – A Leap into the Future of Manufacturing

- PRE-EVENT REPORT

Mumbai is set to witness a technological renaissance as Italian Tech India 2025 arrives at the Nehru Centre, Worli, from 19th to 20th September 2025. This prestigious exhibition is a celebration of Italy's unmatched excellence in machine tool technology – a fusion of precision engineering, cutting-edge automation, and timeless innovation.

Italy, globally renowned as a leader in machine tools and industrial automation, brings to India an impressive showcase of high-performance solutions tailored for next-gen manufacturing. From advanced CNC systems and smart robotics to eco-efficient machining tools, Italian technology stands as the gold standard in quality, durability, and innovation.

But this isn't just about machines — it's about transformation across entire industries. Italian Tech India 2025 shines a spotlight on four strategic sectors where Italy's innovation is driving real-world impact:

- Machinery & Engineering
- Automotive & Auto-components
- Infra, Building & Construction
- Agri & Food Industry

India, with its booming manufacturing ecosystem and push for smart industry 4.0 solutions, is primed to benefit immensely from Italian expertise. As Indian industries seek productivity, sustainability, and competitiveness, the synergy with Italian tech becomes not just beneficial – but essential.

Under the umbrella of Italian Tech in India, the IMPRESA AWARDS stand as a prestigious recognition of entrepreneurial and managerial excellence among companies operating within the Indo-Italian business corridor. These awards have now grown into a benchmark of quality, innovation, and cross-cultural success, honouring organisations and individuals who have made a meaningful impact on the bilateral economic relationship. They celebrate companies that represent the best of Italian business values—innovation, design, quality, and sustainability— while successfully engaging with India's dynamic and diverse market by acknowledging their outstanding achievements across key strategic areas

Italian Tech India 2025 is more than an expo; it's a gateway to partnerships, progress, and prosperity. Don't miss this opportunity to connect with Italy's finest engineering minds and discover solutions that can redefine your production future.

Join the Italian Tech India 2025 in Mumbai Witness innovation. Embrace transformation. Italy is not just building machines – it's building the future with India.

Lubeco®
GREEN FLUIDS

High-performance. Eco-friendly.
Engineered for Industry.

Lubeco Green Fluids *delivers an extensive range of* ***Advanced Metalworking Fluids, Specialty Lubricants, Rust Preventives and Cleaners*** *for modern manufacturing.*

MAKE IN INDIA

RoHS COMPLIANT

D-U-N-S® REGISTERED

ABS Quality Evaluations, Inc. Management System Certification

Engineered Lubricants for Gear Manufacturing -Versatile solutions - ***Mineral, Synthetic & Vegetable based Neat Cutting Oils***

+91 7028246764
info@lubecogreenfluids.com

Lubeco Green Fluids: Pioneering Sustainable Performance in Industrial Lubrication

- By Pratap Tex-Chem Pvt Ltd Group

Introduction

In the modern era of global manufacturing, industries are not only measured by their productivity but by their commitment to sustainable, high-performance solutions that drive both operational efficiency and environmental responsibility. Lubeco Green Fluids, a flagship brand of Pratap Tex-Chem Pvt Ltd Pvt. Ltd., has firmly established itself as a leader in this transformation. Based in Pune, India, and with a legacy dating back to 1999, Lubeco Green Fluids has built its reputation on delivering cutting-edge industrial lubricants, metalworking fluids, and cleaners tailored for a broad spectrum of sectors such as automotive, aerospace, steel, oil & gas, defence, and general engineering.

Company Background and Vision

Lubeco Green Fluids operates with a vision that marries technological innovation with ecological responsibility. The brand is rooted in Pratap Tex-Chem Pvt Ltd's legacy of over four decades of industrial expertise, but it relentlessly pursues advancements that set new standards in lubrication science. Recognized across India and global markets, Lubeco serves a diverse clientele—OEMs, Tier I & II suppliers, and channel partners—offering solutions that meet the exacting requirements of modern manufacturing.

What truly sets Lubeco apart is its dedication to sustainability. Every product line is meticulously engineered to minimize environmental impact, from biodegradable and low-toxicity formulations to packaging that supports greener supply chains. This commitment is backed by ISO 9001:2015 certification, and further reinforced by RoHS compliance and participation in the Make in India and MSME programs.

Industries Served

Automotive Manufacturing:

Lubeco Green Fluids is a trusted partner to automotive manufacturers, supplying high-performance fluids for machining, assembly line lubrication, and metal parts protection. The brand's products help automakers minimize maintenance, improve component reliability, and support cleaner, safer manufacturing environments.

Aerospace & Aviation:

Precision and compliance with strict quality standards are critical in aerospace. Lubeco's fluids are meticulously formulated for machining aerospace alloys, aluminium, and titanium, ensuring superior performance, surface finish, and corrosion resistance.

Defence & Military:

In defence applications, durability and reliability are paramount. Lubeco's versatile lubricant portfolio supports the manufacture and upkeep of armaments, vehicles, and precision components, even under extreme operational stresses.

Steel & Metal Fabrication:

From rolling mills to CNC shops, Lubeco's cutting fluids and specialty lubricants boost productivity in steel plants and fabrication units by extending tool life, improving surface finishes, and reducing downtime.

Oil & Gas:

Lubeco's industrial lubricants and corrosion preventives are essential for critical pumps, valves,

and rotary equipment in the oil and gas sector, where equipment is frequently exposed to harsh chemicals and environmental extremes.

Engineering (Pumps, Valves, Compressors):

Precision moving parts require advanced lubrication. Lubeco's hydraulic, spindle, and gear oils ensure reliable power transmission, protection, and heat dissipation, extending the service life of vital engineering systems.

Textile Machinery:

The textile industry demands non-staining, low-residue lubricants due to the sensitive nature of fabrics and fibers. Lubeco Green Fluids supplies specific solutions that maximize uptime and maintain textile quality.

General Manufacturing & Heavy Industry:

From general job shops to heavy equipment plants, Lubeco's comprehensive product range supports efficient metal cutting, forming, rust prevention, cleaning, and equipment lubrication.

Product Portfolio Overview

Metal Cutting Fluids: Water-Soluble & Neat Oils

Water-Soluble Metal Cutting Fluids:

These fluids are engineered for versatility, covering applications from grinding and milling to high-precision CNC work. They form stable emulsions or transparent solutions that offer superior cooling, lubricity, and corrosion protection for a broad range of metals, including aviation-grade aluminium and high-cobalt alloys. Their high tramp oil rejection and long sump life result in enhanced tool longevity, surface finish, and operational cost savings. Environmentally safer, these fluids feature vegetable oil esters and are formulated without hazardous additives.

Neat Metal Cutting Fluids:

For the most demanding operations, Lubeco offers neat oils—mineral, vegetable, and synthetic base—tailored for heavy-duty broaching, honing, and carbide grinding. These oils provide excellent lubricity, extreme pressure protection, high oxidation stability, and minimal mist and odor. Biodegradable variants support regulatory compliance, while their advanced anti-wear packages safeguard valuable tooling.

Hydraulic, Spindle & Gear Oils

Lubeco develops a range of mineral and synthetic hydraulic oils, fire-resistant fluids, spindle oils, and gear lubricants designed for everything from precision machinery to heavy-duty mining equipment. With properties such as fire resistance, stable viscosity, and high oxidation stability, these fluids minimize wear, prevent corrosion, and keep systems running efficiently across all temperature extremes.

EDM and Wire EDM Fluids

Precision in electrical discharge machining is ensured by Lubeco's EDM and wire EDM fluids. These products feature refined dielectric oils and water-soluble coolants, delivering superior dielectric strength, thermal stability, and chip flushing capabilities. Their colorless, low-viscosity formulations provide operator visibility, minimal evaporation loss, and outstanding oxidation resistance.

Rust Preventives & Rust Removers

Storage, transit, and processing can all threaten the integrity of metal components. Lubeco's rust preventives—offered in oil, solvent, and water-based variants—form thin, uniform protective films that prevent corrosion for up to 18 months indoors and 6 months outdoors. Their rust removers, meanwhile, are efficient at dissolving rust, oils, and contaminants without harming base metals, providing near-neutral, operator-safe, biodegradable cleaning solutions.

Quenching Oils & Polymer Quenchants

Heat-treatment processes demand precise, safe quenching. Lubeco's quenching oils use state-of-the-art GTL base stocks for high thermal stability and rapid, uniform cooling, minimizing steel cracking and distortion. The polymer quenchants deliver versatility, enabling manufacturers to adjust cooling profiles according to component needs, all while eliminating hazardous brine and caustic solutions.

Specialty Metalworking Lubricants

For drawing, stamping, punching, and forming applications, Lubeco offers specialty lubricants—including mineral, vegetable-based, and water-soluble oils. These products feature superior boundary lubrication, fast drying, low residue, and excellent cooling, protecting tooling and supporting dimensional accuracy in fabricating precision parts.

