

Information Memorandum – Triveni Power Transmission Limited

INDUSTRY OVERVIEW

1. EXECUTIVE SUMMARY

1.1. INDUSTRY OVERVIEW – INDIA POWER & ENERGY INFRASTRUCTURE

According to the Central Electricity Authority (CEA) and the Ministry of Power, India's power and energy sector is in a phase of sustained expansion and modernization, driven by rising electricity demand from industrial growth, urbanisation, infrastructure development, and increased electrification across residential and commercial segments. As of FY 2024–25, India's total installed electricity generation capacity has crossed 510 GW, reflecting continuous additions across thermal, renewable, hydroelectric, and nuclear power sources. While the share of non-fossil fuel capacity has exceeded 50% for the first time, thermal power—largely coal-based—continues to account for a dominant share of actual electricity generation due to its ability to provide reliable, continuous base-load power.

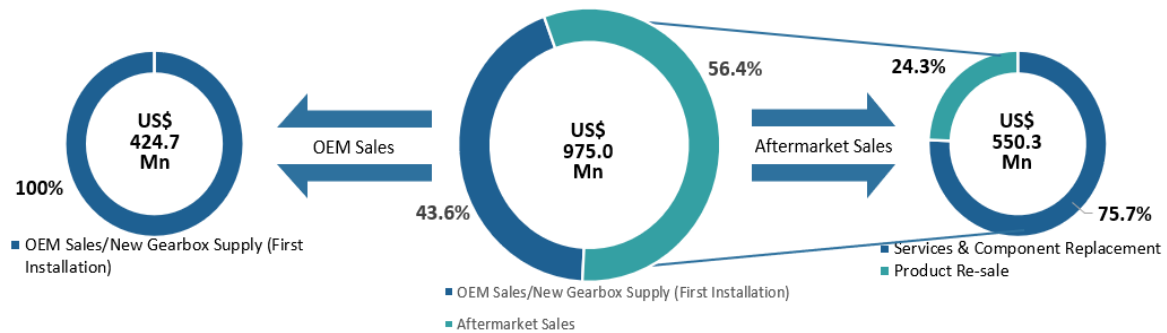
According to the Ministry of Coal, coal production has remained strong to support thermal power plants, highlighting that conventional generation assets will remain indispensable over the medium term even as renewable energy capacity expands. At the same time, government initiatives such as the National Electricity Plan, transmission network expansion, and grid modernisation programmes are driving large investments in power infrastructure. These developments are resulting in both greenfield capacity additions and brownfield upgrades focused on efficiency improvement, emission reduction, and operational reliability.

This evolving energy landscape has a direct and structural linkage to the high-speed rotating equipment ecosystem, where high-speed helical gearboxes play a critical enabling role. Across thermal, hydroelectric, nuclear, and large renewable installations, high-speed helical gearboxes are integral to the operation of boiler feed pumps, induced draft and forced draft fans, primary air fans, compressors, cooling water pumps, turbine auxiliaries, and other balance-of-plant systems. These applications typically operate under continuous or high-duty cycles, demanding gearboxes capable of handling high rotational speeds, elevated torque loads, thermal stresses, and stringent vibration limits.

As India adds new power generation assets and simultaneously upgrades existing plants to meet higher efficiency and environmental standards, demand is increasing for high-efficiency, low-loss, precision-engineered helical gearboxes that can ensure high uptime and reduced maintenance. Furthermore, ageing power infrastructure is creating steady replacement and retrofit demand, as operators seek to improve plant availability and reduce unplanned outages. According to government planning documents, sustained investments in generation, transmission, and industrial energy infrastructure are expected over the next decade, positioning high-speed helical gearboxes as a core mechanical component underpinning India's power and industrial growth trajectory.

1.2. OEM & AFTERMARKET - GLOBAL INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET

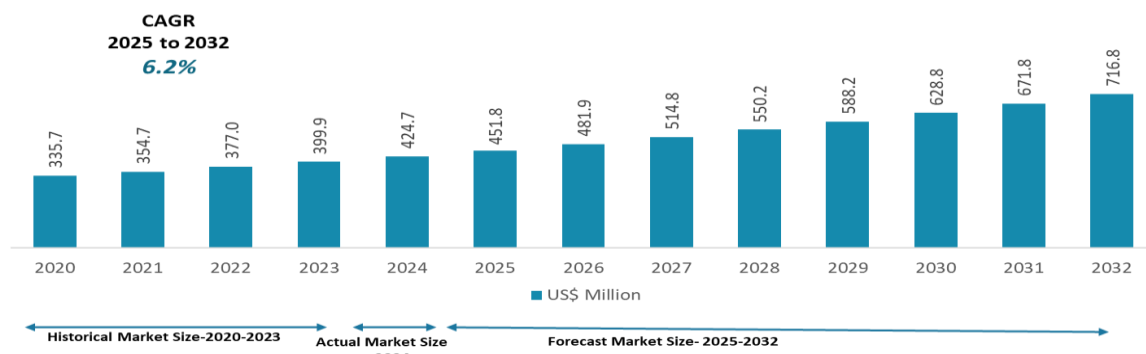
The global industrial high-speed helical gearbox market operates within a broader parent market that supports critical power transmission requirements across heavy and continuous-process industries such as cement, power generation, metals, mining, petrochemicals, and large manufacturing plants. These gearboxes are essential components in high-speed rotating equipment including compressors, turbines, pumps, fans, and mill drives, where precision, reliability, and uninterrupted operation are mandatory. Owing to their high capital value, long operational life, and mission-critical function, the market is structurally stable and closely linked to industrial production trends rather than short-term demand cycles. In 2024, the global parent market is valued at approximately US\$ 975.0 million, reflecting sustained industrial dependence on mechanical power transmission systems despite increasing electrification and automation across manufacturing environments.



Source: Company Annual Reports, Investor Presentation, The Trade Vision, Trade Map, Primary Contacts – Supply Side & Demand Side OEMs and Service Provider, Coherent Market Insights Analysis

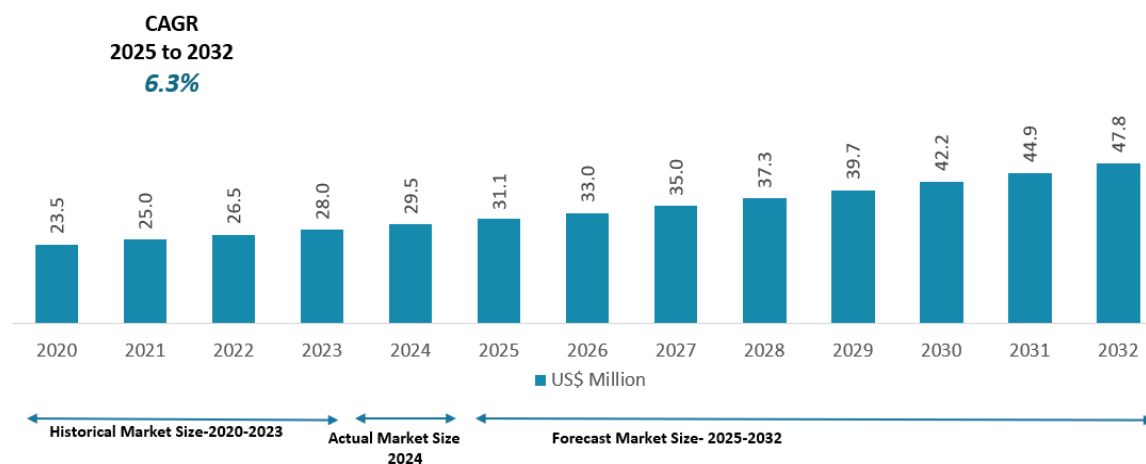
PARENT MARKET – GLOBAL INDUSTRIAL HIGH SPEED HELICAL GEARBOX

Within this parent market, OEM and aftermarket together form the two fundamental revenue pillars. The OEM segment represents sales of new high-speed helical gearboxes supplied during first-time installation, capacity expansion, or complete system replacement projects. OEM demand is primarily driven by greenfield industrial investments, brownfield expansions, and modernization initiatives undertaken by plant operators. In 2024, OEM sales account for around US\$ 424.7 million, equivalent to 43.6% of the total market. This segment shows steady growth momentum as industries increasingly replace legacy gear systems with higher-efficiency, compact, and digitally compatible gearboxes designed to meet evolving performance and energy-efficiency requirements.



Source: Company Annual Reports, Investor Presentation, Primary Contacts – Supply Side OEMs and Demand Side OEMs, Coherent Market Insights Analysis

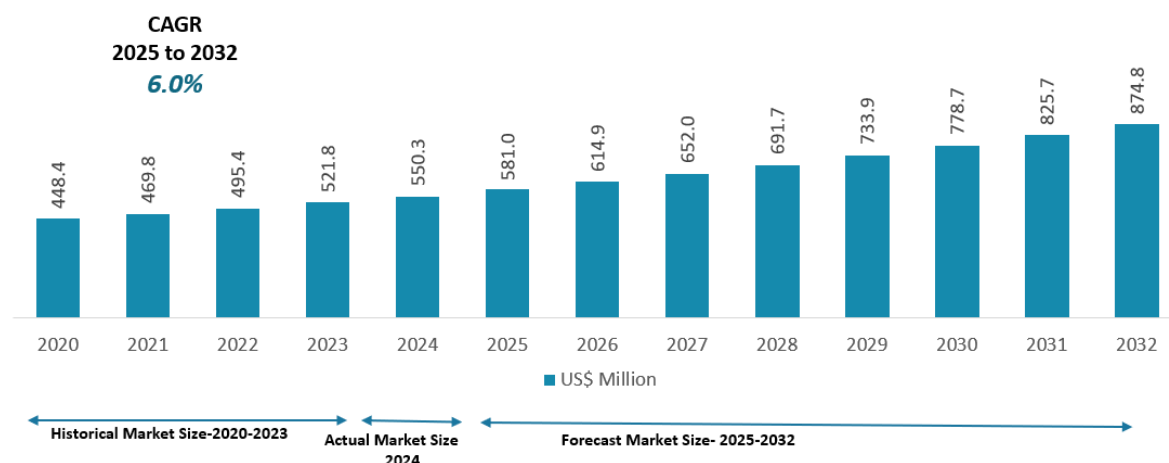
Global Industrial High Speed Helical Gearbox OEM Market Value (US\$ Mn) Analysis and Forecast, 2020-2032



Source: Company Annual Reports, Investor Presentation, Primary Contacts – Supply Side OEMs and Demand Side OEMs, Coherent Market Insights Analysis

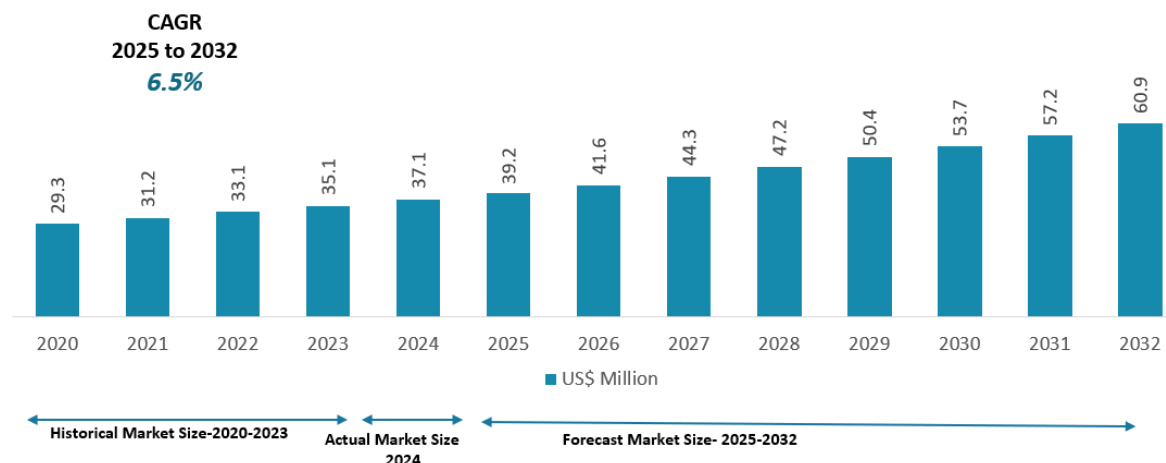
India Industrial High Speed Helical Gearbox OEM Market Value (US\$ Mn) Analysis and Forecast, 2020-2032

The aftermarket segment constitutes the larger share of the market, valued at approximately US\$ 550.3 million in 2024, representing 56.4% of total revenue. Aftermarket includes maintenance services, spare parts, gear and bearing replacement, refurbishment, and in some cases re-sale of rebuilt or replacement gearboxes. The dominance of the aftermarket reflects the long service life of industrial gearboxes, which typically operate for 15 to 25 years under high mechanical stress. As a result, once installed, gearboxes generate recurring demand throughout their lifecycle, making aftermarket revenue more stable and predictable compared to OEM sales. Within this segment, services and component replacement form the majority share, indicating that plant operators increasingly prioritize life-extension and uptime optimization over full gearbox replacement.



