Petronet MHB Technology Conference: 2026

8 PMHBL Technology Conference: 2026, Day 2

8.1 Welcome address & lamp lighting

Speaker - Mr. Sudhir Kumar, Managing Director, PMHBL
10:00 AM – 10:20 AM

The inaugural session of the PMHBL Technology Conference 2026 commenced with a warm welcome address by Mr. Sudhir Kumar, Managing Director, Petronet MHB Limited, followed by the ceremonial lamp lighting and unveiling of the Net Zero poster. Mr. Sudhir extended greetings to dignitaries, delegates, industry partners, academia, and members of the energy fraternity attending PMHBL's first-ever technology conference.

Figure 2: Welcome address by Mr. Sudhir Kumar, Managing Director, PMHBL

In his keynote, he emphasized the pivotal moment at which India's oil and gas sector currently stands, marked by rapid transformation, global energy transitions, and competitive pressures. He highlighted that India is projected to be the world's largest source of oil demand growth this decade, accounting for nearly one-third of global growth, even as demand stagnates in mature markets. This divergence, he noted, reinforces the rising strategic importance of India's energy infrastructure, particularly pipelines.

The address underscored the critical role of pipeline transportation as the backbone of India's growing economy, supporting expansion in refining, downstream operations, mobility, and emerging fuel ecosystems such as hydrogen and biofuels. As India advances toward the Viksit Bharat 2047 vision, Mr. Sudhir stressed the need for a robust, efficient, and future-ready pipeline network that integrates intelligent systems and next-generation technologies.

He outlined PMHBL's recent initiatives, including capacity augmentation to 5.60 MMTPA, deployment of battery energy storage systems, adoption of advanced control architectures, installation of energy-efficient equipment, and major technology collaborations such as the MoU with IISc Bengaluru to develop smart pigs and intrusion/leak detection systems. He also highlighted PMHBL's pioneering Pipeline Usage Benefit Scheme (PUBS), solar power integration,

and automation of SV stations, along with the company's newly approved Net Zero roadmap, targeting achievement between 2030–2035.

Figure 3: Dignitaries unveiling the Net Zero poster

He reiterated PMHBL's commitment to responsible growth, digital transformation, renewable integration, and innovation-driven operations. He encouraged all participants to leverage the conference platform to exchange knowledge, explore emerging technologies, and collectively strengthen India's pipeline ecosystem. The address concluded with a reaffirmation of PMHBL's dedication to building a smarter, cleaner, more connected, and energy-secure future for India.

8.2 Plenary address

Speaker - Mr. Ramesh Ramasamy, Director, PMHBL
10:20 AM – 10:40 AM

The keynote address by Mr. Ramesh Ramasamy, Director, PMHBL, provided a strategic and forward-looking perspective on India's evolving energy landscape and the critical role of pipeline infrastructure in meeting national aspirations. He highlighted the Government of India's ambitious 2047 targets for the oil and gas sector, calling for a significant rise in domestic oil production from 29 to 100 MMT, domestic gas production from 36 to 100 BCM, an increase in refining capacity to 400 MMT, and substantial growth in petroleum product and natural gas demand. Achieving these milestones, he noted, requires strengthened exploration and production, improved ease of doing business, and major expansion of the country's refining, petrochemical, and pipeline infrastructure.

Figure 4: Plenary address by Mr. Ramesh Ramasamy, Director, PMHBL

He emphasized that India stands at an inflection point, with petroleum product demand expected to grow by 2040, making pipeline modernization and expansion fundamental. Strong policy support through initiatives such as the National Infrastructure Pipeline, the Pradhan Mantri Urja Ganga Project, the PNGRB Petroleum & Petroleum Products Pipeline Tariff Regulations 2024, and upcoming amendments to the PNGRB Act is enabling development of a more integrated, resilient, and investment-friendly national pipeline grid. He highlighted that while India has authorized extensive petroleum, product, and natural gas pipeline networks, the continued reliance on road transport must be reduced, as every kilometre of additional pipeline commissioned directly lowers transport risks and emissions.

He underlined that the pipeline corridors of the future must not only transport today's fuels but also be capable of carrying tomorrow's energy molecules. With India's net-zero transition gaining momentum, he stressed the importance of developing multi-fuel ready pipelines that can handle biofuels, hydrogen, and blended gases. Decisions on materials, design philosophy, right-of-way planning, automation, and digital instrumentation taken today will determine how effectively India adapts to emerging fuels and technologies over the next several decades.

Operational intelligence and digital transformation, he noted, will be central to building a modern energy logistics backbone. He stressed that technological advancement must be anchored by a culture where safety and reliability remain non-negotiable. He also acknowledged the strong contribution of Petronet MHB Limited, noting that PMHBL continues to stand as a shining example of operational excellence, innovation, and responsible energy transportation in India's pipeline sector.

Concluding his remarks, Mr. Ramasamy urged the gathering to continue sharing not only their successes but also their failures, for it is often those failures that become the true steppingstones to the next level.

8.3 Session 1: How AI is redefining energy sector

Speaker - Mr. Anish De, Global Head for Energy, Natural Resources & Chemicals (ENRC), KPMG International

10:40 AM – 11:00 AM

The session explored how Artificial Intelligence is rapidly reshaping the global energy sector, moving far beyond the early ChatGPT era into a new age of industry-enriched, enterprise-scale AI applications. He emphasized that the purpose of forums like this is to surface real technological possibilities, especially within the pipeline sector where opportunities are vast and form a critical pathway toward India's broader net-zero ambitions. The session began with an impactful leadership roundtable video showcasing how global energy leaders view AI's transformative role. Mr. De highlighted that many long-standing security challenges in the energy industry are now solvable through AI, and with India's energy demand rising sharply, the integration of AI has become more urgent and strategically important.

Figure 5: Address by Mr. Anish De on the theme "How AI is Redefining the Energy Sector"

He explained the evolution from Classical AI to Generative AI to Agentic AI, noting that this progression represents a continuous strengthening of the same technological lineage. Modern AI systems can now sense, comprehend, and act - learning and improving autonomously through real-time feedback. India, he noted, is among the largest adopters of AI, with its effectiveness growing as AI increasingly learns from and interprets human behavior. Mr. De outlined how AI capabilities today span content generation, information extraction, and large-scale code generation, the latter being one of the highest-impact applications. The true potential lies in combining these capabilities for industrial applications, unlocking massive possibilities across the energy value chain.

For business leaders, he illustrated a wide array of AI use cases across the upstream-to-downstream spectrum, stressing the need for companies to identify possibilities across the full value chain and then choose scenarios aligned with their operational priorities. With Agentic AI, organizations can optimize processes across refineries and pipeline operations, where many of

the 25 major refinery tasks can already be automated. Importantly, he emphasized that AI does not eliminate human judgment; rather, it learns when and where human intervention is needed, and improves over time. He stressed the necessity of a strong foundational framework for leveraging AI effectively. This includes six key pillars such as the right technology choices (AI platforms, cloud architecture, data management, cybersecurity, etc.) which must align with an organization's strategic needs for AI to deliver optimized performance.

In conclusion, Mr. De noted that while the AI ecosystem is driven by very high valuations and significant capital investment, the long-term revenue certainty remains evolving. Yet AI fundamentally reshapes how organizations imagine problems, design solutions, and build trust in technology-driven decision-making. He also highlighted that data centers pose significant energy challenges, but paradoxically, AI will also be a powerful enabler for achieving Net Zero, driving efficiency, optimization, and intelligent planning across the energy system.

8.4 Session 2: Corporate digitalization: A strategic imperative

***Speaker* - Mr. Rahul Khargaria, Head – Digital Projects, ONGC**

11:15 AM – 11:35 AM

The session on corporate digitalization was given by Mr. Rahul Khargaria, where he emphasized that digital transformation today represents a fundamental shift for modern enterprises - moving from simply doing digital to truly being digital. He explained that this shift is rooted in optimizing and automating business processes, with data now acting as the core strategic asset that connects every function and drives all organizational outcomes.

He highlighted that digitalization has become a strategic imperative, shaped by rising user expectations for seamless experiences, disruptive competition from digital-native players, and the increasing need for decision-making based on high-quality data. He stressed that high-integrity data is the most critical pillar enabling operational resilience, improved efficiency, enhanced safety, and accurate predictive monitoring.

Figure 6: Address by Mr. Rahul Khargaria on the theme "Corporate Digitalization: A Strategic Imperative"

Mr. Khargaria discussed the common challenges that hinder successful digital transformation, noting that nearly 70% of digital initiatives fail due to legacy systems, fragmented infrastructure, cultural resistance, digital skill gaps, persistent data quality issues, and the rapid escalation of cybersecurity threats as digital footprints expand. As organizations digitize more processes, the surface for cyberattacks widens, demanding stronger cybersecurity frameworks.

He also pointed out the existing innovation gap, where organizations recognize the importance of technology but struggle to translate strategy into meaningful impact. The ecosystem is crowded with tools, yet many lack strong business justification or data-backed rationale. He noted that technology deployments often falter when capability-building, workforce adaptation, and structured frameworks are missing.

Reinforcing a key message, he emphasized that digitalization is not a one-time IT project but a continuous business capability requiring sustained investment, cultural alignment, and strategic clarity. Organizations must continually strengthen foundational pillars, technology architecture, governance, talent, processes, and cybersecurity to derive long-term value.

In conclusion, Mr. Khargaria stated that building a sustainable digital future requires operational excellence, organizational resilience, strong sustainability practices, and enhanced national energy security, achieved through continuous digital innovation. He reiterated that digitalization must be nurtured as an ongoing strategic capability rather than treated as a standalone initiative.

8.5 Session 3: Curtain raiser: PMHBL Corporate digitalization program (CDP) & key features

Speakers - Mr. Allan Jothi, CISO PMHBL & Mr. Subhojeet Acharjee, Business Development Manager, Lumbini Elite Solutions
11:35 AM – 11:45 AM

The session Curtain Raiser for Corporate Digitalization Program served as a significant moment in the conference, as PMHBL formally unveiled its Corporate Digitalization Program (CDP), a major step forward in the company's journey toward becoming a future-ready digital enterprise. The session was jointly delivered by Mr. Allan Jothi and Mr. Subhojeet Acharjee, and offered participants a first look into the architecture, intent, and transformational scope of PMHBL's digitalization initiatives.

Figure 7: Mr. Allan Jothi (left), PMHBL, and Mr. Subhojeet Acharjee (right), Lumbini Elite Solutions, presenting the PMHBL Corporate Digitalization Program

The speakers began by contextualizing the need for CDP within PMHBL's operational landscape. As energy infrastructure grows more demanding and complex, PMHBL recognized the necessity of building an integrated digital backbone that supports streamlined operations, enhanced visibility, strengthened cybersecurity, and better decision-making across the value chain. This led to the creation of CDP, a structured, organization-wide digital transformation program designed to elevate PMHBL from traditional operational modes to a highly connected, insight-driven digital enterprise.

Through the session, the audience was introduced to how CDP represents a shift in mindset, moving from isolated digital tools to a cohesive enterprise digital ecosystem. The presenters explained how PMHBL's digitalization vision is anchored in improving operational governance, unifying systems, reducing manual interventions, and enabling real-time intelligence that strengthens the reliability and efficiency of pipeline operations. They highlighted how CDP integrates corporate workflows with operational intelligence, creating a continuous feedback loop that enhances process consistency and overall organizational resilience.

The unveiling of CDP marked the transition from planning to activation, as several components of the program are now progressing toward live deployment. The presenters emphasized that with the program going live, PMHBL is stepping into a new phase of digital maturity where its systems and processes will increasingly be governed by structured data, integrated dashboards,

and predictive insights. The session also underscored how CDP lays the foundation for future advancements. As PMHBL moves ahead, this unified digital backbone will support the introduction of advanced analytics, automation layers and AI-based decision systems, ensuring that the company remains aligned with national energy goals and the emerging global standards of digital pipeline management.