MPI Oils, Powders & Solutions

Magnetic Particle Inspection (MPI) is critical in non-destructive testing, especially for safety-critical ferrous components. Lubeco's MPI range ensures fine

particle suspension, high visibility under UV, corrosion control, and rapid, residue-free inspection—backed by oil- and water-based formulations for a variety of testing methods.

Industrial Cleaners and Paint Strippers

Industrial cleaning demands robust, user-friendly solutions. Lubeco's aqueous and solvent-based cleaners provide fast, thorough removal of machining lubricants, waxes, and residues, while their paint strippers efficiently remove a range of industrial coatings without harming metal substrates or generating hazardous fumes.

VCI Packaging and Biodegradable Solutions

Sustainable packaging is increasingly vital. Lubeco's VCI (volatile corrosion inhibitor) films and biodegradable packaging solutions ensure protection for sensitive components during storage and shipping, aligning with global environmental standards.

Technical Support and Customization

A defining strength of Lubeco Green Fluids is its R&D-driven approach. The company offers tailored solutions—modifying formulations and additive packages to address unique requirements or operational challenges faced by clients. This is complemented by comprehensive technical support: on-site evaluations, fluid management, troubleshooting, and guidance on regulatory compliance are standard services.

Commitment to Sustainability & Quality

Environmental stewardship is a central pillar of Lubeco's corporate philosophy. The use of renewable raw materials, elimination of hazardous additives, production of biodegradable alternatives, and responsible packaging help customers adhere to evolving regulations and corporate social responsibility standards. ISO and RoHS certifications, along with D&B verification, reinforce the brand's credibility.

Operational efficiency is delivered not just through product quality but also via cost savings—whether in longer sump life, reduced fluid top-ups, or extended tool service intervals. Lubeco actively works to lower the total cost of ownership for its clients.

Industry Recognition

Lubeco Green Fluids is regularly featured in leading industrial publications for its innovation and technical leadership. Its products are trusted by some of the most demanding manufacturers in the automotive, aerospace, and heavy equipment spaces.

Conclusion

Lubeco Green Fluids demonstrates how technical innovation, environmental consciousness, and customer-centric service can combine to set industry benchmarks. Whether the need is cutting fluids for aerospace, biodegradable packaging for automotive components, or fire-resistant hydraulic oils for steel mills, Lubeco delivers with expertise and reliability.

Backed by Pratap Tex-Chem Pvt Ltd's industrial heritage, Lubeco Green Fluids stands out as a partner for manufacturers seeking next-generation productivity and responsible growth. By choosing Lubeco, industries worldwide are choosing not just superior lubrication solutions but a sustainable future for manufacturing.

Gear Machining in India: Addressing Challenges with Advanced Cutting Solutions

- By TaeguTec India

Gear manufacturing has always been at the heart of modern industry, supporting applications in automotive, aerospace, energy, and heavy machinery. In India, the demand for gears has grown substantially, driven by the expansion of the automotive sector, government investments in renewable energy, and the steady development of heavy engineering industries. However, producing gears that meet the required levels of accuracy, durability, and efficiency is a demanding task, particularly when working with hardened steels and complex profiles.

The main challenges in machining gears remain consistent across sectors. Heat-treated steels, frequently used in gearboxes and drive systems, are difficult to cut with conventional tools. Involute profiles demand extremely precise tool paths to maintain form accuracy. Traditional methods such as hobbing, shaping, and broaching are effective but often involve lengthy cycle times and multiple setups. Additionally, the high loads encountered during machining accelerate tool wear, raising costs and downtime in an industry where efficiency is paramount.

Recent years have seen the adoption of more advanced machining techniques in India, with power skiving emerging as a key development. Unlike hobbing or shaping, power skiving allows for the complete machining of both internal and external gears in a single setup, typically on multitask machines. This integration reduces cycle time, eliminates the need for multiple machines, and makes it especially attractive for the Indian automotive sector, where compact, high-precision gears are in high demand.

For large-module gears, such as those used in wind turbine gearboxes and heavy equipment, indexable and segment hobs are increasingly relevant. These modular designs extend tool life and reduce vibration compared to traditional high-speed steel hobs, while also offering cost efficiency through easier insert replacement. In regions such as Gujarat and Tamil Nadu, where renewable energy projects are expanding, such tooling solutions have a direct role to play in supporting localized gear production.

At the other end of the spectrum, fine-pitch gears for automotive and electronics applications require tools that combine precision with flexibility. Here, head-changeable tools have gained attention for their ability to deliver high surface quality and quick tool changes. This capability reduces downtime while ensuring that the resulting gears meet the noise and efficiency requirements of modern drivetrains.

The shift toward these advanced solutions has been supported by manufacturers and tooling companies operating in India. TaeguTec India is one example of a supplier providing a comprehensive portfolio of gear machining tools—including power skiving, hobbing systems, and fine-pitch gear tools—along with localized engineering support. Such local presence is significant, as it allows Indian manufacturers to adapt global innovations to the realities of domestic production environments, from material specifications to machine tool availability.

For Indian manufacturers, the best outcomes often come from combining these advanced tools with process optimization. Multitask machines that integrate turning, milling, and gear cutting are increasingly common in high-volume operations. Predictive maintenance and monitoring of tool wear are helping reduce unplanned downtime. Customization of cutting parameters—taking into account the specific hardness of locally sourced steels—further ensures that productivity gains do not come at the expense of tool life or quality.

As India continues to expand its automotive output, invest in wind energy, and strengthen its heavy machinery base, gear machining will remain a central enabler of industrial progress. The adoption of modern techniques like power skiving, modular hobbing, and head-changeable systems reflects a broader trend toward higher efficiency and reduced costs. Supported by local expertise and global technological advances, India's gear manufacturers are well-positioned to meet both domestic and international demands for precision, performance, and reliability.

Head-changeable Power Skiving

Liebherr FlexChamfer Technology

- By Liebherr Group

What It Is

FlexChamfer is an innovative, CNC-controlled chamfering and deburring process developed by Liebherr for precise gear finishing. It works using standard carbide milling cutters to shape variable chamfers—ideal for external gears, cluster gears, shafts, and internal gears—even when component geometries are complex or include interfering contours.

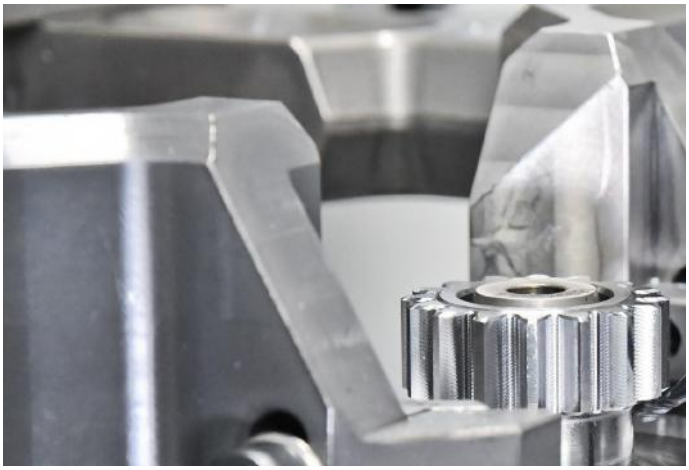


Fig 1 FlexChamfer

Key Advantages

- **Highly flexible and economical:** Uses off-the-shelf milling cutters that are inexpensive and easy to change—no custom tooling required.
- **Perfect for small to medium batch sizes:** Especially advantageous for prototypes or low-volume production where setup times must be minimized.
- **Fast tool changeovers:** CNC precision allows tool switching in under a minute, enhancing productivity.
- **Versatile application:** Compatible with gear hobbing, shaping, skiving machines, and adaptable to both wet and dry machining environments.
- **Parallel finishing:** Chamfering can occur simultaneously with primary machining, saving valuable cycle time.
- **User-friendly control:** The LHGearTec interface guides operators through parameter entry and offers process visualization, simplifying setup and adjustments.

How It Compares to ChamferCut

Liebherr also offers another chamfering method called ChamferCut, which excels in high-volume production:

- ChamferCut produces extremely precise, deformation-free chamfers with high repeatability and long tool life.
- Ideal for mass production, while FlexChamfer shines in flexibility and cost-effectiveness for smaller runs.
- Both methods can be integrated into the same machine, providing versatility for varied production demands.

Fig 3 LC 500 DC- Chamfercut

At a Glance: FlexChamfer Highlights

Feature	Description
Tooling	Uses standard catalogue carbide milling cutters
Batch Size Suitability	Tailored for small to medium production volumes
Machine Compatibility	Works with hobbing, shaping, and skiving machines
Setup Time	Extremely short—tool swaps in under one minute
Machining Mode	Can operate in parallel with primary machining (wet or dry mode)

Software Support	LHGearTec interface provides intuitive guidance and visualization
Cost Efficiency	Lower tooling investment, quick changeovers, suitable for varied geometries

Fig 2 LC500 DC

Liebherr Machine Tools India Pvt. Ltd., established in 2003, manufactures high-precision gear hobbing, shaping, skiving, and gear grinding machines. In addition, Liebherr-Verzahntechnik GmbH (VZT), Germany, produces precision gear metrology machines, high-accuracy gear cutting tools, gear grinding worms, and specialized workholding equipment.

