

PRESENTS

# Digital Transformation in the **Aluminium Industry**



# Table of Content

<b>1. Executive summary.....</b>	<b>06</b>
<b>2. Introduction.....</b>	<b>06</b>
a. What is Digital Transformation.....	07
b. The various phases of Digital Transformation.....	07
<b>3. Drivers of Digital Transformation.....</b>	<b>09</b>
a. Data availability & storage.....	09
b. Computational power & IaaS.....	09
c. Business demand.....	09
d. 7 forces shaping everything in the digital age.....	09
e. Support from Ecosystem?	10
<b>4. Key technologies for Digital Transformation.....</b>	<b>11</b>
a. ERP.....	12
b. Peripheral technologies.....	12
c. Exponential technologies.....	12
i. Robotic process automation.....	13
ii. Industry 4.0.....	17
iii. AI & Machine Learning.....	21
iv. Intelligent Chatbot.....	24
v. Virtual & Augmented Reality.....	26
vi. Blockchain.....	27
vii. ChatGPT & AI based content generators.....	30
<b>5. Technology revolutionizing the future of the aluminium industry.....</b>	<b>31</b>
a. Advanced extraction techniques.....	31
b. Automation and robotics.....	31
c. Data analytics and AI.....	32
d. Lightweighting and design.....	32
e. Recycling and circular economy.....	32
f. Energy efficiency.....	32
g. Smart manufacturing.....	32
<b>6. Digital Transformation in Aluminium Industry – key trends.....</b>	<b>32</b>
a. Internet of Things (IoT) and Industrial Automation.....	33
b. Artificial Intelligence (AI) and Machine Learning (ML).....	33
c. Data Analytics and Visualisation.....	33
d. Robotics and Autonomous Systems.....	33
e. Supply Chain Digitisation.....	33
f. Digital Twin Technology.....	33
g. Energy Efficiency and Sustainability.....	34
h. Cybersecurity.....	34

<b>7. Digital Transformation in Aluminium value chain.....</b>	<b>34</b>
a. Bauxite mining.....	34
b. Alumina refining.....	38
i. Case study.....	40
c. Primary aluminium.....	41
i. Case studies.....	42
ii. IoT technology for efficient cathode bar monitoring.....	42
iii. IoT technology – Case studies.....	43
iv. Robotics process automation.....	43
v. RPA – Case study.....	44
vi. Deployment of RPA in the Aluminium sector.....	44
vii. Case Study.....	44
viii. Data Collection in the Aluminium Smelter.....	45
ix. Case study.....	46
d. Downstream segment.....	47
i. Digital Transformation in the downstream.....	47
ii. The utilisation of digital technologies in the process of aluminium extrusion.....	47
iii. Case study.....	48
iv. Digital technologies used in the production of aluminium flat-rolled products.....	49
v. Case study.....	49
vi. Digital technologies used in the production of aluminium foil.....	49
vii. Digital technologies conducted in the manufacturing of aluminium wheels.....	50
viii. Case study.....	50
ix. Digital technologies used in the production of aluminium wires.....	51
x. Digital foundries casting techniques to create high-value turbine parts.....	52
xi. Case study.....	53
e. End user segments.....	54
i. Industrial digital transformation gaining momentum in the end-use sector.....	54
ii. Digitisation in the construction sector with the use of aluminium.....	56
iii. Digital transformation in the automotive sector with the use of aluminium.....	56
iv. Aluminium packaging sector undergoing digital transformation.....	58
v. Digital technologies used in aluminium cans.....	59
vi. Digital technologies impacted the aerospace industry, including using aluminium and other materials.....	59

