

# POST EVENT REPORT UPDATES



**GDCTECH 2025**

**2<sup>nd</sup> CONFERENCE ON**

## **MAGNESIUM CASTING TECHNOLOGY**

The Orchid Hotel, Balewadi, Pune, India  
4<sup>th</sup> and 5<sup>th</sup> December 2025 (Thu-Fri)

**Partner Association**



### **Dear Magnesium Fraternity Members,**

It gives immense satisfaction in 2nd conference & exhibition on Magnesium Casting Technology on 4-5 December 2025 at The Orchid Hotel, Pune.

As a conference co-coordinator, I must acknowledge the support by conference committee & speakers presenting all aspects of magnesium. Total 17 papers presented and one panel discussion. Below is the post conference report in brief.

**Rajesh Sampat**



### **1. Introduction and Context**

The International Magnesium Conference, held as part of the GDCTECH Forum in Pune, on 4th & 5th December 2025 brought together International Magnesium Associations, global technology providers, researchers, equipment manufacturers, and Indian industry stakeholders to deliberate on the evolving role of magnesium and its alloys in modern engineering applications. The conference was structured to address magnesium technology from a holistic perspective—covering geopolitical supply considerations, process and product technologies, application development, sustainability, safety, and commercialization challenges.

Magnesium, as the lightest structural metal,

occupies a unique position in global lightweighting strategies. Its relevance is being reinforced by regulatory pressure on emissions, electrification of mobility, and the demand for high-performance yet sustainable materials. The conference therefore focused not only on metallurgical and processing aspects, but also on the broader ecosystem required to enable large-scale industrial adoption.

### **2. Geopolitical and Supply Chain Perspective**

Several contributions highlighted the strategic importance of magnesium resources and supply chains. Magnesium is an abundant element globally; however, its primary production is geographically concentrated. Presentations on global magnesium resource distribution and industrial policy demonstrated that China currently dominates magnesium production and processing capacity, making magnesium a strategically sensitive material for automotive, aerospace, and energy sectors.

This concentration has two implications for India and other emerging manufacturing economies. First, supply security and price volatility remain key risks for downstream users. Second, there is a strong case for developing regional capabilities in

recycling, secondary magnesium processing, and value-added manufacturing. Recycling of magnesium chips and turnings, as discussed in the sustainability-focused papers, was positioned as a critical lever to reduce dependence on primary magnesium and to close the material loop in lightweight manufacturing.

### ***3. Magnesium Processing Technologies***

Magnesium high-pressure die casting (HPDC) emerged as the dominant industrial process discussed during the conference. Comparative analyses of hot-chamber and cold-chamber die casting systems highlighted fundamental differences in melt handling, air entrapment, cycle time, and defect tendencies. Hot-chamber systems were shown to offer advantages in cycle time and reduced air volume, whereas cold-chamber systems provide flexibility for larger components and higher locking forces.

Design-for-magnesium principles were emphasized repeatedly. Papers on aluminum-to-magnesium conversion demonstrated that magnesium adoption cannot be treated as a direct material substitution. Differences in density, viscosity, solidification rate, and thermal behavior require re-engineering of gating systems, runner design, venting, and cooling layouts. Casting simulation was presented as an essential tool for magnesium, enabling prediction of flow behavior, shrinkage, and porosity before physical trials.

### ***3.2 Porosity Control and Quality***

#### ***Assurance***

Porosity remains one of the most critical quality challenges in magnesium castings. Detailed discussions on vacuum and pressure impregnation (VPI) technology illustrated how impregnation has evolved from a salvage operation to a mandatory quality assurance process for safety-critical and pressure-retaining components. The process sequence—vacuum evacuation, sealant infiltration, pressurization, cleaning, and polymerization—was shown to be effective in sealing both micro- and macro-porosity without altering dimensional or functional characteristics. The increasing specification of impregnation by OEMs reflects the maturity of magnesium applications in automotive powertrains, transmission housings, and structural components.

### ***4. Surface Engineering and Corrosion***

### ***Protection***

The high chemical reactivity of magnesium continues to limit its application in aggressive environments. Contributions on surface treatment technologies, particularly chrome-free conversion coatings, addressed this challenge directly. Modern conversion coatings based on zirconium, titanium, and other environmentally compliant chemistries were presented as effective alternatives to traditional hexavalent chromium systems.