Smart Tool Selection for India's Gear Industry: Harnessing Industry 4.0 for Precision and Cost Efficiency

- By Sudhanshu Nayak

India's gear manufacturing sector is undergoing a profound transformation as it embraces the possibilities of Industry 4.0 technologies. The adoption of interconnected digital systems such as the Internet of Things (IoT), artificial intelligence (AI), and digital twins is redefining how cutting tools are selected, monitored, and optimized in modern gear production. Traditionally, tool selection relied heavily on operator experience, trial-and-error adjustments, and static data from suppliers. While these methods served the industry for decades, they are increasingly inadequate in a global manufacturing landscape that demands AGMA Q12 precision, ISO 1328 tolerances, and cost reductions of 20% or more.

For India, the timing of this shift is critical. The rapid rise of electric vehicles (EVs) has introduced new requirements for quiet, efficient, and compact gearboxes, while the aerospace sector demands gears with exceptional fatigue resistance and surface integrity. Both industries require micron-level precision, minimal variability, and sustainable production methods that reduce energy and coolant usage. Industry 4.0 provides the tools to meet these needs by enabling real-time data-driven decisions. IoT sensors can monitor tool conditions during operation, AI algorithms can dynamically optimize cutting parameters, and digital twins can simulate tool performance with predictive accuracy. This convergence ensures not only higher-quality gears but also significant improvements in productivity and cost efficiency.

This article explores how Industry 4.0 technologies are transforming the way Indian manufacturers approach gear cutting tool selection, with a focus on the mechanisms that underpin these innovations, the performance metrics that demonstrate their impact, and the solutions available to overcome adoption challenges.

Industry 4.0 Technologies in Tool Selection

At the heart of Industry 4.0's impact on gear manufacturing lies the digital twin. A digital twin is a virtual replica of a physical tool or machining process that uses input data, mathematical models, and finite element analysis (FEA) to simulate real-world behavior. For gear cutting, digital twins can predict tool wear, cutting forces, chip formation, and thermal effects with up to 90% accuracy. This predictive capability drastically reduces the need for trial-and-error in tool selection, cutting development times by nearly 25%. For example, before a new hob is used on a batch of automotive gears, manufacturers can simulate different feed rates, cutting angles, and tool materials, allowing them to determine the most efficient and cost-effective configuration without risking expensive scrap.

IoT-enabled sensors bring real-time monitoring into the equation. By embedding sensors into cutting tools or toolholders, manufacturers gain access to data streams measuring vibration (typically frequencies below 100 Hz), cutting temperature (below 800°C), and spindle torque. These measurements provide insights into tool performance under actual working conditions. When combined with predictive algorithms, the data can trigger preventive actions such as reducing feed rates, initiating tool changes, or adjusting lubrication strategies before tool failure occurs. In practice, such predictive maintenance has been shown to extend tool life by up to 20%, while reducing unplanned downtime and scrap rates.

Artificial intelligence ties these elements together by processing the massive data flows generated by IoT systems and digital twins. AI-based optimization engines can recommend the best cutting speeds and feed rates

in real time, based on wear progression and material characteristics. For example, neural networks trained on historical wear patterns can suggest using cubic boron nitride (CBN) tools instead of high-speed steel (HSS) when machining hardened gears, improving efficiency by 10% and ensuring longer tool life. In hobbing trials, AI-driven feed rate optimization has led to 15% productivity gains compared to conventional static programming.

The combination of digital twins, IoT, and AI aligns perfectly with the needs of India's automotive and aerospace manufacturers. In EV drivetrain production, for instance, gears must achieve tolerances within 4 µm to meet ISO 1328 standards. Industry 4.0 tools not only make this possible but also reduce tool selection times and material waste, creating a more cost-effective and sustainable process.

Tool Condition Monitoring (TCM)

While smart selection is crucial, ongoing monitoring of tool condition is equally important for precision and cost efficiency. This is where Tool Condition Monitoring (TCM) systems come into play. TCM employs a mix of sensor data and statistical models to track tool wear in real time, ensuring that gears meet quality standards while maximizing tool utilization.

One of the most effective techniques in TCM is Bayesian discriminant analysis, which uses probabilistic models to classify the condition of a tool based on input signals. In gear manufacturing trials, this method has achieved 93.3% accuracy in detecting tool wear states. Such precision allows manufacturers to reduce unplanned downtime by nearly 20%, as tools can be replaced or adjusted at the optimal point rather than prematurely or after catastrophic failure.

Typical parameters monitored in TCM include flank wear (kept below VB = 0.3 mm), crater depth on the rake face, and acoustic emission signatures. These indicators are directly linked to surface finish and dimensional accuracy. For instance, maintaining tool flank wear within prescribed limits ensures that gear flanks achieve surface roughness values around Ra 0.5 µm, which are critical for minimizing noise and vibration in EV transmissions. In grinding operations, TCM also enables the maintenance of tolerances within 4 µm, validated by coordinate measuring machine (CMM) inspections.

The benefits extend beyond quality to sustainability. TCM supports dry cutting processes, which eliminate the need for liquid coolants. This not only reduces coolant disposal costs by 30% but also lowers energy consumption by 15%. Given India's increasing focus on environmentally responsible manufacturing, this represents a major advantage for both large manufacturers and SMEs.

An additional benefit of TCM is its integration with digital twins. The data collected from tool wear monitoring feeds back into simulation models, enabling increasingly accurate predictions of tool life and performance. Over time, this creates a self-improving loop that enhances both tool selection and process planning. Affordable IoT platforms and open-source TCM software are now making these capabilities more accessible, lowering adoption costs by as much as 25% for smaller manufacturers.

Applications and Performance Metrics

The application of Industry 4.0 in smart tooling extends across the major gear manufacturing processes: hobbing, grinding, and skiving.
In hobbing, IoT-enabled tools significantly reduce tool selection time—by as much as 40%—through automated parameter recommendations based on real-time data. This has translated into cycle times that are 20% faster than those achieved with manual tool selection methods. For India's high-volume automotive sector, this efficiency gain directly translates into cost savings and improved competitiveness.

In grinding, particularly for aerospace gears that demand DIN 7 quality, TCM systems have proven essential. By continuously monitoring CBN tools, manufacturers can maintain surface finish and dimensional accuracy throughout the tool's life. The result is consistently high-quality gears with tolerances verified within 4 µm, ensuring compliance with global aerospace standards.
In power skiving, AI-driven optimization of tool parameters has reduced tool wear by 25%, while still achieving surface finishes of Ra 0.6 µm. This is particularly relevant for EV applications, where noise levels below 80 dB are required as per ISO 6336 standards. By reducing variability in tool wear and surface finish, smart skiving ensures quieter, more efficient gearboxes that meet the acoustic demands of electric drivetrains.

Statistical analyses also highlight the economic benefits. In conventional gear manufacturing, 50–80% of tool life often goes underutilized, as tools are replaced prematurely to avoid unexpected failure. By leveraging

smart monitoring and AI recommendations, Indian manufacturers can reduce this waste by approximately 30%, significantly lowering cost-per-part ratios. Digital twins further optimize multi-pass grinding strategies, delivering 15% improvements in efficiency while maintaining repeatability within 3 µm.

Future Trends and Conclusion

The evolution of smart tooling in India's gear industry is far from complete. Future trends point toward even more advanced integration of digital technologies. Machine learning models will become increasingly sophisticated, not only predicting wear but also dynamically adjusting cutting parameters in real time to achieve ideal conditions. Blockchain technologies are being explored for tool traceability, ensuring secure records of tool history, usage, and performance, which could reduce procurement and maintenance costs by up to 30% by 2030.

Cloud-based AI platforms also promise to democratize access to these technologies. By offering subscription-based services at costs 20–30% lower than proprietary systems, cloud solutions will allow SMEs to adopt advanced smart tooling without the burden of heavy upfront investments. When combined with India's Digital India initiatives, such platforms will create an ecosystem where even smaller gear manufacturers can participate in high-value markets like EVs and aerospace.

The path forward requires investment not only in digital infrastructure but also in human capital. Training operators and engineers to interpret data, manage digital twins, and integrate AI-driven recommendations into production workflows is essential. By aligning vocational programs with Industry 4.0 competencies, India can ensure that its workforce is prepared for the demands of next-generation gear manufacturing.

