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# Souvenir



International Conclave on Digital HR for Capability Building in Metals & Mining Industry



12- 13 APRIL 2023

SAIL, MANAGEMENT TRAINING INSTITUTE  
RANCHI





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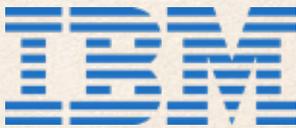
## Diamond

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## Gold

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## Silver

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**संजीव कुमार**  
कार्यपालक निदेशक (मा.सं.वि.)  
**Sanjeev Kumar**  
Executive Director (HRD)



स्टील अथॉरिटी ऑफ इंडिया लिमिटेड  
मैनेजमेंट ट्रेनिंग इंस्टीट्यूट  
श्यामली कॉलोनी, डोरन्डा, राँची, झारखंड-834002  
**Steel Authority of India Limited**  
**Management Training Institute,**  
Shyamali Colony, Doranda, Ranchi, Jharkhand-834002  
ईमेल/email- ed.hrd@sail.in, sanjeev.kumar01@sail.in  
फोन/Phone - 0651-2411227

## INTRODUCTION

Even the best of technology cannot serve its purpose if it is not handled by the right talent backed by a conducive organizational culture. We realized that Digital Transformation using Industry 4.0 tools & processes was the elephant facing the larger society and the people who were likely to be impacted were largely unaware of this reality, its implication or appropriate response to it. Our experience gathered from driving Digital Transformation across SAIL during more than one decade came in handy in identifying issues & challenges in this process, and it was realized that there is an urgent need for consolidating efforts not only across the organization but also across different industries.

With a view to collate the best practices for overcoming challenges of the industry necessitated by the need for Digital Transformation, a Conclave on “Digital HR for Capability Building in Metals & Mining industry (D-CBMM 2023)” was conceptualized which is being organized during 12th-13th April 2023 in Ranchi. This Conclave aimed for developing an effective digital transformation road map for Capability Building in Engineering Sector in general, specifically Metals & Mining - a sector having great potential for value unlocking through meaningful Digital Transformation.

The Digital Transformation challenges are not unique to any one organization and therefore people & organizations came forward for supporting us both as organizing partners as well as those who participated in exhibition gallery showing use cases as well as solutions for Digital Transformation.

As a prelude to this Conclave papers had been invited for different technical sessions and top few papers have been selected for presentation of the papers during the Conclave and subsequent publication.

I'd like to thank all for the support they extended for the Conclave and publication of this Souvenir.

*Sanjeev Kumar*  
(Sanjeev Kumar)

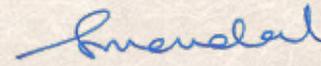
President, National HRD Network Ranchi &  
Convener - D-CBMM 2023, Steering Committee



## Message

It is a pleasure to know that NHRDN Ranchi Chapter along with SAIL, CIL, MOIL and XISS is organising D-CBMM 23 event at Management Training Institute, Ranchi. As D-CBMM'23 seeks to identify Human Resource Management challenges in Metals & Mining industry and map them to digital HR solutions, I am sure, it will not only help the participants but also help creating new systems and processes in the future. I hope this conclave shall achieve its objectives of bringing the challenges and issues involved in leveraging the disruptive technologies in the metals and mining on the surface.

My best wishes to the organisers for successful conduct of this event.



(Soma Mondal)

Chairman

पी.एम. प्रसाद  
अध्यक्ष-सह-प्रबंध निदेशक  
**P.M. Prasad**  
Chairman-cum-Managing Director



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Corporate Identity Number

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फैक्स/Fax: 0651-2360003

मो० / Mob. : 8987784100

ईमेल / email: cmd.ccl.cil@coalindia.in

वेबसाइट/Website : www.centralcoalfields.in



## Message

It gives me immense pleasure to learn that Management Training Institute of SAIL is organising an International Conclave on the topic **Digital-HR for Capacity Building in Metals and Mining (D-CBMM) 2023** from 12<sup>th</sup>-13<sup>th</sup> April 2023 in Ranchi.

This being a unique initiative of Management Training Institute of SAIL in flagging the challenges related to disruptive technologies in engineering sector especially metals and mining.

In light of the above, I am sure that the conclave would provide the requisite tools, systems, processes and platforms for establishing digital HR ecosystem in Metals & Mining industry.

I convey my best wishes for the success of this International Conclave and congratulate the teams from SAIL, CIL, MOIL, XISS and NHRDN Ranchi for organising this event.

(P.M. Prasad)

Chairman-cum-Managing Director

**Ajit Kumar Saxena**  
Chairman-cum-Managing Director



**MOIL Limited**

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Tel. : 0712-2592070,2592071, Fax : 0712-2592073  
E-mail cmd@moil.nic.in Website : www.moil.nic.in  
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## Message

As the industries across the globe continue to evolve and advance, it is essential to invest in human resources to ensure that we have the necessary capabilities to keep pace with these changes. This conclave will provide an excellent opportunity for HR professionals, industry experts, and academics to come together to discuss the latest trends and best practices in HR for metals and mining.

We believe that this conclave will serve as a catalyst for innovative thinking and will facilitate meaningful discussions and collaborations that will help shape the future of HR in this industry.

MTI, Ranchi's organizing committee deserves all the accolades for their efforts to make the International Conclave a grand success.

**Ajit Kumar Saxena**  
Chairman-Cum-Managing Director

**Dr Joseph Marianus Kujur SJ**  
Director, XISS



## Message

Dear participants of the conclave on digital HR,

I am pleased to address you today on the topic of digital HR, a rapidly evolving field that is transforming the way we work and manage talent. As we move towards a more connected, globalized world, digital HR has become essential in enabling organizations to attract, retain, and develop their employees.

In today's fast-paced environment, digital HR has the power to streamline HR processes, improve employee engagement, and enhance the overall employee experience. It can help organizations to leverage technology to automate routine tasks, such as recruitment, onboarding, and payroll processing, freeing up HR professionals to focus on strategic initiatives that drive business growth.

Digital HR can also facilitate employee development by providing personalized learning opportunities, enabling employees to acquire new skills and knowledge that are essential for their career growth. Additionally, it can help organizations to track employee performance and identify skill gaps, allowing them to develop targeted training programs and enhance their talent pipeline.

However, as we embrace digital HR, it is important to recognize that it also comes with its challenges. Data privacy, security, and ethical considerations must be carefully navigated to ensure that employees' personal information is protected. Moreover, there is a risk of creating a digital divide if access to technology is not equitable across the workforce.

In conclusion, I urge you all to embrace digital HR as a critical component of the modern workplace. By leveraging technology to streamline HR processes and enhance employee development, we can create a more engaged, productive, and successful workforce. Thank you for your attention, and I wish you all a productive and insightful conclave.

Dr Joseph Marianus Kujur SJ  
Director, XISS

अनिर्बान दासगुप्ता  
निदेशक प्रभारी  
**Anirban Dasgupta**  
Director In-charge



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भिलाई इस्पात संयंत्र  
BHILAI STEEL PLANT



## Message

At the outset, my congratulations to the entire organising team for choosing an appropriate theme of digital capability building for this conclave. I am sure that DCBMM-23 will help the participating Organisations in exploring digital solutions for overcoming limitations in adapting to emerging technologies in Metals & Mining industry. I wish Digital-HR Conclave on Capability Building in Metals and Mining (D-CBMM) 2023 a grand success.

(Anirban Dasgupta)

अमरेन्दु प्रकाश  
निदेशक प्रभारी  
**Amrendu Prakash**  
Director In-charge



स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड  
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## Message

**M**y congratulations to the teams from MTI/SAIL, CIL, MOIL, XISS and NHRDN Ranchi for coming together to organise this conclave on Digital-HR for Capability Building in Metals and Mining (D-CBMM) 2023. The theme for the conclave is the most appropriate keeping in view the digital revolution we are experiencing in the form of disruptive technologies affecting all aspects of business including engineering sector. I hope this conclave will be a huge success.

(Amarendu Prakash)  
Director I/c, BSL

वि. एस. चक्रवर्ती  
निदेशक (वाणिज्य)  
**V.S. Chakravarthy**  
Director (Commercial)



स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड  
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### Message

It gives me immense pleasure to know that Management Training Institute of SAIL is organising a conclave on Digital-HR for Capability Building in Metals and Mining (D-CBMM) 2023 in collaboration with C1L, MOIL, X1SS and NHRDN Ranchi Chapter. The Conclave will help in leveraging emerging technologies for capability building in engineering sector. I congratulate the organising team and wish that this conclave achieves its objective.