In essence, the curtain raiser highlighted PMHBL's strong commitment to embracing digital transformation with clarity and purpose. It reaffirmed that CDP is not just a technology upgrade, but a strategic, long-term initiative aimed at enhancing operational excellence, improving safety, strengthening compliance, and preparing the organization for the demands of tomorrow's energy ecosystem. The session concluded with confidence that PMHBL is now entering a new era, one where digital capability will be central to its efficiency, resilience, and sustainable growth.

8.6 Panel 1: Emerging technologies in pipeline transportation: Innovation, automation & future ready

Moderator - Mr. Anish De, Global Head – Energy, Natural Resources & Chemicals, KPMG International

Panelists -

- ***Prof. Ambedkar, Indian Institute of Science (IISc)***
- ***Mr. C.V. Mallinath, CGM – Digital Initiatives, HPCL***
- ***Mr. Rajeev Ranjan, Co-Founder, Lumbini Elite Solutions***

11:45 AM – 12:15 PM

The session began with the moderator, Mr. Anish De, laying the foundation for the discussion by highlighting the rapid and fundamental shifts occurring in pipeline transportation. He opened by noting how the industry is transitioning from traditional forms of automation to far more intelligent, integrated, and data-driven operational models. He emphasized that the pace at which technologies are emerging, whether AI, IoT, or advanced analytics requires organizations to rethink not only their tools but also their digital infrastructure, governance frameworks, and readiness for transformational change. Mr. De emphasized that technology is no longer simply an enabler; it is becoming inseparable from the strategic and operational functioning of modern pipeline networks. He also highlighted that innovation must be approached responsibly, ensuring that safety, reliability, and compliance remain at the forefront as companies embrace new systems and capabilities.

Reflecting on these themes, Shri C.V. Mallinath brought an operational and technology-leadership perspective, describing how dramatically digital transformation has evolved in just a few years. He reiterated that "*Technology has now changed, earlier it was organizing data now it is more about prediction and decision making, which helps people in decision making,*" emphasizing that the sector has moved far beyond the basics of digitization into a more intelligent, autonomous era of technology. He observed that with agentic AI, bots, and intuitive UI/UX systems becoming common, users now expect one-click outcomes and seamless processes. Low-code and no-code tools have also enabled even those without technical backgrounds to develop solutions, reducing dependency on core coding teams. However, he pointed out that organizations must balance ambition with budgetary constraints and ensure that secure, scalable foundations are in place. He concluded by emphasizing that IT–OT convergence, supported by disciplined data practices and cybersecurity, is essential for building the intelligent operational environments that future pipeline systems demand.

Offering a research-driven perspective, Professor Ambedkar spoke about the crucial role of scientific inquiry and innovation in shaping the future of pipeline technology. He stressed that academia is constantly exploring new models and capabilities, but the challenge lies in translating these advancements into practical, safe, and scalable industry applications. He noted that "*Research problem comes in technology as risk is associated and room to make mistake is very less,"* underscoring that risk quantification is central to bridging laboratory discoveries with operational realities. He expressed concern about the growing opacity of AI/ML models, which increasingly function like black boxes, raising questions about reliability and interpretability in high-stakes environments. Memory and computational requirements continue to grow, and

distributional shifts in data across organizations prevent simple model generalization. Despite these complexities, he affirmed that progress has been remarkable, and the way forward lies in developing transparent, trustworthy models that can support mission-critical decision making in pipeline systems.

From an enterprise architecture standpoint, Mr. Rajeev Ranjan described how optimization in pipeline transportation depends on unified systems and strong digital foundations. He reflected that *"IT & OT always worked separately, but now convergence is happening and these two are merging,"* pointing to a major shift in how organizations must think about their technology ecosystems. He explained that modern operations demand a seamless flow of information from field equipment and SCADA systems to corporate platforms such as HR, procurement, and asset management modules. This requires a shift towards ERP-led, institution-wide platforms that integrate IoT, OT, corporate databases, analytics engines, and operational workflows. He emphasized that SAP should be seen not just as an ERP but as a strategic platform capable of anchoring end-to-end digital integration. Yet, he cautioned that the success of such systems hinges on data quality, as unfiltered or irrelevant data from OT environments can overwhelm enterprise systems, distort analytics, and hinder decision making. He concluded by reinforcing the importance of disciplined data governance, dedicated infrastructure, and carefully planned architectures in enabling organizations to fully leverage AI, IoT, and automation.

Figure 8: Panel 1: "Emerging Technologies in Pipeline Transportation: Innovation, Automation & Future Ready" featuring (L–R) Moderator Mr. Anish De, Global Head, KPMG International; Mr. C.V. Mallinath, CGM, HPCL; Mr. Rajeev Ranjan, Co-Founder, Lumbini Elite Solutions; and Prof Ambedkar, IISc

In his closing remarks, Mr. Anish De drew the discussion together, emphasizing that the future of pipeline transportation will not be defined solely by access to advanced technologies but by the readiness and maturity of organizations to implement them responsibly. He stressed that without strong foundations, clean data, integrated system architectures, secure IT–OT convergence, clear governance structures, and explainable AI models, even the most powerful technologies can fall short or create new vulnerabilities. He reiterated that as the sector moves deeper into

digital transformation, operational safety, regulatory compliance, and organizational discipline must remain non-negotiable. The overall conclusion of the panel was that technology is poised to revolutionize pipeline operations, but sustainable progress will come only from thoughtful implementation, strong data stewardship, coordinated system integration, and a long-term commitment to building digitally mature, intelligent, and secure operational environments.

8.7 Session 4: Off-grid hybrid inverters

Speaker - Mr. Manjunatha, Director, Studer-Innotec
12:15 PM – 12:35 PM

The session provided an in-depth understanding of off-grid hybrid inverter technologies and their growing relevance across diverse industries, including telecom, oil & gas, defence, and remote infrastructure applications. He explained that hybrid inverters today are designed to power a wide range of applications, with certain models engineered specifically for challenging geographies such as high-altitude regions, extreme climates, and remote terrains. The flexibility to support both on-grid and off-grid configurations ensures continuous power supply, effectively addressing the persistent challenge of bridging energy gaps in critical operations. He highlighted the capability of hybrid inverters to seamlessly integrate with solar power systems and grid supply, enabling optimized energy usage depending on availability and demand. These inverters support efficient power management, intelligent load handling, and advanced energy routing, making them suitable for areas with unreliable grids or no grid access at all.

The session provided detailed insights into the technical features that distinguish modern hybrid inverters. These include high energy-efficiency, adjustable power factor usage, compatibility with grid and DG synchronization, and interoperability with renewable sources such as wind and hydro. An important aspect demonstrated was the advanced control features, such as programmable charging for lithium-ion batteries, allowing grid charging current to be adjusted from 0A to 40A DC at 48V. The systems are further strengthened by robust online monitoring capabilities through SCADA, with remote control centre accessibility ensuring reliability and real-time supervision.

Figure 9: Address by Mr. Manjunatha on the topic "Off-Grid Hybrid Inverters"

Mr. Manjunatha elaborated on how hybrid solutions are now being introduced across both off-grid and on-grid setups, offering highly reliable power solutions for oil and gas facilities. Their modular design allows them to handle 100% imbalance loads and integrate effectively with customers' secure SCADA environments. He further shared practical examples from deployments at petrol pumps, where hybrid inverter systems ensure seamless transactions and 24/7 operations supported by scalable battery banks and remote monitoring. He also highlighted the range of battery technologies compatible with hybrid systems, up to 11 types including lead-acid, lithium,

nickel-gel, and sodium-ion, providing users flexibility based on operational needs and environmental conditions. The session also touched upon applications in buoy systems, where hybrid inverters deliver reliable power to maritime and offshore installations. Additionally, he showcased solar mobile energy systems for defence, designed to be rugged, highly reliable, tactically efficient, and suited for rapid deployment in mission-critical field environments. The hybrid flexibility of these systems enables defence units to operate independently of grid infrastructure while maintaining high power reliability.

Overall, the session offered a comprehensive understanding of how hybrid inverter technologies are evolving to meet the demands of modern energy challenges across multiple sectors. It highlighted their vital role in ensuring resilience, efficiency, and sustainability in environments where continuous, high-quality power is indispensable.

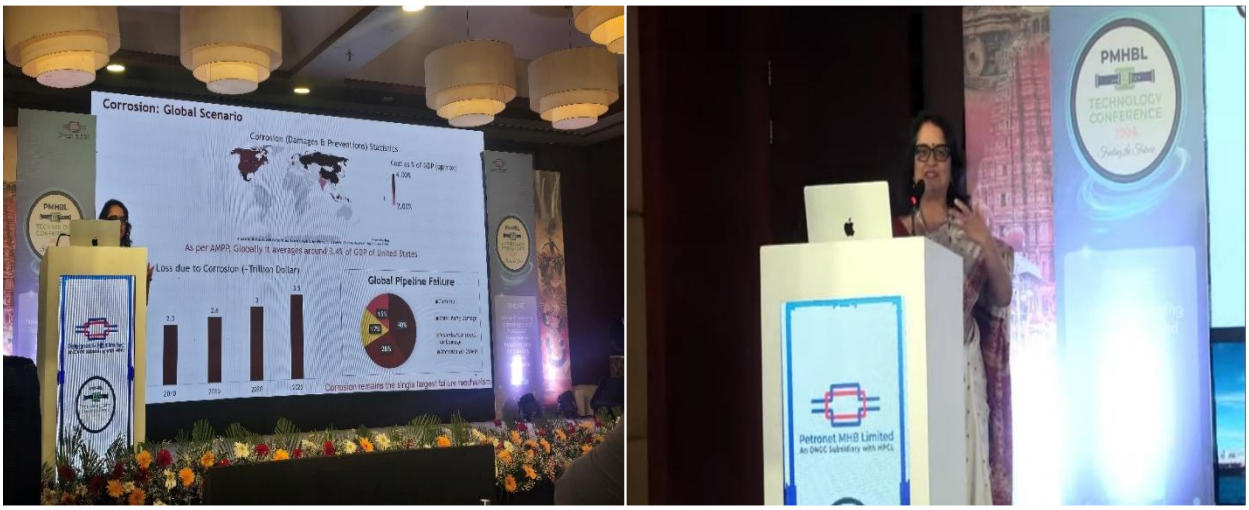
8.8 Session 5: Corrosion management in pipelines: Emerging trend and digital integration

Speaker - Ms. Nischal Tinku, Head – Pipelines, ONGC
12:35 PM – 13:00 PM

The session provided an overall understanding of corrosion in pipeline systems, and it began with a discussion on the global scenario, where Ms. Nischal Tinku highlighted that nearly 40% of pipeline failures worldwide are caused by corrosion, making it one of the most critical threats to pipeline integrity. She explained that harsh subsea conditions, aging infrastructure, and premature deterioration of assets continue to challenge operators across the globe. Moving deeper into the subject, she described the common causes of corrosion, emphasizing the increasing presence of microbes in water systems, reduced flow velocities, and elevated concentrations of corrosive gases such as H2S, all of which accelerate internal corrosion. These evolving operational factors demand a structured and scientifically grounded approach to corrosion prevention and control.

She outlined ONGC's Corrosion Management Framework, which includes continuous monitoring and analysis, optimization of pigging frequency, and selecting appropriate pig types and sizes to suit pipeline conditions. Chemical dosing forms a major mitigation strategy, and she discussed how surfactants help disperse debris while biocides rapidly eliminate harmful microbes like SRB and APB, which otherwise contribute to rapid corrosion. Internal coating was highlighted as another essential layer of defense, and she explained how robotic arms are now being deployed to coat pipelines from within, ensuring precision and efficiency.