In conclusion, smart tool selection driven by Industry 4.0 represents a strategic opportunity for India's gear industry. By integrating digital twins, IoT sensors, AI optimization, and advanced TCM systems, manufacturers can achieve unprecedented levels of precision, efficiency, and sustainability. The results are clear: reduced costs, extended tool life, minimized waste, and gears that meet the strictest global standards. As India positions itself as a global hub for EV and aerospace gear production, embracing smart tooling will not only enhance competitiveness but also solidify the country's reputation as a leader in advanced, sustainable manufacturing.

Sudhanshu Nayak, a dynamic mechanical engineer, is driven by a fervor for cutting-edge technologies like 3D printing, cloud manufacturing, & Industry 4.0. He has gained invaluable firsthand experience with 3D printing during his tenure at innovative startups. His youthful energy fuels a deep expertise in social media marketing, technical content creation, & market research.

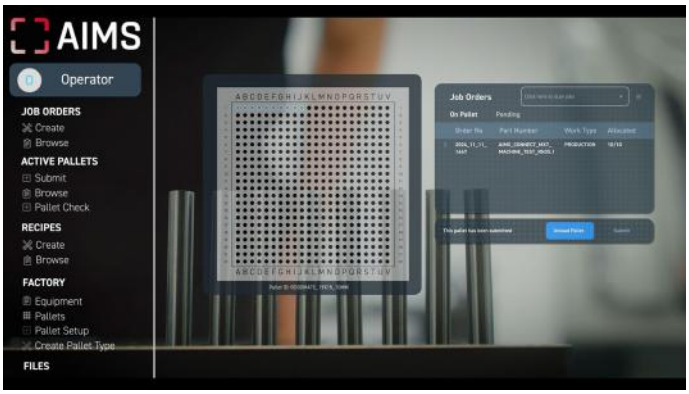
Building the Future of Smart Tool Manufacturing - Together

Why now is the time to join the AIMS ecosystem

- By Samuel Kirkpatrick

The manufacturing industry is undergoing its most transformative shift in over a century. As smart automation, AI-driven production systems, and advanced robotics redefine what's possible, manufacturers are seeking ways to scale efficiently, adapt rapidly, and remain competitive in a world that rewards agility and intelligence.

In the tool and cutter grinding (TCG) sector, ANCA has been at the forefront of that transformation for 50-plus years. But the industry challenges ahead—labour shortages, productivity pressures, rising costs, and demand for traceability—require more than smart machines. They demand integrated, open, and collaborative systems that elevate the entire production ecosystem.



This is where AIMS—the ANCA Integrated Manufacturing System—enters the spotlight. Designed to Connect, Automate, Create, AIMS is an open, interoperable smart factory solution that is reshaping what's possible in tool manufacturing.

And now, ANCA is inviting visionary technology equipment manufacturing, or TCG industry players, to become partners in this growing global ecosystem.

Why Forward-Thinking Vendors Are Aligning with Open Ecosystems Like AIMS

As tool manufacturers navigate mounting cost pressures, evolving customer expectations, and widening skills gaps, there's growing recognition that it's partnerships that will meet the complex needs of a modern smart factory. The era of closed systems and proprietary silos is giving way to collaborative, open ecosystems that bring together complementary technologies to deliver holistic value.

That's why technology vendors across hardware, software, and automation are increasingly seeking partnerships that allow them to embed their innovation into broader platforms - like ANCA's AIMS. Becoming part of the AIMS-ready ecosystem offers a powerful position in an industry-leading platform.

Here's why:

- **Open ecosystems are shaping purchasing decisions**
  Manufacturers are no longer sourcing machines or software in isolation. They're looking for integrated, interoperable systems that reduce complexity and risk. By being part of a trusted ecosystem like AIMS, vendors position themselves to be part of these full-stack solutions—rather than competing in fragmented Request for Proposals.

- **Value is shifting from products to solutions**
  It's not just what a product does—it's how it fits into a manufacturer's process. AIMS partners gain the advantage of being embedded in a solution-oriented sales approach, where customer conversations focus on end-to-end value, not line-item pricing.

- **Reach and visibility multiply through shared infrastructure**
  The traditional sales model—one company, one channel—is being replaced by co-marketing, co-selling, and shared customer journeys. AIMS opens doors to ANCA's global customer base, sales team, and service network—creating scale many vendors can't access alone.

- **Integration is the new differentiator**
  The ability to seamlessly connect to a customer's digital factory infrastructure is fast becoming a purchasing prerequisite. AIMS provides both the technical infrastructure and engineering collaboration to make third-party integration straightforward, turning "partnership potential" into real-world deployments.

- **Collaborative innovation unlocks new customer**

value
In a modular factory environment, the best innovation doesn't always come from one place. Smart vendors know that collaborating—whether on data sharing, software features, or joint R&D—can unlock use cases neither party could deliver alone. AIMS provides the platform for that collaboration to thrive.

The AIMS ecosystem is leading the industry and at the forefront of smart manufacturing as the benchmark for integrated, end-to-end tool production with world-leading closed-loop geometry compensation.

Beyond access to ANCA's large and loyal global customer base, AIMS partners benefit from two-way opportunity sharing, preferred inclusion in end-to-end customer solutions, and potential access to ANCA's international sales and service networks.

With detailed integration support and co-marketing opportunities, partners can scale faster, extend their reach, and deliver greater value by being part of a collaborative, future-ready ecosystem built on openness, interoperability, and shared innovation.

Who Could—and Should—Partner?

The AIMS ecosystem welcomes any organisation that can add value to the smart factory experience for tool manufacturers. This includes:

- **Tool measurement and metrology equipment providers**
  (e.g. ZOLLER, a current AIMS partner)
- Machine accessory and fixture manufacturers
  (e.g. Arobotech-style component manufacturers)
- Tool and cutter industry machinery providers
  (edge prep, laser marking, packaging, cut & chamfering, etc.)
- Smart manufacturing software companies
  (MES, ERP, simulation, production monitoring)
- Worker tracking, localisation, and wearable tech providers
- AR and operator augmentation companies
- Barcode scanning and digital interface hardware suppliers

But most importantly: if your solution improves automation, integration, traceability, or productivity in a factory, there's a place for you in AIMS.

Why AIMS, Why Now?

Tool manufacturers are under increasing pressure to do more with less. AIMS addresses that challenge by connecting every process and piece of equipment into a single, intelligent, modular system. Whether it's integrating a third-party machine without a native data interface or scaling up to fully autonomous, lights-out manufacturing, AIMS makes it possible.

Samuel Kirkpatrick

Senior Product Manager – AIMS, ANCA CNC Machines

Sam Kirkpatrick is an innovative engineering leader with over a decade of experience in automation and smart manufacturing. Since joining ANCA in 2012, he has been instrumental in the development of AIMS (ANCA Integrated Manufacturing System)—a modular, intelligent automation platform designed to transform CNC tool production through connected, autonomous processes.

Sam has led global engineering teams and helped shape AIMS from concept to deployment, drawing on experience from GE Global Research and industrial automation across multiple sectors. As Senior Product Manager, he now drives the strategic direction of AIMS and its role in shaping the future of automated manufacturing.

He holds a B.S. in Computer Engineering and an M.S. in Electrical Engineering (Robotics) from Lehigh University, where his research in the VADER Lab informed his approach to robotics and intelligent systems.

VDMA Symposium on "Evolving Technologies in the Machining Process Value Chain"

- EVENT REPORT

TAJ MG Road, Bangalore, August 8th, 2025

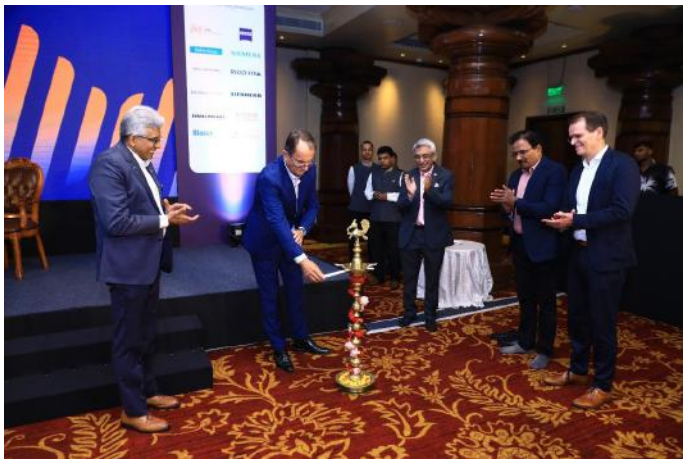
The VDMA (German Engineering Federation) India Bangalore Office organized a Symposium on "Evolving Technologies in the Machining Process Value Chain" on August 8th, 2025, at the TAJ MG Road, Bangalore.