Source: Company Annual Reports, Investor Presentation, The Trade Vision, Trade Map, Primary Contacts – Supply Side Service Provider and End User, Coherent Market Insights Analysis

Global Industrial High Speed Helical Gearbox Aftermarket Market Value (US\$ Mn) Analysis and Forecast, 2020-2032



Source: Company Annual Reports, Investor Presentation, The Trade Vision, Trade Map, Primary Contacts – Supply Side Service Provider and End User, Coherent Market Insights Analysis

India Industrial High Speed Helical Gearbox Aftermarket Market Value (US\$ Mn) Analysis and Forecast, 2020-2032

Market growth is supported by several structural and operational factors. Rising global industrial output continues to drive demand for reliable power transmission equipment, particularly in energy-intensive industries. Aging installed base across developed economies is accelerating replacement cycles, while emerging economies are adding new capacity to support infrastructure development and manufacturing localization. Increasing focus on operational efficiency, reduction of unplanned downtime, and compliance with energy-efficiency standards is further strengthening demand for advanced helical gearbox systems. Additionally, the integration of condition monitoring, predictive maintenance, and digital diagnostics is reinforcing long-term service demand and strengthening OEM–customer relationships.

Over the forecast period, OEM demand will continue to expand steadily with industrial investments, and aftermarket services will remain the primary value driver due to the growing installed base worldwide. Manufacturers are increasingly shifting their strategic focus toward long-term service contracts, localized service infrastructure, and digital aftermarket platforms to secure recurring revenues. As industrial operators place greater emphasis on reliability, asset optimization, and total cost of ownership, the global industrial high-speed helical gearbox market is expected to maintain stable growth, with aftermarket activity continuing to shape the competitive and revenue landscape through 2032.

Key Takeaways-

- **Aftermarket** dominates revenue generation with **56.4% share**, driven primarily by recurring demand rather than new equipment installations, while **OEM/new gearbox** supply accounts for **43.6%** of total market revenue.
- Within the aftermarket, **services & component replacement** contribute **75.7%**, highlighting maintenance-led monetization, whereas **product re-sale** (replacement/refurbished gearboxes) represents **24.3%**, reflecting lower but strategic capital-driven demand.

The market is a contribution of **OEM Sales/New Installation** and the **Aftermarket Sales & Services**

OEM Sales/New Installation –

US\$ 424.7 Mn

Aftermarket Sales & Services – US\$ 550.3 Mn

2. OVERVIEW OF GLOBAL & INDIAN ECONOMY MACRO TRENDS

2.1. OVERVIEW

The global economy is expected to maintain stable but moderate growth over the medium term. According to the IMF (January 2026 WEO Update), global GDP growth is projected at 3.3% in 2026 and 3.2% in 2027, broadly in line with the estimated 3.3% growth in 2025. This stability reflects easing inflationary pressures, normalized global supply chains, and continued investment in technology-driven sectors such as artificial intelligence and digital infrastructure. However, growth momentum remains constrained by high interest rates, elevated public debt levels, and persistent geopolitical and trade-related uncertainties, which continue to limit stronger global expansion.

Alongside moderate growth, the global cost environment is gradually improving. Inflation is on a downward trajectory, driven by softer demand conditions and easing commodity prices. Headline global inflation is expected to decline from 4.1% in 2025 to 3.8% in 2026 and 3.4% in 2027. Energy prices are projected to fall by around 7% in 2026, supported by improved supply conditions, although production discipline by major exporters is likely to prevent sharp price corrections. While inflation is easing overall, progress remains uneven across regions, with some advanced economies—particularly the United States—facing slower disinflation due to tariff pass-through effects and persistent services-sector cost pressures.

Against this global backdrop, India continues to outperform most major economies. GDP growth is estimated at 7.3% in 2025, moderating to around 6.4% in 2026 and 2027, but remaining well above global and advanced-economy averages. Growth is underpinned by strong domestic consumption, sustained public infrastructure spending, and steady private-sector capital investment. Inflation in India eased meaningfully during 2025 and is expected to remain close to target levels, providing macroeconomic stability and supporting investment confidence. This combination of high relative growth and improving price stability positions India as one of the most resilient large economies in the current global environment.

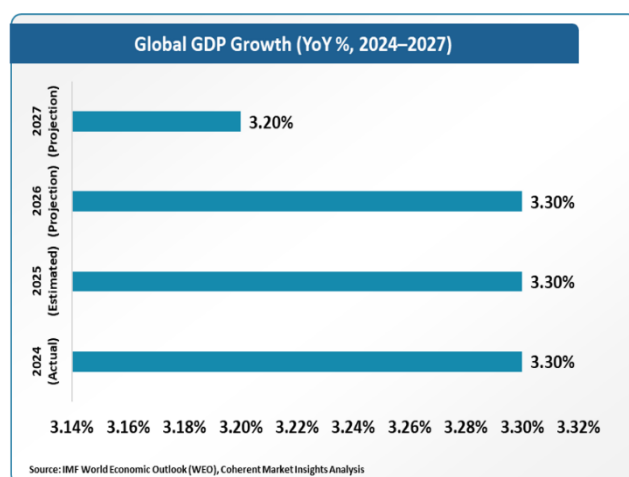
2.2. MACROECONOMIC TRENDS FOR THE GLOBAL ECONOMY

Global economic growth remains stable but uneven across regions, shaped by differences in policy support, investment trends, and structural conditions. Advanced economies are projected to grow modestly, with overall growth of 1.8% in 2026 and 1.7% in 2027. The United States is expected to outperform peers, expanding by 2.4% in 2026, supported by fiscal measures, easing monetary policy, and strong technology-related investment. In contrast, growth in the euro area is likely to remain subdued at around 1.3–1.4%, constrained by structural challenges and weaker industrial activity. Japan's growth is projected to remain below 1%, as fiscal support is offset by weak private investment and demographic pressures.

Emerging and developing economies are expected to grow at just above 4.0% during 2026–2027, continuing to contribute most of the global growth. However, momentum is slowing in key markets. China's growth is projected to decline from 5.0% in 2025 to 4.5% in 2026 and 4.0% in 2027, reflecting weak domestic demand despite policy support. Slower growth in major economies and tighter financial conditions is also weighing on external demand across emerging markets.

Overall, the global macroeconomic environment points to stable but cautious growth, supported by technology investment and selective policy easing, while remaining exposed to geopolitical risks, trade disruptions, and financial market volatility.

2.3. OVERVIEW AND OUTLOOK OF GLOBAL GDP TRENDS



Global growth is expected to remain in the low-3% range through 2027, indicating a stable but moderate economic environment.

Supply conditions have improved compared to recent years, supporting ongoing activity, but high interest rates and cautious spending continue to limit stronger expansion.

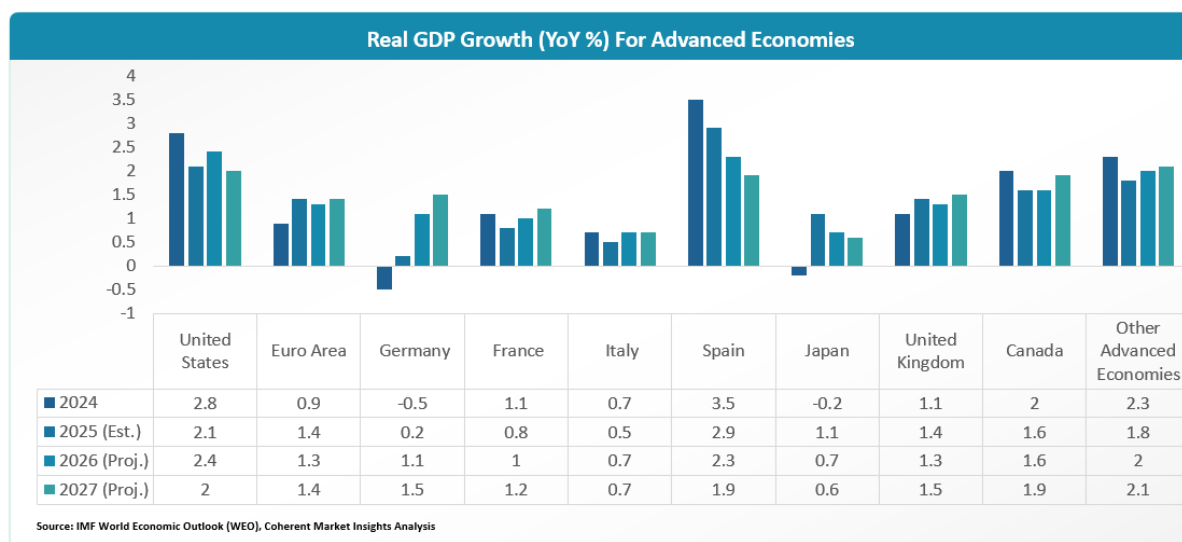
For industrial markets, this translates into steady demand, with investment focused more on maintenance, upgrades, and efficiency improvements rather than large-scale capacity expansion.

2.4. OUTLOOK ON KEY ADVANCED ECONOMIES

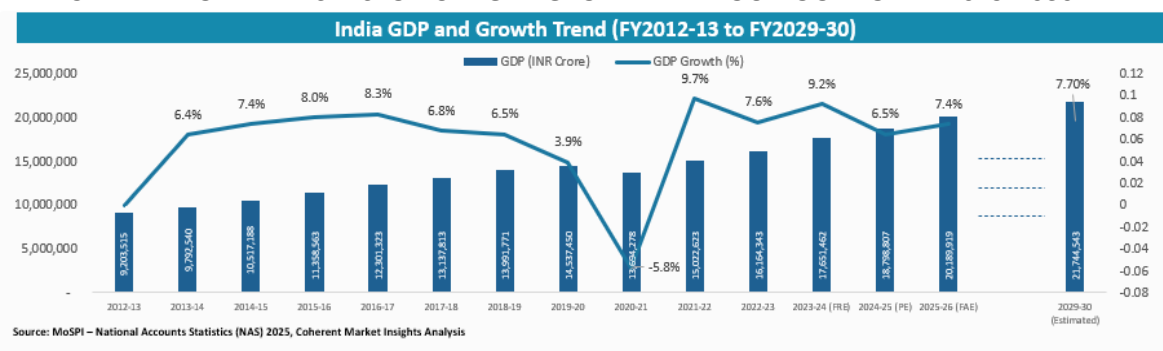
Advanced economies are expected to grow only ~1.7–1.8% during 2024–2027, which is much lower than global levels. This is mainly because borrowing costs remain high, and consumer spending is normalizing.

