India’s First LC-MAX® Unit Goes Live with Integrated AI-led Intelligence at HPCL’s Visakh Refinery

MUMBAI, INDIA, January 5, 2026 /EINPresswire.com/ -- Hindustan Petroleum Corporation Limited (HPCL) has successfully commissioned India’s first LC-MAX® residue conversion unit at its Visakh Refinery, supported by an integrated intelligence backbone, marking a significant milestone in the evolution of India’s downstream refining sector.

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> *Shri Vikas Kaushal, Chairman and Managing Director, HPCL*

The deployment marks the first-ever implementation of the LC-MAX® residue conversion technology in India—one of the most complex refining processes ever designed. Developed and patented by CLG in 2012, LC-MAX® converts the bottom of the barrel into high-value distillates, achieving up to 93% vacuum residue conversion, while driving operational excellence and sustainability across HPCL’s Residue Upgradation Facility (RUF).

Operating such an advanced and complex unit from the outset requires real-time intelligence and optimization. To meet this, the LC-MAX® Digital Suite—developed and delivered by Lummus Digital—integrates real-time monitoring, predictive analytics, and AI-driven optimization to enable HPCL to operate the unit at peak efficiency from day one. Embedded from the startup phase, the digital suite ensures that at feed cut-in, the system is fully operational and production-ready. The suite is powered by mcube™, an advanced AI and data platform that serves as the intelligence backbone.

Lummus Digital and CLG are grateful for the support of the Ministry of Petroleum & Natural Gas (MoPNG) in advancing digital-led initiatives aligned with Hon’ble Prime Minister Shri Narendra Modi ji’s Atmanirbhar Bharat vision for India’s oil and gas sector.

Leadership Perspectives ----------
"This is a defining moment for India’s refining landscape. As the country’s first LC-MAX® unit, this deployment positions HPCL at the forefront of technological and operational innovation. By integrating advanced intelligence, we are setting a new benchmark for efficiency, reliability, and sustainability in Indian refining" – Shri Vikas Kaushal, Chairman and Managing Director,

Hindustan Petroleum Corporation Limited.

“With hybrid modelling and an integrated digital backbone built on mcube™, the LC-MAX® Digital Suite will be a valuable operational asset for HPCL—delivering sustained operational value.” — Debdas Sen, Joint Executive Director, Lummus Digital, & CEO, TCG Digital.

Ujjal Mukherjee, Joint Executive Director, Lummus Digital, & CTO, Lummus Technology, remarked “By combining decades of proven process technology from Lummus with AI-assisted optimization, this deployment represents exactly the kind of integrated innovation the downstream refining industry needs to drive margins.”

Arun Arora, CTO, Chevron Lummus Global adds “CLG is proud to be part of the successful deployment of advanced Digital Suite for the world’s first LC-MAX® unit at HPCL, designed for bottom-of-the-barrel upgrading of vacuum residue. This cutting-edge solution seamlessly integrates CLG’s proprietary process technology know-how and optimization tools, delivering real-time insights to maximize throughput, enhance reliability, and drive superior operational efficiency”

Key Highlights of the Digital Suite:

- Capacity Utilization Monitoring – Real-time insights into section-wise utilization to identify bottlenecks and optimize throughput.
- Feed Operability Index (FOI) – Quantifies feed complexity to maintain stability during crude changes.
- Crude Blending Optimization – Predicts product quality and conversion for better blending strategies.
- Economic Performance Dashboard – Tracks revenue, operating cost, and profitability KPIs.
- Energy & Carbon Tracking – Monitors specific energy consumption and Scope 1 & 2 CO emissions for ESG compliance.
- EB Reactor Health Monitoring – Prevents coke formation through temperature and pressure trend analysis.
- Catalyst Performance & Inventory Management – Optimizes catalyst life and cost through predictive monitoring. The EB Catalyst Inventory Dashboard delivers real time visibility and automated control of catalyst levels across reactors and handling systems. By ensuring accurate inventory management, it optimizes plant performance, ensures product quality, and reduces manual intervention.
- Integrated Hydrogen Management – Reduces energy intensity and optimizes hydrogen consumption.

Strategic Benefits for HPCL:

The LC-MAX® Digital Suite is designed to enable a range of operational and economic improvements that are expected to contribute to higher margins as the solution is adopted and optimized:

- Improved product quality and profitability - enabling better decision-making for product

strategies and yield enhancement.
• Enhanced operational reliability and reduced downtime - helping improve unit availability and overall throughput potential.
• Optimized catalyst addition and hydrogen utilization - supporting more efficient operations and lower variable costs.
• Lower carbon footprint and energy intensity.

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