As for the great potential of India's high position in production and consumption of Machine Tools globally, VDMA is creating a comprehensive awareness of German Technology in the Critical Elements forming part of the Machining process and therefore organised this Symposium together with its many partners: Blaser Swisslube, Ceratizit Group, DMG Mori, EMUGE-FRANKEN, Kardex Remstar, Liebherr, MPS Archonic, REGO-FIX, Roedl&Partner, Siemens, VDMA Forum Manufacturing-X, and Zeiss.

Top: Left to Right: Mr. Syed Imtiyaz, Applications, Manager-Technical Support, Siemens Limited. Mr. Vishal Ravindran, Process Optimization Engineer, MPS Archonic. Mr. Justin Thomas, Head of Marketing, Kardex India Private Limited. Mr. Vikas Gore, Business Development Manager & Technical Support Manager for the Middle East region, Rego Fix India Pvt Ltd. Mr. S. Manohar, General Manager, VDMA India. Mr. Seenivasan Balasubramanian, CEO, International Aerospace Manufacturing Pvt. Ltd (IAMPL)/Rolls-Royce Group. Mr. Rajesh Nath, Managing Director, VDMA India. Mr. Deepak Rayanagoudar, General Manager – Sales & Application Engineering, EMUGE FRANKEN India Pvt Ltd. Mr. Michael Kirbach, Head of Aerospace Excellence, DMG Mori
Bottom: Left to Right: Mr. Punit Gupta, Managing Director, Blaser Swisslube Solutions Private Limited. Mr. Achim Burkart, Consul General, Consulate General of the Federal Republic of Germany, Bengaluru. Ms. Sushma Agarwal, Senior Associate, Roedl & Partner. Mr. Mounesh Achar, Business Development, Electronics segment & CMM Products, Carl Zeiss India (Bangalore) Pvt Ltd, ZEISS Group. Mr. Venkatesha Malige, DGM Application, Ceratizit, India Pvt Ltd

The Symposium was conducted into four sessions including an Inaugural Session and three Technical Sessions.

At the beginning of the Inaugural Session the traditional Lighting of the Lamp was commemorated by Mr. Rajesh Nath, Managing Director of VDMA India, Mr. S. Manohar, General Manager, VDMA India, Chief Guest Mr. Achim Burkart, Consul General, Consulate General of the Federal Republic of Germany, Bangalore, Guest of Honor Mr. Seenivasan Balasubramanian, CEO, International Aerospace Manufacturing Pvt. Ltd. (IAMPL)/Rolls-Royce Group, Mr. Michael Kirbach, Head of Aerospace Excellence, DMG Mori and Ms. Sushma Agarwal, Senior Associate, Roedl & Partner.



Lighting of the Inaugural Lamp by Mr. Achim Burkart, Consul General, Consulate General of the Federal Republic of Germany, Bangalore

Following that, Mr. Nath welcomed all the guests and gave an overview of the market size of the matter at hand and the importance of the Machining Environment in the Aerospace sector for precision manufacturing.

Mr. Burkart`s insightful speech was about the "Impact of Tariffs in India" and to draw the Inaugural Session to an end, Mr. Balasubramanian talked about the "Role of Machining Process Value Chain in the Aerospace sector" as an expert on this topic. His speech included an overview of the current situation in Aerospace Engineering, some future trends and important key shifts in the value chain to keep up with the trends.

Left to Right: Mr. S. Manohar, General Manager, VDMA India. Mr. Rajesh Nath, Managing Director, VDMA India. Mr. Achim Burkart, Consul General, Consulate General of the Federal Republic of Germany, Bangalore. Mr. Seenivasan Bala-subramanian, CEO, International Aerospace Manufacturing Pvt. Ltd (IAMPL)/ Rolls-Royce Group

The first Technical Session began with Mr. Kirbach (DMG Mori), who presented on "Machining Transformation (MX) – Meet the today's challenges of the Aerospace and other industries". He opened his presentation by asking rhetorical questions about how to stay competitive in the future and answered them during the speech by giving an insight, how Machining Transformation is implemented in the processes at DMG Mori.

After that, Mr. Venkatesha Malige from DGM Application, Ceratizit, India Pvt. Ltd. held an interesting lecture on "Challenges in Machining of High Temperature Alloy Materials through Tooling Solutions" and presented Ceratizit's solution of Direct Cooling with its features and advantages, and also provided some detailed examples of direct cooled tools.

The last one to speak during the first session was Mr. Mounesh Achar, Business Development, Electronics segment & CMM Products, Carl Zeiss India (Bangalore) Pvt. Ltd., ZEISS Group. He gave a coherent summary of how different companies use different products from Zeiss in their processes to present on "Dimensional & Form Metrology Concepts in the Machining Process of the Global Supply Chain".

With that, the first session came to an end, and Mr. Manohar guided through a Q&A Session, where interesting questions about the previous presentations were asked from the auditorium, and the speakers willingly answered them in great detail. There was a coffee and tea break after that to disperse the morning and to clear the minds for the next exciting presentations.

Technical Session 1; Left to Right: Mr. Gurupad Bhat, Managing Director, Staubli Tec Systems India Pvt Ltd. Mr. S. Manohar, General Manager, VDMA India. Mr. Mounesh Achar, Business Development, Electronics segment & CMM Products, Carl Zeiss India (Bangalore) Pvt Ltd, ZEISS Group. Mr. Venkatesha Malige, DGM Application, Ceratizit, India Pvt Ltd. Mr. Michael Kirbach, Head of Aerospace Excellence, DMG Mori

The first presentation of Technical Session 2 was by Mr. Deepak Rayanagoudar, General Manager - Sales & Application Engineering, EMUGE-FRANKEN India Pvt. Ltd., on the topic of "Optimization and Machine Up-Time". At first, he talked about the challenges of Threading, followed by Thread Milling Technology and its advantages, and finally introduced the audience to different products of EMUGE-FRANKEN, like a Speedsynchro Tap-Holder with its benefits and two kinds of Clamping Technology with the achieved savings through the usage of the tools.

He was followed by Mr. Justin Thomas, Head of Marketing, Kardex India Private Limited. His speech on "Optimize Your Manufacturing Efficiency and Supply Chain Agility with Automation" was structured like a customer call, with asking if automation is needed, an explanation, why automation should be considered, and a detailed overview of the advantages Kardex products can bring to their consumers. He ended his speech with a short quiz for the listeners.

Mr. Punit Gupta, Managing Director, Blaser Swisslube Solutions Private Limited concluded Technical Session 2 with his presentation on "Liquid Tool – A New Dimension in Productivity". He gave an insightful overview about the companies experience in different industries, applications and materials.

Again, in the aftermath of the Session, the audience had the chance to ask direct questions to the speakers, again moderated by Mr. Manohar.

Technical Session 2; Left to Right: Mr. Punit Gupta, Managing Director, Blaser Swisslube Solutions Private Limited. Mr. Justin Thomas, Head of Marketing, Kardex India Private Limited. Mr. Deepak Rayanagoudar, General Manager – Sales & Application Engineering, EMUGE FRANKEN India Pvt Ltd. Mr. Rajesh Nath, Managing Director, VDMA India

The insightful morning came to an end with a networking lunch and a huge buffet of delicious meals, provided by the hotel.

The 3rd and last Technical Session of the day was opened by Mr. Vikas Gore, Business Development Manager & Technical Support Manager for the Middle East Region, REGO-FIX India Pvt. Ltd. His presentation was about "Achieve Tool Handling Excellence" and included an overview of different Tool Holders and their advantages and fields of application.

After Mr. Gore, Mr. Anil Agrawal, Managing Director, Liebherr Machine Tools India Pvt. Ltd. held his presentation on "Trending in Gear Hopping and Chamfering Technologies". He introduced the guests to different Chamfer Cut Technologies along with an application example and technical data. Mr. Agrawal continued with an introduction to various Carbide End Mills and what they can be used for again accompanied with the technical data of the tools, and ended his presentation with some facts and also an example to the topic of Gear Hopping.

In the following presentation on "Smart Machining Revolution – Boost CNC Productivity with Digital Twin & AI Intelligence" Mr. Syed Imtiyaz, Applications Manager – Technical Support, Siemens Limited, spoke about the two main topics of "Speed – Optimize My Machining/ AI" by highlighting the key challenges faced by Discrete manufacturing industries and how they can be confronted and "Efficiency – Digital Twin of CNC". He hereby explained, how a digital twin of the product in question can improve its whole life cycle.

Mr. Vishal Ravindran, Process Optimization Engineer, MPS Archonic, talked about "Process Optimization for Enhanced Efficiency & Profitability". He began by explaining, what Process Optimization means and continued with how much potential the topic contains for specific companies. After that, he described the journey of Process Optimization from defining objectives to monitoring and improving the implemented solutions.

The last presentation of Technical Session 3 was on "International Manufacturing – X" by Mr. M. R. Subramanya, Vice President, Siemens Technology and Services Pvt. Ltd. In his lecture, Mr. Subramanya focused on the background of Manufacturing – X and Factory – X, talked about the data ecosystem, showed specific use cases, and concluded with the fundamental framework, which is needed for IMX.