(V S Chakravarthy)  
Director (Commercial)

स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड, इस्पत भवन, लोदी रोड, नई दिल्ली 110 003 दूरभाष: +91-11-24365193, 24365918 ई-मेल: dcsail@sailin वेबसाईट www.sail.co.in  
Steel Authority of india Limited, Ispat Bhawan, Lodi Road, New Delhi 110003, Phone: +91-11-24365193, 24365918 E-mail: dc.sail@sail.in Website: www.sail.co.in  
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अतनु भौमिक  
प्रभारी निदेशक  
**Atanu Bhowmick**  
Director In-charge



स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड  
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### Message

**M**y compliments to Management Training Institute for organising the D-CBMM 23 conclave on digital capability building in metals and mining sectors. I also congratulate CIL, MOIL, XISS and NHRDN Ranchi for coming together to organise this conclave. I sincerely believe that this conclave will go a long way in addressing the challenges posed by the disruptive technologies in the modern-day engineering sector.

(Atanu Bhowmick)

Director I/c, RSP

स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड, राउरकेला स्टील प्लांट, राउरकेला, ओडिशा 769011 दूरभाष: (0661) 2510018 फैक्स (0661) 2511072 ई-मेल: rsp.director@sail.in  
Steel Authority of India Limited, Rourkela Steel Plant, Rourkela, Odisha-769 011 Phone: (0661) 2510018 Fax: (0661) 2511072 E-mail: rsp.director@sail.in  
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**बृजेन्द्र प्रताप सिंह**

निदेशक प्रभारी

बर्नपुर एवं दुर्गापुर इस्पात संयंत्र

**Brijendra Pratap Singh**

Director In-charge

Burnpur & Durgapur Steel Plant



स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड  
STEEL AUTHORITY OF INDIA LIMITED

इस्को इस्पात संयंत्र  
IISCO STEEL PLANT



## Message

**D**-CBMM 23 conclave is garnering huge attention as the conclave seeks to address the issues and challenges being faced by the engineering sector especially the metals and mining in adoption of disruptive technologies and going digital. The expert sessions, paper presentation, e-gallery competitions offer a great opportunity to the technology providers to showcase their products. My best wishes to the entire organizing team from MTI/SAIL, CIL, MOIL, XISS and NIRON Ranchi for the huge success of this event.

(BP Singh)

Director I/c (Burnpur & Durgapur Steel Plant)

बर्नपुर- 713325, पश्चिम बंगाल, दूरभाष 0341-2240551/2240586, फैक्स 0341-2241506, ई-मेल: isp.director@sail.in वेबसाइट: www.sail.co.in  
Burnpur 713325, West Bengal, Phone: 0341-2240551/2240586, Fax: 0341-2241506, E-mail: isp.director@sail.in, Website: www.sail.co.in

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ए.के. तुल्सीआनी  
निदेशक (वित्त)  
**A. K. Tulsiani**  
Director (Finance)



स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड  
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## Message

I am happy to note that Management Training Institute of SAIL, in collaboration with IIL, MOIL, XISS and NHRDN Ranchi Chapter is organising the D-CBMM conclave on digital technologies. This conclave comes at a very appropriate time. In the post-covid era, work culture and workplaces have undergone a sea change based on number of digital interventions. Digitalisation continues to emerge stronger with each passing day, leaving us with the only option to upgrade ourselves in line with the same. Rather, a closer analysis would reveal these digital interventions have made our lives more comfortable and work more systematic and organised. It would actually be in our interest to embrace it with open arms which would give us a technological edge in the short to long run.

The D-CBMM conclave on digital technologies would go a long way in bringing the challenges put forth by the disruptive technologies in engineering sector in general and Metals & Mining sector in particular. My best wishes to the organisers team for a successful event.

(A K Tulsiani)  
Director [Finance]

ऑफ इण्डिया लिमिटेड, इस्पात भवन लोदी रोड, नई दिल्ली 110003, दूरभाष: (011) 24368092 24369203, 24300400 ई-मेल: director.financetillin  
Steel Authority of India Limited, Ispat Bhawan, Lodi Road, New Delhi 110003, Phone: (011) 24368092, 24369203, 24300400 Email: director.financedsail.in  
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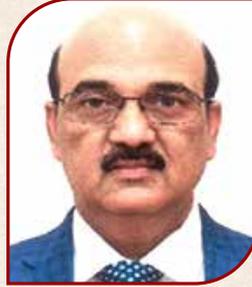
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के.के. सिंह  
निदेशक (कार्मिक)  
**K.K. Singh**  
Director (Personnel)



स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड  
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## Message

As the needs and expectations of employees and businesses continue to outgrow, HR needs to proactively adapt to meet the demand. Huge opportunities lie in the form of New-age HR tech solutions, Immense capabilities of modern technologies to engage with employees on real-time basis, Analytics for data-driven decisions, Artificial Intelligence & Machine Learning. But the moot question is about leadership & managerial competencies that are required to efficiently harness these technologies for building digital culture in the organisations.

It is indeed a welcome step that Management Training Institute, SAIL is organising “Digital-HR Conclave on Capability Building in Metals and Mining-2023” in collaboration with CIL, MOIL, XISS and NHRDN Ranchi Chapter. The conclave has been designed to focus on areas viz. “Redefining leadership capabilities in digital era” and strengthening digital-culture for lean & agile organization. In the present context, the focus could not have been more apt.

I am hopeful that the organisers and participants would work towards making this conclave a landmark event in redefining the challenges & opportunities associated with “Digital-HR” and launching an upgraded version of the “Managers & Leaders”; well-equipped to master these incredibly potent technologies of our times.

With Best wishes.

के.के.सिंह  
(K K Singh)

स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड, इस्पत भवन, लोदी रोड, नई दिल्ली 110003, दूरभाष : (011) 24368097, 24367259 ई-मेल : director.personnel@sail.in  
India Steel Authority of India Limited, Ispat Bhawan, Lodi Road, New Delhi 110003, Phone : (011) 24368097, 24367259 Email : director.personnel@sail.in  
Corporate Identity Number: L27109DL1973GO1006454

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**अरविन्द कुमार सिंह**

निदेशक (तकनीकी, परियोजनाएं एवं रॉ मैटेरियल्स)

**Arvind Kumar Singh**

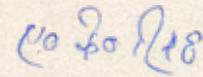
Director (Technical, Projects & Raw Materials)

इस्पात भवन, लोधी रोड, नई दिल्ली-110003  
Ispat Bhawan, Lodhi Road, New Delhi-110003



Message

The Digital-HR Conclave on Capability Building in Metals and Mining (D-CBMM) 2023 being organised by Management Training Institute of SAIL in collaboration with CIL, MOIL, XISS and NHRDN Ranchi Chapter is going to offer a common platform for the business leaders & technology providers to understand challenges & need for deployment of digital HR in the business context of capability building in Metals & Mining industry. I sincerely believe that this conclave will be a big success.



(Arvind Kumar Singh)

## सेंट्रल कोलफील्ड्स लिमिटेड

(कोल इण्डिया की एक सहायक कंपनी)

कार्मिक निदेशालय

दरभंगा हाउस, रांची-834029

दूरभाष संख्या : 0651-2360013/Extn-5123

ई:मेल- dp.ccl.cil@coalindia.in

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### Message

It gives me great pleasure to know that Academicians and Industry leaders are joining hands to organise a mega conclave aimed at identifying a road map for Capability Building by incorporating the principles and processes of Digital Transformation for leveraging both talent and technology.

I would like to congratulate the team from SAIL, CCL, MOIL, XISS and NHRDN Ranchi for coming together to organise such conclave.

I sincerely wish the organisers & participants of this Conclave a grand success in their endeavour to address the challenges posed by the disruptive technologies in the modern-day engineering sector.

(H. N. Mishra)  
Director (Personnel)  
Central Coalfields Limited



## About the Conclave

Conclave on Digital HR for Capability Building in Metals & Mining industry (D-CBMM 2023) is being organised during 12th-13th April 2023 at MTI SAIL Ranchi.

The Conclave is being organized in the wake of the paradigm shift in industry landscape with the advent of emerging technologies.