- U.S. growth stays comparatively stronger but gradually cools as the cycle normalizes.
- Euro Area improves but remains slow; Germany is weak in 2024 before recovery.
- Japan and the U.K. show modest improvement but remain low-growth markets.

Overall, advanced economies suggest a stable demand base, but not a strong growth push for heavy industrial expansion.



2.5. TREND OF INDIA'S HISTORICAL GDP GROWTH AND OUTLOOK FOR FY 2029-2030



*FRE (First Revised Estimates), PE (Provisional Estimates), FAE (First Advance Estimates)

*GDP data is taken at Constant Prices (Base Year: FY2011–12) from MoSPI/NSO “First Advance Estimates of GDP, FY2029–30”

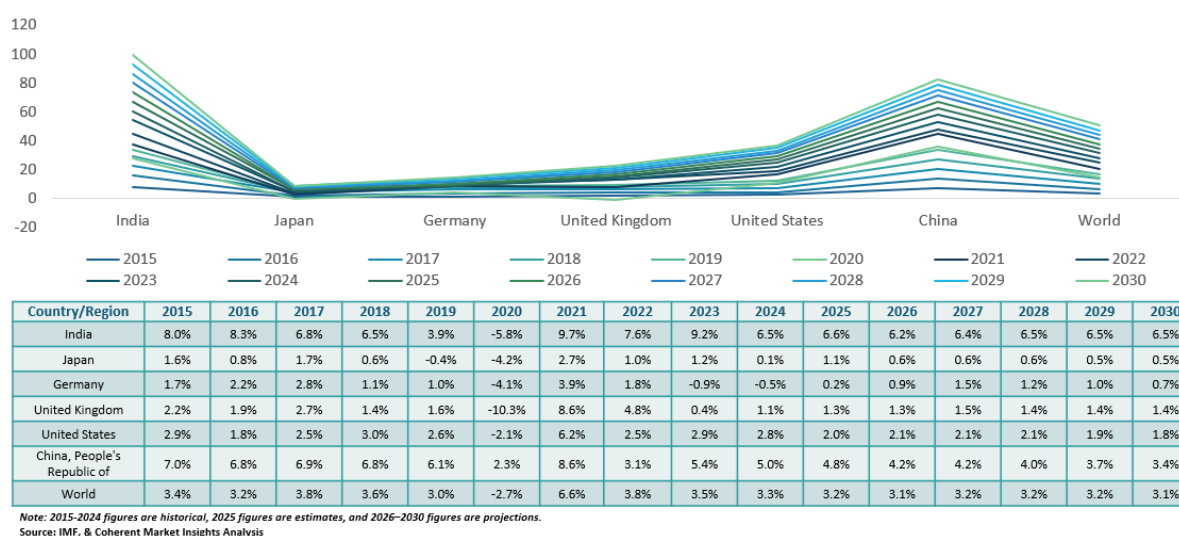
India's economic performance reflects three distinct phases: steady expansion, pandemic disruption, and recovery with stabilization. From FY2012–13 to FY2019–20, GDP increased consistently from about ₹92 lakh crore to nearly ₹145 lakh crore, supported by average growth of 6–8%.

In FY2020–21, GDP contracted by –5.8% due to COVID-19 impacts, followed by a strong rebound of 9.7% in FY2021–22. Growth normalized at 7–9% during FY2022–25, with GDP projected to reach around ₹275 lakh crore by FY2029–30, indicating sustained long-term expansion.

2.6. COMPARISON OF INDIA'S GDP GROWTH WITH GLOBAL GDP AND KEY GEOGRAPHIES

India continues to maintain a clear growth advantage over the global economy and most major developed markets. In 2024, India's GDP growth of 6.5% is well above the global average of 3.3%, and significantly stronger than growth in the United States (2.8%), China (5.0%), Germany (-0.5%), and Japan (0.1%). This relative outperformance is not a one-year phenomenon. Over the 2025–2027 period, India's growth is expected to remain in the 6.2–6.6% range, while global growth stays near 3.1–3.2% and U.S. growth moderates to around 2.0–2.1%.

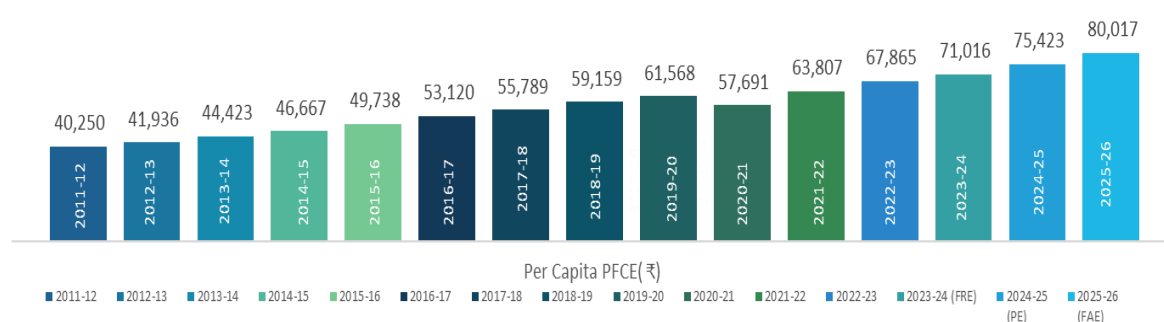
This sustained growth premium reflects the strength of India's domestic demand, supported by rising consumption, public infrastructure spending, and steady private investment. In a global environment where growth remains modest and external demand is uncertain; India's economy is less dependent on global trade cycles and better positioned to sustain momentum internally.



GDP GROWTH – INDIA VS WORLD, U.S., CHINA, AND OTHER ECONOMIES (YOY, %), 2015–2030

For industrial markets, this creates a more favourable demand environment. Unlike mature economies, where spending is largely focused on replacement, efficiency, and aftermarket services, India's higher growth typically supports a broader mix of demand. This includes not only maintenance and modernization, but also new capacity additions and expansion-led capital expenditure, resulting in stronger volume growth and project opportunities for industrial suppliers.

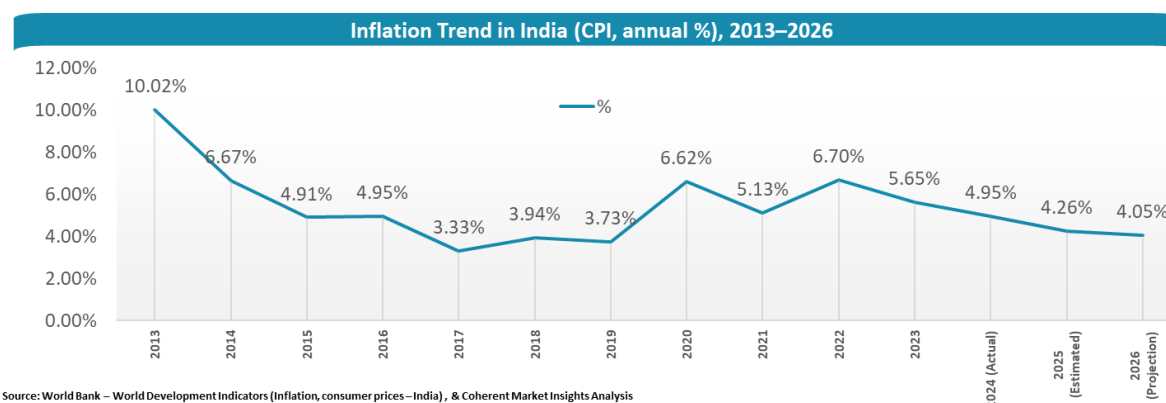
2.7. PRIVATE FINAL CONSUMPTION GROWTH IN INDIA



India's per-capita private final consumption expenditure (PFCE) shows a strong long-term upward trajectory, increasing steadily from ₹40,250 in FY2011–12 to ₹61,568 in FY2018–19, supported by rising incomes, urbanization, and expanding consumer markets. Growth was temporarily disrupted in FY2019–20 and FY2020–21, when per-capita PFCE declined to ₹57,691, reflecting the impact of COVID-19 on employment, mobility, and household spending.

Following the pandemic, consumption recovered sharply, with per-capita PFCE rising to ₹63,807 in FY2021–22 and further to ₹67,965 in FY2022–23 and ₹71,016 in FY2023–24 (provisional). Consumption growth is expected to remain strong, with PFCE estimated at ₹75,423 in FY2024–25 and projected to reach ₹80,017 by FY2025–26, highlighting the continued strengthening of India's domestic demand base and its role as a key driver of economic expansion.

2.8. INFLATION IN INDIA

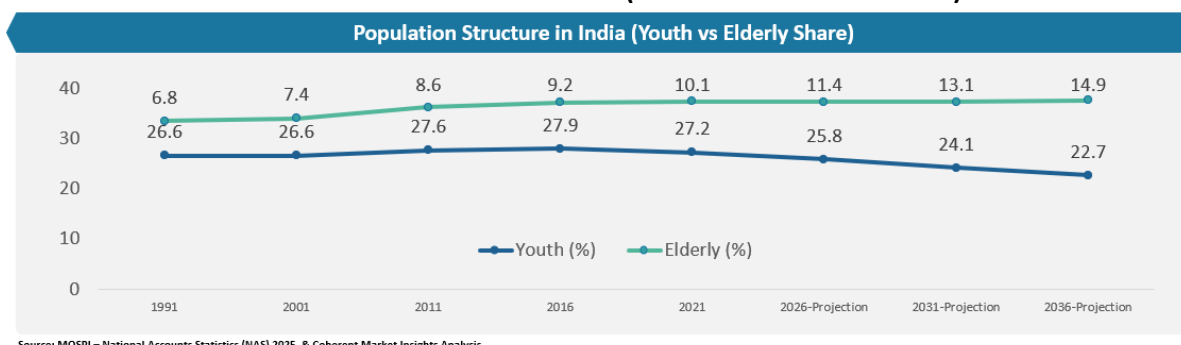


India's inflation trend reflects multiple phases over the past decade. Inflation was elevated at 10.02% in 2013, before moderating sharply to 6.67% in 2014 and stabilizing around 4.9–5.0% during 2015–2016. It eased further between 2017 and 2019, averaging 3.3%–3.9%, supported by lower commodity prices and improved supply conditions.

Inflation rose again during the pandemic period, increasing to 6.62% in 2020 and remaining elevated at 5.13% in 2021 and 6.70% in 2022, driven by global supply-chain disruptions, higher energy prices, and food inflation. From 2023 onward, inflation has shown a gradual moderation, declining to 5.65% in 2023 and 4.95% in 2024 (actual). It is estimated to ease further to 4.26% in 2025 and 4.05% by 2026, indicating a more stable inflation environment supportive of long-term investment planning and economic growth.

