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BENGAL'S FOUNDRY HEARTLAND RE-MAPPING RE-INVENTION LANDSCAPE

— Madhumita Mookerji

Coal dependence makes emissions adherence a challenge

Power, pig iron pricing remain critical growth hurdles

The story of West Bengal's foundry industry is, in many ways, the story of Howrah itself. The district houses the oldest and most historically significant foundry cluster in India -- a legacy built over generations of engineering craftsmanship, labour strength, and entrepreneurial resilience.

Over time, however, several foundries have gradually moved out of Bengal or downed shutters due to a mix of structural constraints, cost pressures, and the emergence of more attractive industrial ecosystems in other states. Yet, despite this migration, the foundry sector in West Bengal remains remarkably strong. Even today, when one speaks of foundries in Bengal, the conversation inevitably comes back to Howrah.

This is not a small or isolated industrial belt. Howrah's foundry matrix stretches across several distinct zones -Dasnagar, Liluah,



Benaras Road, Baltikuri, Dhulagarh, Uluberia and adjoining areas -- forming a deeply interconnected industrial geography. Together, these pockets house more than 200 foundry units, most of them MSMEs, making the district the unquestioned nucleus of Bengal's castings industry.

While Bengal's share in India's total foundry output has declined over the years to about 6-7%, Howrah still contributes nearly 70% of the state's total foundry production. That alone underscores its continued relevance.

FCDA at Ranihati: the new growth engine

A defining turning point came around 2010 with the development of the Foundry

Cluster Development Association (FCDA) industrial park at Ranihati on Amta Road.

Spread across nearly 900 acres, the FCDA is now emerging as the single largest organised foundry cluster in the state. More than 170 stakeholders are associated with the project, which was initially developed with subsidy prop from the Department of Industrial Policy & Promotion (DIPP), Government of India, followed by active support from the West Bengal government.

The cluster has grown rapidly over the last five to six years. At present, 15-16 foundries, along with an almost equal number of ancillary units, are already operational within the FCDA ecosystem. What makes the cluster especially significant is not just its current size, but the pipeline ahead: the maximum number of upcoming greenfield and brownfield foundry projects in Bengal are now being planned within this zone.



A few years ago, Howrah foundries carried the reputation of being conventional and technologically conservative. That perception is changing fast. The FCDA is playing a central role in this transformation by enabling modern plant infrastructure, shared services, logistics advantages, and future-ready industrial planning.

Why Ranihati is emerging as Bengal's ideal foundry ecosystem

Industrial clusters thrive where ecosystems align -- and Ranihati is increasingly ticking all the right boxes.

The area offers access to skilled and semi-skilled manpower, proximity to raw material suppliers, robust transportation links, and a ready ancillary base. These factors naturally reduce operational friction and improve competitiveness for new units.

This ecosystem advantage explains why both job-work-oriented foundries and sanitary casting units are coming up in a big way here.

The FCDA's current contribution to Bengal's total foundry output may still be modest because only around 15 foundries are operational so far. But, in strategic terms, it represents the future of Howrah's modernisation journey.

Product mix: engineering job work, sanitary castings, DI leadership

One of West Bengal's structural challenges is the absence of very large downstream engineering industries within its boundaries. This has shaped the product mix of Howrah's foundries. The region remains heavily dependent on engineering job work components and export-oriented sanitary castings. In fact, sanitary castings - including manhole covers and related products - have emerged as the single largest export segment for Bengal foundries, with supplies reaching markets across the globe.

Another major strength lies in ductile iron (DI) pipes. West Bengal is the largest manufacturer of DI pipes in India, and some of the country's biggest names in the segment -- Rashmi Group, Kejriwal Castings, Electrosteel Castings, Jai Balaji Group and a few other biggies -- are based in the state. This concentration gives Bengal a natural competitive advantage in the DI space and provides a stable demand anchor for grey iron and ductile iron foundries in the wider Howrah belt.