Figure 10: Address by Ms. Nischal Tinku on the topic "Corrosion Management in Pipeline: Emerging Trends and Digital Integration"



Ms. Tinku also introduced emerging developments such as nanotechnology-based internal coatings, with anti-microbial and self-healing capabilities. While these technologies show significant promise, she acknowledged that cost remains a major barrier to widespread adoption. A key part of her presentation focused on the complexities of clamped pipelines, which often face repetitive failures due to limitations in pigging. She then stated that ONGC uses a detailed risk matrix based on the API 1160 model to assess these lines, and she noted that despite constraints, up to 18 clamped pipelines have been successfully pigged to date. For pipeline replacement

decisions, ONGC applies risk matrices aligned with API RP 14E/1160, ensuring that only high-risk lines are prioritized for replacement.

She further discussed ONGC's ongoing digital transformation in integrity management. The introduction of Pipeline Integrity Management Systems (PIMS) now allows risk-based investigations, structured documentation, and proactive decision-making. She explained how ONGC is developing PI Vision dashboards integrated with leak detection systems, enabling real-time alarms that support quick field responses. Importantly, she highlighted ONGC's in-house innovation, a leak detection system capable of narrowing down leak locations to within 2 km, significantly improving operational reliability.

The session concluded with a focus on the future: ONGC's transition toward data-driven analytics for predicting corrosion behavior, identifying leak-prone segments, and making more informed operational decisions. Ms. Tinku highlighted that the integration of monitoring technologies, chemical strategies, digital dashboards, and analytical tools will collectively strengthen ONGC's capability to manage corrosion more intelligently and proactively.

8.9 Session 6: Driving excellence: Strategic innovations at PMHBL

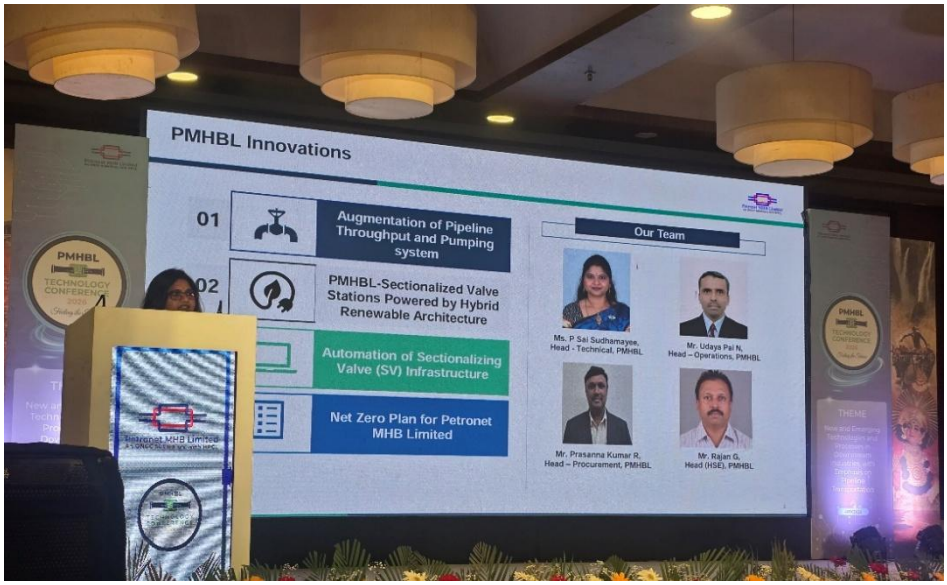
Speakers - PMHBL Team

- ***Ms. P. Sai Sudhamayee, Head – Technical, PMHBL***
- ***Mr. Udaya Pai N, Head – Operations, PMHBL***
- ***Mr. Prasanna Kumar R, Head – Procurement, PMHBL***
- ***Mr. Rajan G, Head (HSE), PMHBL***

14:00 PM – 14:30 PM

The session Driving Excellence, centered on PMHBL's strategic innovations, was formally opened by Ms. P. Sai Sudhamayee, Head – Technical, who set the context by stating that in today's competitive environment, leadership is not defined merely by creating infrastructure, but by how intelligently and efficiently that infrastructure is used. She emphasized that PMHBL has consistently pushed innovation across its operations and that the subsequent presentations would highlight the transformative initiatives undertaken across technical, operational, procurement, and HSE domains in PMHBL.

Figure 11: Ms. P. Sai Sudhamayee, Head, Technical, PMHBL, delivering the introductory address for the session 'Driving Excellence: Strategic Innovations at PMHBL

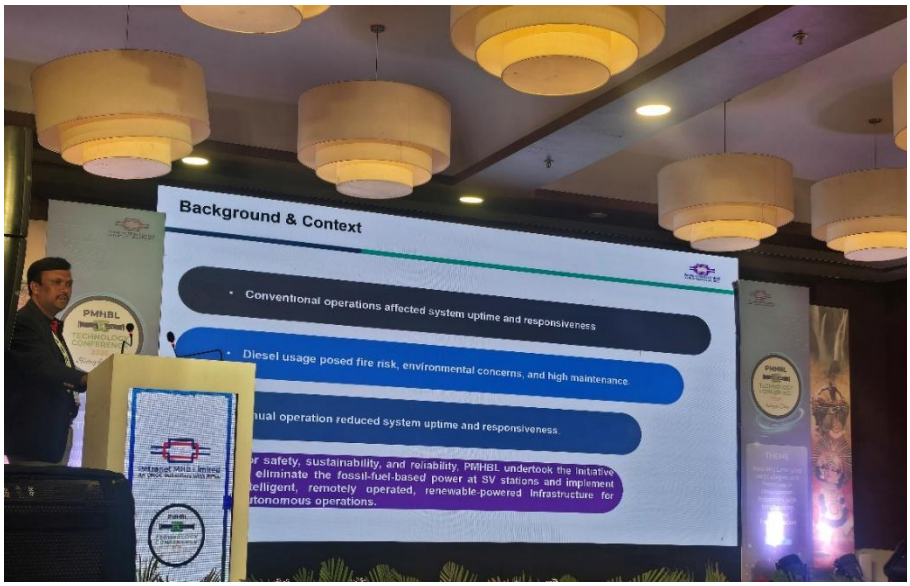


The first presentation was delivered by Mr. Udaya Pai, Head – Operations, who focused on the augmentation of PMHBL's pipeline and pumping systems, with detail on the recent commissioning of the Hassan pump station after a gap of 23 years. He explained that this critical upgrade was completed within a challenging 45-day execution timeline, despite several operational constraints. Pre-project assessments had indicated significant limitations including aging pump components, high hydraulic stress, increased vibration profiles, and reliability risks during low-demand operations. The augmentation project brought forward a comprehensive upgradation of the mainline pumps at Mangalore and Hassan. With the new configuration, PMHBL achieved improved equipment protection, stabilized hydraulic behavior, reduced vibration, and enhanced operational reliability. Mr. Udaya highlighted the strategic challenge of maintaining uninterrupted pipeline operations throughout the refurbishment phase—something that required precise

planning and coordination with field teams. He noted that this project not only extended the asset life of existing stations but also improved sustained pumping efficiency. The successful completion resulted in reduced operational risks, higher system resilience, and a strengthened pipeline backbone capable of reliably supporting rising petroleum product demand in the region.

Following this, Mr. Prasanna Kumar, Head – Procurement, presented PMHBL's transformational initiative around the Battery Energy Storage System (BESS). He explained that BESS has become an essential component of PMHBL's energy architecture, offering improved backup reliability, reduced dependence on conventional grid supply, and enhanced energy optimization. He elaborated on how BESS stabilizes voltage fluctuations, supports uninterrupted operations during grid disturbances, and provides a cleaner alternative compared to traditional DG-based backup solutions. He highlighted that BESS also contributes significantly to cost savings over the asset lifecycle by minimizing fuel consumption, reducing maintenance requirements, and enabling integration with renewable energy sources in the future. This initiative aligns with PMHBL's broader sustainability vision and demonstrates the organization's commitment to adopting modern, efficient, and environmentally compatible technologies.

Figure 12: Mr. Prasanna Kumar R, Head – Procurement, PMHBL, presenting the transformational initiative on the Battery Energy Storage System (BESS)



The third presentation was delivered by Mr. Rajan G, Head – HSE, who showcased PMHBL's accomplishment in the automation of sectionalizing valve (SV) infrastructure. He shared that PMHBL has successfully achieved 100% operational uptime at nearly 60% of its SV stations, making this one of the organization's most robust digital transformation achievements. The automated model incorporates several intelligent features such as perimeter intrusion detection, remote SV valve operation, enhanced telecom reliability, and real-time health monitoring. Mr. Rajan emphasized that this model is not only scalable but also cost-optimized, allowing seamless replication across the remaining pipeline sections. The automation initiative has significantly improved safety response capability, reduced manual intervention, enabled faster isolation during emergencies, and strengthened overall pipeline integrity management. This initiative has now

been recognized internally as a proven example of how digital solutions can transform traditional asset operations into a more secure, efficient, and intelligent system.

Figure 13: Mr. Rajan G, Head – HSE, PMHBL, highlighting PMHBL's accomplishment in the automation of the SV system

The session concluded with a final segment by Mr. Udaya Pai, who presented PMHBL's Net Zero Plan, developed in collaboration with CSIR–NEERI. He explained that the roadmap has been meticulously structured based on current operational profiles, energy consumption trends, and projected future throughput. Under full capacity utilization scenarios, PMHBL is on track to achieve Net Zero emissions between 2034 and 2035. The strategy includes a combination of energy efficiency improvement measures, renewable energy adoption, process optimization, reduction of Scope 1 and 2 emissions, and long-term sustainability commitments. Mr. Udaya emphasized that PMHBL's Net Zero journey is not just compliance-driven, but a strategic choice to align the organization with national decarbonization goals while ensuring operational excellence and environmental stewardship.

Figure 14: Mr. Udaya Pai N, Head – Operations, PMHBL, highlighting PMHBL's Net Zero Plan

Taken together, the session demonstrated PMHBL's strong commitment to embracing innovation across its operational ecosystem, ranging from infrastructure upgrades and energy storage solutions to digital automation and long-term sustainability planning. Each initiative reflects PMHBL's focus on building a resilient, future-ready, and technologically advanced pipeline infrastructure capable of supporting India's growing energy needs with reliability and efficiency.