2.9. OVERVIEW OF KEY FUNDAMENTAL GROWTH DRIVERS FOR INDIA

2.9.1. POPULATION STRUCTURE IN INDIA (YOUTH VS ELDERLY SHARE)

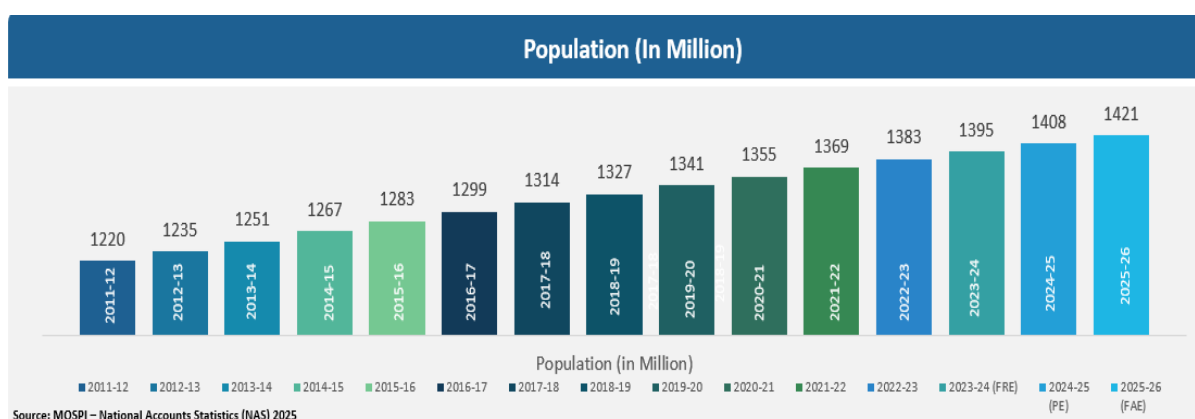


India's Demographic Overview:

India's population structure is gradually shifting. The youth share increased until the mid-2010s and has declined since, reflecting lower fertility rates and changing demographic trends. At the same time, the elderly population has risen steadily due to longer life expectancy and improved healthcare.

This transition indicates that India will continue to benefit from a large working-age population in the near term, supporting economic activity and consumption. Over the longer term, the rising elderly share will increase the focus on productivity improvement, automation, and efficiency-led industrial investments.

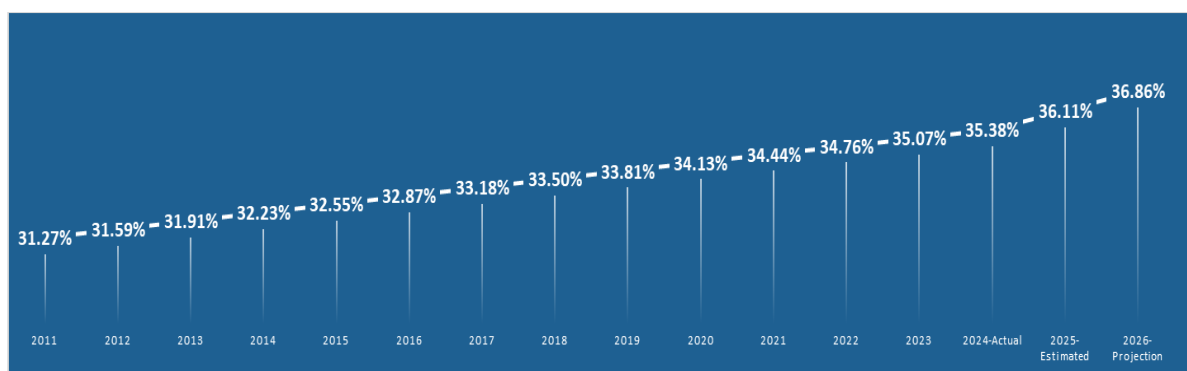
2.9.2. INDIA'S POPULATION



India's population has continued to grow steadily over the past decade, increasing from 1,220 million in FY2011–12 to 1,341 million by FY2019–20, reflecting long-term demographic expansion. Despite the economic disruption during the pandemic period, population growth remained stable, reaching 1,355 million in FY2020–21 and 1,369 million in FY2021–22, highlighting the structural nature of India's demographic momentum.

The upward trend has continued in recent years, with the population estimated at 1,383 million in FY2022–23 and 1,395 million in FY2023–24 (FRE). It is projected to reach 1,408 million in FY2024–25 and 1,421 million by FY2025–26, reinforcing India's position as the world's most populous country. This sustained population growth underpins long-term demand across power, infrastructure, manufacturing, and consumer sectors, supporting continued expansion in electricity consumption, industrial activity, and capital investment.

2.9.3. URBAN POPULATION (% SHARE OF TOTAL POPULATION)

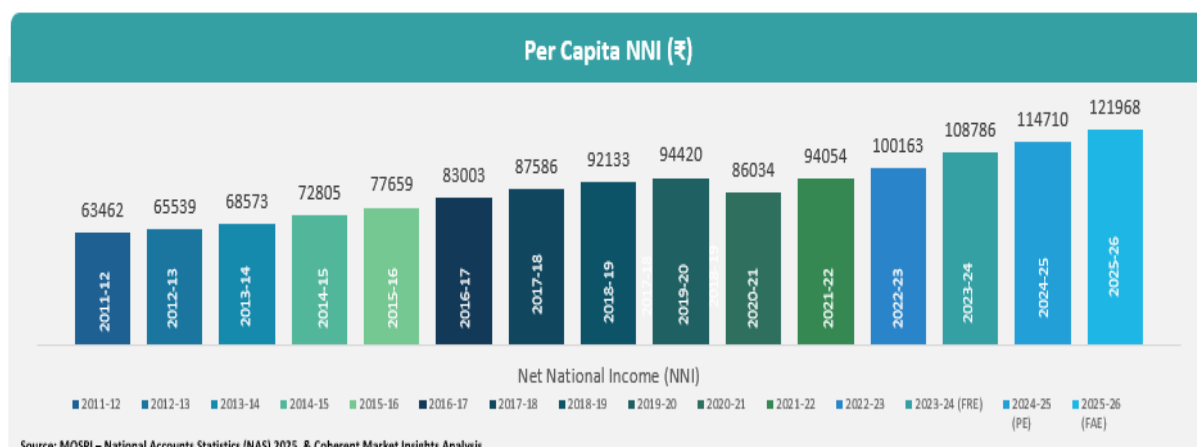


India's urban population share has increased steadily over the past decade, rising from 31.27% in 2011 to 33.50% by 2018, reflecting gradual migration from rural to urban areas driven by employment opportunities, infrastructure development, and industrial expansion. This upward movement continued through the pandemic period, with the urban share reaching 34.13% in 2020 and 34.44% in 2021, indicating the structural nature of urbanization despite short-term economic disruptions.

In recent years, urbanization has accelerated further, with the urban population accounting for 34.76% in 2022 and 35.07% in 2023. The share increased to 35.38% in 2024 (actual) and is estimated to reach 36.11% in 2025, before rising further to 36.86% by 2026. This sustained growth in urban population underscores expanding demand for power, transportation, housing, industrial infrastructure, and

municipal services, reinforcing long-term investment requirements across energy and manufacturing sectors.

2.9.4. PER CAPITA INCOME

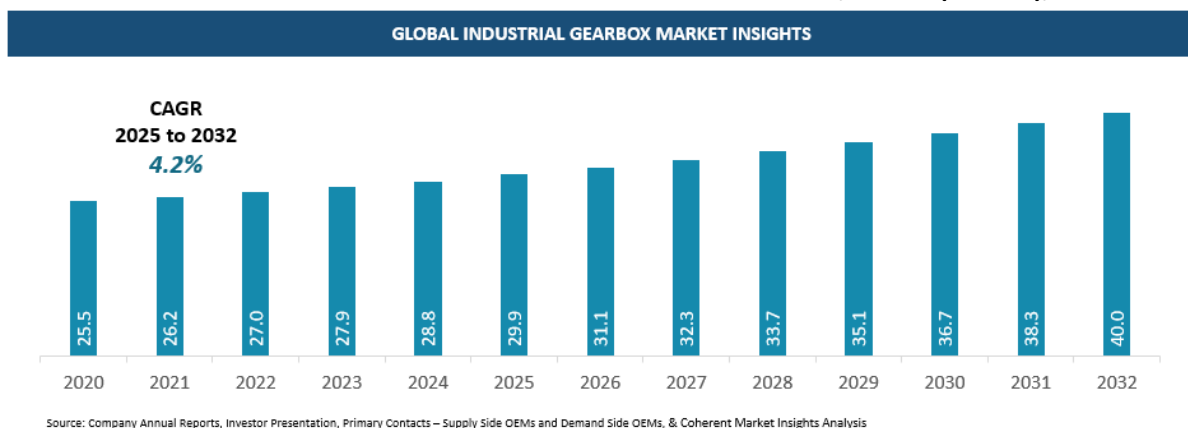


* NNI refers to Net National Income

- India's steady increase in per capita NNI reflects improving income levels and rising purchasing power. Higher incomes support stronger household consumption, greater discretionary spending, and increased demand for goods and services. This income expansion also encourages savings, credit uptake, and investment activity across the economy.
- As purchasing capacity improves, demand shifts toward higher-value products and organized markets, strengthening manufacturing and services growth. Overall, rising per capita income reinforces domestic demand resilience and acts as a key long-term driver of India's economic expansion.

3. PARENT MARKET INSIGHTS - GLOBAL INDUSTRIAL GEARBOX MARKET

3.1. GLOBAL INDUSTRIAL GEARBOX MARKET SIZE AND FORECAST, VALUE (US\$ Bn), 2020 – 2032



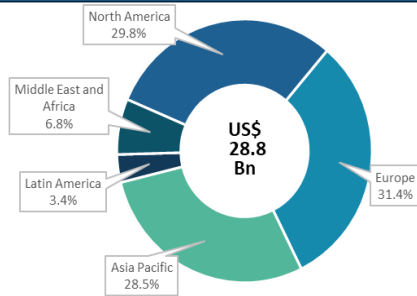
3.2. GLOBAL INDUSTRIAL GEARBOX MARKET SIZE AND FORECAST, VALUE (US\$ Bn), BY REGION AND SPEED TYPE, 2024

Europe leads the global market with a 31.4% share, followed closely by North America (29.8%) and Asia Pacific (28.5%), highlighting strong and balanced demand across key industrial regions.

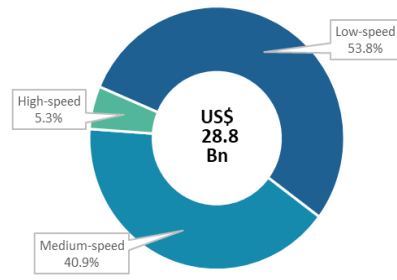
By speed, low-speed gearboxes account for the largest share at 53.8%, while high-speed gearboxes represent a smaller base but offer significant growth potential driven by energy, power generation, and high-RPM industrial applications.