Technical Session 3; Left to Right: Mr. S. Manohar, General Manager, VDMA India. Mr. Anil Agrawal, Managing Director, Liebherr Machine Tools India Pvt Ltd. Mr. Vishal Ravindran, Process Optimization Engineer, MPS Archonic. Mr. Vikas Gore, Business Development Manager & Technical Support Manager for the Middle East region, REGO-FIX India Pvt Ltd. Mr. Syed Imtiyaz, Applications Manager-Technical Support, Siemens Limited. Mr. M. R. Subramanya, Vice President, Siemens Technology and Services Pvt. Ltd

With that, Mr. Manohar called for a last Q&A Session before he drew the Symposium to an end with Concluding Remarks about the successful event with 165 attendees in total and a Vote of Thanks to all the listeners, speakers, and organizers.

The hotel again served coffee, tea, and sweets, which could be enjoyed while chatting with other attendees and representatives of the partners at their booths.

Hitork's Dual Edge: Manufacturing Excellence Meets Marketplace Collaboration

- By Sushmita Das

Hitork Gears & Drives is carving a unique space in the mechanical power transmission industry by blending manufacturing expertise with a collaborative marketplace model. At the helm is Mr Karthik Seshagiri, a versatile leader with global experience in operations, product development, and software engineering. In this conversation, he shares Hitork's journey, its differentiation in a competitive landscape, milestone projects, and the company's vision for driving innovation in gearing and linear motion systems in the era of Industry 4.0.

1. Mr. Karthik, what was the driving vision behind starting Hitork Gears & Drives?

Thanks for the question. I have to answer by first mentioning our founder Late Mr. Seshagiri, who had started Gears and Gear Drives about four decades ago. Mr.Seshagiri was a stalwart in Gear Technology and had designed complex gearing systems for a myriad of industries - steel, industrial automation, SPM, bulk material handling and finally defence. Gears and Gear Drives predominantly become a Linear Actuator design and manufacturing company. The growth of GGD and its technical expertise caught the attention of a foreign company, which led to its acquisition.

HitorkGearsAndDrives is a company founded by me and folks with a similar experience. The strength is that Hitork has goodwill in the mechanical power transmission space; therefore, there was an idea to bring like-minded manufacturers and dealers under one marketplace. The partners on this website are known to us, and we continue to collaborate on various other projects.

HitorkGearsAndDrives also has a manufacturing unit that caters to industries that require custom gearboxes, shafts, spindles, joints, spiral bevel gearboxes, etc.

HitorkGearsAndDrives, therefore, combines trading and manufacturing under one entity.

2. How does Hitork differentiate itself in such a competitive mechanical power transmission space?

HitorkGearsAndDrives has the strength of engineers and designers with rich experience in the Gear Technology field. The differential is leveraging a partnership for a certain process, while maintaining transparency and ensuring that everyone in the supply chain feels that they have got a fair share in the deal. From the buyer's standpoint:- It is the flexibility to accept challenging prototypes and the manufacture of the same. An additional differential is to be diverse, extending into gearing systems with electronic feedback circuits mounted to augment Industrial 4.0.

3. Could you share a milestone project that really shaped the company's journey?

The milestone that shaped GGD and led to the birth of HitrokGearsAndDrives is the order from TATA for an outrigger, which is an electromechanical linear actuator that is used in the PINAKA/MRSAM Army projects. Presence in the defence sector got the foreign buyer interested in the acquisition of GGD, and then the parts that are not aligned to the defence vertical or steel industry are what Hitork also undertakes.

4. Mechanical Power Transmissions products are at the core of modern automation—what unique role do Hitork's solutions play here?

Mechanical Power Transmission Products, especially gears, shafts, splines, etc, date back 5000 years in usage. Hitork aligns itself with the expectation of the current industrial standards in Gear Technology. The unique role that Hitork plays is going through the layers above and below a gearing part. The layers below are the fabrications or prime movers - we partner with the right companies and learn from them to provide a better solution to the end user. The layer above the gearing part that Hitork plays a crucial role in is the control electronics - we constantly learn and adapt to newer generations of control and feedback electronics, and the change is so rapid here that we constantly look for genuine partners to collaborate with.

5. In terms of design and engineering, how do you ensure precision and reliability in your products?

This is the most elaborate work in the design and engineering stage of gear manufacture. In the design stage, the designer ensures that the spec of the customer are completely understood and documented in a drawing and technical proposal. The next step, especially for gears, is to rely on first principles and methodologies for material selection and profile calculation - nowadays it's far easier because software renders that information in record speed, the designer must have a strong understanding of the correct software to be used.

From the engineering side, the goal is to break

down the project into various stages so that traceability can be maintained. The initial step is the correct material selection with customer approved material test certificates, the next step is to leverage modern measuring instruments and high precision hand held devices - like CMM, Vernier, material crack detector, XRay, decibel level check etc, the final step is to ensure that all inspection criteria has been met, and these documents have been approved by the customer before effecting a dispatch.

6. With industries moving towards higher efficiency, how is Hitork integrating innovation into gear and mechanical power transmission solutions?

This is a continuous process, and here it is more of an improvisation. We constantly seek newer synthetic materials and high-grade polymers to be included in our products once the evaluation is done.

7. What are the key challenges you face in developing gearboxes for diverse industries?

Challenges are mostly related to space availability in the application to house the gearing application, unique materials specified in the gearing, and strict mandates on heat treatment specifications are the challenges in diverse applications

8. Which industries are showing the strongest adoption of linear motion products right now?

Linear Motion Projects,

Defence, Steel Mills, Industrial Automation, Medical Equipment Manufacturers and the newest and growing rapidly is robotics.

9. Can you share an application where Hitork's solutions solved a real-world customer challenge?

Hitork has made precise gearing for solar power plants to track the 180-degree movement of panels and also the azimuth movement of panels, by reducing cost with optimal metallurgy usage and integrating off-the-shelf motors. The cost was a challenge, but the agility of Hitork helped win the order and overcome the challenge.

10. How do you see the role of linear motion evolving with automation and Industry 4.0?

Linear Motion Technology will continue to evolve with Industry 4.0. The complexity of the product will undergo enhancement, which will create an uptick in the requirement for better machinery. IOT devices need to be intelligently placed within the Linear Motion parts; therefore, complexity in machining housings will increase. Machine belts, motors, screws and translation nuts all would need to encompass intelligent feedback devices.

11. What new technologies or trends in motion control excite you the most?

New trends are the usage of synthetic material in manufacturing gears, shafts, etc. When it comes to prime movers and with the current geopolitical situation, which could result in supply chain issues of rare earth material - used in DC motor magnets, I reckon that there will be some application switching back to hydraulic motors - this is only if the environment does not have clear room requirements.

12. Where do you see Hitork Gears & Drives in the next five years?

In the next 5 years, I see Hitork's marketplace having at least 500 vetted partners listing their products on the website and generating a year-on-year 30% growth from the marketplace. From the machine shop side of Hitork, I foresee a significant growth in custom-made gearboxes and full-stack developed mechanical power transmission systems with a 40% year-on-year growth.

Karthik Seshagiri, Director, Hitork

Versatile business leader with global experience in operations, product development, business management, and software engineering. Skilled in driving business consolidation, acquisitions, and scalable growth with strong financial and digital oversight. Proven success in securing 100+ clients, leading B2B teams, and delivering innovative automation solutions by integrating electronic controls with mechanical systems.

Capital Tool Industries Expands Global Footprint with Second Major Acquisition in Two Years

- By Gear Technology India

Capital Tool Industries (CTI) has taken another big leap on the global stage with the acquisition of Acedes Gear Tools, UK — marking its second international acquisition in just two years.

Following the successful integration of Mico Tools in Belgium, this latest move strengthens CTI's presence in Europe and reinforces its position as a trusted global leader in gear cutting tools. Together, these strategic acquisitions highlight CTI's commitment to innovation, quality, and customer-focused growth across international markets.

With Acedes Gear Tools now part of its portfolio, CTI significantly enhances its technical capabilities and market reach, while ensuring that existing Acedes customers continue to receive the same uncompromising standards of service and precision they rely on.

Two acquisitions in two years underline CTI's vision: to be at the forefront of gear cutting excellence worldwide.

Capital Tool Industries – Precision in Every Cut

Established in 1966, Capital Tool Industries has been a trusted name in the gear cutting tool industry for nearly six decades. From its very inception, the company's products—ranging from Gear Hobs, Bevel Blades, Rack Type Cutters, Spline Hobs, Gear Shaving Cutters, Milling Cutters, Shaper Cutters, and Broaches—earned recognition for their innovative design and uncompromising quality.

Today, Capital Tool Industries stands among the leading gear hobs exporters and gear cutter manufacturers in India, catering to large-scale global demand with unmatched consistency.