**The following are the key features of the Conclave :**

- discussion on the way ahead for bringing talent & technology together for a meaningful Digital Transformation
- discussion on the building talent & culture for adoption of emerging technology including Industry-4.0
- Showcasing of Digital HR products & services for overcoming human limitations for using technology
- Learning best practices & strategy for effective digital transformation across organisation

Several top-level dignitaries from engineering/ production / operations / maintenance functions of Engineering, Metals & Mining Sector, as well as Academia, are participating in the Conclave. Also, leading Technology partners/consultants/suppliers/ experts/ companies shall be sharing their experiences & perspective on the subject. This shall enable participating organisations to develop a road map on use of digital transformation tools, systems, processes & platforms for enhancing organisational performance.

Looking forward to a wonderful experience for all participants and the organizing team.

(Mohammad Yusuf Hussain)  
Sr Faculty MTI SAIL  
& Secretary, National HRD Network, Ranchi Chapter

## Emerging technology for Metal and Mining Industry

### Paper 1: EPIC: Emulated PLC in the Cloud for Industry 5.0

Parichay Bhattacharjee\*, Prashant Kumar Singh

CRM-III, SAIL, Bokaro Steel Plant,

Bokaro Steel City-827001, Jharkhand, India

\*Corresponding author Email & Mobile: parichay.b@sail.in , 8986875019

**Abstract:** As manufacturing industries embark upon the transition from Industry 4.0 to Industry 5.0, one of the defining attributes fueling this transformation is the ever-increasing use of resource virtualization. In this work, we propose the Emulated PLC In the Cloud (EPIC) architecture for providing control through a virtualized Programmable Logic Controller (PLC) as a utility service for industrial automation use-cases. EPIC opens up a new paradigm in industrial automation and process control by intermingling the key benefits of Cloud-based virtualization and Edge Computing to provide a robust alternative to traditional PLC-based infrastructures. EPIC decouples the computational requirement of an industry from its innate dependencies on difficult-to-scale hardware. We also introduce the concept of Common Controllers (CC) that leverages the EPIC architecture to provide real-time execution of programs of physically distant factories and industries within the same virtualized PLC in the cloud. The EPIC architecture also allows legacy and non-IoT compliant PLCs to tap the benefits of virtualized execution and dynamic scalability. The proposed system is secured, scalable, interoperable, multi-tenant capable, backward-compatible and easily integrable in existing industrial setups. EPIC's efficacy is evaluated in an actual steel industry through extensive experimentation on a networked water tank and pump setup. EPIC achieves 37.49% lesser scan cycle time, 54.61% lesser response time, 68.77% lesser end-to-end delay, and 22.12% lesser packet drop rate compared to industrial PLCs. Additionally, EPIC can massively extend work and load memories for PLC program execution and support cross-vendor applications and implementations. The results obtained establish the EPIC architecture as a potent alternative and comparable to standalone industrial PLCs in terms of quantifiable performance metrics such as Scan Cycle time and Response time as well as intangible benefits such as unlimited memory, seamless scalability, and the ability to multi-task on program execution fronts, which are important contributions of this work.

### Paper 2: Prescriptive Analytics using Hybrid Models: Applications in Steel Rolling

Sushant Rath

R&D Centre for Iron & Steel,

Steel Authority of India Limited, Ranchi, Jharkhand, 834002

Corresponding author Email & Mobile: srath@sail.in, 8986880111

**Abstract:** Manufacturing industries are passing through a phase of transformation from the 3rd to the 4th industrial revolution, also referred to as Industry 4.0 or Industrial Internet of Things (IIoT), with analytics at its core. Based on complexity, analytics are generally classified into four types: descriptive, diagnostic, predictive, and prescriptive. This paper describes different applications of hybrid prescriptive analytics models in steel rolling. The hybrid models are developed by integrating traditional mathematical models with machine learning (ML) algorithms. This type of prescriptive hybrid model uses a series of multi-variable optimization algorithms. One such prescriptive analytics model determines an optimized draft schedule with objective functions of maximizing mill productivity or minimizing specific heat energy consumption or minimizing specific power consumption within constraints of allowable force, torque, power, and targeted mechanical properties. This paper also discusses MOOC training programs for employees working on digitization projects.

### Paper 3: Driving the Wheels of Change: Techno-managerial Interventions at the Wheel and Axle Plant of SAIL DSP

Aneesh PA<sup>1\*</sup>, Archana Sharan<sup>1</sup>, Diwakar Raj<sup>2</sup>, SA Balaji<sup>2</sup>, Jit Sarkar<sup>3</sup>, SK Behera<sup>3</sup>

<sup>1</sup>RDCIS, SAIL, Ranchi-834002, Ranchi, Jharkhand, India

<sup>2</sup>DCIS Plant Centre, SAIL, Durgapur-713203, Durgapur, West Bengal, India

<sup>3</sup>DSP, SAIL, Durgapur-713203, Durgapur, West Bengal, India

\*Corresponding author Email & Mobile: aneesh@sail.in , 8986880327

**Abstract:** Railway wheels produced at the Wheel and Axle Plant of Durgapur Steel Plant are in great demand and have been enjoying unparalleled trust and a decade-long association with Indian Railways. Recently, there has been a worrying trend in the productivity of the

plant owing to high levels of rejection at quality assurance tests like Brinell hardness. Hence, RDCIS, the research and development wing of SAIL, along with DSP, jointly formulated a project to introduce an improved heating control system for heat-treatment furnaces. The objective of the project was to reduce variation of temperature within various zones of the heat treatment furnaces by establishing a strict heating regime to produce wheels with desired thermo-mechanical properties. However, during progressive elaboration of the project, the team worked in a self-organized manner and formulated a solution that had both technological as well as HR interventions, which resulted in developing synergy between multiple departments. A hybrid model of project management greatly assisted the team to cope with several unforeseen hurdles that propped up during the implementation phase of the project. After successful commissioning of the system, variation of zonal temperature has been brought down to  $\pm 10$  degrees Celsius from earlier levels of  $\pm 40$  degrees Celsius. It led to a reduction of wheels rejected at the Brinell hardness test from 8% to 6%. In this paper, we discuss various technological and HR management techniques that have contributed to the success of the project.

## Paper 4: Applications of Machine Learning and Data Analytics in Oxygen Plant

Arghya Roy, Anu Prakash, Ankur Dutta

Instrumentation, SAIL, IISCO Steel Plant

Burnpur, West Bengal, India

Corresponding author Email: arghya.roy@sail.in

**Abstract:** Oxygen Plant plays a pivotal role in steel industries. The main products from the plant include Oxygen, Nitrogen, and ultra-pure Argon. High-pressure Oxygen at  $20 \text{ kg/cm}^2$  is supplied to Basic Oxygen Furnaces for oxygen lancing, supply of Oxygen at  $8 \text{ kg/cm}^2$  to blast furnaces for blast Air Oxygen enrichment, use of Oxygen for scrap cutting, and for other miscellaneous activities like cutting and welding. High-pressure Nitrogen at  $30 \text{ kg/cm}^2$  is used for converter splashing and flare stack purging, and Nitrogen is also supplied to Blast furnace at  $14 \text{ kg/cm}^2$  for Coal Dust Injection. Ultra-pure Argon, which is the final product from the oxygen plant, is supplied to Basic Oxygen Furnaces for ladle stirring at  $16 \text{ kg/cm}^2$  and for other miscellaneous activities like welding, etc. Apart from the above-mentioned utilities of the oxygen plant in the total steel-making process pipeline, the oxygen plant also caters to the need for medical oxygen. For uninterrupted continuous production in the manufacturing plant like Oxygen Plant, proper health monitoring of high-speed rotating devices like main air compressors, booster air compressors, expansion turbines, and cryogenic pumps is extremely important. Many times these devices go to unscheduled breakdown that causes a delay in the production time and ultimately causes a substantial financial loss in the total production cycle. Not only it causes huge production losses, but it is also a safety concern as these rotating devices operate at higher speeds. Conditional-based monitoring of these machines is being done through data collection of important parameters like vibration, axial shift position, bearing temperature, differential pressure, etc. Predictive models are being developed through different supervised machine learning techniques, which will help predict machine's critical parameters depending on other process conditions so that unscheduled breakdowns can be reduced, which in turn will increase its reliability. Oxygen Plant is the most power-consuming unit in the steel plant. Power optimization of the main machines in the oxygen plant like main air compressors, booster air compressors, expansion turbines, and cryogenic pumps through machine learning models is being applied to determine the predicted power output depending on various parameters of the machines like the position of its inlet guide vane, suction temperature, discharge pressure, etc. and comparing it with the actual power taken, which will help to determine the maximum power drawn by which machines and accordingly adjust their parameters to determine their optimum performance level. Supervised machine learning techniques are being used to predict the high-pressure and low-pressure oxygen production depending on other process parameters of the cold box of the oxygen plant. Optimization of the production by finding out the important process parameters and its tuning, which affects production, is determined. Evaluation of the prediction models on the basis of parameters like  $R^2$  value, absolute root mean square error is being done, and finally, deployment of the models in the actual process and visualization through a dashboard is being established.