GLOBAL INDUSTRIAL GEARBOX MARKET INSIGHTS

Value (US\$ Bn) of Gearboxes by Region, 2024



Value (US\$ Bn) of Gearboxes by Speed Type, 2024



Source: Company Annual Reports, Investor Presentation, Primary Contacts – Supply Side OEMs and Demand Side OEMs, & Coherent Market Insights Analysis

Note: Low-speed: Below 1500 rpm; Medium-speed: 1500-2500 rpm; High-speed: Above ~2500 rpm;

3.3. OEM & AFTERMARKET - GLOBAL INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET DYNAMICS- DRO

- Rising industrial automation and expansion of heavy industries globally
- Increasing demand for energy-efficient and high-performance power transmission systems

- High initial cost of industrial gearboxes and precision components
- Long lead times and dependency on specialized raw materials



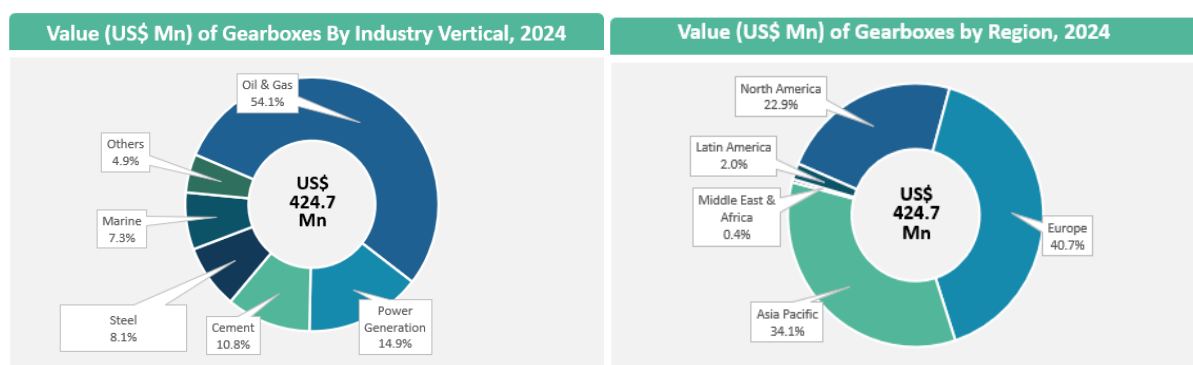
- Growing investments in renewable energy and power generation projects
- Increasing demand for high-speed and customized gearboxes in process industries

4. OEM - GLOBAL INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET

4.1. GLOBAL INDUSTRIAL HIGH SPEED HELICAL GEARBOX OEM MARKET VALUE (US\$ MILLION) ANALYSIS AND FORECAST, 2020 - 2032



Source: Company Annual Reports, Investor Presentation, Primary Contacts – Supply Side OEMs and Demand Side OEMs, & Coherent Market Insights Analysis



Source: Company Annual Reports, Investor Presentation, Primary Contacts – Supply Side OEMs and Demand Side OEMs, & Coherent Market Insights Analysis

Key Takeaways:

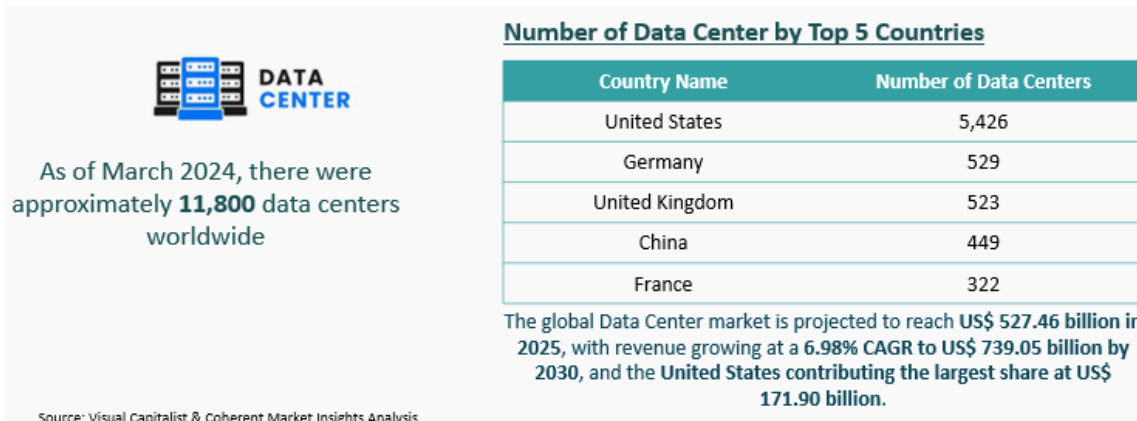
Oil & Gas is the largest OEM end-use industry, accounting for ~54.1% of total market value (US\$ 424.7 Mn) in 2024, making it the dominant contributor to global high-speed helical gearbox demand. Power generation and cement together represent the second-largest demand base, contributing ~14.9% and ~10.8% respectively, supported by steady OEM installations across energy and heavy industrial applications.

In terms of regions, Europe accounts for 40.7%, supported by a dense installed base; however, higher gearbox specifications and pricing keep its value share higher than its volume share. Asia Pacific accounts for 34.1%, driven by a high number of new equipment installations across power generation, petrochemicals, LNG, fertilizers, and general industrial machinery, where unit demand is higher even at lower average prices.

4.2. DRIVER - OEM - GLOBAL INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET

Demand for gas turbines is increasingly being driven by the rapid expansion of data centers, as rising compute intensity and uptime requirements are pushing operators to secure reliable, on-site power generation. The scale-up of hyperscale and AI-driven data centers has sharply increased electricity consumption, making gas turbines a preferred solution for primary, backup, and peaking power due to their efficiency, fast start capability, and operational reliability. This structural growth in data-center power demand is directly translating into higher gas-turbine installations.

This trend is evident in the strong performance of data-center-focused technology providers. For instance, Nvidia's data-center revenue rose to \$39.1 billion in Q1 and \$41.1 billion in Q2 of fiscal 2026, increasing by 73 percent and 56 percent respectively compared to the same quarters of the previous year. Such growth reflects the accelerated build-out of data-center infrastructure, which is driving sustained demand for gas turbines and, in turn, supporting higher demand for high-speed helical gearboxes used in gas-turbine drivetrain systems, particularly in regions witnessing rapid data-center expansion.

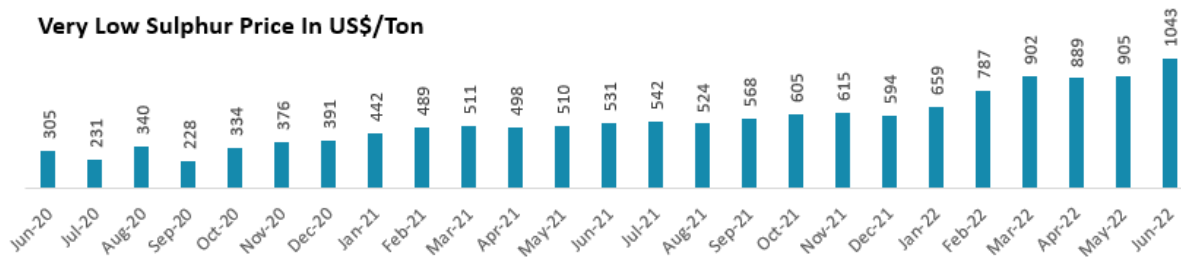


4.3. RESTRAINT - OEM - GLOBAL INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET

Environmental Regulations on Marine Emissions

Environmental regulations on marine emissions are restraining the growth of the high-speed helical gearbox market. Stricter sulphur and NOx limits are forcing shipowners to move away from conventional propulsion systems toward LNG, hybrid, and electric solutions. These newer propulsion systems often use different drivetrain designs, reducing the need for traditional high-speed helical gearboxes used in conventional marine shaft lines.

Very Low Sulphur Price In US\$/Ton



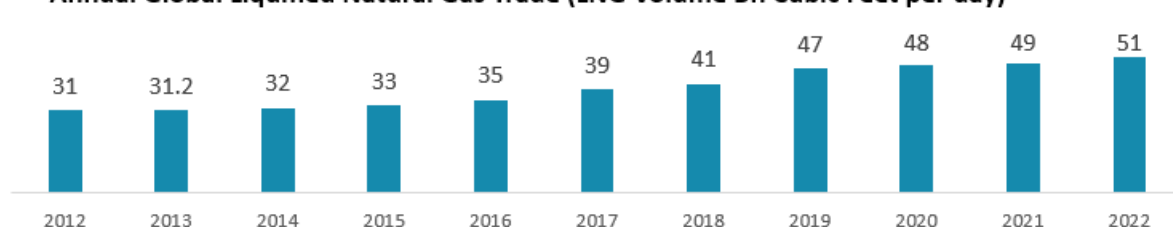
Source: UNCTAD reports, & Coherent Market Insights Analysis

For instance, the IMO's sulphur cap reduced sulphur content in marine fuel from 3.5% to 0.5%, significantly increasing operating costs. UNCTAD reports that low-sulphur fuel oil prices rose from US\$391.3/ton in December 2020 to US\$1,043.8/ton in June 2022. As a result, shipowners are prioritizing spending on emission-compliance technologies rather than conventional gearbox upgrades, directly limiting demand for standard high-speed helical gearboxes in newbuilds and retrofits.

4.4. OPPORTUNITY - OEM - GLOBAL INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET

Rising Demand for Liquefied Natural Gas (LNG) Carriers

Annual Global Liquefied Natural Gas Trade (LNG Volume Bn Cubic Feet per day)



Source: International Energy Agency (IEA), & Coherent Market Insights Analysis

The rapid growth in liquefied natural gas (LNG) transportation is creating a strong opportunity for the high-speed helical gearbox OEM market, driven by the maritime industry's shift toward cleaner fuel alternatives. LNG carriers rely on advanced propulsion systems, including gas turbines, dual-fuel engines, and electric drives, all of which require high-performance helical gearboxes for efficient power transmission, auxiliary systems, and cargo handling under extreme operating conditions.

This opportunity is directly supported by the steady increase in global LNG trade volumes, as shown in the chart below. Rising LNG trade leads to higher demand for new LNG carriers and fleet expansion, with each vessel requiring multiple high-speed helical gearboxes for propulsion, compressors, pumps, and boil-off gas management systems—driving sustained OEM demand.

4.5. TRENDS - OEM - GLOBAL INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET

Integration Of Condition Monitoring and Predictive Maintenance

The integration of condition monitoring and predictive maintenance is a key trend shaping the high-speed industrial helical gearbox OEM market, especially in gas turbines used in power and industrial

operations. These gearboxes run at very high speed and under heavy load, so failures are costly and cause downtime.

Because of this, operators are increasingly using vibration monitoring, thermal checks, acoustic monitoring, and oil analysis to detect early issues like misalignment, bearing wear, and lubrication problems. This is increasing demand for gearboxes designed for monitoring (sensor-ready designs, diagnostic ports, and compatibility with analytics platforms), pushing OEMs toward smarter, more serviceable gearbox designs.

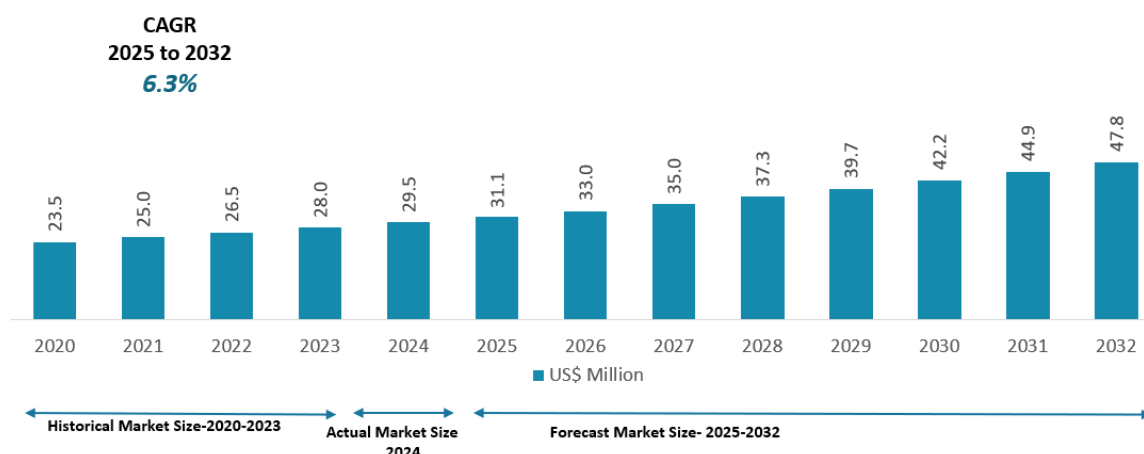
Rise in Vessel Retrofitting and Modernization

The rise in vessel retrofitting and modernization is becoming an important trend for the industrial high-speed helical gearbox OEM market. Instead of ordering new ships, many marine operators are upgrading existing vessels to meet stricter emission and efficiency regulations. These retrofit projects often involve replacing old gearbox systems with high-speed helical gearboxes that offer better efficiency, lower noise, and improved power transmission.