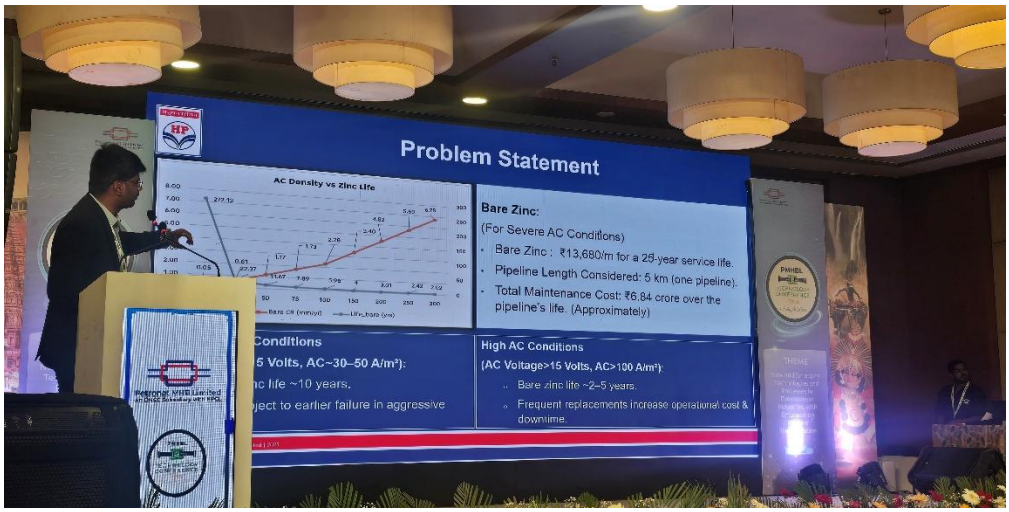
8.10 Session 7: New and emerging technologies and processes in pipeline transportation

Speaker – Mr. Vanchi Vishwanath, CGM, Pipelines, HPCL & Mr. Shiv Shankar, PhD, Anna University

14:30 PM – 14:50 PM

This session was a joint session with the opening by Mr. Shiv Shankar, PhD, Anna University, who presented his research on conductive polymer coatings on zinc ribbons for enhanced AC performance in pipeline systems. He began by explaining that zinc ribbons, widely used in AC mitigation systems, tend to corrode rapidly when exposed to alternating current due to polarity reversals and electrochemical instability. Under higher AC density, zinc degradation accelerates significantly, thereby reducing the effective lifespan of the ribbons. This formed the core problem statement, where the service life of zinc ribbons was found to be directly impacted by AC current intensity. To address this challenge, Dr. Shiv Shankar explored the feasibility of a conductive polymer coating that could resist corrosion while allowing electrical continuity. He noted that the coating needed to demonstrate chemical resistance, maintain electrical conductivity, adhere strongly to the zinc surface, and withstand environmental stresses. After rigorous evaluation, PEDOT (poly(3,4-ethylenedioxythiophene)) emerged as the most promising material.

Figure 15: "New and Emerging Technologies and Processes in Pipeline Transportation" session by Mr. Shiv Shankar, Anna University

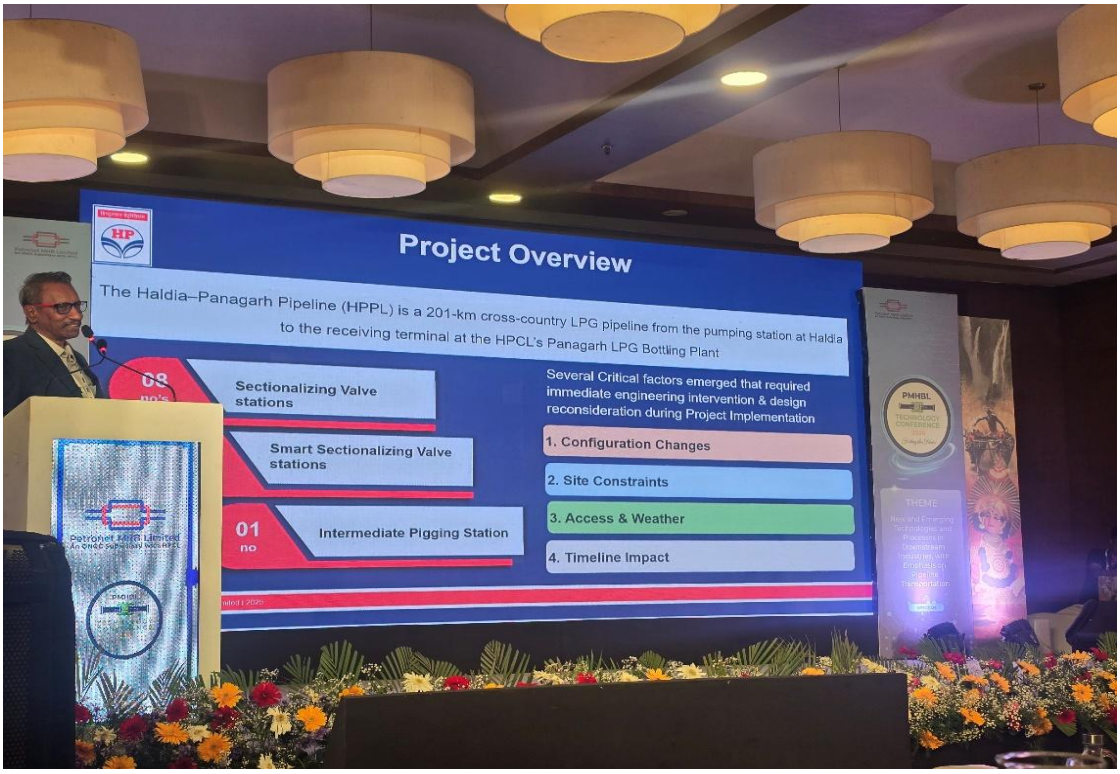


He described the methodology used in the study, which involved material selection, surface preparation, electrochemical testing, detailed surface characterization, simulation of various AC exposure conditions, and inspection. The results demonstrated that PEDOT-coated zinc ribbons showed significant improvements, including a shift toward more noble electrochemical behavior, formation of a stable protective layer, reduction in Ecorr values, and an overall three-fold improvement in corrosion resistance. The findings suggest that integrating conductive polymers like PEDOT can greatly enhance the durability and performance of AC mitigation systems.

The session continued with a presentation by Mr. Vanchi Vishwanath, Chief General Manager – Pipelines, HPCL, who spoke on Composite Pre-Engineered Building (PEB) Solutions for SV

Station Infrastructure. He highlighted the practical site constraints typically encountered in SV station construction, such as limited space, terrain variations, and operational safety requirements. To address these challenges, he introduced a hybrid solution involving factory-fabricated composite steel structures, designed for modularity, rapid deployment, and consistent quality. Mr. Vanchi explained how these structures were assembled in both single-storey and double-storey configurations depending on field requirements. The approach offers several advantages, including reduced construction timelines, minimal on-site fabrication, improved structural consistency, and better alignment with safety and design standards. The hybrid PEB solution not only overcomes site constraints but also allows for scalable replication across pipeline networks, ensuring uniformity and reliability.

Figure 16: "New and Emerging Technologies and Processes in Pipeline Transportation" session by Mr. Vanchi Vishwanath, HPCL



Collectively, the presentations demonstrated how innovations in material science and engineered structures are driving improvements in operational efficiency, safety performance, and asset longevity within the pipeline industry. Whether through enhanced AC mitigation using advanced polymer-coated zinc ribbons or modernizing SV station buildings with composite PEB systems, the session showcased the transformative role of new technologies in strengthening pipeline infrastructure.

8.11 Panel 2: Operational excellence in pipeline systems: Process optimization and SOP modernization

Moderator - Sandeep Chittora, Associate Partner, KPMG

Panelists -

- ***Mr. Ramesh Ramasamy, Director, PMHBL***
- ***Mr. B Sudharshan, ED, MRPL (retd)***
- ***Mr. Sudhir Kumar, Managing Director, PMHBL***

14:50 PM – 15:10 PM

The session opened with remarks from Mr. Sandeep Chittora, who introduced the discussion by grounding it in the context of Industry 4.0. He shared that much of his work has been around helping industries adapt to emerging technologies that enhance reliability, efficiency, and process intelligence. He emphasized that in pipeline systems, operational excellence is fundamentally about strengthening pipeline integrity, maximizing throughput and asset utilization, and doing so without ever compromising on safety. He highlighted that the evolution of digital tools, analytics, automation, and integrated monitoring has created new possibilities for transforming pipeline operations, and urged the panel to explore how modern practices can elevate legacy systems in a responsible and high-performance manner.

Mr. Sudhir Kumar spoke about operational excellence through the lens of the challenges faced historically by pipeline transportation companies, particularly issues such as limited pumping efficiency and underutilized system capacity. He explained that digitalization has been central to overcoming many of these inefficiencies by strengthening cost control, enforcing process discipline, and enabling better visibility across operations. He described how the organization invested heavily in capability-building, with employees receiving structured learning from institutions such as IISc and IIM to sharpen their technical understanding and leadership readiness. He emphasized that such capability enhancement, supported by cultural initiatives like their Happy Employee program, plays a critical role in achieving operational maturity. Sudhir concluded by reaffirming that while advanced technologies like AI and ML hold promise, they must be adopted selectively and sensibly, only where they offer clear, measurable value to operational efficiency.

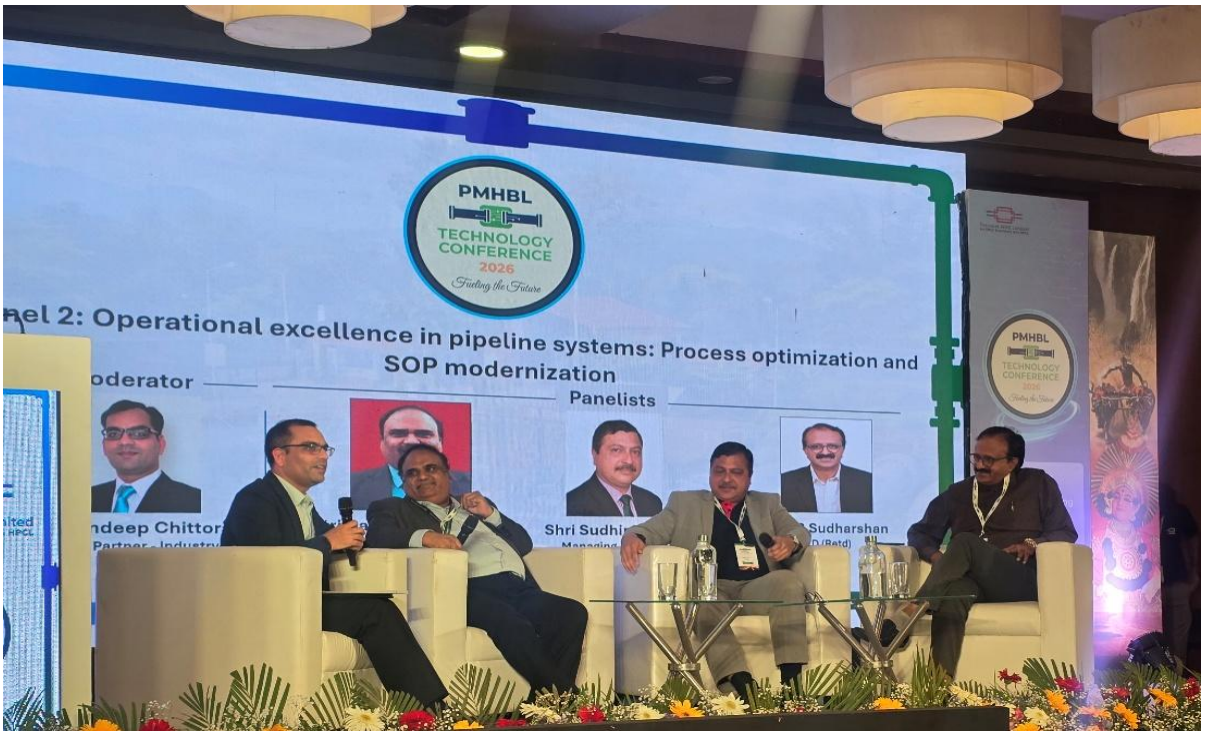
Mr. B. Sudharshan then presented a practical view of operational excellence shaped by his deep experience in managing pipelines extending from ports to refineries. He described the operational complexities arising from leak risks, right-of-way exposure, external interference, and the differing pressures of public-domain versus in-premise pipeline management. He explained how strong SOPs, cathodic protection systems, continuous physical monitoring, and advanced process control help maintain system stability and safety. He elaborated on how real-time optimization tools, digital twins, and IT-OT integration have strengthened refinery decision-making, supported by specialized teams focused on analytics, AI, and ML. He noted that preventive, predictive, and condition-based maintenance approaches now work together to reduce breakdowns and convert failures into planned interventions. In his closing message, Mr. Sudharshan stated that there is “no choice other than embarking on new technologies,” emphasizing that embracing modernization is essential for achieving reliability and operational value.