### Technical Session 2

## Redefining Leadership Capabilities in Digital Era

### Paper 1: Human Resource Analytics – an Emerging Field in The Digital ERA

Shalabh Sharma

Centre for Engineering and Technology, SAIL, Rourkela-769011, Odisha, India

Corresponding author Email & Mobile: projectshalabh@gmail.com, 9717652929

**Abstract:** Human Resource analytics is an emerging field gaining widespread popularity among organizations. Based on a comprehensive review of about 144 papers from ProQuest, Google Scholar, and Scopus databases, this paper attempts to highlight the potential of HR

analytics to transform organizations and also bring to light an opportunity where HR's future shall be brighter than the past. From tracking the concept of HR analytics and its ability to influence business, the paper goes on to explore various aspects of the buzzword in detail and organizes the contributions of various scholars in order to build a framework for understanding HR analytics. It also emerges that, besides the hard elements (data, strategy, technology), the softer elements, viz. people, their skills, mindset/culture of the organization, etc., are equally important for the success of HR analytics. The paper concludes that organizations, including those in the metals and mining industry, can improve their overall effectiveness by way of evidence-based or data-driven decision-making through the adoption of HR analytics.

## Paper 2: Redefining Leadership Capabilities in Digital era: RELAX & MOVE

Anju Singh

Personnel Dept., Bokaro Steel Plant, SAIL,  
Bokaro Steel City, Jharkhand, India  
Corresponding author Email: anju.singh@sail.in

**Abstract:** The modern world has undergone a dramatic transition toward the digital era. To keep up with the changes occurring everywhere, enterprises must emphasize more on digital transformation. Digital transformation can be frightening and bewildering. Nonetheless, adaptation becomes easy if the 'great leaders' are certain about the changes and how they will benefit everyone. Many leaders today find it challenging to cope with the increasing pace and unpredictability of change. For a large number of industries, the root cause of this change is disruption fueled by digitization of products, processes, and business models. This report seeks to explore the capabilities that leaders require to succeed in the digital era. This paper is based on small models which Bokaro Steel has introduced successfully during the recent past. The research found that leadership capabilities in the digital era shared many of the same characteristics as leadership in more stable environments, with a few notable exceptions. This paper provides the readers with the mantra: RELAX AND MOVE.

## Paper 3: Challenges in Capacity Building in Industry 4.0 Technologies in Steel Industry: Case Study of Bokaro Steel Plant

YSN Reddy\*, Bipin Krishna Sartape

Computerization, Automation & Communication, SAIL,  
Bokaro Steel Plant, Bokaro Steel City-827001, Jharkhand, India

\*Corresponding author Email & Mobile: y.suryanarayana@sail.in , 8986874724

**Abstract:** Despite rapid automation, the need for human resources is more critical than ever, and digital transformation is driven by people, not technology. As SAIL has embarked on a journey of digital transformation, Bokaro Steel Plant, an integrated steel plant of SAIL, has a task at hand: to create a future-ready workforce that can initiate and drive digital transformation projects while also developing a team of specialists in Industry 4.0 technologies. To achieve this, BSL has partnered with some of India's top institutes, including IIIT Hyderabad (one of the top 10 AI/ML labs in Asia), IIT Kanpur, and IIT Roorkee, for curriculum design and training delivery. IIT-Roorkee has conducted the first training for Centre for Digital Transformation (CoDT) members through virtual mode. Applying learnings from this, changes were made in training curriculum and delivery, such as focusing on breadth of technologies rather than depth and shifting to physical mode delivery for effective learning. The program was conceptualized by CoDT in collaboration with HRD to cover all young workforce (Age <45 Years) of BSL across disciplines of Works, Non-Works, and Mines. IIT Kanpur was roped in as the delivery partner, and the curriculum was designed by CoDT in consultation with IIT Kanpur. A Leadership workshop was conducted for all the CGMs and HoDs to onboard them on this journey and sensitize them to the program. Owing to the complexity of the program, an online nomination module and a digital dashboard for real-time monitoring of training, learning metrics, and feedback were deployed. The response was overwhelming, with more than 80% of participants rating either very good or good and praising the delivery and content. A six-month-long duration program will be started once the introduction phase is over to develop captive teams in Industry 4.0 technologies. This kind of approach not only builds the breadth in terms of overall knowledge of Industry 4.0 technologies among a large section of people but also creates a selected pool of captive teams for each technology. These learnings can be applied to any organization or SAIL plants to implement large-scale capacity building programs in Digital transformation.

## Paper 4: Employee Interface System – a digital HR initiative for Capability building in Rourkela Steel Plant

Anup Agarwal<sup>1</sup>\*, Sanjib Kumar Behera<sup>2</sup>, Somadutta Tripathy<sup>2</sup>

<sup>1</sup>Hot Strip Mill-2 Department, Rourkela Steel Plant, Rourkela-769002, Odisha, India

<sup>2</sup>Personnel Department, Rourkela Steel Plant, Rourkela-769002, Odisha, India

\*Corresponding author Email & Mobile: anup.agarwal@sail.in , 8895504326

**Abstract:** Today, HR is evolving into a technology-based profession providing universal one-stop access to HR services through technology-based web applications, mobile applications, and changing human resource management practices worldwide. These are not only resulting

in faster, improved service but also reducing operational costs and eliminating human error. With this goal, Rourkela Steel Plant (RSP), a unit of Steel Authority India Limited, has also taken digital HR initiatives to streamline HR processes and reduce administrative burdens. One such solution that the HR team of RSP has implemented is Employee-Zone and Karmi-Mitra under Employee Interface Initiatives. Employee-Zone is a web-based application that an employee can access anywhere on a computer system within RSP premises, and Karmi-Mitra is a mobile-based application that an employee can access anywhere on a mobile, in and outside RSP premises. These initiatives have eliminated the use of paper for various HR applications and have also reduced the response time for various HR services. Additionally, these have also impacted in reducing the operating costs and eliminating human error. Employees can now browse various HR services related to Quarter option, Service certificates, Medical Treatment Book (MTB), OPD Appointments, Vaccination bookings, Various reimbursements, Allowances, and Tax exemption data etc. through these portals. In addition to this, it also provides storage access to data related to Past medical reports, Statutory data, and other financial data for the reference of employees. The paper talks about these initiatives in detail, from approach to solution and how they have impacted the company, the employees, and the human resource management. The paper also sheds light on prospects that can be worked upon in these applications to eliminate any shortcomings and further provide broader and effective HR services through digital means.

### Technical Session 3

## Digital Culture for Lean and Agile Organization

### Paper 1: Digital Culture for Lean & Agile Organization

**Manohar Singh**

GAIL (India) Limited, Petrochemical Complex, Pata,  
Auraiya-206241, Uttar Pradesh, India

Corresponding author Email & Mobile: manohar.singh@gail.co.in, 9903322900

**Abstract:** Digital culture in an organization is the relationship between employees and the use of technology. Embracing digital has now become a mandate for any organization to be successful, and it is imperative, especially for lean organizations, to develop a digital and data mindset to remain competitive in the marketplace. Digital tools help organizations save time and money while improving communication, driving productivity, recruiting top talent, giving employees the ability to work from anywhere, providing information that can influence business decisions, and more. The paper identifies four major components that can help make digital transformation a success in lean and agile organizations. A top-down approach, strategy over technology mindset, a culture that encourages innovation, risk-taking, and optimizing operational processes are the most important elements that can drive digital transformation. Additionally, upskilling employees and encouraging them to take ownership of their growth lie at the core of making a digital culture sustainable. A case study of initiatives by several companies toward digital transformation has been discussed to design the best possible strategy that can drive digital culture in lean and agile organizations. Executive support, removing the concept of silos, breaking the stereotype around failure and risk aversion are a few of the factors that have been identified.