This trend is especially strong in commercial shipping, where upgrading existing fleets is more cost-effective than building new vessels. As fleets age, operators are focusing on propulsion and drivetrain upgrades that can fit into existing vessel layouts. This is creating steady demand for replacement and retrofit-ready high-speed helical gearboxes, supporting consistent OEM sales driven by modernization rather than newbuild activity.

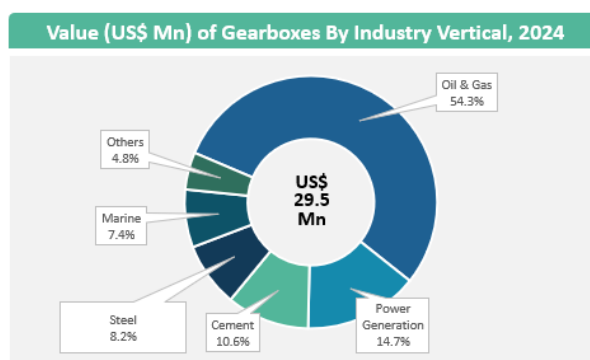
5. OEM - INDIA INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET

5.1. INDIA INDUSTRIAL HIGH SPEED HELICAL GEARBOX OEM MARKET VALUE (US\$ MILLION) ANALYSIS AND FORECAST, 2020 - 2032



Source: Company Annual Reports, Investor Presentation, Primary Contacts – Supply Side OEMs and Demand Side OEMs, Coherent Market Insights Analysis

5.2. OEM - INDIA INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET ANALYSIS, BY INDUSTRY VERTICAL

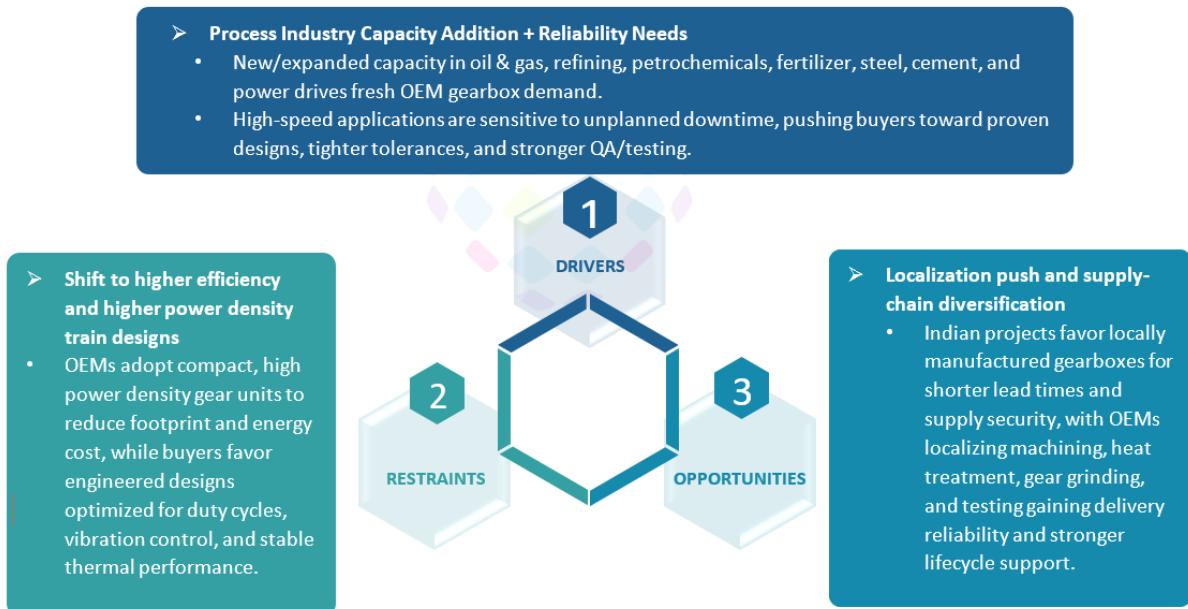


Source: Company Annual Reports, Investor Presentation, Primary Contacts – Supply Side OEMs and Demand Side OEMs, & Coherent Market Insights Analysis

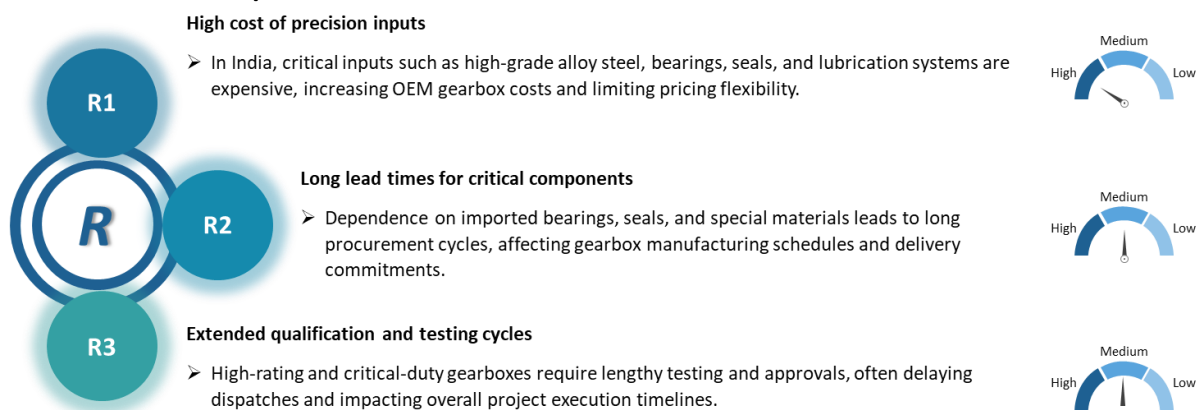
Key Takeaways:

- In India, oil & gas dominates OEM high-speed helical gearbox demand, accounting for 54.3% of market value in 2024.
- In India, the cement industry contributes 10.6% of market value, reflecting balanced demand across value and unit shipments.

5.3. MARKET DYNAMICS- DRO



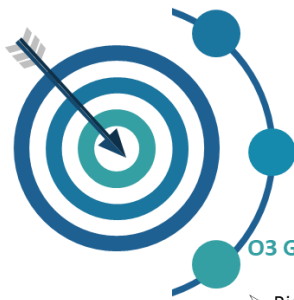
5.4. RESTRAINTS/CHALLENGES



5.5. OPPORTUNITY

O1 Engineered upgrades embedded into OEM packages

- In India OEMs can differentiate by offering advanced gearbox designs with integrated monitoring provisions, optimized lubrication systems, improved sealing, and lower vibration performance tailored to Indian process industry operating conditions.



O2 Export-oriented manufacturing and India as build hub

- Indian gearbox plants can serve Middle East, Southeast Asia, and Africa projects, supported by global certifications, standardized testing, strong QA systems, and cost-competitive manufacturing capabilities.

O3 Government-led industrial and infrastructure investment in India

- Rising public and private investment in refineries, fertilizers, steel, power, and industrial corridors in India creates sustained OEM demand for high-speed helical gearboxes across new and expansion projects.

5.6. TRENDS - OEM - INDIA INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET

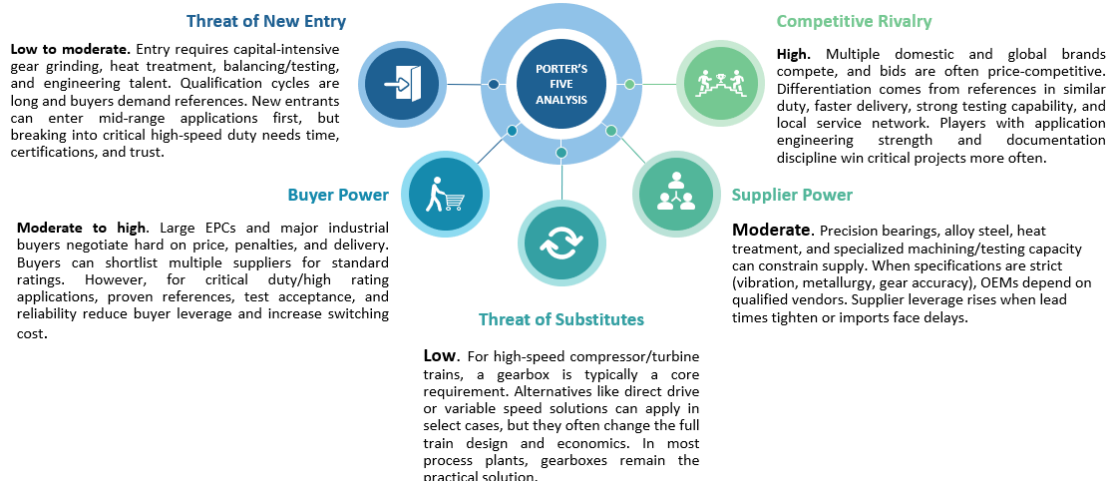
Steel Capex Driving High-Speed Helical Gearbox Demand

Ongoing capacity expansion in the Indian steel industry is directly increasing OEM procurement of high-speed helical gearboxes used in critical auxiliaries such as ID/FD fans, blowers, compressors, pumps, and other continuous-duty drives. Because a gearbox failure can stop an entire production line, buyers are tightening requirements around uptime, thermal stability, load repeatability, and proven operating life. Demand is particularly strong in greenfield additions and brownfield debottlenecking projects, where commissioning timelines are tight and operational risk tolerance is low. This favors suppliers with fast delivery capability, strong Indian references, and assured local spares support.

