



# LEVERAGING DIGITAL TECHNOLOGIES IN THE STEEL INDUSTRY

## Introduction

The steel industry is pervasive, and its growth is reflected in the global economy. In 2020, crude steel production worldwide was around 1,864 million tons (MT)<sup>1</sup>. The global steel market is projected to reach 2,175 million tons by 2024, growing at a CAGR of 4.5% between 2020 and 2024<sup>2</sup>. This growth rate is driven by increasing urbanization, higher expenditure on construction and infrastructure projects, and increased adoption of steel in automotive, electrical, and other end use industries.

## Supply and demand trends

The demand for steel products is projected to grow by 5.8 % in 2021 to reach 1,874 MT after declining by 0.2% in 2020 amid the pandemic crisis<sup>3</sup>. Steel production in Asia in 2020 was 1,374.9 MT, which is 1.5% higher compared to 2019<sup>1</sup>. China is the largest steel maker in the world, responsible for 56.5% of global steel production in 2020. China is also the largest market for consumption of steel. According to figures by Indian Brand Equity Foundation, finished steel consumption is expected to grow from 98.71 MT in 2018-19 to 230 MT by 2030-31. Figure 1 shows the annual growth trend of global crude steel production from 2013 to 2020.

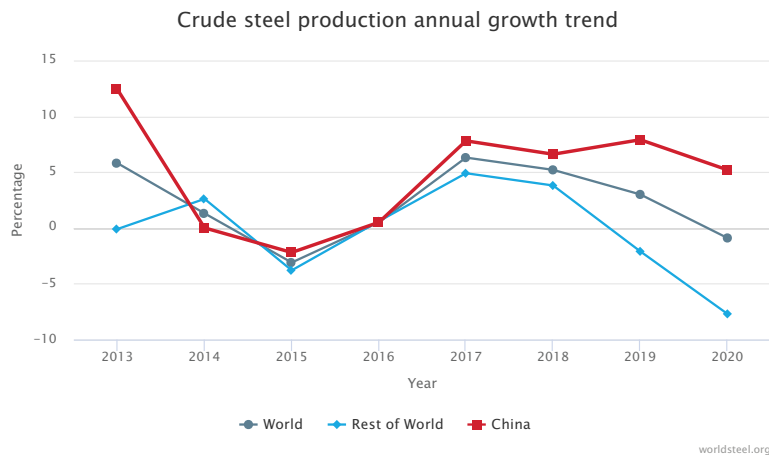


Figure 1: Global crude steel production growth rate trend

## Post-Covid impact on the steel industry

Global steel production during the first three months of 2020 was 1.4% lower than in the same period in 2019<sup>4</sup>. The demand for steel reduced sharply during the pandemic even though steel was declared as an essential commodity in several countries. The difference between global crude steelmaking capacity and crude steel production increased up to 700 MT in 2020 due to overall increase in capacity and decrease in production resulting from Covid-19<sup>5</sup> as shown in Fig 2.

The automotive industry, a key steel customer, was affected as manufacturing was restricted during this time. The oil and gas sector also saw a lower demand for steel due to falling energy prices.