With his extensive experience, Mr. Ramesh Ramasamy provided insights grounded in the unique operational realities of petroleum product pipelines. He highlighted that the lack of control over pipeline right-of-way continues to be one of the biggest vulnerabilities, describing product pipelines as “moving bombs” to underscore the potential risks to life, business, and the environment. He stressed that timely and accurate scheduling of product flow is vital since delays cause assets to idle, reducing operational throughput. Discussing tools that support operational excellence, he pointed to advances emerging from collaborations with institutions like IIT and described the critical role digital platforms now play in pipeline management. He explained that their systems generate nearly 4,000 to 5,000 alarms, which are digitally filtered to around 400 meaningful alerts, adding firmly that “Digital platform is must.” Mr. Ramasamy concluded his thoughts with a message that captured both caution and urgency: “Be cautious, act and accelerate,” summarizing the mindset required to balance safety discipline with modernization.

Collectively, the panelists emphasized that operational excellence is no longer confined to traditional process improvements but is increasingly defined by digital systems, analytics, structural efficiency, and organizational readiness. Their insights converged on themes of digital twins, intelligent monitoring, strong alarm filtration, predictive maintenance, workforce upskilling, and regulatory alignment as essential pillars for future pipeline performance. Each emphasized that technology must be backed by strong foundational practices, from data governance to cultural readiness, to truly deliver value.

Concluding the session, Mr. Sandeep reiterated that the global promise of tenfold productivity improvements will only be realized if digital interventions genuinely enhance operational efficiency on the ground. He emphasized that the success of pipeline modernization depends on disciplined execution, technology adoption that is purposeful and well-integrated, and a sustained commitment to safety and throughput. He closed by highlighting that operational excellence is a continuous journey, and the future of pipeline systems lies in uniting modern technology with strong processes, skilled people, and a forward-looking industry mindset.

Figure 17: Panel 2: Operational Excellence in Pipeline Systems: Process Optimization and SOP Modernization. (L–R) Moderator: Mr. Sandeep Chittora, Associate Partner, KPMG; Panelists: Mr. Ramesh Ramasamy, Director, PMHBL; Mr. Sudhir Kumar, MD, Petronet MHB; Mr. B. Sudharshan, ED, MRPL (Retd)

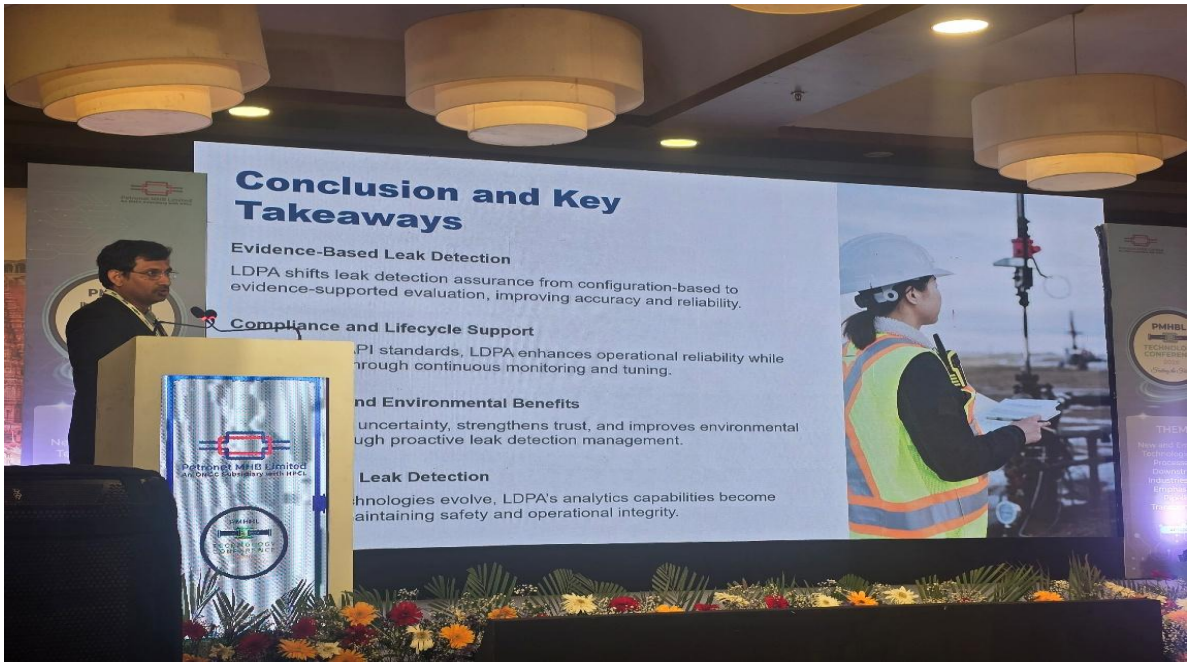


8.12 Session 8: Advancement in Leak Detection Systems

Speaker – Mr. M.S.R.K. Bose, Emerson
15:10 PM – 15:25 PM

The session on advancements in Leak Detection Systems delivered a deeply insightful overview on how leak detection technologies have evolved, where current challenges lie, and why proven performance, not theoretical claims, must guide industry adoption. Mr. Bose began by positioning leak detection as a critical intersection of safety, regulatory compliance, operational reliability, and environmental stewardship within pipeline operations. As he noted, a leak detection system is not merely a monitoring tool; it is a risk-mitigation backbone that underpins operator confidence and public trust.

Figure 18: Address by Mr. M. S. R. K. Bose, Emerson, on the topic 'Advancement in Leak Detection Systems



Mr. Bose traced the historical evolution of leak detection systems in India over the past three to four decades. In the early 1990s, pipeline operators focused primarily on installing basic alarm-trigger systems at the time of commissioning, with very limited integration and minimal performance benchmarking. Over time, the industry gradually transitioned to stable, SCADA-integrated monitoring systems placed within control rooms, bringing structured visibility and operational discipline. However, as he emphasized, the maturity of technology has far outpaced the maturity of performance evaluation. The new generation of systems requires far deeper understanding, operators must now assess how well a system performs in real pipeline conditions, not merely whether it raises alarms.

Addressing the current market landscape, Mr. Bose highlighted that pipeline operators today face a significant influx of vendors claiming AI-driven solutions, often tested only under laboratory or idealized conditions. He cautioned against trusting systems that look promising on paper or on laptops but have never been validated in real, complex operational environments. Drawing from

industry feedback shared throughout the day, he stressed that pipeline operators are frequently approached with unverified technologies, and the pressure to adopt “new” solutions should never overshadow the need for demonstrated field performance.

He then shifted to the core drivers of advancement in leak detection. He stated that modern systems must empower organizations through safer, secure, and operationally aligned capabilities. Leak detection today is no longer about installing a single system—it is about building an ongoing Leak Detection Program, consistent with best practices, which emphasizes continuous performance monitoring, periodic assessment, operator interaction, and informed decision-making throughout the system’s lifecycle. Mr. Bose clarified that Emerson’s approach is not about bringing another hardware-heavy system but providing an overlay solution that enhances existing infrastructure, improves situational awareness, and supports operators in moving from reactive responses to proactive event handling.

Throughout the session, he underscored that the true advancement lies in provenness, systems must show that they work reliably in the real world, across varied operational states, fluid behaviors, environmental conditions, and transient events. A solution is effective only when it reduces false alarms, detects meaningful deviations, and integrates smoothly with existing control room operations. In his concluding remarks, Mr. Bose reiterated that advancements in leak detection must always prioritize operator empowerment, regulatory alignment, and programmatic continuity, not just technical sophistication. He emphasized that with the industry's increasing safety expectations, environmental accountability, and stakeholder scrutiny, the focus must be on adopting leak detection solutions that are validated, customizable, and capable of sustaining performance over the pipeline’s entire operational life.

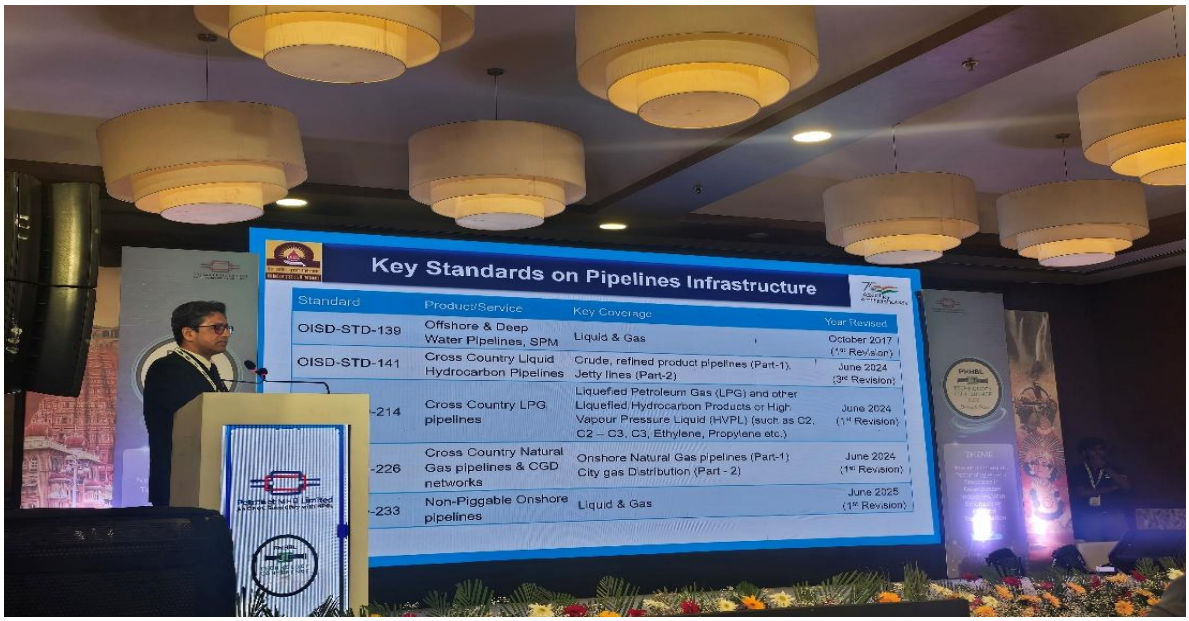
8.13 Session 9: Major changes during recent revision of OISD standards

***Speaker – Mr.* Chandra Sekhar Dutta, Director, Pipelines, OISD**

15:25 PM – 15:40 PM

The session presented by Mr. Chandra Sekhar Dutta provided a detailed overview of the key updates introduced in the recent revision of OISD standards governing cross-country pipeline infrastructure. He began by highlighting the range of standards that shape the regulatory framework for India's pipeline ecosystem, covering offshore and deep-water pipelines, liquid hydrocarbon pipelines, LPG pipelines, natural gas pipelines, CGD networks, and non-piggable pipelines. The session emphasized how these documents form the backbone of safe and reliable pipeline operations nationwide. Mr. Dutta then outlined the major changes introduced in the latest revisions, explaining how they aim to elevate safety performance, strengthen design practices, and reinforce integrity management across the sector.

Figure 19: Address by Mr. Chandra Sekhar Dutta on the topic 'Major Changes During the Recent Revision of OISD Standards'



The first major modification relates to safety, fire protection, operations and maintenance, and minimum pipeline integrity requirements, all of which must now be fully implemented within one year of pipeline commissioning. He emphasized that operators are mandated to carry out a gap analysis within this timeframe to identify deficiencies and plan mitigation measures. This early-stage assessment is intended to minimize long-term risks and ensure compliance at the foundational stage of pipeline operations.

He then highlighted key updates in the engineering and design requirements. Given that design deficiencies have historically contributed to several operational issues, the revised standards now specify an increase in minimum wall thickness from 5.5 mm to 6.35 mm, particularly for LPG and natural gas pipelines. The revision strengthens the structural robustness of pipelines carrying volatile and high-risk products.