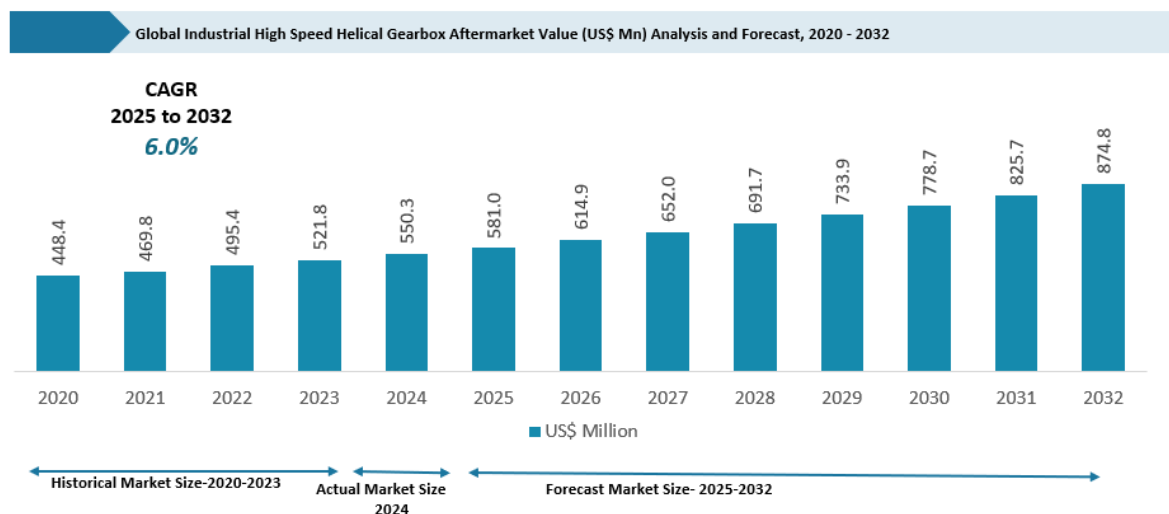
Refinery–Petchem Pushing Special-Purpose High-Speed Helical Specs

India's expanding refinery and petrochemical capacity is raising expectations for gearbox OEMs supplying mission-critical process equipment. High-speed helical gearboxes in these plants are typically used as precision speed increasers or reducers for compressors, fans, and pumps, where reliability is non-negotiable. Project owners and EPCs are increasingly demanding stricter testing protocols, defined vibration limits, robust lubrication systems, and comprehensive protection features. Documentation quality, traceability, and performance validation prior to handover have become standard expectations. Suppliers capable of meeting these disciplined requirements and supporting site acceptance and early-life monitoring are gaining a clear competitive advantage.

5.7. PORTER'S ANALYSIS

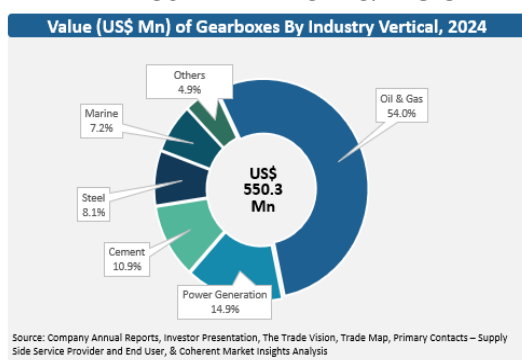


6. AFTERMARKET - GLOBAL INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET



Source: Company Annual Reports, Investor Presentation, The Trade Vision, Trade Map, Primary Contacts – Supply Side Service Provider and End User, & Coherent Market Insights Analysis

6.1. AFTERMARKET - GLOBAL INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET, BY INDUSTRY VERTICAL & REGION



Key Takeaways:

- Oil & gas dominates aftermarket demand, accounting for 54.0% of total market value, driven by high failure rates, continuous operations, and frequent overhaul requirements of high-speed gearboxes used in compressors, LNG trains, and refining processes.
- Power generation shows strong aftermarket intensity, contributing 14.9% of value, supported by periodic turbine overhauls, long operating hours, and refurbishment-driven replacement of high-speed helical gearboxes.

6.2. DRIVERS - AFTERMARKET - GLOBAL INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET

Increasing Focus on Life-Extension Services, Rebuild Kits, and Performance Upgrades

Industries are increasingly extending the operating life of high-speed helical gearboxes instead of replacing them. Life-extension services such as gear regrinding, bearing replacement, shaft refurbishment, and rebuild kits help reduce capital expenditure. Performance upgrades improve efficiency, reliability, and load capacity. This approach minimizes downtime, supports sustainability goals, and allows plants to maintain production without major equipment replacement, driving steady aftermarket demand.

Growth Supported by Aging Industrial Infrastructure in North America and Europe

A large portion of industrial plants in North America and Europe operate equipment installed more than 20–30 years ago. These aging facilities rely heavily on high-speed gearboxes for compressors, turbines, and pumps. As complete system replacement is costly, operators prioritize gearbox repair, refurbishment, and spare replacement. This aging installed base continues to generate stable and recurring aftermarket demand.

6.3. RESTRAINTS & OPPORTUNITY - AFTERMARKET - GLOBAL INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET

High Cost of Genuine OEM Spare Parts and Overhaul Services Limiting Replacement Frequency

Genuine OEM spare parts and certified overhaul services for high-speed helical gearboxes are expensive due to precision engineering, strict tolerances, and limited supplier availability. High costs often delay maintenance cycles, especially for small and mid-sized operators. Many users extend service intervals or shift to local repair alternatives, which reduces replacement frequency and slows overall aftermarket revenue growth despite strong installed base demand.

Rising Adoption of Condition Monitoring and Predictive Maintenance Services

Industries are increasingly adopting condition monitoring and predictive maintenance to reduce unplanned downtime and avoid catastrophic gearbox failures. Technologies such as vibration analysis, oil condition monitoring, temperature sensors, and digital diagnostics enable early fault detection. This allows operators to plan maintenance schedules efficiently, extend gearbox life, and optimize spare inventory, creating strong growth opportunities for advanced aftermarket service providers.

6.4. DEMAND & SUPPLY TRENDS - AFTERMARKET - GLOBAL INDUSTRIAL HIGH SPEED HELICAL GEARBOX MARKET

6.4.1. Demand Trends

Aging Assets & Refurbishment Cycles Driving Aftermarket Growth:

Industrial plants in sectors like steel, cement, oil & gas, and thermal power are running gearboxes that are 10–20+ years old. These assets are entering mid-to-late-life stages, pushing demand for component replacement, condition monitoring, and overhaul services. Example: In 2024, Tata Steel initiated a US\$ 42 million modernization plan at its Jamshedpur facility, including upgrades to gear-driven rotary kilns

Shift from Reactive to Predictive Maintenance Increasing Spare Part Preparedness:

Operators are moving from reactive maintenance to predictive and condition-based models, triggering higher demand for OEM-quality spares and real-time failure diagnostics

Surge in Cement, Steel, and Renewable Power Capacity Adding to Aftermarket Base

As companies expand operations, every new rotary asset adds to the future installed base for spares and service. In many cases, buyers are signing LTSPs (long-term spare provisioning) upfront.

6.4.2. Supply Trends

OEMs Expanding Service Ecosystem with Digital Add-ons:

To reduce long lead times and improve regional responsiveness, OEMs are building localized assembly lines and service hubs for gearboxes and spares. This helps clients minimize downtime and streamline MRO operations.

Rise of Tech-Enabled, Regionally Focused Third-Party Providers:

Independent providers are emerging in India, Vietnam, Poland, and South Africa offering quick turnaround of spares using 3D scanning, CNC reverse engineering, and casting of high-speed gears

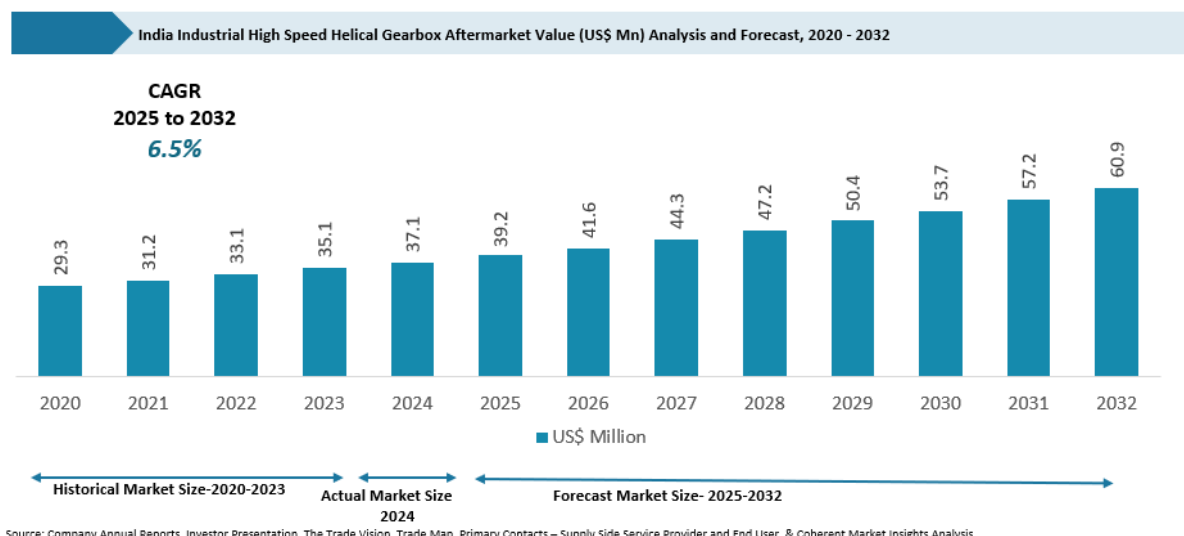
Technology Advancements Enabling Faster Spare Reproduction

Use of CAD/CAM, 3D printing, and digital twin simulation is making it easier to produce discontinued or customized parts quickly

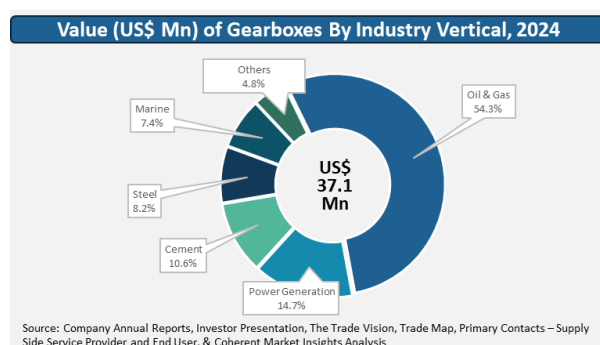
Rapid Manufacturing & Additive Printing Shrinking Lead Times

OEMs and tier-1 suppliers are using hybrid manufacturing (CNC + additive) to produce obsolete parts and low-volume components faster

7. AFTERMARKET - INDIA INDUSTRIAL HIGH-SPEED HELICAL GEARBOX MARKET



7.1. AFTERMARKET VALUE OF GEARBOXES BY INDUSTRY VERTICAL



Key Takeaways:

- In the India industrial high-speed helical gearbox aftermarket, oil & gas dominates the industry vertical mix with 54.3% share, driven by continuous-duty compressors, turbines, and high replacement intensity across upstream and downstream facilities.
- Power generation accounts for 14.7%, followed by cement (10.6%), steel (8.2%), and marine (7.4%), while other industries contribute a smaller share within the total US\$ 37.1 Mn aftermarket value.

8. COMPETITIVE LANDSCAPE - GLOBAL INDUSTRIAL HIGH-SPEED HELICAL GEARBOX MARKET

8.1. OEM BUSINESS - STRATEGIES ADOPTED BY MARKET PLAYERS

Modular Design & Custom Engineering

Develop a family of gearboxes based on interchangeable components like shafts, housings, bearings, seals, and gear stages. This modular architecture allows manufacturers to configure gearboxes for specific applications with reduced design time and lower production costs.

- SEW Eurodrive's X Series supports over 10,000 gear ratio permutations using modular building blocks, allowing rapid delivery to diverse sectors such as water treatment, cement, and mining.

Impact: Reduces engineering lead time by up to 40%, improves delivery speed, supports mass customization, and lowers total inventory overhead due to shared components.

Regional Service Hubs & OEM Tie-ups

Establish final assembly or service hubs in strategic regions (e.g., Latin America, Southeast Asia, Middle East). Partner with EPCs and OEMs to embed gearboxes in large infrastructure or energy projects through long-term contracts and preferred supplier status.