Raw material comfort, but pricing pain

On the supply side, Bengal remains relatively well placed. The state houses major pig iron and ferro-alloy producers, ensuring strong raw material availability. Companies such as Bengal Energy, Electrosteel Castings, Jai Balaji Group,

Rashmi Group and others provide local supply comfort, reducing the need for imports.

For MSME foundries, this is a major advantage because most units do not have the scale or capital to establish captive pig iron plants.

However, pricing has become a severe pain point.

Despite iron ore and coke prices remaining largely stable internationally and domestically, pig iron prices have reportedly risen by nearly 20% over the past two to three months. Industry stakeholders view this as an unjustified increase, potentially bordering on cartelisation, especially after the extension of the import duty cap.

For an industry, where 95% of the units fall under MSME classification, such sharp cost escalations can be devastating. Foundries typically operate on order cycles involving sample approvals and delivery schedules stretching 5-6 months. Sudden raw material inflation during this period can erode margins entirely.

Demand outlook remains fundamentally strong

The domestic demand environment remains encouraging. Downstream engineering demand is healthy, and industry stakeholders remain optimistic that

the state government may eventually attract larger businesses into Bengal. Such investments would be transformational because the foundry sector is widely regarded as the mother industry of engineering.

At present, Bengal lacks a large automotive, tractor, or diversified engineering manufacturing base. Wagon manufacturing offers some support, but the benefit is limited because wagon makers largely consume steel castings rather than grey iron or ductile iron castings - the dominant products of Howrah.

Even so, the medium-term outlook remains positive.

The expectation is for a 10% CAGR in the Howrah region's foundry sector over the next 3-5 years, provided key bottlenecks are addressed.

The three big bottlenecks

The first and most urgent challenge is power tariff competitiveness. Power costs in West Bengal remain 15-20% higher than several competing states, particularly when compared with DVC-linked industrial tariffs. For a capital-labour-power-intensive sector like foundry, this directly impacts competitiveness.

The second issue is raw material price discipline. Foundries need greater



transparency and justification for pig iron price hikes, especially in the absence of geopolitical disruptions or input-side cost escalation.

The third major concern is policy support. The lapse of the Bangladeshi MSME incentive framework has created a vacuum. Industry leaders are strongly advocating for a renewed state-level incentive policy to support modernisation, capacity expansion and technology upgrades.

These are precisely the kinds of policy advantages that have helped foundry hubs in Kolhapur and Gujarat outpace older centres like Howrah.

Learning from Kolhapur and Gujarat

Howrah's stakeholders increasingly look toward Kolhapur and Gujarat as models worth emulating.

The lessons are straightforward: competitive power tariffs, strong incentive schemes, and



stable raw material pricing frame-works.

Interestingly, labour relations are no longer the challenge they once were in West Bengal. One of the most positive developments over the last 7-10 years has been the near absence of disruptive trade unionism here. This gives the state a stronger platform for industrial revival - provided the policy and cost bottlenecks are fixed.

Skill, sustainability and the next technology leap

The FCDA is not just expanding industrial land; it is actively building institutional capacity.

A highly placed source in the Foundry Cluster Development Association, speaking to Foundry Frontier, said, a highly efficient skill development centre has been established within the cluster to address Bengal's skilled manpower gap. The larger vision is to give the cluster an international flavour by offering world-class infrastructure

and shared industrial services.

He added: "One of the most important projects now underway is the commissioning of what is expected to be the country's first sand reclamation plant within the cluster. This could be a game changer. Sand availability is a major issue for foundries, both from cost and environmental standpoints. The reclamation facility will allow units to send used sand for processing and receive reusable material back at competitive costs, significantly improving sustainability and resource efficiency."

Carbon emissions and CBAM-era challenge

Carbon emissions are emerging as the next major strategic frontier. The sector's dependence on thermal coal-based energy remains its first structural bottleneck. Even the pig iron used by foundries is largely produced through thermal routes, making carbon intensity difficult to reduce.