f.	Recycled aluminium.....	60
i.	Changing the face of the aluminium scrap recycling sector with digital technology.....	60
ii.	On-site waste management techniques.....	61
iii.	Case study.....	61
iv.	Sorting and material processing.....	61
v.	Case study.....	61
vi.	Mobile scrap metal processing.....	63
vii.	Artificial Intelligence (AI).....	63
viii.	Case study.....	63
ix.	Block Chain Technology.....	64
x.	3D Printing.....	64
xi.	Software.....	64
xii.	Case Study.....	65
<b>8.</b>	<b>Futuristic digital innovations in aluminium industry.....</b>	<b>66</b>
a.	Digital innovations for aluminium smelters.....	66
i.	Digital smelters by GE digital.....	66
ii.	Case study.....	67
iii.	Camera by Hycast.....	67
iv.	Elios by Fives.....	67
v.	Automated guided vehicles.....	68
vi.	AiRC-1000 by Automation Innovation.....	68
vii.	Maritime logistics solution.....	68
b.	Global Aluminium companies that have embraced digital solutions.....	69
i.	EGA's collaboration with Microsoft for cloud computing.....	69
ii.	Alba embraces VR technology.....	70
iii.	Hydro deploys AVEVA™ PI System™ & HAL5000 pot control system.....	70
iv.	China Hongqiao Group's utilization of smart manufacturing systems.....	70
v.	GCC adopts Vectra's Attack Signal Intelligence technology.....	71
vi.	Vedanta deploys IIoT & IoT technology.....	71
vii.	BALCO incorporates T-Pulse HSSE Monitoring System.....	71
viii.	Rusal uses aluminium ingots quality check network.....	71
ix.	Rio Tinto Case Study.....	72
x.	Qingtongxia Aluminium's transformation to a 5G smart factory.....	72

<b>9. Role based questions on Digital Transformation poised by various stakeholders.....</b>	<b>73</b>
a. FAQs from CDO/CIO.....	73
b. FAQs from Investors.....	75
c. FAQs from Technology professionals.....	76
d. FAQs from IT Managers.....	77
e. FAQs from Service Providers.....	78
f. FAQs from OEMs.....	79
<b>10. Top 15 major tools Aluminium industry may benefit from.....</b>	<b>80</b>
<b>11. Digital leaders in the industry.....</b>	<b>82</b>
<b>12. Online marketplace shaping the future of the aluminium industry.....</b>	<b>84</b>
a. Revolutionizing aluminium trade: How technology powers effortless transactions on online marketplaces.....	84
i. Price discovery.....	84
ii. Market segmentation.....	84
iii. Transaction security.....	85
iv. Dispute resolution mechanisms.....	85
b. Benefits for buyers.....	85
i. Access to a wide range of suppliers.....	85
ii. Competitive pricing.....	86
iii. Security & transparency.....	86
iv. Time and effort savings.....	86
c. Benefits for sellers.....	86
d. Case Study.....	87
<b>13. Conclusion.....</b>	<b>90</b>

## Technology revolutionizing the future of the aluminium industry

Technology has emerged as a crucial driver in reshaping industries worldwide in today's quickly expanding environment. The aluminium industry is one sector experiencing profound changes due to technological advancements. Technology is vital in reshaping the future of aluminium production, from extraction and manufacturing processes to recycling and energy efficiency. With innovative solutions and cutting-edge tools, the aluminium industry is witnessing a paradigm shift that enhances productivity and sustainability and unlocks new possibilities for design and application. Here, we will discuss the pivotal role that technology is playing in revolutionizing the aluminium sector and examine the emerging trends changing its landscape



### Primary Aluminium

Primary aluminium production is a complicated and uninterrupted process, operating in a closed loop. Modifications made early in the production process might affect operations in later production stages, thus hindering aluminium smelters' possibilities for experiments to improve production. The onset of the COVID pandemic in 2020 has popularised the use of Industry 4.0 across all manufacturing industries, including aluminium. Undeniably, Industry 4.0 has proved to be an inevitable solution in the aluminium industry for achieving higher productivity at a lesser time and with a scanty workforce. Having experienced the robust outcome of digitalisation and automation during the COVID crisis, many aluminium smelters are increasingly harnessing the transformational potential of the 4th Industrial Revolution to position themselves as the 'Smelter of the Future'. Adopting digital solutions has helped smelters who use the electrolysis process to pull aluminium from its oxide boost productivity. Even a 1% gain in productivity leads to an annual global savings of USD\$ 970 million in total production costs. Investing in technology has also proven to reduce problems by providing more insights; for instance, data analytics can give details about temperature and chemistry, allowing plant managers to make proactive changes to cut down on wasted time or money. While sustainability has become a way for aluminium