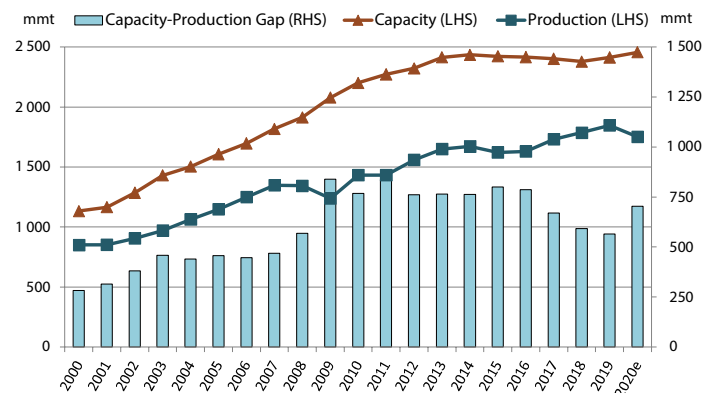


Figure 2: Global Capacity-Production Gap

# Challenges

## Operational challenges in steel manufacturing processes

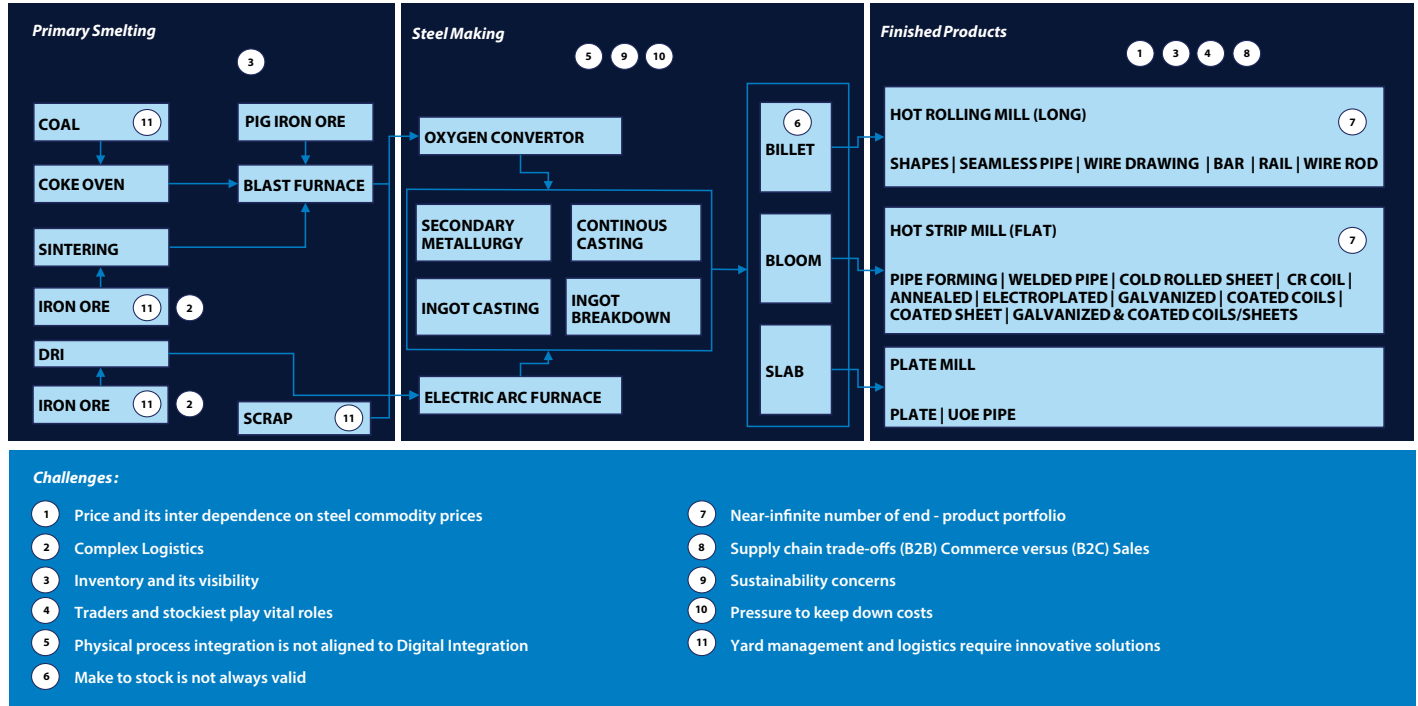


Figure 3: Functional challenges in steelmaking

The steelmaking process has a complex value chain. Manufacturers are challenged to adopt efficient processes to stay competitive while at the same time saving resources. Improving asset utilization, reducing downtime, and improving

product quality are also important. Figure 3 depicts key functional challenges in the steelmaking process.

Achieving a reduction in carbon emissions is a challenge in the steel industry, and breakthrough technologies are being

developed worldwide to address it. Producing one ton of steel emitted around 1.83 tons of carbon dioxide in 2017<sup>6</sup>. Reuse of wastewater and enhancing safety inside plant works also challenge steel enterprises.





## Digital advancements and technology adoption

There are numerous digital technologies which reshape every process in the steel industry from raw material management to sales and distribution. These digital technologies help the industry to overcome current challenges by improving supply chain visibility, providing real-time capability, interoperability, and facilitate the convergence of information technology and operational technology (IT-OT).

Figure 4 shows some key themes for digital transformation in the steel industry.