"With global frameworks such as Carbon Border Adjustment Mechanism reshaping export competitiveness, Bengal's foundries will increasingly need policy-backed decarbonisation pathways," reminded the FCDA source.

Net metering for solar has recently been allowed, which is a positive step. However, industry stakeholders are urging the state to

adopt models similar to Madhya Pradesh, Gujarat and Rajasthan, where solar power fed into the grid can be offset against industrial consumption at nominal charges.

Such a framework could provide critical cost relief while simultaneously reducing the carbon burden.

A historic cluster at a modern crossroads

India's casting production has expanded dramatically from about 5 million tonnes (mnt) earlier to roughly 12 mnt at present. Yet, as other states have scaled up faster, Bengal's relative share has declined.

Still, Howrah remains the emotional, historical and industrial soul of Bengal's foundry identity. The difference today is that this legacy cluster is no longer standing still. From FCDA-led modernisation and sand reclamation to skill development, DI leadership, sanitary exports and green energy aspirations, Howrah is quietly preparing for its next industrial chapter.

The opportunity is real. The ecosystem is strong. The intent is visible.

What now determines the future is whether policy support, competitive power, and rational raw material pricing can arrive in time to help India's oldest foundry cluster reclaim a larger share of the country's industrial growth story.



FORGING THE FUTURE: HOW MIDHANI IS SCALING INDIA'S TITANIUM AND SUPER ALLOY CAPABILITIES

— Madhumita Mookerji

Co's presence spans deep sea missions to outer space

Capacity expansion, exports, critical minerals in focus

Nishank Kumar Jain, additional general manager, Mishra Dhatu Nigam Limited (Midhani), is engaged in managing production of titanium alloys and super alloys. With a long and rich experience of 20 years in working with various melting furnaces, his areas of interests include castings of super alloys and titanium alloys through vacuum induction and vacuum arc melting procedures, re-melting, electro slag re-melting and induction melting. Foundry Frontier caught up with Jain on the sidelines of a recent foundry conference. Excerpts from a free-wheeling interview:

Q. Tell us about Midhani's areas of operation

A. Midhani is an INR 1,000-crore-plus-turnover PSU under the Ministry of Defence. It is into melting of various grades of super alloys, titanium alloys and special steels. Being a government organisation, most of our products are supplied to government



entities. For instance, Defence, ISRO, and some private partners who ultimately supply to the government.

Our tagline says, "In deep vacuum, we create wonders". We refine most grades under vacuum and deliver under very stringent quality control environments. For instance, on the higher side, we make an ingot of 1,200-mm diameter and on the lower side, a wire of 0.1 mm diameter. We can prepare a sheet as thin as a toffee wrapper!

During Covid, when very few were working from their workplace, we were busy preparing nickel wires which are used as a sensor in oxygen concentrators.

Q. What sort of facilities does Midhani have?

A. We have very good facilities with respect to vacuum induction melting, vacuum arc remelting, electro slag remelting – these are all primary melting furnaces.

We do the melting, test samples and based on the testing take corrective action, if required. We cater to a gamut of users and, as per their requirements.

We have developed various grades of Titanium alloys, Super alloys and special steels for the Indian strategic sector.

That apart, we have a very good facility with regard to forging. We have two forge presses where we can bring down 1200-mm diameter up to 50-mm diameter. Post-forging, we have hot rolling where we can bring it down to another 5 mm, post-which we have cold rolling. In cold rolling we can bring it down from 5 mm to 0.1 mm. We thus have an integrated steel plant where we make more than 500 grades. In titanium, we have more than 60 grades. With respect to super alloys, more than 100 varieties.

We recently added a wide plate mill. We purchased a mill which has the capability of rolling 3-metre-wide plates of super alloy and titanium alloys. The length would be almost 17 metres and thickness, almost 4 mm.