producers to mark themselves as different in the market, IoT sensors give them an idea of how much electricity they use over a given period. It makes it easier to lessen the consumption of electricity if required.

### **Deployment of RPA in the aluminium sector**

Traditionally, many critical operations in aluminium smelters are operated manually. These operations can be automated using robotics and automating the process. Some areas where digitisation can be applied are:

- Automatic pouring of hot molten metal in the furnaces in the casthouse can improve process control for higher quality casting and lower energy consumption through better control over temperature and pouring speed.
- Remote-controlled robots can perform critical process measurements in the reduction pots and furnaces, abolishing people being put in hazardous situations

### **Data Collection in aluminium smelter**

Aluminium smelters house numerous assets ranging in age, purpose, and position. Many of the operational procedures need to be updated and require manual intervention, creating challenges for smelter staff to guarantee the peak performance of every equipment component.

Digital transformation efforts hold the promise of enhancing visibility, efficiency, adherence to environmental regulations, and safety protocols. These initiatives empower teams to address various challenges by leveraging data-driven insights. Converting data into operational intelligence is imperative for smelters, as neglecting this crucial step can hinder any organisation from extracting benefits from their digital endeavours. Through the progression of data management approaches, smelters can potentially convert existing obstacles into chances for digital transformation.

### **Digital transformation in the aluminium downstream segment**

Technology has played a transforming role in reshaping civilisations, economies, and cultures throughout history. It is a product of human creativity and curiosity. Technology has advanced surprisingly, from the development of the wheel to the age of artificial intelligence, with significant societal implications brought about through innovation and adaptability. The contribution of technology in this modern world is unavoidable in every sector.

Aluminium downstream industries play a critical role in fostering economic growth and innovation. The downstream businesses use aluminium and its different forms as raw materials to create final products.

They use aluminium's inherent properties to build diverse goods, contributing to numerous modern life elements. These sectors increase the value of aluminium by converting it into a variety of commodities for customers and other businesses. This segment has implemented different digital reforms and assessed its future prospects. Some of the downstream products are extrusions, rolled products, foils etc.

# AI-Fluencers

An  Circle™  
www.aicircle.com initiative



**Explore, Inspire and Engage**

Contact @ 





## World's 1st online B2B marketplace for the entire aluminium value chain

### FEATURES

#### ► ENQUIRY GENERATION

Any seller can list their products & buyers can connect to specific sellers by sending an enquiry against listed products

#### ► BUSINESS LEADS

Both sellers and buyers can post business leads for any specific requirements & can choose to respond to other business leads

#### ► MY BIZ

Exclusive positioning to showcase your brand, a customized space for with all the advanced features to promote your products

#### ► SURPLUS

If you have any unused assets or used equipment /machinery and want to sell it, you can get verified leads from potential customers.

### WHY CHOOSE US?



Trusted platform, safe & secure, easy to use



40+ years of Experience in Global Aluminium Industry



Reduced carbon footprint for your business



50K+ Exclusive Database



Customized Marketing Strategy to find buyers



Get business leads and enquiries directly in your inbox, no commission

**1400+**

GLOBAL SELLERS

**5000+**

LIVE PRODUCT LISTINGS

**110+**

COUNTRIES

Registration on AL CircleBiz is FREE for all Sellers & Buyers

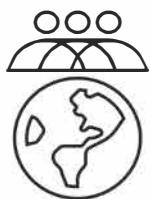
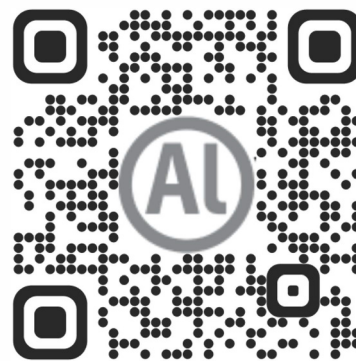