For natural gas pipelines, new requirements mandate continuous monitoring of moisture, CO2, and oxygen levels at gas dispatch terminals to ensure product quality and protect downstream systems. For LPG pipelines, he emphasized the strict limit of not more than 15 ppmw moisture, highlighting that even small deviations can lead to operational hazards due to the volatile nature of LPG. Several past accidents were referenced as part of the rationale behind tightening these limits. He explained that these revisions reflect learnings from incident analysis, field assessments, and global industry practices. They aim not only to strengthen design but also to enhance operational discipline and integrity assurance over the entire lifecycle of pipeline assets.

In closing, Mr. Dutta emphasized that the updated standards are designed to create a more robust framework for pipeline safety and integrity, supporting safer operations and strengthening the reliability of India's expanding pipeline infrastructure.

8.14 Panel 3: Next generation HSE

Moderator - Mr. Ramesh Ramasamy, Director, PMHBL

Panelists -

- ***Mr. Chandra Sekhar Dutta, Director, Pipelines, OISD.***
- ***Mr. P S Murty, ED, HPCL Mumbai (Retd)***
- ***Mr. P Rama Chandra Murthy, MRCL Engineering Safety Consultants***

15:40 PM – 16:10 PM

Mr. Ramesh Ramasamy opened the discussion by placing strong emphasis on the need to leverage next-generation technologies such as AI and ML to strengthen HSE practices. He highlighted that asset integrity, particularly for aging pipelines and critical infrastructure, has become a central concern for operators across the country. He stressed that modern digital tools must not be considered optional enhancements, but essential safeguards that can help predict failures, strengthen monitoring, reduce exposure to hazardous environments, and ensure that assets continue to operate safely throughout their lifecycle. His introduction framed the session around the critical question of how next-generation technologies, modern engineering practices, and stronger safety cultures could collectively shape the future of HSE in the pipeline sector.

Mr. Chandra Sekhar Dutta began by describing the challenges associated with maintaining the integrity of aging assets. He explained that pipeline systems that were originally designed using open-cut methods now face new difficulties due to the changing natural landscape, especially shifting river courses in northern regions. These evolving site conditions demand revised engineering approaches and continuous updates to protective measures. He described how corrosion management has also required adaptation, with wall thickness adjustments and the installation of sleeves in areas where corrosion progresses faster. He elaborated that when assessments show that sections of a pipeline may not survive beyond the next five years, they are proactively replaced, reflecting a priority toward safety and continuity. In reflecting on the future, he explained that current methods for internal assessment involve extensive manual work and significant expense, whereas advanced AI and ML can provide comprehensive bottom scanning, reduce costs, and protect personnel by minimizing the need for confined-space entry. His perspective highlighted both the engineering realities and the transformative potential of digital tools in maintaining asset integrity.

Mr. P. S. Murty offered a perspective grounded in decades of pipeline and refinery safety leadership. He clarified that aging infrastructure does not automatically signify unsafe infrastructure, remarking that “Aging does not mean it’s unsafe, it only means the condition in which we have laid the lines has changed”. He emphasized that pipeline systems remain one of the safest modes of transportation, if monitoring and process safety remain within the designed operating envelope. He distinguished pipeline operations from refinery operations, explaining that pipelines do not have the same runaway reaction risks as refinery units, yet demand a completely different discipline in monitoring. He stressed that continuous monitoring is essential, and technologies such as AI and ML can be powerful tools to detect corrosion patterns, identify early indicators of failure, and strengthen preventive programs. He also highlighted that corrosion management relies not only on monitoring but on adopting unique, situation-specific solutions

rather than attempting to standardize requirements across all systems. His reflections underscored that intelligent monitoring, supported by digital tools, must evolve alongside aging infrastructure to maintain high safety performance.

Mr. P. Rama Chandra Murthy provided a conceptual and safety-engineering perspective, explaining the underlying hazard mechanisms that must be understood before integrating AI and ML into HSE frameworks. He emphasized that galvanic coupling and corrosion are inherently unpredictable phenomena, rooted in electrochemical reactions that vary by site, material, environment, and historical usage. He stated that guidelines and regulatory frameworks provided by PNGRB offer sufficient direction, but each element must be applied with precision and technical rigor. He stressed that before adopting AI and ML for hazard prediction, organizations must first understand what constitutes a hazard within their operational context, the associated threat pathways, and the types of barriers needed for prevention. He explained that AI and ML must ultimately support the fundamental HSE goal of “no injury and no loss of containment,” aligning digital tools with barrier-based safety models. His contribution reinforced that technology must be rooted in deep understanding of the process hazards it intends to address.

As the session progressed, the conversation expanded to cultural maturity and the organizational mindset required to integrate new technologies into HSE practices. The panel agreed that digital tools alone cannot transform safety performance unless accompanied by cultural evolution. Mr. Dutta highlighted that tasks such as tank assessments or sludge inspections often require hazardous confined-space entry, and AI-based scanning approaches could not only reduce cost but significantly reduce human exposure. Mr. Murty emphasized that corrosion management systems require continuous checking—something not feasible through human monitoring alone—and that AI and ML can offer continuous insights that strengthen barrier performance. Mr. PR Murthy reinforced that organizations must first understand their hazards before deploying AI tools so that digital systems enhance, rather than complicate, safety practices.

The panel also discussed the importance of shared emergency response systems for hydrocarbon incidents. Mr. Dutta noted that ongoing efforts are exploring area-based and cost-efficient models that multiple operators can utilize collectively to improve readiness and timeliness in emergencies. Mr. Murty added that hydrocarbon exigencies require specialized capabilities, and pooling resources could deliver stronger response mechanisms in regions with clustered pipeline activity.

The session concluded with the collective wisdom of the panel, acknowledging that next-generation HSE is not a standalone objective but a combination of engineering updates, cultural evolution, regulatory clarity, and integration of modern technologies. In his closing remarks, session chair, Mr. Ramesh Ramasamy, emphasized that the future of pipeline safety lies in systems that are predictive, adaptive, and deeply informed by data. He highlighted that the vision must be to move beyond compliance and create an HSE ecosystem that continuously learns, anticipates risks, and safeguards both people and assets. He remarked that with continued innovation, cross-industry collaboration, and adoption of AI and ML, the industry is well positioned to elevate safety performance to the next level.

Figure 20: Panel 3: Next Generation HSE (L–R) Moderator: Mr. Ramesh Ramasamy, Director, PMHBL; Panelists: Mr. Chandra Sekhar Dutta, Director, OISD; Mr. P. S. Murty, ED, HPCL (Retd); Mr. P. Rama Chandra Murthy, MRCL Engineering Safety Consultants

8.15 Session 10: When AI converges with IT & OT

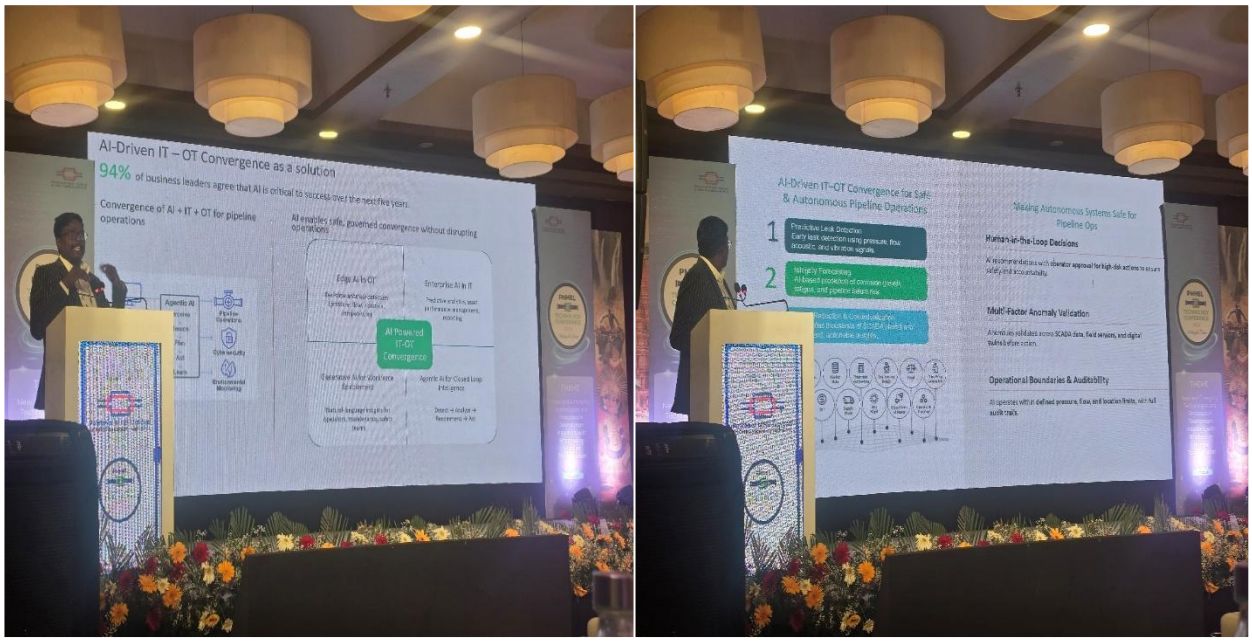
Speaker – Mr. Sundaravelu Shanmugam, Global Technology and Innovation Leader, Data & AI, Kyndryl

16:25 PM – 16:45 PM

This session focused on the transformational potential of AI in the oil and gas sector, emphasizing that true value can only be unlocked when IT and OT converge. Mr. Sundaravelu Shanmugam explained that traditionally, IT systems and OT environments have operated in silos, each with separate data, processes, and priorities. For AI to be effective at scale, organizations must adopt an AI-driven operational mindset, where digital intelligence is embedded across both IT and OT layers, enabling seamless data flow and coordinated decision-making.

He stressed that the distribution of AI workloads must be aligned with application performance requirements, ensuring that network architectures are mature enough to deliver real-time insights when required. If networks and systems cannot support AI inference speed, the benefits of AI diminish, especially for time-critical operations such as leak detection, predictive maintenance, or field-level safety interventions.

Figure 21: Address by Mr. Sundaravelu Shanmugam on the theme 'When AI Converges with IT & OT



Mr. Sundaravelu also highlighted several barriers commonly faced by large enterprises. Many organizations continue to operate on legacy systems, and even newer systems often inherit older technical debt, limiting innovation. Past failed AI investments, often due to insufficient data maturity or unclear outcomes, have created hesitancy. He pointed out the challenge of cloud repatriation, where customers move workloads to the cloud for integration but later shift back due to performance, cost, or security concerns—making operational harmonization even more complex. Additionally, if application performance lags, the innovation pipeline also slows down, reducing the value of AI deployment.

He noted that despite these challenges, business leaders overwhelmingly recognize the importance of AI, with 94% agreeing that AI will be critical to organizational success over the next five years. He emphasized that AI, when implemented with strong governance and data foundations, can drive safe IT-OT convergence without disrupting ongoing operations.

Mr. Sundaravelu outlined key AI use cases for the pipeline sector, such as predictive leak detection, pipeline integrity forecasting, alarm reduction and contextualization, and real-time anomaly intelligence. However, he cautioned that the biggest reason AI deployments fail is the lack of maturity in training data, which prevents AI systems from learning and adapting effectively.