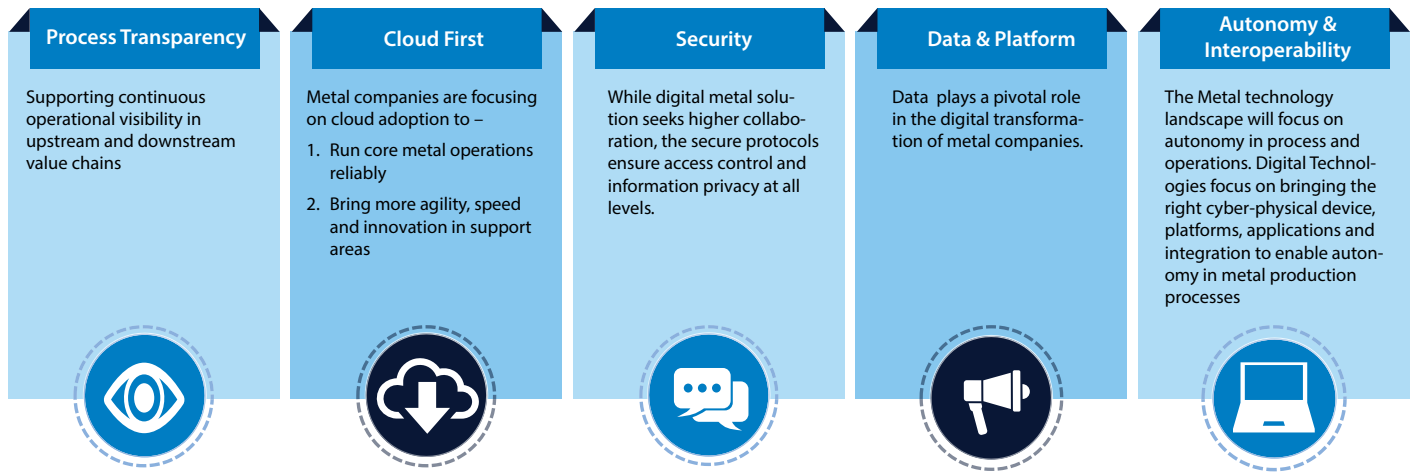


Figure 4: Key themes for digital transformation in the steel industry

Emerging digital technologies such as Industrial Internet of things (IIoT), robotic process automation are being extensively applied in the steel industry, while supply chain logistics, safety, cybersecurity, sales and marketing are undergoing a digital transformation.





## Industrial Internet of Things

The Industrial Internet of Things harnesses smart devices and cloud-based infrastructure to connect plants in the steel industry and enhances process visibility. IIoT-based remote monitoring of

plant, equipment, and process control applications provides operations staff with the ability to monitor multiple systems without having to physically inspect the entire shop floor. These

systems also maintain data history for analysis and compliance reporting, which can be further used to predict failures and disruptions. Figure 5 shows key trends in IIoT in steelmaking.

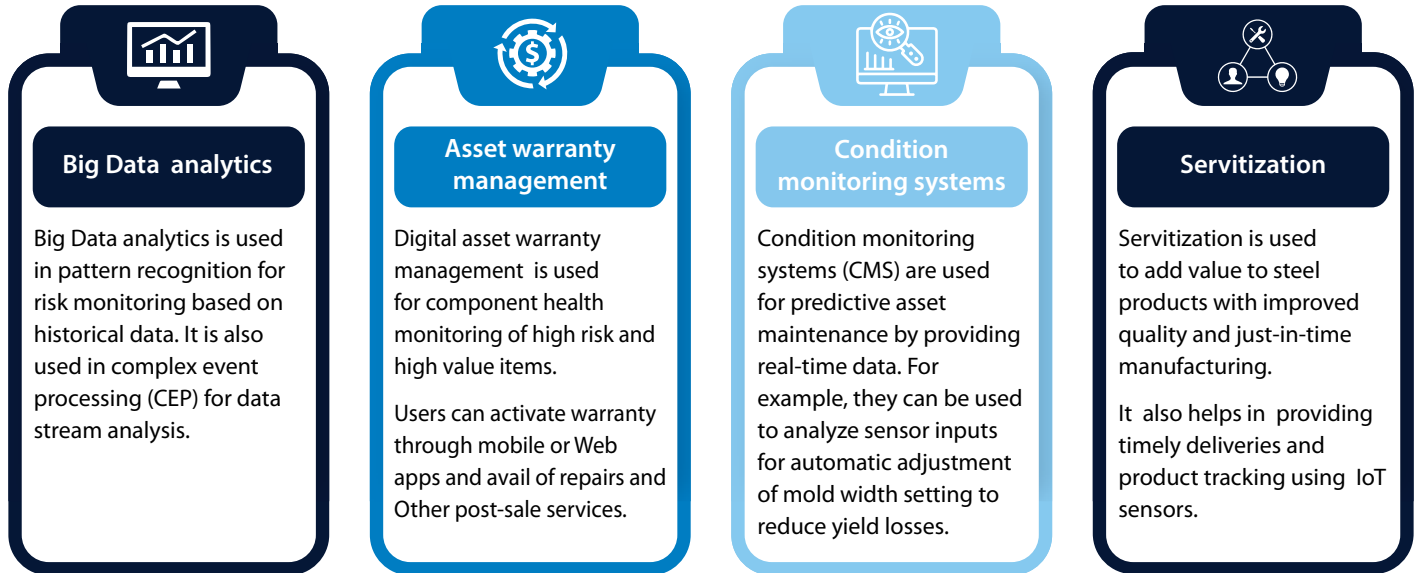


Figure 5: Key IIoT trends in the steel industry

Infosys offers a wide range of Internet of Things (IIoT) ecosystem services for 'connected' business operations. These services enable remote diagnostics, real-time factory visibility, and automated monitoring. The IIoT Gateway framework connects digital devices and processes and helps in automating work through robotic processes.



## Robotic process automation

Mundane and repetitive tasks such as handling tickets, KPI calculations, and security checks are prone to human error,

which can be reduced by applying robotic process automation (RPA) tools. RPA helps achieve higher efficiencies, reduce human

error, and identify trends for decision making. Figure 6 shows key implementation areas of RPA in the steel industry.