**Unlock your  
Aluminium business  
potential with our  
innovative tools!**

**World's 1st global online B2B marketplace for the entire aluminium value chain**

***Free On-board***  
with AL CircleBiz  
Connect with  
***Global Buyers***

**Free registration**



**Over 30000 registered users**



**1300+ onboarded sellers**



**Reach out to audience across  
195 countries**



**50K+ Exclusive Database**

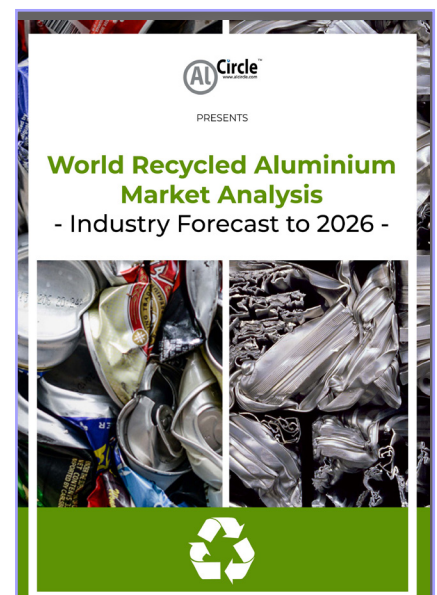
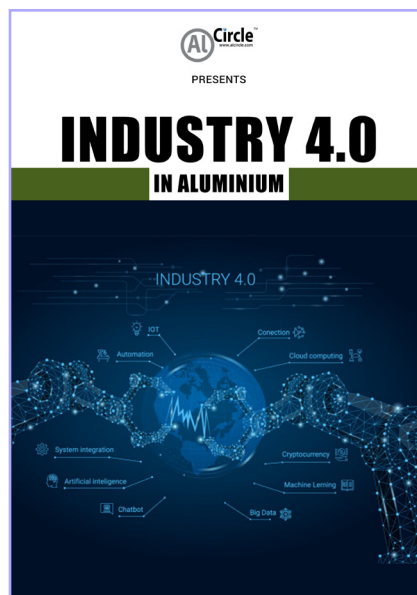