Q. What kind of a presence does the PSU have in foundries in particular?

A. Midhani, in relation to foundries, has very good facilities in titanium castings and super alloys castings. We have 300-kg vacuum arc skull smelting furnace where we can make a titanium casting as big as 160 kg. This is the biggest titanium casting done in India. With respect to super alloys we are able to make a 20-kg casting and are planning to put up a 200-kg facility where we would be able to make a casting product roughly of about 50 kg.

Our presence is from deep sea to outer space, the latter because the Vikram lander on the moon has some components made by Midhani.

Air induction melting furnaces are used in normal castings but we are not into this.

Q. What products are you supplying to ISRO?

A. We are supplying forged products and can supply rounds up to 250-mm diameter and up to 100-mm diameter under forged conditions. Then from 100-mm to let's say about 10-mm in hot rolled (HR) conditions and 10-mm and below up to 0.1 mm in cold rolled (CR) conditions. In flats, under forged conditions, we produce roughly 50-mm to 5-mm thickness under HR conditions and below 5-mm under CR conditions.

Q. Are these ferrous-based?

A. We have a ferrous line and yes the above are all ferrous-based.

But, some super alloys will be nickel or cobalt-based. And, titanium alloys, in any case, are titanium based.

Q. Are these products in “finished” form?

A. No, the products are in semi-finished form. We do not manufacture components. For instance, if we are supplying to ISRO, it will make components out of the material we supply – may be a hot rolled coil or say a 100-mm diameter rod which will require machining to reach the required size.

However, we supply finished products only in relation to castings.

Q. Apart from Defence, which other industries does Midhani cater to?

A. We supply lot of material to space and power sectors too, mainly to the government. We supply some material to private companies also but eventually these companies will make components for Indian strategic sectors from our material and will supply. Our products are very specialised and go into special applications.

Q. So what is the present capacity for super alloys and titanium alloys?

A. In super alloys, we produce around 3,500 tonnes per annum (tpa) and 500-600 tpa in titanium alloys and 7,000-8,000 tpa in

special steels – which include special stainless steels. Our melting facilities are located in Hyderabad. In Rohtak, we do only armouring business. The unit has a capacity of armouring of around 100 vehicles per annum and 300-400 bullet-proof jackets per month.

Q. What challenges is Midhani facing with regard to critical minerals?

A. That is a very challenging area. Aluminium, iron, titanium ores are available. But nickel, cobalt, tungsten, and chromium are not available domestically and India is dependent on imports from China, Europe, Russia etc. In super alloys, requirements of nickel and cobalt are very high and that is why we are exploring long-term partnerships with OEMs or producers of nickel and cobalt, especially from northern Europe, to ensure security of raw material.

Another challenge is precision manufacturing since we supply for Defence-related items. A 0.4% percentage anomaly can lead to rejection.

Q. Tell us about Midhani's expansion and investment plans

A. Our domain, as already mentioned, is super alloys and titanium alloys and special steels. We are expanding but in these three existing domains only, as of now. This is because, the requirement for these in India is very high and we are not able to fulfil all

requirements with the exiting capacities.

We are planning to increase our production facility to meet these requirements.

Q. Is Midhani looking at any newer areas?

A. We did look at powder metallurgy – because we wanted to make some products through the 3D printing route. And, for this we need a 3D print cast. But, being a government company, we need to follow all procurement procedures. We are trying to procure one powder manufacturing equipment through Germany.

Q. What about exports?

A. We have recently entered exports. But since our products are very specialised, exports are very limited in volume. We are in talks with engine manufacturers like Rolls Royce, GE etc and supplied some trial orders of super alloys engine casings etc. Here too, we are supplying semi-finished components.

Recently, we supplied some material to GE & Honeywell. We can supply only where there is no conflict of interests with the Government of India. No conflict areas will include civil aero engine manufacturing etc.