### Paper 2: A Study on Impact of EHRM on Organizational Performance

**Dr Sandeep Kumar, Dr Rashi Malpani & Dr Nitu Singhi**

Faculty of Commerce & Management, Sarala Birla University, Ranchi-83510,  
Jharkhand, India

Corresponding author Email: nitu.singhi@sbu.ac.in

**Abstract :** In the current digital age, the impact of technology on organizational performance has become increasingly significant. The emergence of electronic human resource management (e-HRM) has revolutionized the way organizations manage their workforce. E-HRM refers to the use of digital technology to manage human resource activities, including recruitment, selection, performance appraisal, training, and development. This has led to many benefits for organizations, including increased efficiency, reduced costs, and improved overall performance. Most large businesses and institutions now employ electronic human resource management (E-HRM), which is one of the crucial organizational systems for human resource management (HRM), and its applications have been found to be very efficient and economical. The present study aims at investigating the impact of electronic human resource management (E-HRM) on organizational performance. The sample of this study included 250 line managers. To carry out this study, a cross-sectional research design was used. Data was collected through a structured questionnaire. Correlation and hierarchical regression analysis were implemented to test the hypothesis. The article empirically proves that there exists a positive relationship between E-HRM and Organizational Performance. The study also focuses on how important e-HRM practices are for enhancing organizational effectiveness and giving the company a competitive edge.

With electronic systems, HR managers can communicate with employees in real-time, using a variety of channels such as email, instant messaging, and social media. This will help to build stronger relationships between employees and their managers, and to create a more positive work environment.

### **Paper 3: ISP: Inspiring Culture of Excellence through Digital Transformation**

**Ravi Shanker Pandey<sup>1\*</sup>, Kadar Mani<sup>2</sup>, Deepak Kumar<sup>1</sup>, Sanjib Ranjan Das<sup>3</sup>**

<sup>1</sup>Comp & Auto Department, <sup>2</sup>Human Resource Department, <sup>3</sup>Instru. & Auto Department,  
IISCO Steel Plant, SAIL, Burnpur-713325, West Bengal, India

\*Corresponding author Email & Mobile: ravi.pandey@sail.in, 9434776591

**Abstract :** The iron and steel industry has been a cornerstone of the global economy for centuries, but to stay competitive in today's rapidly changing market conditions and environmental landscape, it's crucial to embrace new technologies. The most successful organizations know that lean and agile practices are not just something to do, but something to become. SAIL-ISP is a shining example of transformation and innovation. With a rich history that dates back to an era of old-age machinery, the plant has now set its sights on the future by embracing digital transformation and Industry 4.0. The use of cutting-edge technologies like cyber physical systems, IIoT, Cloud analytics, etc., and sensitization programs for employees has fostered a digital culture that's driving progress. These distinctive and unprecedented strides are playing pivotal roles in optimizing production processes, reducing costs, enhancing product quality, prioritizing safety, and enhancing digital skills and competence. SAIL-ISP has been committed to this changing landscape and adopted the "D-BOT" (Convergence of Data, Business, Organization & Technology) strategy to stay ahead of the competition. Our suite of innovative systems to streamline the process and production data onto a common digital platform includes Unified Plant View (UPV), Laboratory Information and Management System (LIMS), Shopwise Digital Dashboards, Life Cycle & Condition Monitoring System, HEC Cloud-Based ERP System, and HR intervention for promoting Digital Culture like weekly sensitization program: Arambh, Reverse mentoring model, Data scientist scheme, and Online Internal Customer Satisfaction module. These systems enable us to efficiently capture, analyze and optimize our process, production, quality & maintenance data, enhancing our decision-making capabilities. At SAIL-ISP, we place a strong emphasis on our employees' professional growth, and our HR orientation focuses on inculcating digital culture through awareness and training sessions on these innovative systems. We believe that by providing our employees with the tools and expertise they need to be up to date with the latest technologies and systems, we will together create a culture of excellence that drives our organization forward.

### **Paper 4: Achieving HR goals through Digital technologies at BSL**

**Nidhi<sup>1\*</sup>, Ravi Kant Ravi<sup>2</sup>**

<sup>1</sup>C&A, Bokaro Steel Plant,

<sup>2</sup>EL&TC, Bokaro Steel Plant,

Bokaro Steel City - 827004, Jharkhand, India.

\*Corresponding author Email & Mobile: nidhi@sail.in , 8986872458

**Abstract :** In the metal and mining industry, digital transformation has become a critical priority for organizations seeking to improve HR processes and maximize workforce efficiency. By leveraging the power of the Internet and digital technologies, organizations in the metal and mining industry can now access a wealth of HR data and tools to achieve this goal. These include cloud-based HR management systems, virtual recruiting and onboarding platforms, online learning and development programs, work from home, remote health monitoring of employees, employee safety, employee self-service, and surveys, etc. This paper explores the use of digital technologies in achieving digital HR goals, with a focus on key strategies and best practices at Bokaro Steel Plant and also to bring in centralized system to replace old legacy decentralized systems. The paper begins by defining digital HR and providing an overview of digital technologies such as FTTH, SVDS with ANPR, SIP devices, Oracle HCM Cloud, Drone survey, Biometric system which are already implemented or will be implemented at BSL. It then examines how organizations can use these technologies to achieve digital HR goals, including their application in recruitment and selection, learning and development, performance management, employee engagement, and HR safety in the metals and mining industry. Throughout the paper, case studies, real-world examples, and use cases illustrate how organizations are leveraging internet and digital technologies to achieve their digital HR goals. Ultimately, this paper demonstrates that internet and digital technologies are critical components of a successful digital HR strategy, and that organizations must embrace these technologies to stay competitive and meet the evolving needs of their workforce.

## Adopting SMAC technology in large Organizations

### Paper 1: e-Requisition System – A Unique HR Solution

Saurabh Varshney<sup>1\*</sup>, Arunesh Sharma<sup>1</sup>, Akhil UK<sup>1</sup>, Jitendra Meena<sup>2</sup>

<sup>1</sup>Sinter Plant-III, Bhilai Steel Plant,

<sup>2</sup>C&IT, Bhilai Steel Plant,

Steel Authority of India Limited, Bhilai - 490001, Chhattisgarh, India

\*Corresponding author Email & Mobile: svarshney@sail.in, 9407980494

**Abstract:** Sinter Plant-III (SP-III) in Bhilai Steel Plant is spread over a vast area and is divided into three operational areas: Raw Material Area, Machine #1, and Machine #2. Currently, requisitions for various electrical jobs to be carried out in SP-III are given by the Mechanical & Operation sections in written format in the requisition register present in respective electrical shift rooms located at three different locations or telephonically in case of emergency or breakdown. In the current system, the requisitioner has to physically come from the work site to the respective shift room for lodging requisitions, leading to delays. As there is no formal feedback system for completion of the requested jobs to the requisitioner, chances of miscommunication can happen, especially in the case of verbal requisitions. The e-Requisition system, developed as part of an Industry 4.0-related workflow digitization initiative in SP-III, is designed such that requisitions can be given from any PC or mobile by authorized personnel and feedback of job execution can be given from these devices with proper time stamping, improving time accountability and minimizing inordinate delays and the need for the physical presence of the requisitioner for manual entry. This cross-platform system has been developed entirely in-house. The system is developed with five major workflows with different access levels. With the new system replacing the traditional register, the entire process has been streamlined, directly impacting and improving the productivity of man and machine, along with enhanced safety, with unnecessary delays being avoided leading to lesser turnaround times. By leveraging IT to automate mundane tasks, employees can now focus on more engaging and fulfilling work, leading to increased job satisfaction and a better work-life balance. Bhilai Steel Plant is in the process of embracing many such technologies to help create a lean and agile workforce.