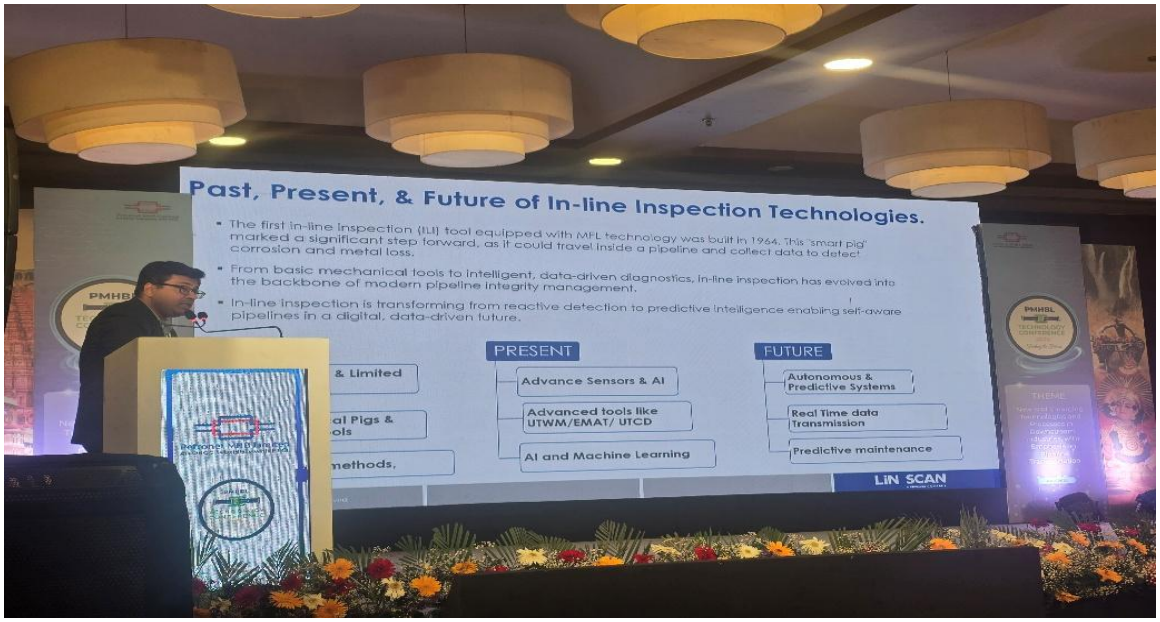
He concluded by introducing an architectural blueprint for AI + IT + OT convergence, built on five foundational layers: Detect, Analyze, Orchestrate, Execute and Learn. This cyclical model ensures continuous intelligence, automated decision-making, and adaptive learning, enabling enterprises to evolve from reactive to predictive and eventually autonomous operations. Overall, the session emphasized that successful AI adoption in the oil and gas industry is not merely a technology shift but a strategic transformation driven by integrated systems, reliable data pipelines, and robust IT-OT alignment.

8.16 Session 11: The next frontier of ILI: Overcoming challenges in complex pipeline systems

Speaker – Mr. Prateek Chauhan, LinScan
16:45 PM – 17:05 PM

The session explored the past, present, and future of In-Line Inspection (ILI) technologies, highlighting the advancements shaping modern pipeline integrity management. Mr. Chauhan began by describing pipelines as the "hidden highways of the modern world," essential to global energy movement yet often exposed to complex operational challenges. Among the major issues, he emphasized the difficulties associated with inspecting loading lines and multi-configuration pipelines, which continue to pose significant constraints for operators due to geometry, bends, diameter variations, and flow dynamics.

Figure 22: Address by Mr. Prateek Chauhan, LinScan, on "The next frontier of ILI: Overcoming challenges in complex pipeline systems"



Mr. Chauhan presented LinScan's growing portfolio of specialized ILI technologies, developed to address precisely these complexities. He outlined several innovations including ultra-compact ILI tools, purpose-built to traverse tight restrictions and challenging pipeline geometries. He then introduced EMAT crack inspection technology, designed to evaluate coating health, identify stress corrosion cracking, and detect structural anomalies without the need for liquid couplants, making it suitable for difficult-to-inspect pipelines.

The session also covered LinScan's Combo Inspection Tools, which integrate multiple sensing technologies into a single run, enabling operators to detect metal loss, cracks, deformation, and coating issues simultaneously. Additionally, Mr. Chauhan showcased their Smart Caliper AI, an advanced digital caliper tool enhanced with machine learning capabilities to improve accuracy in detecting dents, ovalities, and mechanical deformation, while reducing false positives and operator interpretation effort.

He further highlighted notable projects and field applications, including a large-scale multi-diameter pipeline inspection project spanning from the USA to Canada, demonstrating LinScan's capability to handle non-standard, highly complex pipeline systems. This example illustrated how adaptive tool design, data intelligence, and robust field practices have enabled ILI solutions to evolve in response to increasingly demanding pipeline environments.

In closing, Mr. Chauhan emphasized that the next frontier of ILI lies in combining advanced sensing, compact tool engineering, AI-driven analytics, and versatile multi-diameter capabilities. Together, these advancements are helping pipeline operators overcome long-standing inspection challenges and significantly enhance the safety, accuracy, and reliability of integrity assessment across complex pipeline systems.

8.17 Session 12: Demonstration: VR-based PIG receipt and launch activity

Speaker – Mr. Vijay K, R2M
17:05 PM – 17:15 PM

This session provided an immersive demonstration of how Virtual Reality (VR) can transform training practices for PIG receipt and launch operations in pipeline systems. He explained that VR-based training has become a powerful tool for enhancing workforce capability, particularly in activities that involve high operational risk, require specialized equipment, and demand precise procedural execution.

The presentation began with an overview of the existing challenges faced during traditional training for PIG operations. These include high-risk working environments, reliance on expensive equipment, limited resource availability, and the practical difficulty of repeatedly simulating real field scenarios for trainees. Mr. Vijay emphasized that conventional training often cannot fully expose workers to the dynamic and hazardous nature of live operations, which is where VR can enable more dynamic training experience.

This was followed by a live VR demonstration, where the audience was shown how workers would interact with a virtual PIG launcher/receiver environment. The system offered real-time, immersive simulation, enabling trainees to practice step-by-step procedures, identify potential hazards, respond to operational cues, and safely understand the complete workflow from preparation to execution. The VR environment faithfully replicates field conditions, providing experiential learning without exposing personnel to actual operational risk.

Figure 23: Demonstration of VR-based PIG receipt and launch activity by Mr. Vijay K, R2M

Mr. Vijay also outlined the business benefits of adopting VR-based operational training. He highlighted that organizations could achieve significant cost reductions by minimizing field training requirements, lowering equipment wear, and reducing downtime associated with training-driven interruptions. VR also helps improve safety performance, as trainees become better prepared and more confident before entering real operational sites. In addition, VR-based learning accelerates maintenance cycles, strengthens decision-making abilities, and offers consistent training quality across multiple batches and locations. The demonstration effectively showcased how VR can enhance competency development for pipeline teams, making training safer, faster,

and more cost-effective, while elevating overall operational readiness for high-risk activities such as PIG launching and receipt.

In concluding, the session highlighted how VR-based training stands at the intersection of safety, innovation, and operational excellence. By offering a risk-free, repeatable, and highly immersive learning environment, VR strengthens workforce capability while supporting organizational goals of reducing incidents, enhancing efficiency, and fostering a future-ready operations culture. The demonstration reinforced that adopting immersive technologies is no longer optional; it has become a strategic enabler for safer, smarter, and more resilient pipeline operations.

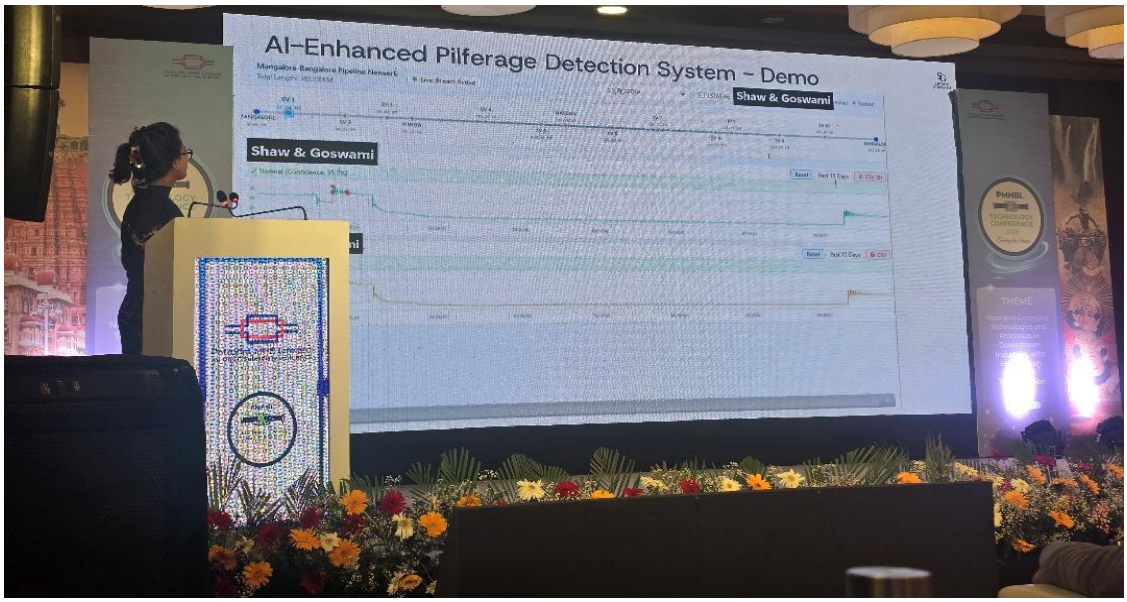
8.18 Session 13: Advanced analytics: AI for petroleum pipeline

Speaker – Ms. Aditi, Advisor, M/s Shaw & Goswami

17:15 PM – 17:35 PM

The session focused on how advanced analytics and AI-driven behavioral modelling are reshaping real-time monitoring and integrity management for petroleum pipelines. Ms. Aditi began by outlining the operational complexities that pipeline operators face today. With pipeline systems now generating vast volumes of acoustic, hydraulic, and operational data, traditional threshold-based systems have reached their limits. These legacy systems often trigger excessive alerts, contributing to significant alarm fatigue, where operators are inundated with noise from non-critical disturbances. She explained that without contextual intelligence, earlier models offered no behavioral learning, forcing teams to rely heavily on manual correlation and interpretation.

Figure 24: Address by Ms. Aditi on the topic 'Advanced Analytics: AI for Petroleum Pipeline



Transitioning from these limitations, she introduced an AI-based approach where the system ingests historical and real-time data, learns the pipeline's baseline operating pattern, and continuously detects deviations from this learned behavioral norm. Rather than depending on static thresholds, the AI learns what "normal" looks like across pressure, flow, vibration, and acoustic signatures. With this baseline established, even subtle deviations can be detected with far higher precision.

To demonstrate the capability, she showcased a real application on the Mangalore to Neriya pipeline segment. The system was trained using past operational datasets, enabling it to understand behavioral signatures characteristic of regular operation. Once deployed, the AI system was able to identify anomalies only when they truly diverged from learned patterns. During the demo, the system filtered out routine, harmless disturbances and flagged only those abnormalities that held operational significance, highlighting its ability to reduce false positives while strengthening true anomaly visibility.

She further explained how AI-enhanced intrusion monitoring benefits from this behavioral learning approach. By detecting deviations in vibration or acoustic behavior consistent with external interference, the system can identify threats earlier and with higher confidence. Unlike traditional systems that flood operators with threshold breaches, the AI-driven system contextualizes events, correlates signals, and elevates only those deviations that truly matter. As she described, the shift from threshold alerts to behavior-based intelligence marks a major transformation in pipeline operations. By learning baseline patterns and dynamically comparing them against real-time behavior, the system supports operators in distinguishing noise from actionable risk.

Ms. Aditi concluded by emphasizing the wider operational and strategic value of integrating AI into pipeline monitoring. With faster visibility into anomalies, reduced false alarms, improved decision-making, and enhanced predictive capability, AI significantly strengthens pipeline integrity management. By enabling operators to understand both normal and abnormal behavioral patterns in real time, this approach improves safety performance and prepares organizations for a more intelligent, proactive future of pipeline operations.