With a state-of-the-art manufacturing facility, the company delivers tools that exemplify the finest in metallurgy, achieving precision edges and curves that set benchmarks in performance. Backed by a team of highly skilled professionals and powered by the latest technology, CTI combines expertise and innovation to create products that meet the most demanding industry standards.

Renowned for its ability to meet any quantity or quality requirement, Capital Tool Industries continues to strengthen its legacy as a global partner in precision gear cutting tools.

THE FUTURE OF GEARS & GRINDING MEETS POWER TRANSMISSION AT MPT EXPO DETROIT!

BOOTH 479

OCT 21–23, 2025

DON'T MISS IT – SEE YOU IN DETROIT!

Financial Discipline: The Overlooked Gear in Gear Manufacturing

A Practical Guide On How To Strengthen Competitiveness By Aligning Shop-Floor Excellence With Financial Discipline.

- By Sumit Chuttar

Why Finance Matters in Gear Manufacturing

In the world of gears, precision is everything — metallurgy, tooling & tolerances. Yet behind every gear that runs flawlessly, there's another gear that often runs silently: finance.

Many gear businesses are led by smart engineers who sometimes overlook the fiscal aspects of running a capital-intensive enterprise. Too often, finance is left to accountants or auditors, treated as an afterthought. The assumption is simple: "If orders are flowing, the business is safe." The reality is harsher—finance is the foundation of sustainability. Every decision in gear manufacturing—whether investing in a CNC hobbing machine, extending credit to an OEM, or negotiating steel prices—creates financial consequences that ripple across the balance sheet.

And here's the overlooked truth: when two shops have similar machines and engineers, it's often the financially disciplined one that comes out ahead.

Profit vs. Cash: The Hidden Trap

Gear manufacturers often celebrate large and "profitable" order books. But profit on paper is not the same as cash in the bank. In capital-intensive industries, this gap can be a silent killer. Accepting orders at thin margins may appear attractive until volumes shift or input costs rise. What looked profitable yesterday can quickly turn into bleeding losses at the organizational level — draining working capital, straining operations, and forcing management to divert funds meant for capex or growth into day-to-day survival.

The antidote lies in financial literacy across the organization. When managers at every level understand the difference between profit and cash — and treat cash flow management as a core discipline — companies build the resilience needed to withstand shocks and sustain growth.

Working Capital: The Pulse of the Shop Floor

Working capital is the oxygen of gear manufacturing — and yet, it is where most companies suffocate.

- Receivables: OEMs push for 120-day terms while salaries and bills can't wait.
- Inventory: Forgings, blanks, and semi-finished gears sit idle, locking up crores.
- Payables: Suppliers demand faster payments, squeezing liquidity further.

Some businesses collapse not because of engineering flaws, but because their cash is trapped in the wrong places. Isn't it worth asking: What if the same discipline we apply to quality could be applied to cash flow? Isn't it worth checking if the company has the right processes to track cash flow more often?

Costing and Pricing: Winning Without Bleeding

Costing errors don't scream — they whisper. They creep in quietly, eroding margins the way grey hair sneaks up with age. And the danger multiplies under long-term contracts: a single miscalculation at the start can drain profits year after year. Yet too often, costing is treated as a one-time ritual. MIS reports recite numbers but rarely question the assumptions behind them. The result? Warning signals go unnoticed. In today's unforgiving global market, precision in financial numbers is not a luxury — it is as vital as precision in gears themselves.

Capital Must Work as Harder as the Machines

Every gear shop knows the pride of installing new machinery. But how often is the tougher question asked: Will this investment truly sweat?

Return on Capital Employed (ROCE) is not just a finance department metric — it is the ultimate test of whether the plant itself is working intelligently. A financially mature organization doesn't merely chase orders; it ensures that every rupee invested produces sustainable returns.

In the end, it's not just the entrepreneur's test — it's a challenge every engineer, manager, and decision-maker must pass.

The Double-Edged Sword of Borrowing

In the rush to recover after Covid, many gear manufacturers borrowed recklessly, betting that volumes would rise. Some did — but many didn't. And now the very loans meant to fuel growth have become millstones dragging companies under.

Debt, after all, is a double-edged sword. In skilled hands, it multiplies growth. In careless hands, it cuts deep. The irony is stark: insolvency in this industry rarely comes from poor engineering — it comes from leverage without discipline.

The lesson is as old as commerce itself: treat debt as a tool, or it will surely become a trap.

Building a Financially Intelligent Organization

Just imagine your entire organization is financially intelligent.

What would change if finance didn't just live in the CFO's office, but in every decision made on the shop floor?

- What if it shaped the production manager's batch size?
- What if it guided the sales team's payment terms?
- What if it influenced the procurement officer's steel contracts?
- And what if it even determined the quality leader's decision to accept rework or reject a batch?

Isn't it true that when every department speaks the language of finance, the company moves from silos to synergy? Suddenly, scheduling isn't only about throughput — it's about cash. Supplier negotiations aren't only about price — they're about capital flow.

And just imagine what happens then: a gear company doesn't just become efficient. It becomes truly competitive.

A Roadmap for Gear Companies

1. Make Finance Everyone's Job – Build financially intelligent teams across functions.
2. Integrate Finance into Strategy – Test every expansion or export plan against financial models.
3. Strengthen MIS – Use accurate data, not instincts, to track costs and productivity.
4. Adopt Weekly Reviews – Create rhythm, accountability, and speed.
5. Focus on ROCE – Treat it as the true KPI.
6. Stay Lean & Digital – Free capital by outsourcing and tech-enabling.
7. Learn & Adapt Continuously – Keep financial literacy alive.

Finance as the Competitive Edge

Machines may cut the gears, but finance keeps them turning.

In gear manufacturing, technical brilliance opens the door. But long-term competitiveness belongs to those who align that brilliance with financial discipline.

So the question isn't just "How advanced is your shop floor?" It's also "How financially intelligent is your organization?" Many entrepreneurs know the return on a fixed deposit or the gains from the stock market. But does your team know the Return on Capital Employed (ROCE) in your business? Do they have a clear plan to improve it? And by when?

Because if the answer is no, then who is responsible for improving the ROCE of your business?

In today's world, the smartest gear is the one you don't see — the financial discipline driving everything else.

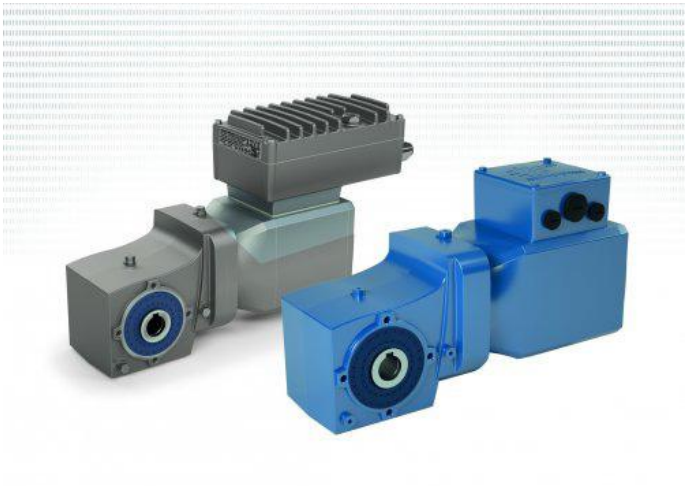
Mr. Sumit Chuttar is a merit-holder Chartered Accountant and an alumnus of Harvard Business School, where he studied Entrepreneurship, Disruptive Strategy, and Innovation. Over the past 25 years, he has worked with businesses across industries, helping them sharpen competitiveness, instill financial discipline, and build strong organizational culture and governance. He is the Founder & CEO of The Solutionists, a boutique advisory firm dedicated to solving complex business problems with clarity and precision.

If you want to make your organization financially intelligent or improve its financial performance, he can be reached at sumit@thesolutionists.co.in or +91 76208 13847.

SURFACE PROTECTION SOLUTION FROM NORD DRIVESYSTEMS

- By Gear Technology India

NXD makes aluminium more resistant and durable



With NXD, NORD DRIVESYSTEMS has launched the latest generation of its surface treatment. The system manufacturer equips its aluminium drive solutions with two variants of effective surface protection. This makes them more resistant to extreme environmental conditions, and ensures long-lasting performance even under demanding operating conditions.

NXD is the surface treatment from NORD for gear units, smooth motors and frequency inverters made from aluminium. It provides the users with an economic and effective alternative for the surface protection of drive solutions, which are heavily stressed by extreme environmental conditions. With NXD, NORD increases the durability of these drive systems and thus prolongs the system availability. The surfaces are free from chromates and PFAS.

Two variants for perfect and effective protection

With NXD, aluminium surfaces are galvanised, making them particularly corrosion-resistant and durable. The latest generation of surface protection is available in two variants. NXD BASIC® consists of the galvanically-produced base layer with an additional varnish. Corrosion protection is also ensured in case of damage to the varnish. The variant is suitable for use under demanding environmental conditions such as offshore areas.