### Paper 2: Digital Interventions for Enhancing Performance and capability Building at SAIL, Bokaro Steel Plant Learning Development Centre

Neeta Baa<sup>1\*</sup>, Amit Anand<sup>1</sup>, Dinesh Kumar Singh<sup>1</sup>

<sup>1</sup>Human Resource Development, Bokaro Steel Plant, SAIL

Bokaro Steel City - 827001, Jharkhand, India

\*Corresponding author Email & Mobile: neeta.baa@sail.in , 8986872359

**Abstract:** Bokaro Steel Plant Learning and Development Centre has taken significant steps towards digitizing its training and development processes to enhance its performance and capability building. The two such interventions are the SAP-based Vocational training system and SAP-based management information system. The vocational training system has enabled the BSL L&D Centre to streamline its vocational training activities, which include applying for vocational training, payment of training fee, issuance of gate passes, submission of training completion report, and generation of training completion certification. The system is a SAP-based application linked with the web-based system and is accessible through the domain name <https://vt.bokarosteel.in>. The BSL L&D Centre has successfully completed the vocational training of 909 students through this system in the year 2022-23, generating a revenue of Rs. 2912063. This system has enabled BSL L&D Centre to have a more transparent and efficient process, thereby enhancing its performance and capability building. The second intervention is the SAP-based management information system, which the BSL L&D Centre has implemented for the preparation of a training plan, identification of training needs, preparation of training completion reports, training programme coordinator report preparation, training programme evaluation, date range-wise report generation, inviting different award nominations and finalization of awards, archiving of important Power Point presentation, performance improvement workshop action plan report, and other minutes of the meeting in the SAP-based system for easy access. The system has helped the BSL L&D Centre to monitor the training process more efficiently, analyze the data-driven decisions to enhance its performance and capability building.

## Paper 3: Journey of Digital Transformation at ISP: Influencing Lives in and Around

Deepak Kumar<sup>1\*</sup>, Gaurav Kumar Singh<sup>2</sup>, R S Pandey<sup>1</sup>, Sanjib Ranjan Das<sup>3</sup>

<sup>1</sup>Comp. & Auto. Department, IISCO Steel Plant, SAIL

<sup>2</sup>Human Resource Department, IISCO Steel Plant, SAIL

<sup>3</sup>Instru. & Auto. Department, IISCO Steel Plant, SAIL,  
Burnpur - 713325, West Bengal, India

\*Corresponding author Email & Mobile: Deepak.kumar1@sail.in , 9434777041

**Abstract:** The Indian Steel Industry employs more than two lakh people at present. SAIL has a share of nearly fifty percent in that. India has set a target to double the crude steel production capacity from 154 million tonnes per annum to 300 million tonnes per annum in the next 9 to 10 years in order to boost indigenous capabilities. Digital transformation and Industry 4.0 shall be playing a major role in achieving this dream. Digitalization not only concerns the application of technologies to the production or use of advanced tools for optimization and sustainability, but it also concerns the continuous updating of skills and changing needs of the steel industry workforce. Over time, traditional HR practices have given way to Digital HR practices. Social, mobile, analytics, and cloud (SMAC) technologies are leveraged to make HR more efficient, effective, and connected. At ISP Capability Building, Reverse Mentoring, Development of Data Scientists, well-conceptualized training programs/modules have led employees and management to take data-driven decisions. It resulted in successful development and implementation of digital solutions like real-time dashboard for all process units, Laboratory Information Management System (LIMS), Unified Plant View (UPV), Digital Twins, etc. Digital initiatives have also been taken to ease the life of employees and stakeholders. Digital HR practices helped to establish harmony among the environment, steel plant, and society. In this paper, a systematic approach has been adopted to understand the impact of the digital journey of ISP on the workforce and the role of HR in its implementation.

## Paper 4: Achieving synergy in Contract Labour Management at RSP using Digital platform-Online Contract Labour Management System (OCLMS)

Harinath Yadav<sup>1</sup>, Sangeeta Maria Sindur<sup>2</sup>, Sanjay Kumar Gautam<sup>3</sup>

<sup>1</sup>Raw Material Handling Plant, <sup>2</sup>Personnel Department, <sup>3</sup>Computer & IT Dept,  
Rourkela Steel Plant, SAIL, Rourkela - 769011, Odisha, India

\*Corresponding author Email: harinath.yadav@sail.in

**Abstract:** In the present times, Contract Labour Management is of utmost importance for growing industry to manage activities of Contract Labours, and digitisation of the system becomes the need of the hour. Rourkela Steel Plant, as its HR objective, believes in its philosophy that “People” are the most important and invaluable assets in any organisation, including Contract Labours. Various challenges were faced by the organisation due to obsolete processes and manual interventions in managing Contract Labours who were being deployed in various departments for the execution of various jobs. With a focus to improve processes, from the start to the end of the Contract and maintaining a Centralised System to enhance the ease of accessibility of information and details w.r.t Contractors and Contract Labour to all the stakeholders, an Online Contract Labour Management System (OCLMS) has been developed in RSP. The system has enabled the organisation to maintain transparency and develop an efficient process in the overall working of Contract Labour Management. The system has helped in digitisation of the processes like Pass Management, Safety Training details of the Contract Labours, Labour Deployment, and Bills Clearance System.

### Technical Session 5

## Tools for immersive employee experience

### Paper 1: Exploring the Potential of Extended Reality in Learning and Development: A Review of Current Applications and Future Directions

Chandra Nath Kumar

Academics & IT, Management Training Institute,  
SAIL, Ranchi - 834002, Jharkhand, India

Corresponding author Email & Mobile: Chandra.kumar@sail.in , 8986880630

**Abstract:** Extended reality (XR) technologies, including virtual, augmented, and mixed reality, have been gaining increasing attention in the field of learning and development (L&D) as a means of enhancing training outcomes and improving learning experiences. These have

the potential to revolutionize capability development by providing immersive, personalized, collaborative, and remote learning experiences that can enhance the effectiveness and efficiency of capability development programs. This paper provides a comprehensive review of the current state of the art in XR-based L&D, covering a range of topics including the benefits of XR for training, the different types of XR technologies and their applications, and the challenges and limitations of implementing XR in L&D. The review highlights that XR has the potential to create highly immersive and engaging learning experiences that can simulate real-world environments and tasks, enhance learner motivation and retention, and facilitate more efficient and effective training. Several studies have shown that XR-based training can lead to better learning outcomes compared to traditional methods, particularly in domains such as technical and procedural training, where hands-on practice is critical. However, the review also points out some of the challenges and limitations of XR-based L&D, including the high cost of hardware and software, the need for specialized skills and expertise to develop XR applications, and the potential for motion sickness and other side effects in some learners. Furthermore, the review identifies several areas for future research, such as exploring the optimal design of XR-based learning environments, investigating the role of XR in soft skills training, and examining the long-term effectiveness of XR-based training. Overall, this paper argues that XR has significant potential for enhancing L&D, but also highlights the need for careful consideration of the benefits and limitations of XR, as well as the development of appropriate strategies and guidelines for its effective use in different contexts.

## Paper 2: Gamification in Learning and Development

**Aprajita Sharma\*, Saumya Pandey, Dr. Sharda Singh**

Human Resource Management, Xavier Institute of Social Service,  
Ranchi - 834001, Jharkhand, India

\*Corresponding author Email & Mobile: asharma28hr2022-24@xiss.ac.in, 7905187831

**Abstract:** Gamification refers to applying game design principles and mechanics that enhance learner motivation levels and improve knowledge retention and engagement through social mechanisms like badges, points, or leaderboards. In today's VUCA world, technology is naturally a driving force behind learning and the development of employees. Industries increasingly utilize cutting-edge digital tools and strategies to achieve better results in their learning and development methods. In the case of metals and mining industries, implementing gamification in the learning and development methods can help build their workforce's capabilities. They are facing huge skill storage because they are unable to adapt to constant innovation and technological changes, which makes this sector unattractive to the younger generation. Bringing gamification to learning and development will increase the engagement and productivity of employees, encourage social interaction and teamwork, and foster creativity and innovation in the work culture. This will gradually help retain and attract young talents to the metal and mining industries. The main purpose of this research paper is to study the metals and mining industry's problems and challenges regarding skill shortage and how the adaptation of gamification in the learning and development process can help this industry overcome these challenges.

## Paper 3: ChatGPT: The Trend Changer in the field of HR

**G S S Anila, Rashmi, Dr. Sharda Singh\***

Human Resource Management, Xavier Institute of Social Service,  
Ranchi - 834001, Jharkhand, India

\*Corresponding author Email: shardasingh@xiss.ac.in

**Abstract :** ChatGPT is a language model developed by OpenAI, designed to respond to text-based queries and generate natural language responses. It is a part of the broader field of artificial intelligence known as natural language processing (NLP), which seeks to teach computers to understand and interpret human language. ChatGPT can be used for a plethora of work, including activities in the HR domain. In this research paper, we have tried to explain the application of ChatGPT in the entire employee life cycle. Through this paper, our emphasis is to establish various benefits in the field of HR tech, accelerated by ChatGPT. The various HR functions included in this research paper are recruitment, learning and development, performance management, career planning, and employee engagement. Other HR applications have also been briefly explained. For the accomplishment of this research paper, we have taken ideas and concepts from various articles and authors who have explained these activities thoroughly in their works. Apart from explaining the benefits, we have briefly tried to touch on other aspects like the privacy and confidentiality concerns of using ChatGPT. We propose that immediate implementation of ChatGPT may not be on the cards as of now, but the wide range of applications that it provides will surely bring about a change in the HR domain, as it can reduce redundant work and enhance efficiency as well as the effectiveness of the employees.