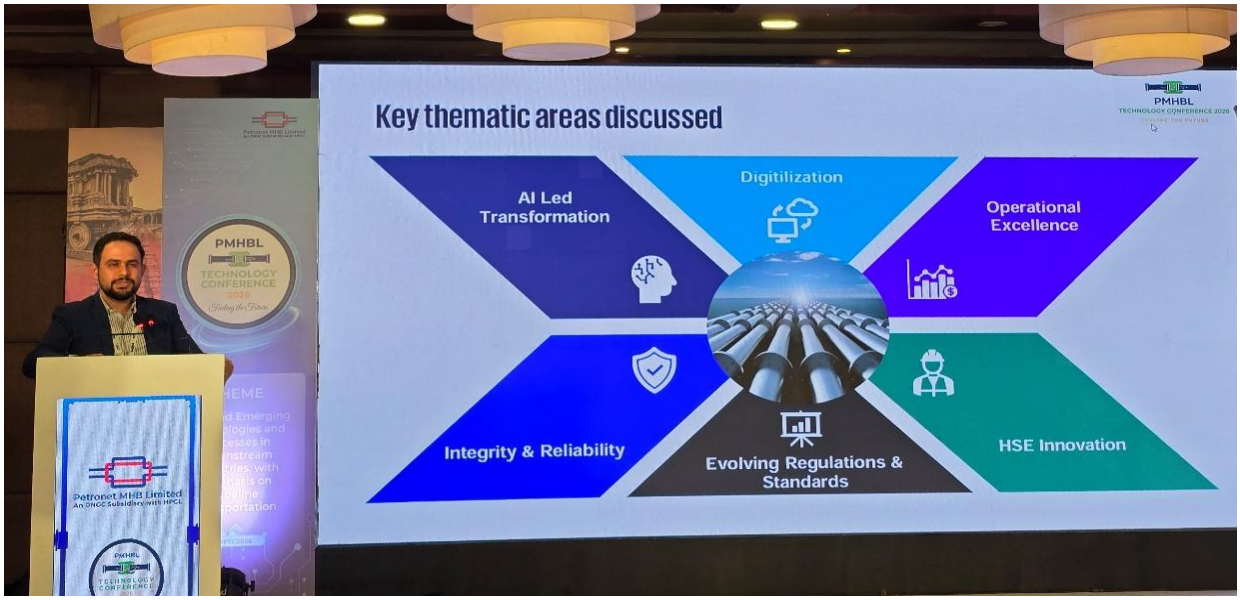
8.19 Conference Takeaways and Way Forward

Speaker – Mr. Sharang Sharma, Associate Director, KPMG
17:35 PM – 17:50 PM

The conference takeaways reflected on the significance of the discussions held throughout the day and the strategic direction they offer for the sector. Mr. Sharma began by thanking all speakers, panelists, dignitaries, and participants, noting that the event's success was driven by the richness of dialogue and the active engagement of industry leaders. He emphasized that this collective participation reflected a shared commitment to strengthening India's pipeline ecosystem and advancing towards a safer, more efficient, and technologically empowered future.

Setting the broader context, he observed that India's energy sector stands at a particularly interesting and pivotal juncture. While global geopolitical developments and the worldwide push towards green energy have led many international forecasts to predict a decline in oil and gas demand, India continues to present a contrasting narrative. In the Indian context, demand for petroleum products is expected to rise steadily for the next two decades. This divergence underscores the importance of building robust, future-ready pipeline infrastructure to support the nation's growing energy needs. Mr. Sharma highlighted that this very need makes gatherings such as this conference critical, as they encourage integrated thinking, industry coordination, and knowledge sharing on the themes that shape operational readiness and national energy security.

Figure 25: Mr. Sharang Sharma, Associate Director, KPMG, delivering the session on Conference Takeaways



He then summarized the central themes that emerged from the sessions.

- Artificial intelligence and machine learning are beginning to transform the sector significantly from predictive maintenance to IT-OT convergence and intelligent decision-making demonstrating how AI-led transformation can reshape operational efficiency.

- Digitalization was also highlighted as a major pillar, with examples such as PMHBL's CDP program showcasing how administrative and operational processes can be elevated to new levels of transparency, accountability, and performance.

- Operational excellence remained a recurring theme, emphasizing the modernization of SOPs, the adoption of emerging technologies, and the continuous optimization of processes to reduce operational expenditure and boost throughput.

- Integrity and reliability of pipeline assets emerged as a central concern, especially given India's aging pipeline network. Technologies such as leak detection systems and intelligent pigging were emphasized as key tools in ensuring that pipelines remain safe and dependable.

- Evolving regulations and standards introduced by the Government of India were acknowledged as essential enablers, ensuring that infrastructure is built, operated, and maintained with safety as the foremost priority.

- Next-generation HSE highlighted how innovation in safety practices, supported by digital tools and stronger safety cultures plays a crucial role in safeguarding people, assets, and the environment.

Mr. Sharma concluded by emphasizing that the responsibility now lies with all participants to translate the knowledge shared during the conference into concrete, actionable outcomes. He remarked that such platforms are valuable only when insights are carried forward and applied meaningfully within organizations. With the learning, experiences, and best practices exchanged, the sector is better positioned to address emerging challenges, adopt new technologies, and drive improvements in safety, efficiency, and reliability. He closed the session with a message of optimism and collective purpose, stating that with shared resolve and coordinated effort, the industry can shape a stronger and more resilient energy future for the country.

8.20 Vote of Thanks

Speaker – Ms. Sai Sudhamayee, Head Technical, PMHBL
17:50 PM – 18:00 PM

The conference concluded with remarks from Ms. Sai Sudhamayee, who reflected on the meaningful discussions and the strong engagement that shaped the PMHBL Technology Conference 2026. She highlighted how the sessions, from AI and digitalization to pipeline safety, operational excellence, VR demonstrations, cybersecurity, leak detection, and analytics collectively showcased how innovation is redefining the pipeline sector. She extended her gratitude to all speakers, session chairs, moderators, industry leaders, technical experts, academic contributors, participating organizations, startups, and technology partners for enriching the dialogue with ideas that push the industry forward. She also acknowledged the efforts of PMHBL's Technical, Operations, Procurement, HSE, and Digital teams for their dedication and the impactful initiatives they presented.

Looking ahead, she emphasized that the future of pipelines goes beyond the movement of energy and is increasingly defined by intelligence, resilience, and sustainability. She thanked all participants for their enthusiasm and participation, noting that their involvement was central to the conference's success. She closed by expressing confidence that the knowledge shared throughout the day would translate into meaningful action across the sector, and with that, formally concluded the PMHBL Technology Conference 2026.

Figure 26: Ms. Sai Sudhamayee, Head Technical, PMHBL, delivering the Vote of Thanks

9 PMHBL Technology Conference 2026: Day 2 - Key takeaways

- Digital transformation emerged as the defining imperative, reinforcing that competitive advantage will be shaped not merely by infrastructure build-out but by intelligent, data-driven utilization of assets across the pipeline value chain.
- AI-led transformation took center stage, demonstrating its ability to fundamentally reimagine monitoring, training, decision-making, and operational workflows through behavioural modelling, predictive insights, and automated intelligence.
- AI-enabled behavioural modelling showcased breakthrough capability, drastically reducing noise, increasing anomaly precision, and elevating pipeline surveillance from threshold-based logic to dynamic, learning-based interpretation.
- Integrated IT–OT convergence surfaced as a strategic necessity, highlighting that scalable innovation requires harmonized systems, modernization of legacy architectures, and the resolution of deep-rooted technical debt.
- VR-based immersive learning introduced a new benchmark for operational training, enabling safe, repeatable, high-fidelity simulations for high-risk activities and significantly elevating workforce preparedness and safety culture.
- Operational excellence was a consistent theme, demonstrated through optimized pumping architectures, enhanced hydraulic stability, automated valve stations, and digital workflows improving responsiveness and lifecycle continuity.
- Advances in corrosion management revealed a maturing integrity discipline, combining chemical processes, internal coatings, robotics, and data-led inspection tools to deliver stronger predictive capability and reduced asset vulnerability.
- Integrity and reliability practices evolved significantly, with modern inspection tools, multi-sensor analytics, and next-generation modelling enabling deeper visibility into asset conditions and more confident long-term planning.
- Leak detection philosophy shifted from isolated systems to continuous programs, emphasizing sustained performance, operator empowerment, and long-term governance rather than one-time installations or theoretical models.
- Evolving regulations and standards underscored the need for stronger engineering fundamentals, elevated monitoring requirements, and tightened implementation timelines—reflecting rising expectations for safety and environmental stewardship.
- In-line inspection technologies demonstrated remarkable technological advancement, integrating compact architecture, crack analysis, multi-parameter sensing, and AI-enabled interpretation for complex, multi-diameter pipelines.
- HSE innovation emerged as a foundational pillar, supported by automation, digital surveillance, immersive training, and integrated monitoring systems that collectively enhance situational awareness and risk mitigation.

10 PMHBL Technology Conference 2026: Day 2 - Summary

Day 2 of the conference provided a multifaceted exploration of how the pipeline sector is evolving through digital intelligence, engineering innovation, safety enhancement, and sustainability-focused practices. The day opened with a strong emphasis on operational excellence, demonstrating that future competitiveness will not be defined by infrastructure volume alone but by how effectively that infrastructure is optimized, automated, and digitally supported. Presentations illustrated successful examples of system augmentation, pumping station upgrades, and digital automation that have significantly strengthened reliability and stability across key pipeline stretches.

Digital transformation remained a core theme throughout the day. Speakers showcased how AI-driven behavioral models are reshaping monitoring practices by learning baseline operating patterns and identifying deviations with far greater precision than threshold-based systems. This transition toward behavior-centric intelligence is helping operators reduce alarm fatigue, shorten response times, and strengthen overall integrity management. Complementing this, a focused discussion on aligning IT and OT systems highlighted that the next phase of AI adoption will depend heavily on integrated, resilient architectures rather than on isolated digital tools.

The introduction of immersive VR training for high-risk operations marked another milestone in digital capability building. The demonstration showcased how virtual simulations can replicate real-world operational environments, enabling personnel to practice complex procedures safely, repeatedly, and without equipment wear—ultimately driving improvements in safety performance and reducing training costs.

The day also brought strong technical depth through sessions on corrosion mechanisms, internal coating technologies, robotic applications, and risk-based inspection models. Presenters emphasized how chemical treatments, advanced coatings, and digital dashboards improve visibility and decision-making, helping organizations better predict, prevent, and manage integrity threats. Engineering insights into modular structural designs further demonstrated how hybrid and pre-fabricated solutions can solve ground-level challenges and expedite field deployment.

In parallel, discussions around updated design and safety requirements stressed the need for stronger construction fundamentals, improved monitoring practices, and shorter compliance timelines. The evolving regulatory landscape reflects the industry's collective learning and the increasing expectations placed on operators to maintain robust safety margins. The exploration of next-generation in-line inspection tools added to this, showcasing compact, flexible, and AI-enhanced technologies designed for challenging geometries and multi-diameter segments.

The shift from viewing leak detection as a one-time installation to treating it as a continuous performance program emerged as a key insight—reinforcing that real-world provability, operator interaction, and lifecycle monitoring now define system value. This aligns closely with the sector's broader movement toward resilience, accountability, and long-term operational dependability.

In conclusion, Day 2 underscored a sector standing on the cusp of profound transformation, where digital intelligence, engineering innovation, and operational discipline converge to redefine the future of pipeline management. The day's discussions illustrated a shift from reactive practices towards predictive, insight-driven operations, setting a clear direction for safer, smarter, and more resilient pipeline ecosystems. The collective learnings established a compelling vision of an industry ready to embrace technology not as an enhancement, but as a strategic cornerstone for the decades ahead.