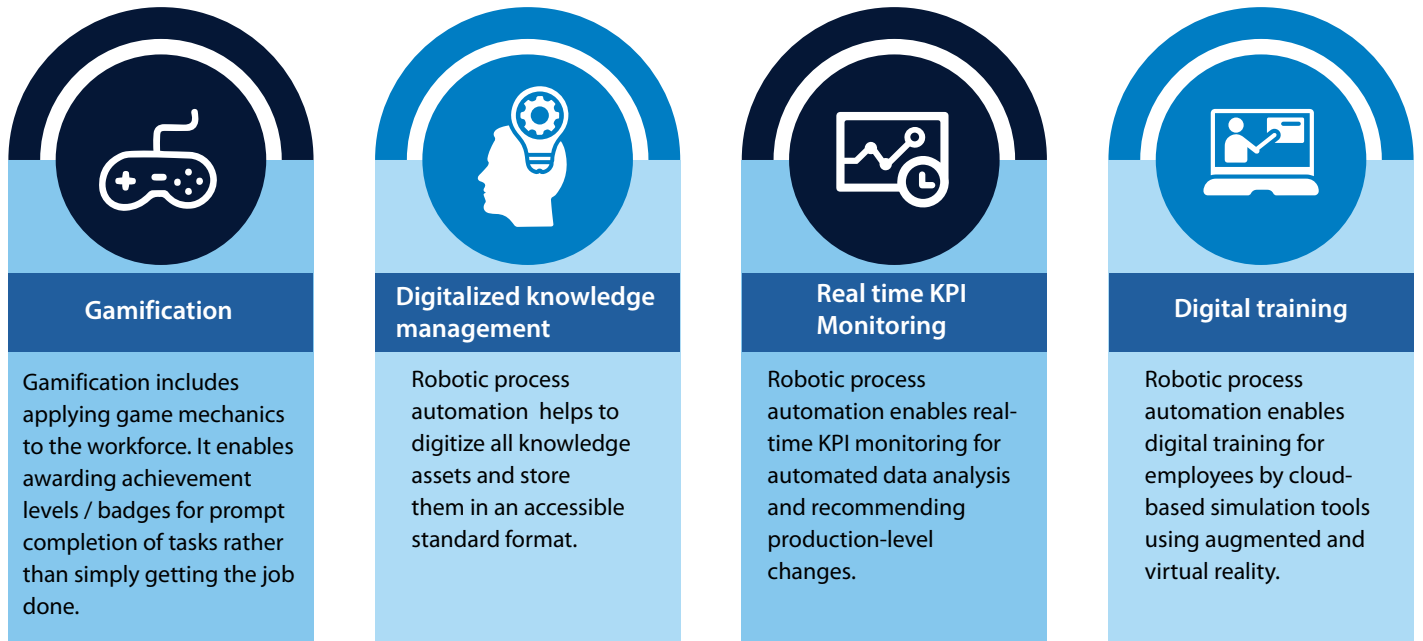
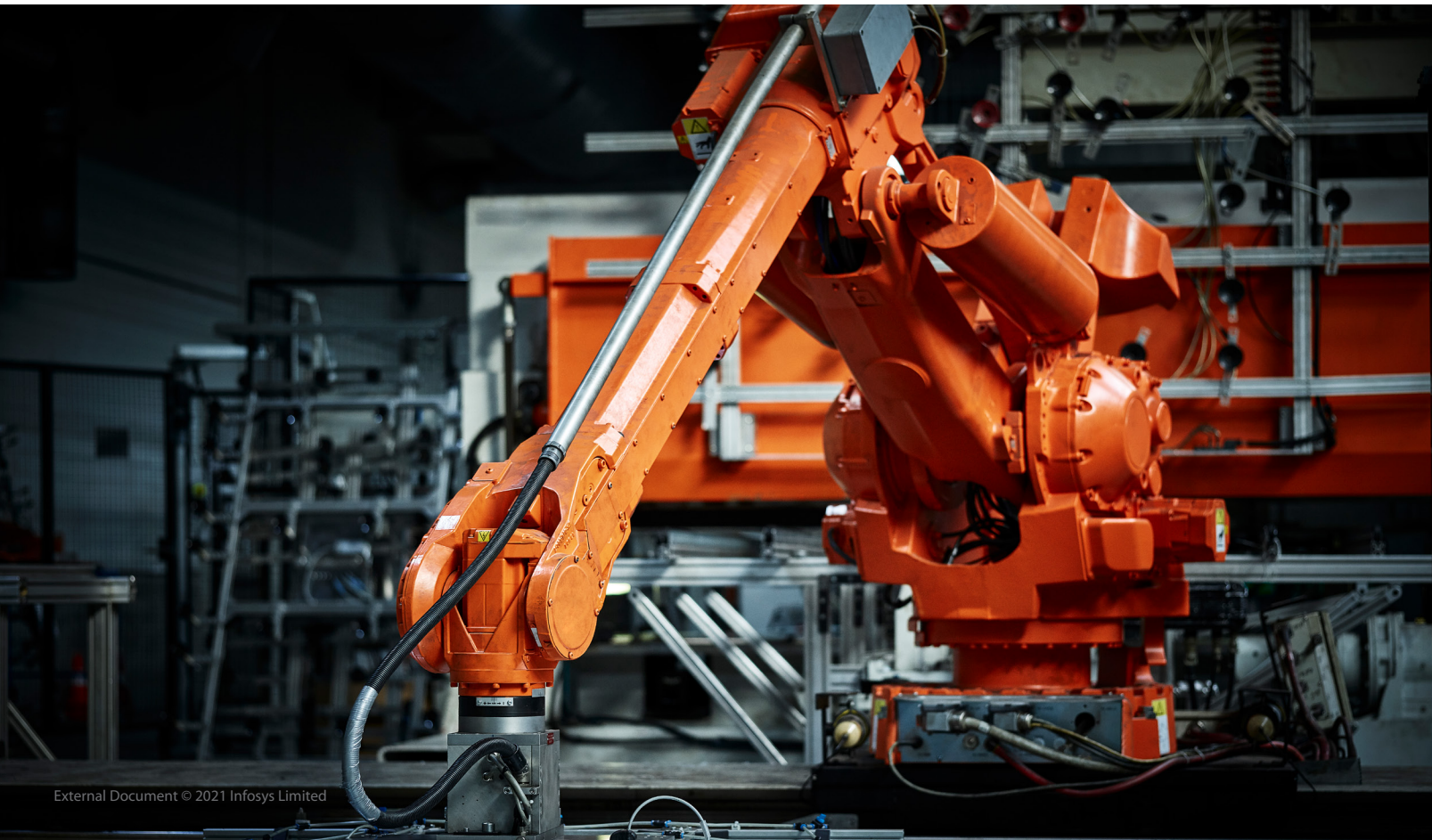


