



Powering Intelligent Plant Operations:

AI-Powered Precision for EBIT Growth

The Oil & Gas and downstream sectors are navigating some of the most challenging market conditions in decades — marked by volatile crude prices, tightening refining margins, and relentless pressure on profitability. Traditional operating models, designed for stability, often falter in the face of dynamic market forces directly impacting EBIT. In this environment, self-optimizing autonomous plants are emerging as a strategic necessity. By enabling continuous process optimization, adaptive decision-making, and operational resilience, autonomous plants help enterprises safeguard margins, enhance asset availability, and maintain process stability. At Lummus Digital, we combine deep process expertise with advanced intelligence, AI, and Hybrid Process Modeling to enable intelligent, autonomous operations. Powered by mcube™, our products learn and adapt in real time — helping enterprises maximize throughput and sustain EBIT in unpredictable markets.

Turn Process Intelligence into **EBIT** Advantage!

Our solutions empower your plant's EBIT performance and reliability across 4 key aspects of business value:



Autonomous Plant Enablement for optimized EBIT

Reduce manual load, automate transitions, and enable AI-driven decision-making



Bottom-of-the-Barrel Economics

Maximize value per barrel through residue conversion and connected feedstock-to-downstream decisions.



Intelligent Operations Optimization

Improve yield, energy, throughput, economics, and planning efficiency

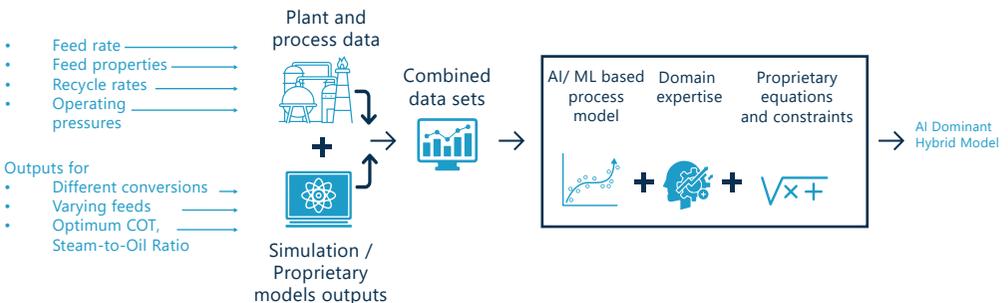


Improving Plant Reliability & Risk Advisory

Reduce downtime, prevent failures, and increase asset availability

The secret sauce "Hybrid Approach"

Lummus Digital has developed the Hybrid Approach integrating first principles-based process models and domain expertise with Data Science, Machine Learning and advanced AI algorithms. Machine Learning is used to create the model, leveraging process simulation, plant or pilot plant data, while using domain knowledge including first principles and engineering constraints to build an enriched model that delivers tangible business value even under complex conditions!



Our Product Portfolio



Refining



CDU & VDU Yield Optimizer

- Maximizes side stream yields
- Optimizes Vacuum Tower Bottom movement
- Reduces costs with real-time data



Hydrocracker Reactor Conversion Optimizer

- Provides real-time predictions of downstream feed
- Optimizes hydrogen consumption, and drives efficiency and profitability



LC-FINING Reactor Conversion Optimizer

- Achieve maximum conversion using real-time data
- Optimizes hydrogen use
- Predicts SHFT values



FCC Ethylene/Propylene Optimization Advisor

- Maximizes ethylene and propylene yields



Lube Oil Base Stock (LOBS) Optimizer

- Maximizes grade cut yields and lube oil output
- Optimizes viscosity



Product Stripper Reliability Advisor

- Prevents steam condensation



Reactor Effluent Air Cooler (REAC) Advisor

- Predicts and prevents fouling and corrosion risks in Hydrocracking units
- Optimizes wash water management



Petrochemicals



Ethylene Heater Optimizer

- Enables continuous optimization in real-time
- Yield Improvements of high value products
- Minimizes energy consumption and carbon emissions



Ethylene Fractionator Optimizer

- Maximizes ethylene yield
- Minimizes slippage
- Optimizes utility use



Charge Gas Compressor (CGC) Fouling Mitigator

- Optimizes Charge Gas Compressor performance by predicting fouling issues in real-time
- Reduces downtime





Lummus Digital is at the forefront of transforming the oil and gas downstream sector, offering domain led digital solutions that tackle the complex challenges faced by refineries and petrochemical industries. As a joint venture between TCG Digital and Lummus Technology, we blend decades of process engineering expertise with advanced AI and data science to deliver tailored solutions for measurable outcome. Our Data & AI platform mcube™ underpins these transformations. We enable organizations unlock the full potential of their data, and by seamlessly integrating AI/ML capabilities into their business processes, we empower businesses to accelerate their digital transformation journey, enhancing agility and driving impactful results.

Our team, comprising over 500 process engineers and 100+ data scientists, we are committed to developing and implementing solutions that enable refineries and petrochemical units to achieve success in their AI-driven business transformation journey.

www.lummusdigital.com

mcube™ is TCG Digital's flagship Data, AI, and Analytics platform—engineered at the intersection of deep industry knowledge and digital innovation. Built on a domain-driven design, it seamlessly navigates the most complex and disparate data landscapes. With AI 2.0 at its core, mcube™ fuses advanced models with real-world context to solve high-impact business challenges. By integrating mcube.data, mcube.ai, and mcube.agents, it transforms enterprise data into intelligent ecosystems. mcube™ drives semantic discovery through ontologies, and empowers agentic applications for autonomous decision-making and continuous learning. From harmonizing data to deploying intelligent agents, mcube™ accelerates 'velocity to value'—delivering clarity, intelligence, and outcomes at scale.

www.tcgdigital.com/tcg-mcube

Contact Us

✉ contactus@lummusdigital.com

🌐 www.lummusdigital.com

📍 Lummus Digital

5825 N. Sam Houston Pkwy.
W., #600 Houston, TX 77086
United States



Speak to our experts