These surface treatments serve a dual role: providing stand-alone corrosion resistance and acting as adhesion-promoting layers for subsequent organic coatings such as e-coat and powder coating. Anodizing processes were also discussed as electrochemical routes to enhance wear and corrosion resistance. The consensus emerging from these discussions was that corrosion protection must be treated as an integral part of component and process design rather than as a downstream corrective step.

### ***5. Safety and Fire Risk Management***

Safety in magnesium processing received focused attention, particularly in relation to Class D metal fires. Magnesium fires burn at extremely high temperatures and cannot be controlled using conventional water- or ABC-based extinguishing systems. Presentations on advanced dry chemical fire suppression agents demonstrated how tailored salt-based formulations can form stable, oxygen-impermeable crusts over burning magnesium.

The development of controlled-dispersion extinguishing systems and automated suppression solutions was highlighted as a critical enabler for wider magnesium adoption, particularly in chip handling, recycling, and machining environments. Safety infrastructure was clearly identified as a prerequisite—not an optional add-on—for commercial-scale magnesium operations.

### ***6. Application Development and Emerging Opportunities***

#### ***6.1 Automotive and Mobility***

Automotive lightweighting remains the primary driver for magnesium technology adoption. Case studies on conversion of aluminum components to magnesium demonstrated weight reductions of 25–40% while maintaining functional performance. Applications such as engine covers, transmission cases, seat structures, cross-car

beams, and housing were discussed in detail. Faster solidification, improved vibration damping, and reduced machining effort were identified as secondary benefits beyond mass reduction.

### 6.2 Medical and Precision Applications

Beyond automotive, emerging applications were presented in the biomedical domain. High-precision magnesium microtubes and biodegradable magnesium implants were discussed as examples of how controlled corrosion—traditionally a limitation—can be transformed into a functional advantage. Applications such as resorbable screws, plates, and stents illustrate the breadth of magnesium technology when supported by precise processing and surface control.

### 6.3 Injection Molding and Alternative Processes

Magnesium alloy injection molding and thixomolding technologies were introduced as complementary manufacturing routes for thin-walled, high-precision components. These processes offer improved dimensional control and reduced oxidation risk, expanding the design envelope for magnesium components in electronics and consumer applications.

## 7. Sustainability and Circular Economy

Sustainability formed a unifying theme across multiple sessions. Magnesium's low density directly contributes to reduced fuel consumption and emissions during product use. However, the conference emphasized that true sustainability requires attention across the full lifecycle—from raw material sourcing to end-of-life recycling.

Recycling magnesium chips, turnings, and scrap was presented as both a technical challenge and a commercial opportunity. Controlled recycling processes can transform machining waste into high-quality secondary input material for the steel and foundry industries, significantly reducing carbon footprint and material loss.

## 8. Commercialization Challenges

Despite its technical maturity, magnesium technology faces several barriers to wider commercialization. These include: - Supply chain concentration and price volatility of primary magnesium. - Higher perceived risk related to fire safety and corrosion. - Limited domestic

experience in magnesium-specific design and tooling. - Need for specialized infrastructure in melting, handling, and recycling.

The conference clearly demonstrated that these challenges are manageable through technology, training, and ecosystem development. Collaborative efforts between material suppliers, equipment manufacturers, surface treatment specialists, and end-users are essential to de-risk magnesium adoption.

## 9. Concluding Remarks

The International Magnesium Conference at GDCTECH Pune successfully positioned magnesium not merely as an alternative material, but as a strategic enabler for lightweight, sustainable, and high-performance engineering solutions. The deliberations reinforced that successful magnesium adoption demands an integrated approach—combining material science, process engineering, safety, surface protection, and lifecycle thinking.

The discussions clearly demonstrated that magnesium technologies have reached a level of technical maturity suitable for large-scale industrial deployment, provided they are supported by appropriate design methodologies, safety frameworks, and surface engineering solutions. At the same time, the conference highlighted that challenges related to supply-chain concentration, fire safety perception, corrosion behaviour, and skill availability must be addressed systematically rather than in isolation.