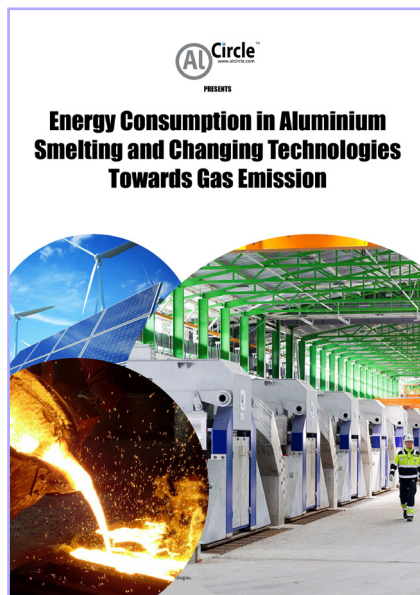
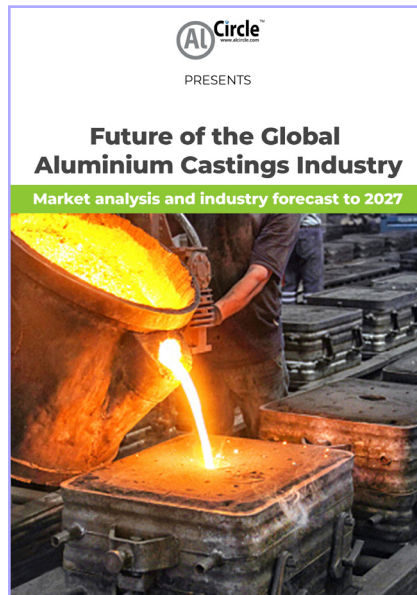
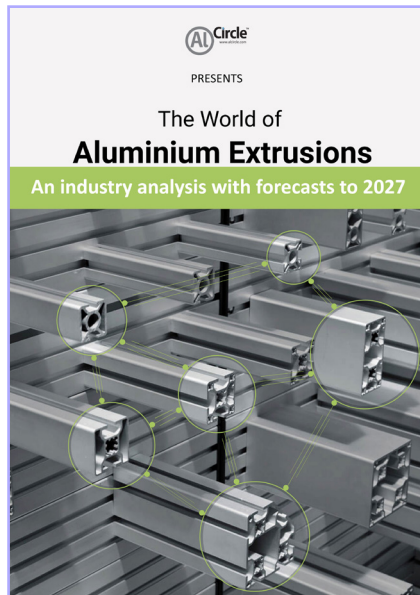
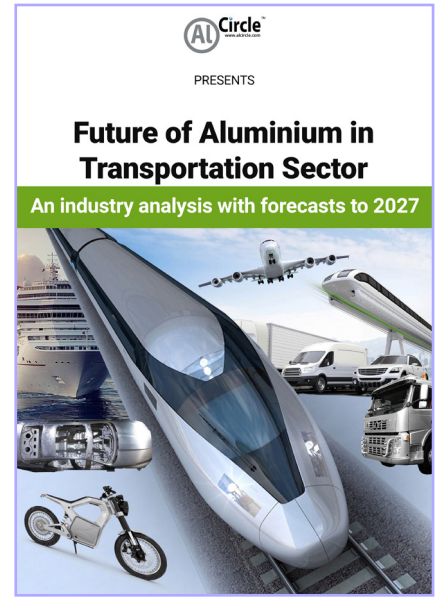
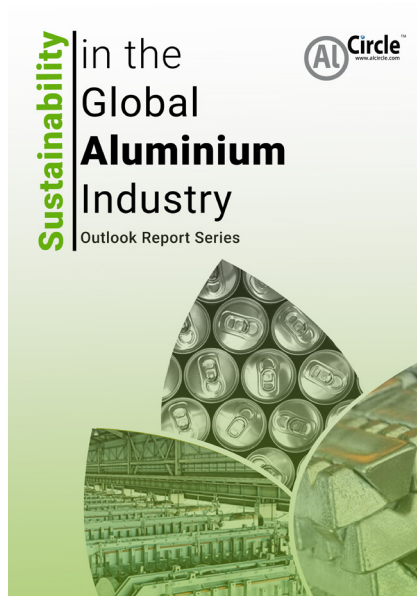
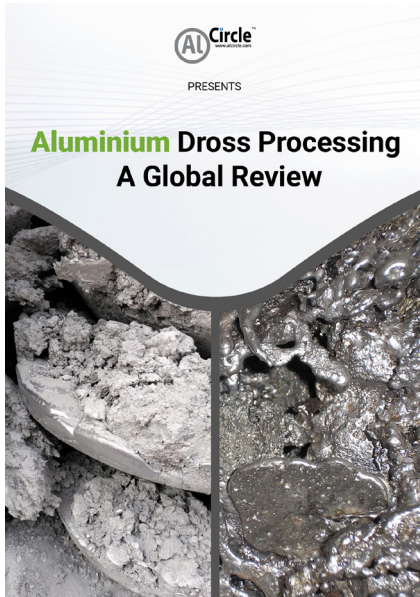


**Customized Marketing  
Strategy to find buyers**



**Get Customer Leads directly  
in your Inbox, no commission**

# More from AlCircle Reports



# Dispose your Surplus products



Free Registration



Sell your old machine

Excess finished and semi  
finished products