Figure 6: Key implementation areas of RPA in the steel industry

Infosys helps in implementing RPA programs by using extensive industry knowledge to improve process efficiency. It excels in automation architecture and cloud IoT solutions to monitor KPIs and metrics in a connected environment.





## Digitalizing logistics and the supply chain

The steel industry supply chain is a complex one, with challenges such as demand fluctuation, irregular raw material supply, price volatility, lack of visibility. As the demand for the steel grows globally, the pressure to procure raw materials is also increasing throughout the industry.

Most steel companies are now focusing on new digital solutions to optimize their supply chain and logistics for minimizing delivery times and increasing visibility. Advance forecasting (pricing and demand) methods together with IT infrastructure for seamless

communication between stakeholders (suppliers, manufacturers, distributors, dealers, customers) along the supply chain can create competitive advantages and help in optimizing logistics costs. Some trends across the supply chain in the steel industry are shown in Figure 7.

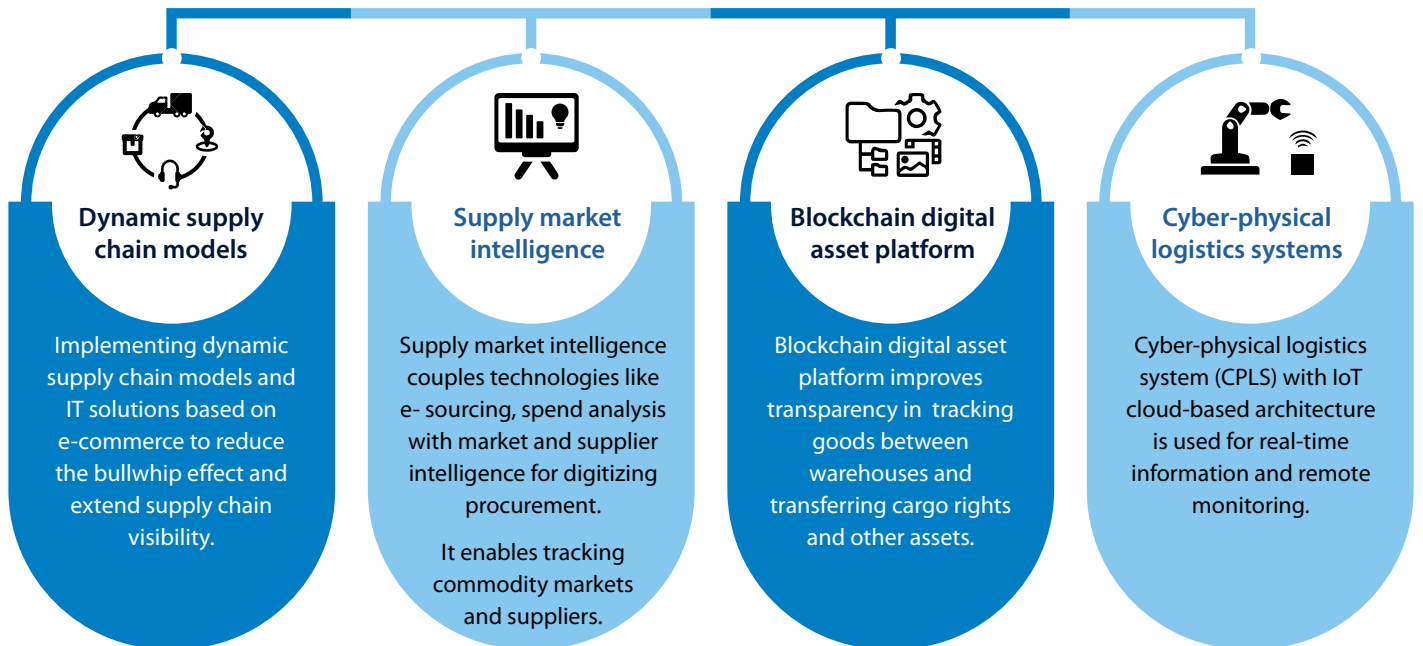


Figure 7: Key trends across the steel industry supply chain

Infosys offers supply chain solutions to improve demand forecasting using AI / ML and deep learning models. Digital solutions like 'supply chain control tower' combined with consulting solutions like 'what if analysis' and 'maturity assessment frameworks' allow companies to manage inventory effectively, facilitate proactive action, and reduce risks due to disruptions in the supply chain. We also offer Supply Chain Buyers-Suppliers Collaboration and Communication Solution by Infosys and Pegasystems, and Infosys Supply Chain Early Warning Solution – a UI-based information modeling tool.



## Enabling safe and sustainable steelmaking

Historically, steel industry has been considered as an unsafe workplace, but it is now working towards achieving zero incidents. The industry spends around € 12 billion (US\$ 14 billion) globally each year in process improvement, and research and

development<sup>7</sup>. As a result, the industry has today transformed to a highly automated and mechanized one with considerable reduction in injury rates. According to a report by the World Steel Association, the injury frequency rate per million hours has reduced by 82 % from 2006 to 2019<sup>8</sup>.

For the steel industry, the four key focus areas are safety culture and leadership, occupational safety management, occupational health management, and process safety management. Digital technologies can improve safety in these key areas. Some trends across safety in the steel industry are shown in Figure 8.