## Paper 4: Moving Closer: AI enabled SAIL CMO Chatbot

Ariff Khan<sup>1</sup>, Sachin Narang<sup>2</sup>

<sup>1</sup>Central Marketing Organization, SAIL ,Chennai -600024 ,Tamil Nadu ,India

<sup>2</sup>Central Marketing Organization, SAIL ,Faridabad -121001 ,Haryana, India

\*Corresponding author Email & Mobile: ariffkhan@sail.in , 919002561441

**Abstract :** Steel Authority of India Limited (SAIL) is one of the largest steel-making companies in India and one of the Maharatnas of the country's Central Public Sector Enterprises. In the past few years, the steel industry has dramatically changed due to the strong competitive scenario and changing customer requirements. The balance of power has shifted to the buyer and has forced all the steel makers to stay on their toes. With the advent of modern digital technologies and B2C platforms, customer expectations have changed from customer satisfaction to personalized customer experiences. In the last 10 years, the steel production of SAIL has gone up 31%, revenue by more than 100%, while manpower has gone down by 39%. With increased volumes and customer base, customer interactions have not only gone up substantially but are happening across multiple channels including social media. B2B customers, who form the major customer base of SAIL, now want a B2C experience. With this background, the paper discusses SAIL's challenges for improved customer experience and flow of information anytime, anywhere to its customers. One of the solutions planned by SAIL CMO is developing an AI-based Conversational Chatbot for its customers, one of its kind in the Steel Industry. This AI bot will automate customer acquisition and offer an improved and intuitive customer experience by delivering personal experiences across multiple touchpoints. It will answer customer queries pertaining to many aspects of our Sales, Warehousing, Finance, Retail, and EXIM operations. The bot is integrated with SAP ERP system for real-time data availability. SAIL CMO's chatbot with English and Hindi language support will be a step towards customer engagement. The chatbot, ready for implementation, will be installed on the SAIL Corporate website – [sail.co.in](http://sail.co.in), SAIL retail website – [sailsuraksha.com](http://sailsuraksha.com), and SAIL CMO's B2B Enterprise Portal and SAIL's WhatsApp business account. With our chatbot working silently 24\*7 as a virtual incarnation of the company, SAIL/CMO can optimize its depleting manpower to other crucial jobs.