From an Indian manufacturing perspective, the conference outcomes were particularly significant. India's strong automotive base, growing foundry and die-casting capabilities, and increasing emphasis on sustainability create a favourable environment for accelerated adoption of magnesium technologies. The presence of global technology providers, Indian system integrators, and end-user industries at a common platform enabled meaningful dialogue across the value chain.

It is evident that forums such as GDCTECH play a vital role in bridging the gap between research, industrial practice, and commercialization. The International Magnesium Conference has laid a clear roadmap for future collaboration, capability building, and responsible deployment of magnesium technologies, reinforcing GDCTECH's role as a catalyst for advanced casting and lightweighting solutions in India and beyond.

This is the second successful conference, on Magnesium Casting Technology organised jointly by GDCTECH forum & International Magnesium Association. Strongly supported by IMA, could get 6 International Papers and 4 International exhibitors. This is attended not only by magnesium fraternity & but also by Aerospace, Automotive and Hand Tool industry in large indicating the use of magnesium going to be on fast track.

Even our Chief Guest of Honour Shri. Sureshji Prabhu expressed the importance of the Magnesium in the industry considering the entrance of EV.

**R. T. Kulkarni**

Founder - GDCTECH FORUM

Director - ARKEY CONFERENCE & ENGG. SERVICES

## Glimpses



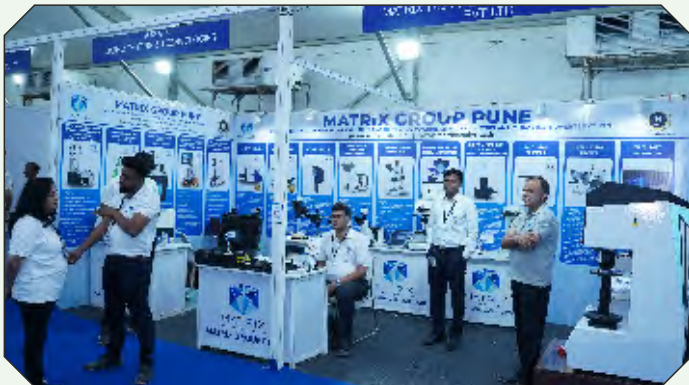
Meeting with Japanese Association

# Exhibition

The GDCTECH 2025 Exhibition was successfully held for three days, total 108 Exhibitors participated in the Exhibition & spread over 5000 sq. mtr area.

The exhibitors included Die Manufacturer, Equipment Manufacturer, Alloy Manufacturer, Service Providers, Measuring & Testing, Consumables Suppliers, Casting Manufacturer and Magnesium Foundries participated.

Around 2000 knowledgeable visitors were visited the Exhibition from all over India, China, Europe & USA. The exhibitors were quite excited with the encouraging response from the visitors.



# Feedback

"GDCTECH's Mega Event in Pune marked the second major magnesium-focused milestone in India, following the inaugural event held earlier in January. This time, magnesium was embedded within the established Aluminium Casting exhibition, where magnesium companies showcased an impressive range of finished components and processing equipment. The International Magnesium Association (IMA) is proud to partner with GDCTECH and to attract both international members as well as growing interest from India. It is particularly encouraging to see the emerging Indian magnesium industry beginning to integrate into our global network.

The two-day magnesium conference featured a strong line-up of presentations and stimulated engaging discussions, especially during the dedicated panel session. Importantly, the programme looked beyond die-casting alone, also addressing alternative technologies such as thixomolding, complementary processes including extrusion, and related applications such as magnesium powder for desulphurisation. As a minor observation, a single larger exhibition hall and dedicated time slots for visiting exhibitors during the conference could further enhance the overall experience. Looking ahead, it is clear that magnesium will continue to establish itself in transport and aerospace/defence applications, both for the domestic market and internationally. IMA looks forward to supporting this development and facilitating a strategic path forward."

Regards,  
**Martin Tauber**  
European Representative  
INTERNATIONAL MAGNESIUM ASSOCIATION (IMA)

## EXHIBITORS



AGANITA VENTURES PVT LTD



BHAGYANAGAR MAGNESIUM PRIVATE LIMITED



HAITIAN ZHISHENG DIE CASTING EQUIPMENT (HONG KONG) CO. LTD.



HISHINUMA MACHINERY CO., LTD



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