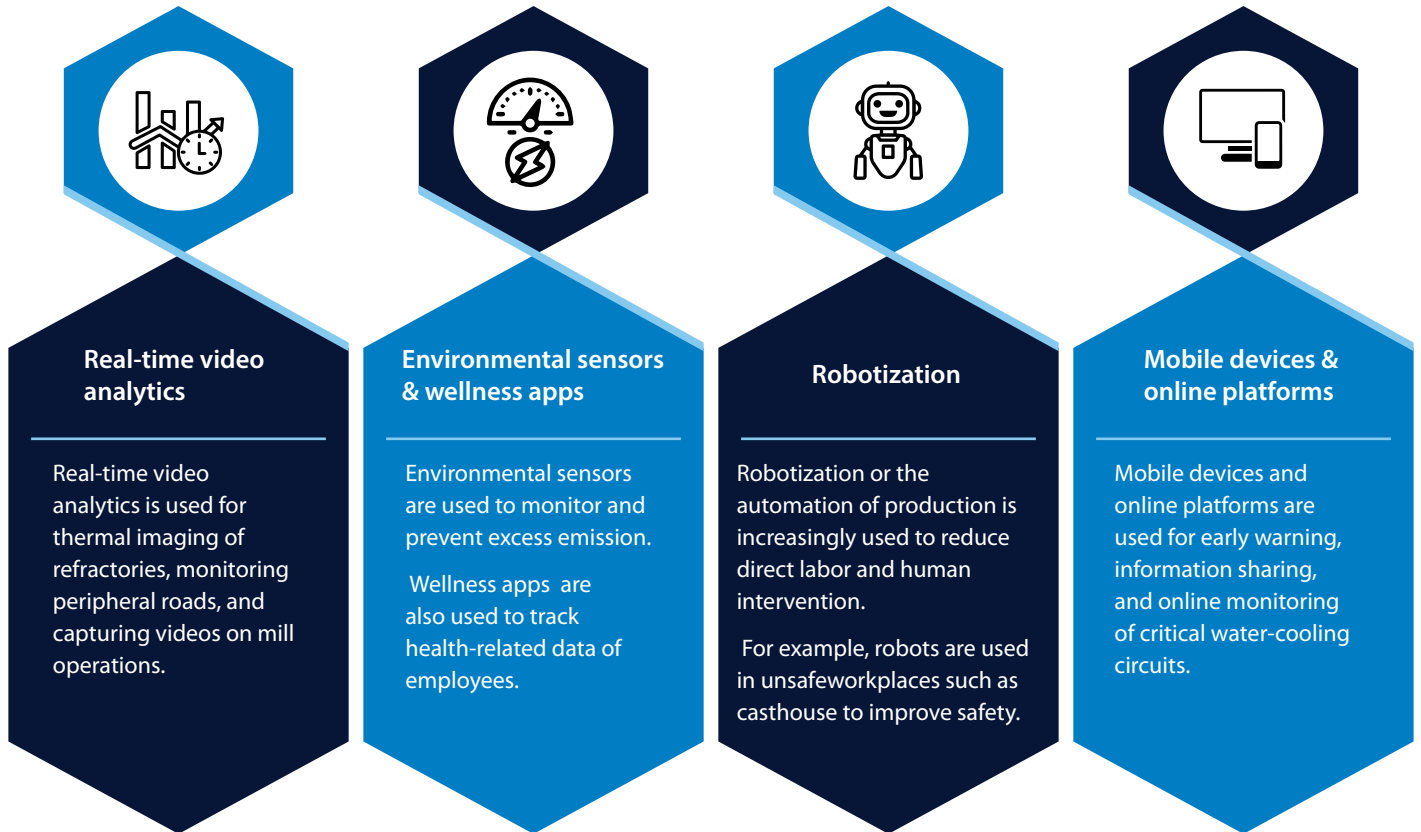


Figure 8: Key trends across safety in the steel industry

Infosys offers smart solutions to improve safety in steel plants. One of these solutions is Ambient Sense 2 which is a working prototype that demonstrates real-time capturing of critical emissions with the use of IoT devices and other sensors to measure CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>x</sub>, VOC emissions in real time and provide alerts. Our Integrated HSE platform is a solution for simplified, standardized, and automated health, safety and environment data reporting.