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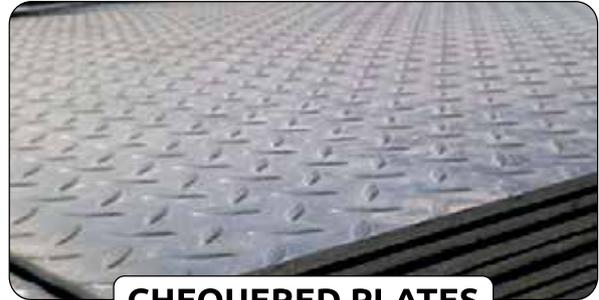
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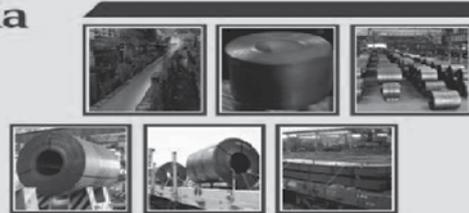
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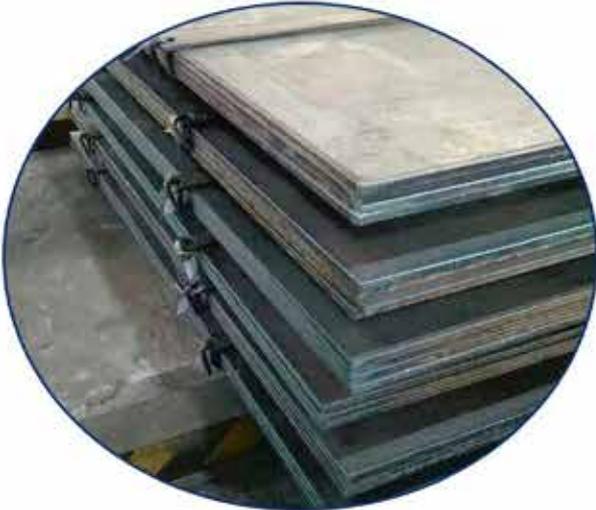
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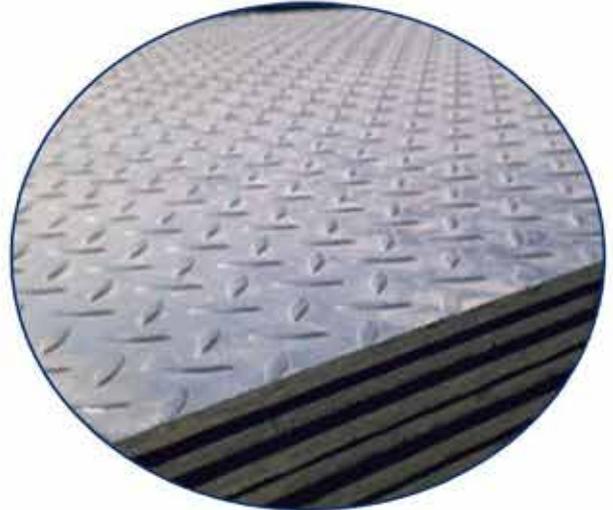
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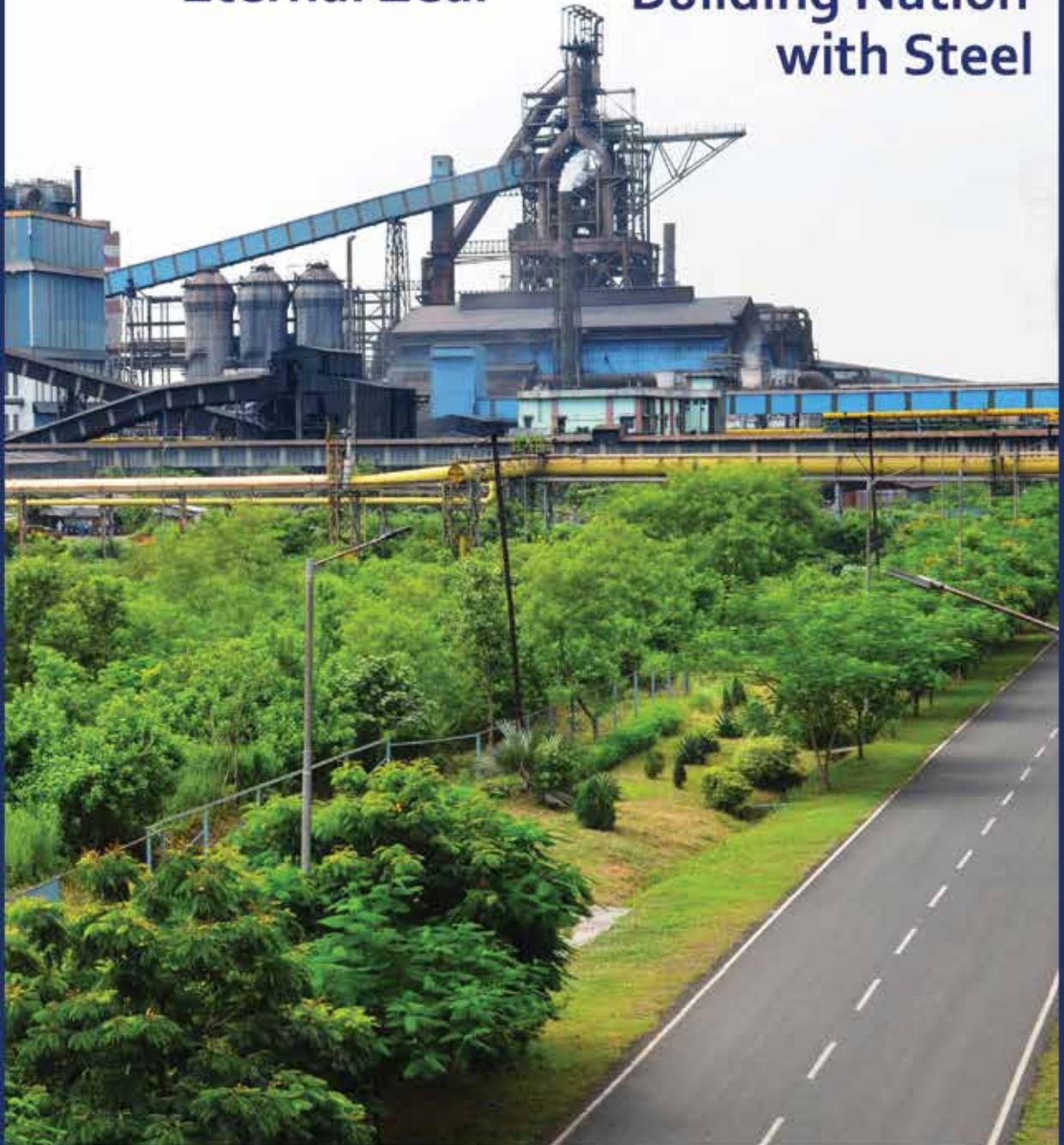
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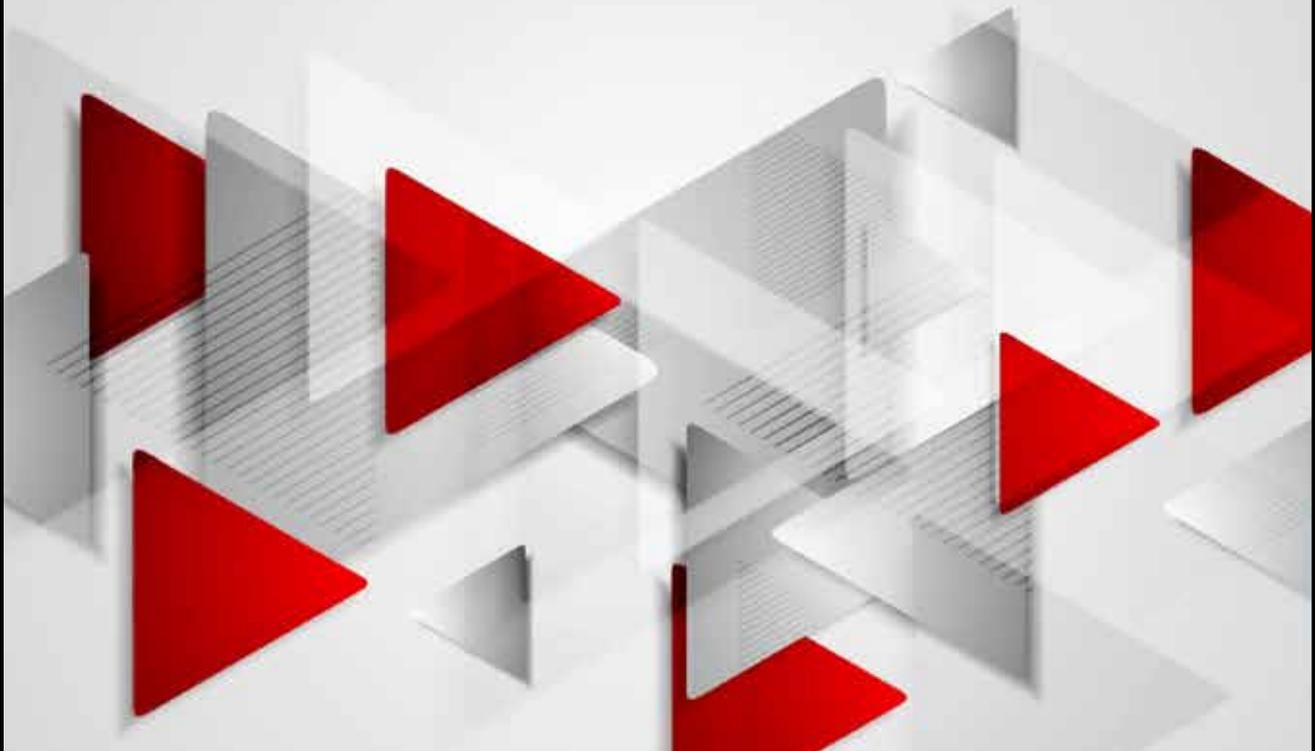
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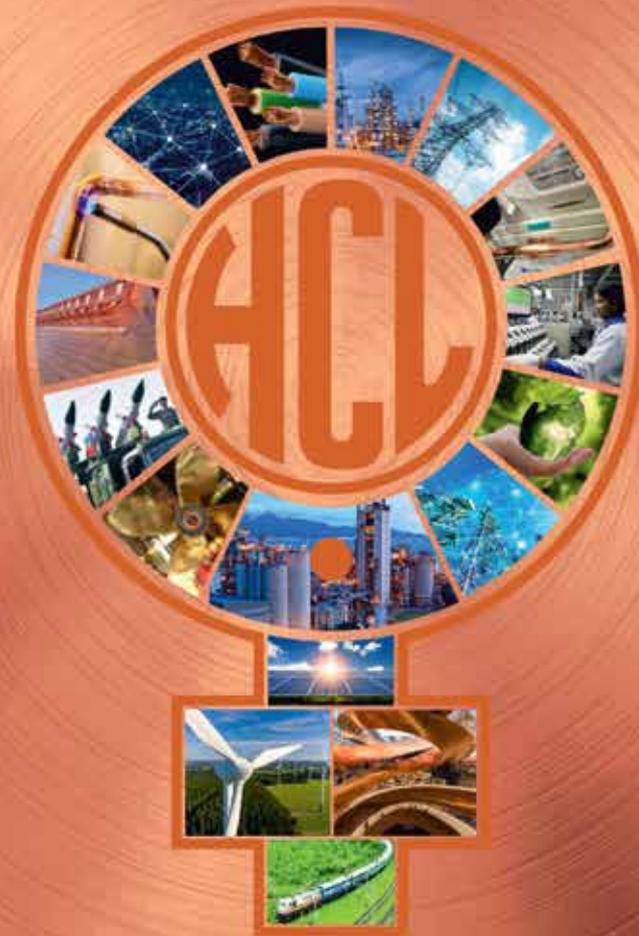
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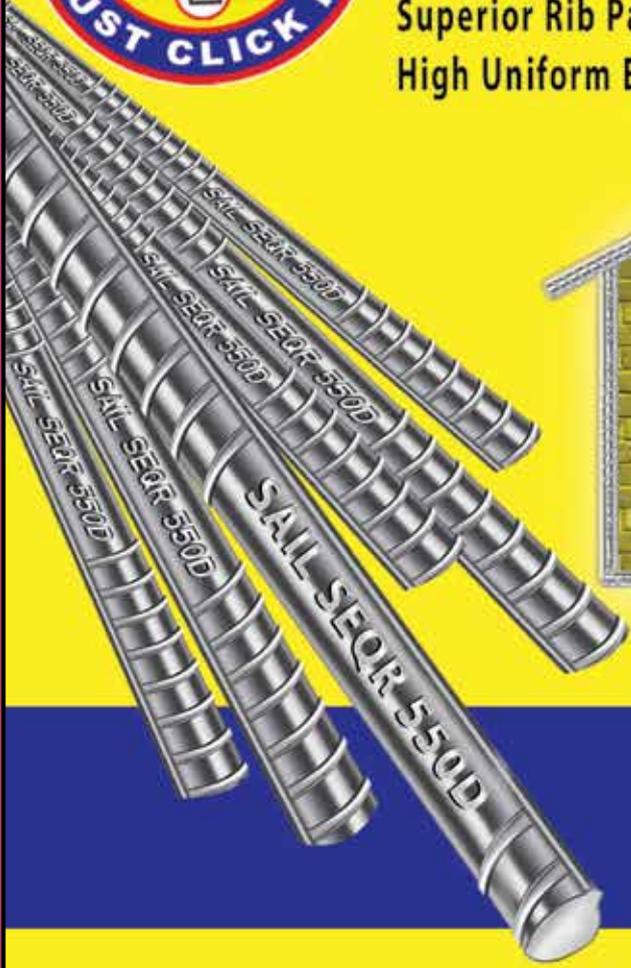
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