Q. Do rising geo-political tensions and increasing use of weaponry have any implications for Midhani?

A. Brahmos and Akash missiles have already

proven their mettle. We are already supplying a material for Brahmos and Akash. Recently, in Lucknow, a special corridor has been set up where Brahmos will be manufactured and the yearly target is 80-100 units. So, Midhani's production is also likely to increase.



WHICH WAY IS INDIAN FOUNDRY INDUSTRY HEADED IN 2026? AN H1CY'26 SNAPSHOT

— Madhumita Mookerji

India's foundry industry entered H1CY'26 at a crucial turning point. Demand from automotive, infrastructure, engineering and exports remains firm, while the sector shifts toward higher-value castings, automation and greener processes. Yet, rising energy costs due to the Middle East crisis, compliance burdens and MSME funding gaps will determine how successfully the industry sustains growth through mid-2026.

Cost pressures, sustainability issues a challenge

Geopolitics to slow down export opportunities

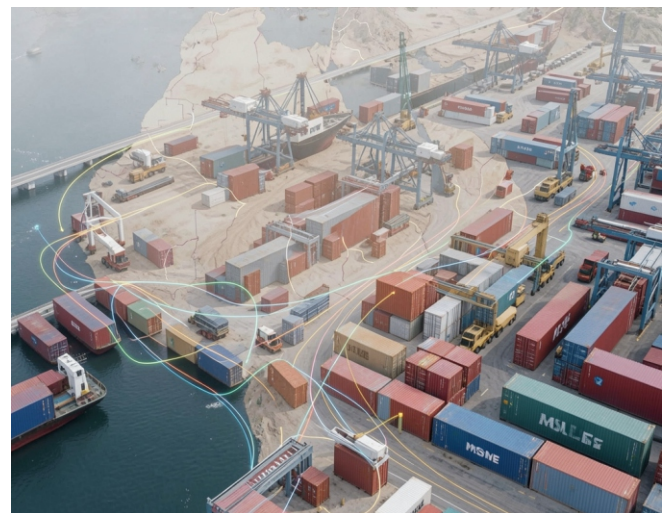
In 2026, as the nation strides forward economically, socially and politically, the foundry industry has also entered a phase of rigorous transition and significant opportunity.

However, the ongoing geopolitical conflict in the Middle East, arising from the Iran-US conflict, has begun to impact the sector, mainly in the form of rising raw material prices, escalating logistics costs, and shifting

export dynamics. “An analysis of recent market data highlights significant cost pressures alongside emerging strategic opportunities for Indian exporters,” says a joint press communiqué from the Foundry Cluster Development Association, Indian Foundry Association, the Institute of Indian Foundrymen and the Howrah Foundry Association.

Highly fragmented landscape

Despite broad demand, the structural landscape remains highly fragmented. There are over 4,500 units, most of them small and medium enterprises, operating alongside a smaller cache of modern, large foundries. The organised segment is more





able to meet global standards, while many MSMEs struggle with capital, compliance and technology adoption.

At the start of 2026, as per industry estimates, India's foundry sector stood as a global heavyweight -- the second-largest castings producer worldwide -- with an estimated worth of INR 1.8-2.0 trillion and annual output at 13-14 million tonnes (mnt). Traditionally dominated by ferrous castings -- especially grey iron used extensively in engines, machinery and pipes -- the industry is now progressing toward higher-value segments such as ductile iron and aluminium castings, driven by evolving demand from the automotive, infrastructure and engineering sectors.

This momentum was evident at major industry events, such as the 74th Indian Foundry Congress (IFC) and Indian Foundry Exhibition (IFEX) 2026, which showcased heightened interest in advanced manufacturing solutions, sustainability, and

export linkages - a scenario that is signalling a shift from conventional production toward high-tech, efficient casting processes.