The second variant is the food-safe NXD tupH®. Here, this galvanised base layer is treated with a sealer. This process prevents flaking or microcracks prone to germs.

Food-safe drive systems with NXD tupH®

NXD tupH® offers safe surface protection for extreme conditions in wash-down applications. It makes drive solutions resistant to acids and alkalis from the regular cleaning and disinfection processes. Even if damage occurs to the galvanised base layer, no particles will flake off due to the sealing, which makes NXD tupH® surfaces hygiene-friendly and thus suitable for use in hygienically critical industries.

NXD tupH® is food-safe according to FDA and according to EU Regulation 1935/2004. This makes components with an NXD tupH® surface suitable for the processing of hygienically sensitive products in almost every important market worldwide.

Aluminium offers numerous advantages

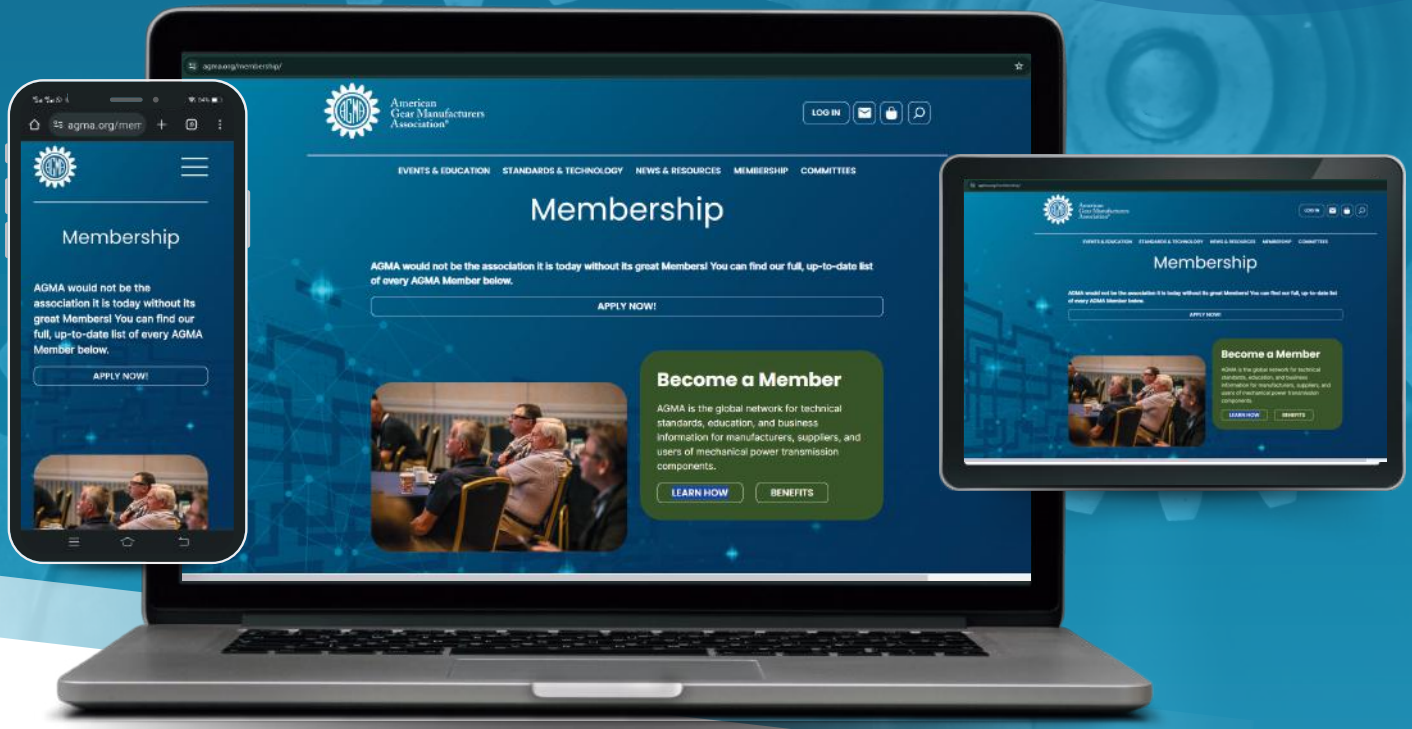
With NXD, NORD reveals the advantages of aluminium for demanding environments and hygienically sensitive production areas. Aluminium is lightweight, economical and fully recyclable. Furthermore, aluminium housings provide better heat conductivity, thus reducing their maximum surface temperature.

NXD is available for all NORD drive components made of aluminium, including the integrated DuoDrive geared motor system, the energy-efficient IE5+ smooth motors as well as NORDBLOC.1® helical in-line gear units and NORDBLOC.1® bevel gear units. With the NORDAC ON PURE, a decentralised frequency inverter with an NXD tupH interface will also be available soon. The solution provider can thus supply complete drive systems with food-safe surface treatment from a single source.

American Gear Manufacturers Association

BECOME A AGMA MEMBER

A Global network of technical standards, education & business information for manufacturers, suppliers & users of mechanical power transmission components



LEARN HOW

www.agma.org

gear TECHNOLOGY INDIA

Nidec Machine Tool Launches GE25CF Hobbing Machine with Integrated Chamfering

- By Gear Technology India

Nidec Machine Tool Corporation announced the launch of its innovative GE25CF hobbing machine, designed to streamline gear manufacturing by integrating gear cutting and chamfering operations into a single, high-efficiency process. This advanced machine is set to transform the production of high-precision gears for electric vehicles (EVs) and a wide range of other applications.

Amid growing demand for quieter and more efficient transmissions, the GE25CF addresses the critical needs of the American gear manufacturing market for enhanced productivity, automation, and reduced labor costs. By combining hobbing (a gear cutting process) with precise chamfering and deburring of both gear ends, the GE25CF significantly optimizes the manufacturing workflow.

Key Features and Benefits:

- Superior Accuracy: Building on Nidec Machine Tool's renowned GE series, the GE25CF utilizes a generating method for high-precision gear machining. Paired with ChamferX, Nidec's dedicated cutting tool, the system ensures accurate chamfering without the metal embossment (secondary burrs) associated with traditional roll type processes. This results in a superior chamfer quality, including the ability to chamfer roots and achieve specified chamfering widths of 1 mm or greater.

- Enhanced Productivity & Operability: The GE25CF incorporates a ring loader for efficient workpiece exchange, enabling simultaneous hobbing and chamfering. This integration significantly reduces cycle times. The machine also features a wider front door opening and a user-friendly operating control with a rotary joint, enhancing operator accessibility and ease of maintenance. Its compact design facilitates streamlined line layouts and supports automated, labor-efficient operations.

- Dedicated ChamferX Tooling: Nidec Machine Tool's ChamferX tools are engineered for high-speed, high-accuracy processing. Leveraging Nidec's advanced tool design simulation and design software, ChamferX ensures precise chamfering and deburring. The tools' long lifespan minimizes exchange frequency, while Nidec provides comprehensive after-sales services, including re-sharpening and recoating, to reduce total running costs.
- Smallest-in-Class Footprint: The GE25CF boasts the smallest footprint in its class for a hobbing machine with integrated chamfering, optimizing valuable floor space in manufacturing facilities.

"The GE25CF represents a significant leap forward in gear manufacturing technology," said Scott Knoy, Vice President at Nidec Machine Tool America. "By integrating hobbing and chamfering into a single machine, we're enabling North American manufacturers to achieve higher levels of precision, efficiency, and cost-effectiveness. This is particularly crucial as the demand for high-quality gears in EVs and other advanced applications continues to grow."

INDIA'S LEADING EXHIBITION ON GEAR & GRINDING TECHNOLOGY

iptex26
9th INTERNATIONAL POWER TRANSMISSION EXPO

Grindex INTERNATIONAL 2026
7th INTERNATIONAL EXPO ON GRINDING AND FINISHING PROCESS

26, 27 & 28 february 2026
Auto cluster exhibition center, Pune, India

www.iptex-grindex.com

TWO MEGA EVENTS ONE PLATFORM

- ★ Face-to-face interaction with global industry leaders, potential partners, and buyers
- ★ Learn from global business leaders and industry experts
- ★ Connect with professionals from various industries such as automobile, aerospace, and energy
- ★ Stay updated on the latest industry standards, techniques, and best practices in power transmission and surface grinding

3 Days | 10+ Countries | 100+ Exhibitors

For More information, Contact
Mr.Vashdev S G
+91 99644 41922 | dev@virgo-comm.com

Organised by
virgo COMMUNICATIONS AND EXHIBITIONS (P) LTD

Supported by

Official Media Partner
gear TECHNOLOGY INDIA


gear
TECHNOLOGY INDIA
JOIN US TODAY