- Bonfiglioli's assembly plants in Brazil and Vietnam enable regional support and quick turnarounds for industries like food processing, packaging, and heavy industry

Impact: Reduces delivery lead times by 20–30%, enhances regional competitiveness, improves after-sales response, and increases win-rate for public or OEM-led tenders.

IoT & Smart Condition Monitoring

Integrate smart sensors within the gearbox housing to measure temperature, vibration, oil condition, and RPM. Link these to cloud-based dashboards and AI-driven alerts to enable predictive maintenance and operational optimization.

- Flender One offers real-time gearbox diagnostics via an integrated digital twin, helping operators avoid critical failures and plan maintenance proactively.

Impact: Cuts unscheduled downtime by up to 70%, reduces maintenance costs by 15–25%, improves equipment reliability, and adds recurring SaaS revenue streams for OEMs.

Digital Twin & Lean Manufacturing

Simulate the operational performance of gearbox assemblies using digital twin models before physical manufacturing. Integrate with ERP, CAD/CAM, and MES (Manufacturing Execution Systems) to reduce waste and errors in production.

- Siemens uses digital twins across product development to optimize gearbox geometry, thermodynamics, and gear tooth fatigue in virtual environments.

Impact: Reduces design errors by 30–50%, lowers development cycles, enhances throughput, and improves first-time-right production of complex, custom gear units.

Source: Primary Research, Desk Research, Paid Subscriptions, CMI Data Repository

8.2. AFTERMARKET BUSINESS - STRATEGIES ADOPTED BY MARKET PLAYERS



O1: MULTIPLE PRODUCT BUNDLE

- Customers can purchase multiple high-speed helical gearboxes at a discounted rate, receiving 15–20% off when buying three or more units. The offering includes standardized installation specifications to ensure compatibility and ease of setup. Additionally, bulk delivery can be scheduled to streamline logistics and reduce lead times.
- Siemens offers this for power generation customers, bundling multiple FLENDER gearboxes for wind farm deployments. This strategy contains total price with buying multiple products.

O2: PRODUCT + FREE SERVICES

- Industrial High-speed helical gearbox purchase includes complimentary commissioning, initial vibration analysis, and first-year preventive maintenance inspections.
- Baker Hughes (Lufkin Gears) offers this package with free installation and 24-month remote monitoring for critical petrochemical applications.



O3: PRODUCT + DISCOUNT ON EXTENDED SERVICES OR AMC (ANNUAL MAINTENANCE CONTRACT)

- Purchase a premium high-speed helical gearbox and receive a 30% discount on a comprehensive 5-year Annual Maintenance Contract (AMC). The AMC includes quarterly inspections, oil analysis, and predictive maintenance reporting.
- RENK offers this strategy for marine propulsion customers with global support coverage. This strategy contains total price with buying the gearbox plus discounted long-term maintenance contract covering critical operational support.

O4: PRODUCT + BUYBACK/UPGRADE OFFERS

- Purchase a new-generation Industrial high-speed helical gearbox with guaranteed 40% buyback value within 7 years when upgrading to future models. Includes technology roadmap and compatibility planning.
- Elecon Engineering provides this strategy for cement and steel mill customers. This strategy contains total price with buying the current gearbox model while securing significant value recovery for future technology upgrades.



DEFENCE BUSINESS OVERVIEW

Executive Summary:

India's defence sector is undergoing a structural transformation driven by sustained budgetary growth, evolving geopolitical dynamics, and a strong policy focus on indigenization and domestic manufacturing. With increasing security challenges across land and maritime borders and a strategic shift towards multi-domain warfare, India has embarked on one of the largest military modernization programs globally.

The sector is transitioning from a historically import-dependent procurement model to a domestic manufacturing-led ecosystem under the "Atmanirbhar Bharat" initiative. This transition is supported by policy reforms such as the Defence Acquisition Procedure (DAP) 2020, Positive Indigenization Lists, and increased participation of private sector players.

India's armed forces are simultaneously undergoing transformation across all three services:

- The Indian Navy is expanding into a blue-water force with a target of 175–200 ships by 2035, supported by large-scale investments in aircraft carriers, submarines, surface combatants, and associated propulsion and mechanical systems. The Navy has achieved one of the highest levels of indigenization among the three services, creating significant opportunities for domestic manufacturers, particularly in shipbuilding and subsystem supply.
- The Indian Coast Guard (ICG) is playing an increasingly critical role in maritime security, coastal surveillance, and protection of India's Exclusive Economic Zone (EEZ). With expanding responsibilities including anti-smuggling operations, offshore asset protection, search and rescue, and environmental protection, the Coast Guard is undertaking fleet expansion through induction of offshore patrol vessels (OPVs), fast patrol vessels (FPVs), interceptor boats, and associated support systems. The ICG's procurement programs are largely domestically driven and involve significant demand for propulsion systems, gearboxes, and auxiliary mechanical equipment, thereby offering additional opportunities for indigenous subsystem suppliers.
- The Indian Air Force is addressing capability gaps through large-scale aircraft induction programs, upgrades of existing fleets, and procurement of force multipliers such as airborne early warning systems, aerial refueling aircraft, and advanced air defence systems. The Air Force is also investing in unmanned aerial systems, space-based capabilities, and next-generation combat platforms.
- The Indian Army is transitioning towards a technology-enabled, agile force with focus on mobility, artillery modernization, air defence systems, and integration of unmanned and network-centric warfare capabilities.

In parallel, emerging domains such as unmanned systems, artificial intelligence, cyber warfare, and space-based capabilities are becoming integral to defence planning. These developments are increasing the technological complexity and capital intensity of defence procurement.

Overall, the Indian defence sector is expected to provide sustained long-term opportunities across the value chain, particularly for companies with capabilities in precision engineering, propulsion systems, and mission-critical mechanical equipment.

Defence Budget (FY27) Overview & Outlook for FY35

Defence Budget	Current (FY27)	Projected in FY35
Total Defence Budget	Rs.7.85 lakh Crs	~ Rs.13-14 lakh Crs
Capital Allocation	Rs.2.19 lakh Crs	~Rs.4-4.5 lakh Crs
Domestic Procurement Share	75%	~85-90%

Source: FY27 Budget Document and Management estimates

Capital expenditure is being prioritised to support modernisation and capability enhancement. A significant portion of procurement is earmarked for domestic industry, including private sector participation. High allocation towards Aircraft and aero engines, Naval platforms and propulsion systems and Artillery and mobility systems. Increasing allocation towards emerging technologies such as drones, electronic warfare, and network-centric systems. The defence sector is transitioning towards technology-driven and capital-intensive procurement. Domestic manufacturing is being structurally incentivised, creating long-term opportunities for Indian companies.

India's defence budget is expected to grow at a CAGR of ~7–8% (historical trend) to Rs.13-14 lakh Crs by FY37 with capital outlay of Rs.4-4.5 lakh Crs, supported by strategic requirements and policy continuity. Capital allocation expected to be 30–35% of total budget with higher spending on Naval expansion, Aerospace programs, Advanced technologies and continued focus on domestic

procurement. Defence spending visibility remains strong over the long term and increasing capital intensity enhances opportunities for engineering and manufacturing companies. Further, policy continuity ensures sustained domestic demand.

Capital Allocation by Services in FY27

Service	Share of Capital Outlay	Key Focus Areas
Indian Air Force	~40–41%	Aircraft, engines, air defence systems
Indian Navy	~30–35%	Warships, submarines, propulsion systems
Indian Army	~23–25%	Artillery, mobility systems, drones

Source: FY27 Budget Document

Indian Air Force

The Indian Air Force (IAF) accounts for the largest share of capital expenditure, driven by the high cost of aircraft acquisition, aero engines, and associated systems. The IAF is currently undergoing a major recapitalisation phase to address declining squadron strength and replace ageing fleets. Key procurement programs include multi-role fighter aircraft, indigenous platforms such as Tejas Mk1A and Mk2, advanced medium combat aircraft (AMCA), and force multipliers such as airborne early warning systems and aerial refuelling aircraft. Additionally, investments in air defence systems, missiles, and unmanned aerial systems further contribute to the capital intensity of this segment. The Air Force segment is characterised by high-value contracts, long gestation periods, and significant dependence on advanced technologies.

Indian Navy

The Indian Navy represents a strategically significant segment with one of the highest levels of indigenisation among the three services. The Navy's long-term vision of developing a blue-water force has led to sustained investments in aircraft carriers, submarines, destroyers, frigates, and auxiliary vessels. Shipbuilding programs typically span long durations and involve extensive participation from domestic industry, including private sector suppliers. The naval segment also has a high requirement for propulsion systems, gearboxes, and other mechanical subsystems, making it particularly relevant for companies with expertise in power transmission and precision engineering.

Indian Army

The Indian Army, while accounting for a relatively lower share of capital expenditure, represents a significant volume-driven procurement segment. The Army is focused on modernising its armoured fleet, artillery systems, and mobility platforms, while also integrating emerging technologies such as drones, electronic warfare systems, and battlefield management systems. The scale of procurement in the Army segment is substantial, driven by the size of the force and the need to operate across diverse terrains. Compared to the Navy and Air Force, procurement cycles may be relatively shorter, and product standardisation is higher.

Implications for Industry

- Naval and Air Force segments offer high-value, technology-intensive opportunities with long-term revenue visibility.
- Army segment provides large-scale, volume-driven opportunities with potential for faster scaling.
- Companies with specialised capabilities in mechanical systems and precision engineering are particularly well positioned in Naval and Air Force programs.

Addressable Market

The Technology Perspective and Capability Roadmap (TPCR) 2025 outlines long-term capability development plans across all three services. We operate in segments aligned with mechanical power transmission and propulsion systems.

- Marine Gearboxes & Power Transmission
- Propulsion Shafting
- Gas Turbine Generators
- Propulsion Gas Turbines
- Steering Gear
- Fin Stabilisers
- Special Application Pumps

Key Growth Drivers

Expansion of naval fleet (175–200 ships), submarine programs (P75I, P76, SSN), increasing indigenisation of propulsion systems, Lifecycle upgrades and refits are the key drivers. The Government of India's 'Self-Reliant India' initiative has fundamentally reoriented defence procurement. Key policy pillars include:

- Defence Acquisition Procedure (DAP) 2020: Categorises procurements to prioritise domestic design and manufacturing with the 'Buy Indian-IDDm' and 'Make' categories at the top
- Positive Indigenisation Lists (PIL): Many items restricted from import, creating mandatory domestic market opportunity
- Defence Industrial Corridors: Two corridors in Uttar Pradesh and Tamil Nadu targeting combined investment of over Rs.50,000 Crs
- iDEX Platform: As of February 2025, 549 problem statements opened, 430 contracts signed with 619 startups and MSMEs
- FDI Liberalisation: 74% FDI permitted under automatic route, 100% with government approval
- 25% of modernisation budget mandated for domestic private sector procurement

Key Risks

- Long procurement cycles and delays
- Budget constraints and revenue expenditure pressure
- Dependence on government procurement
- High qualification and certification requirements
- Technology access limitations
- Supply chain dependencies
- Competition from established players
- Policy and regulatory changes
- Geopolitical dependencies

Key Players in Indian Defence Industry

- HAL (Hindustan Aeronautics Ltd)
- Mazagon Dock Shipbuilders Limited (MDL)
- Garden Reach Shipbuilders & Engineers (GRSE)
- BEML Limited
- CSL (Cochin Shipyard Limited)
- GSL (Goa Shipyard Limited)
- HSL (Hindustan Shipyard Limited)