## Enhancing cybersecurity

In the asset-intensive steel industry, cybersecurity is a top priority in order to protect digital investments from external threats. Figure 9 shows key methods to strengthen cybersecurity in the steel industry.

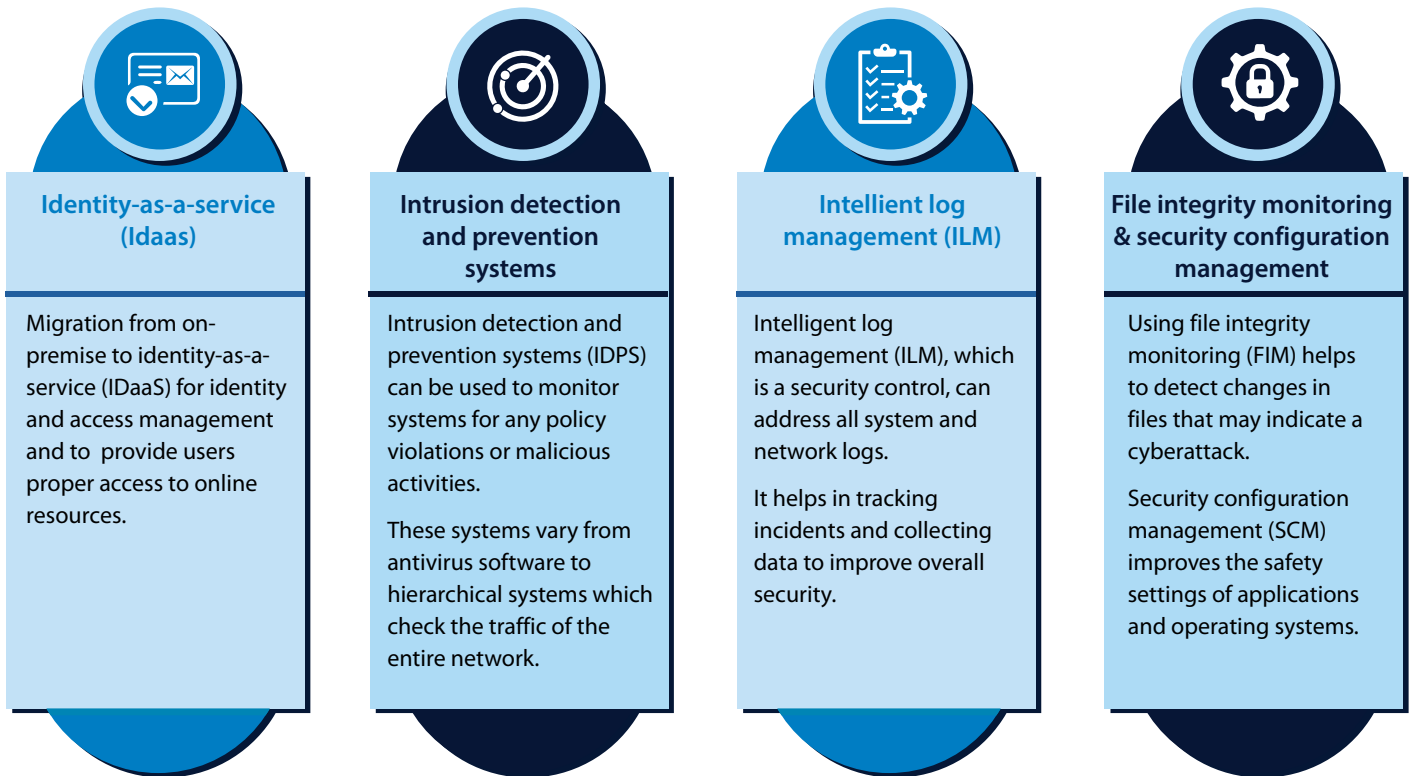


Figure 9: Key methods to strengthen cybersecurity in the steel industry

Infosys provides a managed security services model that helps companies to safeguard data. This also helps organizations to improve their cybersecurity by using a worldwide network of cyber defense centers powered by an advanced security platform.



