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Digital Transformation at HPCL Visakh Refinery: Implementation of EPDDMS

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Introduction



Hindustan Petroleum Corporation Limited (HPCL) is a Maharatna company in the energy business with two refineries, one on the West Coast (Mumbai) and the other on the East Coast (Visakhapatnam).

The refinery at Visakhapatnam, called Visakh Refinery (VR), was the first East Coast Oil refinery commissioned as Caltex Oil Refining India Ltd. (CORIL) in 1957 with a capacity of 0.675 MMTPA.

Taken over by Government of India in 1976 and merged with HPCL in 1978 with an installed capacity of 1.5 MMTPA.

The initial capacity of 1.5 MMTPA has expanded to 15 MMTPA over the last few decades thru multiple expansion projects, Revamps and commissioning of Visakh Refinery Modernization Project (VRMP) this year.



Problem Statement



In the last 6 decades, Visakh refinery has undergone many modifications and expansions. These modifications were done by various EPCs and most of the as-built documentation hand over is in the form of hard copies.

Over the period, this information has undergone a huge change in field due to various revamps and modifications, which may or may not have been reflected in documentation.



This created challenges like:

Hard copy documents in scattered form

Incomplete as-built documentation

Lack of clarity on completeness of proj. documentation

MOCs/revamps not always updated leading to incorrect procurements/ execution delays/ re-works Storage of information in hard copy format take huge space and is prone to damage, misplacement and maintenance issues

Retrieval takes long time leading to increased project lead times



Initiative Implemented



Creation of digital assets like intelligent 3D models, smart P&IDs, documents and master tag database for legacy refinery units in phased manner using AVEVA™ Unified Engineering. This digital initiative included following activities:

- Laser scanning of units in field and creation of intelligent 3D models, from which, GA drawings, ISO & 2D drawings are generated seamlessly
- Creation of intelligent Process & Instrumentation Diagrams (P&IDs), Instrumentation and Electrical diagrams, Master Equipment Tag Database
- Integration of the digital assets, ensuring data consistency between 3D and 2D data.







Initiative Implemented



Further, Asset Information Management (AIM) solution called Electronic Project Data and Document Management System (EPDDMS) was implemented to host all the digital plant information in a single platform using AVEVA[™] Asset Information Management.





Initiative Implemented







Benefits Realized



Improved data validation through multiple sources, ensuring consistency and compliance. Seamless accessibility to accurate and validated Reduction in information **Engineering Hours** 25-30% **Enhanced Design and Engineering** • Higher accuracy, quicker engineering of large scale projects / revamps • Reduced manual errors, rework, and associated costs. • Savings in information Shorter lead times for MOC and Maintenance retrieval time >50% Accurate fabrication of piping spools & in-kind replacements of components • Ensuring compliance to scheduled timelines • Reduction in reworks Faster data retrieval, reducing time spent searching for during execution due critical information. to lack of information 80-90% Enhanced decision-making with reliable, up-to-date / misinformation data. Shorter lead times for MOC and Maintenance



Benefits Realized



BEFORE **AFTER**

Information is available in scattered,	person
dependent manner	

High lead time for gathering required
information (minutes to hours)

Low clarity on information correctness



More prone for project delays/reworks due to lack of information correctness / completeness



Information is available in a centralized platform at the touch of a button

Reduced lead time for gathering required information (seconds)



High clarity on information correctness



Information available in soft format in secure servers, enabling seamless access



Unique Features of the Initiative KAYAA

Integration with all kinds of data (2D/3D) of any kind of formats (of different OEMs) thru inbuilt gateways.

Integration with other Enterprise platforms like SAP (ERP system), LIMS (Laboratory Information Management System) and Process Historians

Intuitive and user-friendly interface, enhancing user adoption and efficiency

Robust security measures to safeguard sensitive refinery data thereby ensuring compliance with Industry regulations

Easily scalable with the refinery's growth



Other Digital Transformation Initiatives





Online Corrosion Monitoring thru IIoT sensors

- Real time monitoring of asset health, enabling preventive maintenance
- Pre-emptive failure detection and reduction in unplanned shutdowns



AR/VR/MR based Training and Simulation for FCHCU

- Virtual Reality (VR) based operator training simulator, containing 25 Nos. scenarios of FCHCU (start-up / emergency / contingency categories)
- Augmented Reality (AR) / Mixed Reality (MR) based maintenance module for assisting maintenance engineers and remote OEM / SME support



Digital Turnaround (TA) Management

- Real-time monitoring of Turnaround activities through the use of intrinsically safe mobile devices
- Enhanced task management, Analytics, critical path identification and prompt resolution of issues





Thank You Any Questions?