Demand drivers and structural dynamics

India's foundry output remained broad-based, serving multiple sectors:

Automotive & auto components: Even as internal combustion engine vehicle demand stabilises, commercial vehicles, tractors, and replacement markets provide consistent volume. Light-weighting trends, propelled by fuel efficiency and electric vehicle (EV) adoption, are elevating demand for aluminium and alloy castings.

Infrastructure & construction: Public spending on urban development, railways, and water systems is fuelling robust demand for ductile iron pipes and structural castings. It may be recalled that, in Union Budget 2026-27, the Indian government allocated a record INR 2.93 lakh crore for railway capital expenditure (total outlay at INR 2.81 lakh crore), while urban development allocations decreased to INR 85,522 crore. Water projects see sustained, long-term investments with a projected \$270 billion over 15 years.

Engineering & capital goods: Heavy machinery, industrial equipment and power generation continue to absorb complex castings that demand precision and quality.

Indian foundry output by material in Jan-Mar'26

Material type	Production (in mnt)	% of total output	Trend (Jan-Mar'26)
Grey Iron	9.5	68	Stable, dominant
Ductile Iron	2.1	15	Strong infra-led growth
Aluminium & Alloys	1.4	10	Fast EV-linked growth
Non-Ferrous, Others	1	7	Stable to moderate
Total	14	100	

Sources: Various

Exports: Increasingly, Indian foundries are carving out export niches in Europe, North America and Southeast Asia - but they are also aware of the need to navigate regulatory hurdles such as carbon compliance and quality standards.

Early growth signals & headwinds in Jan-Mar'26

The first three months of 2026 (Q1CY'26) offered a mixed bag of affirmation and caution:

Output resilient, industry optimistic:

Overall, industry output levels remained stable, with consistent capacity utilisation in key clusters. Grey iron still dominated production volumes, but ductile iron and non-ferrous segments grew faster as manufacturers responded to market shifts (see chart).

Industry stakeholders reported positive indicators -- steady domestic demand,

acceptance of new technologies and participation in international supply chains. Exhibitions like IFEX highlighted Indian foundries' commitment to automation, digitalisation and environmentally conscious practices.

Raw material cost pressures:

Notwithstanding demand, raw material cost pressures dominated operating realities. Energy costs -- both electricity and fuel for melting furnaces -- remained a significant expense, and volatility in raw material pricing (scrap, alloys, pig iron) squeezed margins, especially for smaller units, particularly since the onset of the US-Israel war with Iran from end-February. BigMint data shows foundry-grade pig iron (DAP Ludhiana) prices inched up slightly m-o-m in March to INR 43,193/tonne and had climbed 9% in April to INR 46,240/t from February levels of INR 42,560/t.

Costs of resins, plastic raw materials, and

paints surged, with some inputs seeing increases of up to 61% (e.g., maleic anhydride) and over 35% for materials like ethylene.

Skills and technology gaps: Despite the momentum toward digitalisation and automation, a pronounced skills gap remained. Operating advanced casting technologies like computer numerical control (CNC)-linked processes, simulation software, or robotic handling demands trained manpower that is still in limited supply. Consequently, many older, labour-intensive methods persist, constraining quality consistency and slowing productivity improvements.

Looking Ahead: Apr-Jun'26

As April began, industry themes became clearer: foundries must remain resilient in the face of geopolitical upheavals and barriers (tariff and non-tariff) through strategic adaptations. Here's what to anticipate in Q2CY'26:

Raw material price inflation: From early April 2026, the ongoing Iran-US-Israel conflict triggered significant supply chain disruptions and cost inflation for Indian foundries, with key inputs like pig iron and scrap surging by up to 20% in recent months. As per the press release, steel-grade pig iron rose to INR 41,500/t by 10 April 2026 from INR 36,500/t in January 2026, an almost 14% jump. Foundry-grade pig iron rose 13% to INR 45,000/t (INR 40,000/t) in this period. Prices of domestic foundry-grade and low-ash/higher fixed-carbon coke showed a strong upward correction of INR 2,000-3,000/t, driven by freight escalation and war-related surcharges.