## Digital sales & marketing

Steel is a capital-intensive product and the brand name and quality standards play a key role in the sales of steel products. Sales managers, or key account managers, allocate production to their different customers and

perform functions such as sales forecasting and pricing. Distributors act as liaison between the steel companies and customers and create value addition. Digitalizing the work methods of sales managers and

distributors can help to access a larger customer base, improve targeting, and gain a competitive advantage. Some of the trends across sales and marketing in the steel industry are listed in Figure 10.

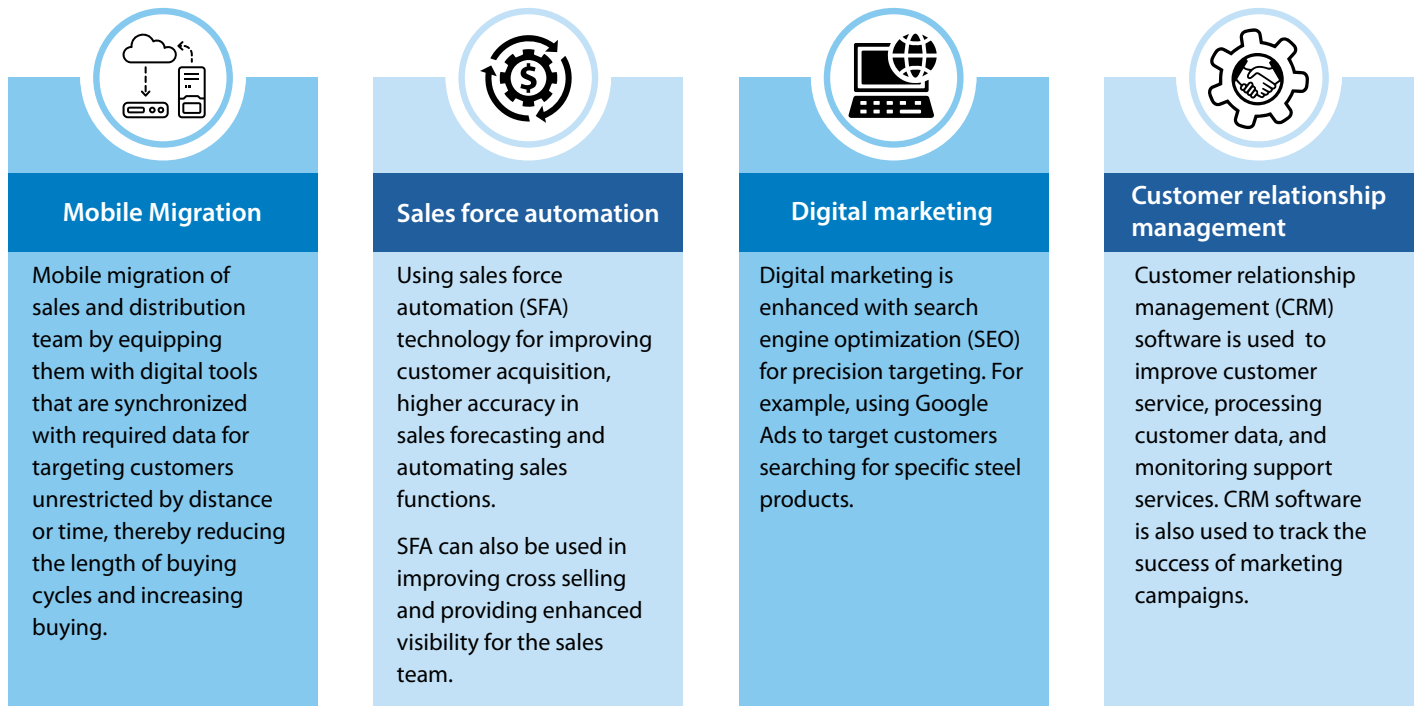


Figure 10: Key trends across digital sales and marketing in the steel industry

The Infosys customer relationship management (CRM) tool helps businesses reduce IT expenditure by removing infrastructure costs. The tool also helps apply CRM in sales and marketing functions with unique processes. It enables the sales workforce to effectively interact with customers, capture real-time customer feedback, and manage campaigns.

## Summary

The steel industry has been one of the biggest contributors to the growth of the global economy. However, the industry faces many challenges such as connecting remote plants working in silos, overcoming cyber threats, training an ageing workforce, and reducing machinery downtime. Steel producers seek to reduce costs and improve product quality. Digitalization can optimize the entire steelmaking process with information technology, automation, and connectivity working together. Safety, supply chain logistics, cybersecurity, and sales and marketing are some of the key areas where emerging digital technologies

will be impactful. IIoT and robotic process automation are also important themes in the digital transformation of steel

plants. In the future, steel manufacturers will be more connected, automated, and supported by robust enterprise systems.





## Appendix

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Naina has 10+ years of experience across metals and steel Industry in operational excellence, project management, process and quality improvement and data analytics. She has helped clients in geographies like Europe and India. She is a B. Tech in Metallurgical Engineering and an M.B.A in Finance & Data Science.



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