Prices of chemicals like resins rose to more than INR 160/kg (INR 100/kg) over January-April 2026, while freights to the US, Europe and the Middle East spurted by 50-60%. Overall, logistics costs increased by 40-100% thanks to war-risk surcharges, emergency conflict surcharges, insurance premiums (up

Key challenges faced by foundries in Jan-Mar'26

Challenge	Impact on foundries	Notes
Raw material price volatility	High	Scrap, pig iron prices fluctuate
Energy & fuel costs	Medium high	Furnace electricity & fuel costs rising
Environmental compliance	Medium high	MSMEs need capital for emission control
Skilled labour shortage	Medium	Training gaps in automation & tech adoption
Export logistics	Medium	Freight & certification hurdles

Sources: Various

to 5-10% of vessel value), and delays from rerouting via the Cape of Good Hope.

The conflict is expected to keep energy and raw material prices and logistics costs elevated through April-September 2026, and force many foundries to consider price increases of roughly 10% on finished casting products, as per some reports.

Continued focus on tech adoption, efficiency: Against such a backdrop, foundries that embrace automation, real-time process control and simulation tools will likely outperform peers in the rest of the year, observed an industry source. With metal-casting technologies such as advanced melting furnaces and induction systems gaining traction, the emphasis will be on reducing defects, improving yield and trimming costs.

Sustainability a compulsion: Sustainability will no longer be optional but central. More foundries, especially the larger and export-oriented ones, are expected to invest in:

- Waste heat recovery
- Sand reclamation systems
- Electric induction furnaces that will replace coke-fired units
- Metal scrap recycling pathways

In cities like Mumbai, metal recycling

initiatives are already boosting environmental and economic outcomes - a trend likely to spread across other clusters. This shift aligns with customer expectations, regulatory pressures, and global compliance regimes like the EU's carbon border adjustment mechanisms, which make carbon footprints in casting exports increasingly relevant.

Export to be under pressure: Export demand for castings was somewhat positive in early 2026, accelerating international outreach, especially into markets seeking cost-competitive and quality-certified castings. But, over April-June, growth will not be automatic. Order inflows have slowed. Buyers are adopting a “wait-and-watch” approach, although demand from oil & gas, pump, and valve components is stable, while there may be a slight slowdown in automotive and construction-linked castings.

Exporters must navigate logistics cost spikes, global quality standards, and geopolitical headwinds in Q2CY'26.

Focus on consolidation, financing channels: While larger, well-capitalised foundries will thrive, smaller ones - particularly those lacking access to affordable capital - will possibly either consolidate, exit, or seek clustering and shared infrastructure solutions. The

expectation through mid-2026 is that industry consolidation will slightly accelerate, especially among MSMEs that cannot independently finance compliance and tech upgrades.

Industry and government forums may increasingly promote scheme-based financing, shared testing facilities, and cluster-level environmental solutions to support MSME competitiveness.

Conclusion

Despite the challenges, India is emerging as a preferred alternative sourcing destination because global buyers are looking to diversify away from conflict-affected regions and also because of its strong engineering capabilities, cost competitiveness and established GCC trade relationships. The first quarter confirmed steady demand and robust fundamentals. As April-June unfolds, growth will increasingly depend on technological adaptation, environmental



compliance, export readiness, strategic capital investment, and, most importantly, the ability to navigate geopolitical headwinds.

Opportunities in Apr-Jun'26

Opportunity	Expected impact	Sector focus
Automation & digitalisation	High	All segments
Green foundries & recycling	High	MSMEs & large units
Export expansion	Medium-high	Europe, North America, SE Asia
Lightweight & precision casting	High	EVs, aerospace, auto
Cluster-based consolidation	Medium	MSME clusters

Sources: Various

