



HMEL[®]

Energising a Brighter Tomorrow



Nomination for

CII – National Award for Environmental Best Practices 2025

World's First ever batch-wise Transportation of Naphtha(White Oil) through a Cross - Country Crude Oil(Black Oil) Pipeline

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Project Overview

World's First Ever Batch-wise Transportation Of Naphtha (White Oil) Through A Cross - Country Crude (Black Oil) Pipeline



 **The Challenge**

A new 1.2 MMTPA Petrochemical Plant needed Naphtha feedstock without affecting the refinery's existing product output (MS/HSD). Traditional options like new pipelines, rail, or road transport would lead to massive capital expenditure, delays, increased carbon emissions, and significant land use.

 **The Innovation**

We challenged the conventional approach with a groundbreaking question: "Why can't Naphtha be transported through the same pipeline that carries crude oil?" This innovative thinking led to the world's first batch-wise transportation of white oil using existing black oil infrastructure.

 **Uniqueness**

This project represents a novel application of existing crude pipeline infrastructure with no global precedent. Patent applications *Indian Patent Office (Application No. 202311052091)* & *US Patent Office (Application No. 18/774,214)* have been filed, solidifying this as a truly groundbreaking engineering achievement in the petroleum industry.

Conception — 1

January 2023

Conceptualization & feasibility studies began

Implementation Phase — 2

First Success — 3

October 2023

First batch of Naphtha successfully transported through crude pipeline

Proven Success — 4

1.2
39+
1st

MMTPA Capacity
Successful Batches
Global First

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BOLDLY EFFICIENT

PROACTIVE COLLABORATION

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Tangible Benefits



Direct Savings & Cost Benefits

\$35/MT saving → ₹353Cr annually (FY24-25) vs rail/other logistics, since inception ~ ₹650 Cr.

Avoided Capex ~ ₹3,000 Cr (no new 1000 + km Naphtha pipeline required)

Strengthens financial efficiency and contributes to India's energy economy



Environmental Benefits

Carbon Emission Reductions:

Pipeline vs Rail: **17,289 MT CO₂ saved** per MMT

FY24-25 (1.14 MMT Naphtha): **~19,709 MT CO₂ savings**

Road transport avoidance: **66,084 MT CO₂ ~ saved**

Avoided construction emissions: **~406,800 MT CO₂**



Operational Efficiency

World's first optimized pipeline utilization — product + crude oil transportation through same pipeline

Continuous supply, zero dependency on external carriers.

Delivery in **nearly half the time** compared to conventional product pipelines ≤18"

17,289 MT CO₂/MMT
Prevented Carbon Footprint

₹353Cr
Annual Savings

₹3,000Cr
Avoided Capex

This innovation represents a game-changing approach to sustainable energy transportation, delivering massive carbon emission reductions while maintaining operational excellence.

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Intangible Benefits



Transforming Operations Through Innovation and Self-Reliance



Self-reliance

Aatmanirbhar Bharat: Eliminated dependence on third-party transport, achieving complete operational independence and strengthening national self-sufficiency goals.



Employee Morale

Employee pride in delivering *world-first* recognized innovation that sets new industry standards and showcases organizational excellence.



Skill Upgradation

Skill India Initiative: In-house design & development of special pigging technology, building critical technical capabilities within the organization.

Industry Benchmark

Pioneered a new operational standard that transforms industry practices and establishes leadership position.

Patent received for In-House design PIGs - embodying the *Make in India* vision. (Indian Design Patent No. 428652-001 & 432824-001)

Infrastructure Optimization

Efficient utilization of existing infrastructure without laying new pipeline over **1000 Km** and without any additional CAPEX investment.

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Replication Potential (Group Level)



Accelerate innovation through collaborative simulation

Cross-functional Assimilation

- SOPs updated with new protocols
- Simulation models created and tested
- Training completed across all teams



Dual-Feed Demonstration

Before: Pipeline limited to crude oil transportation
After: Dual feed (crude + Naphtha) transport, zero contamination achieved.



Process Validation

Comprehensive documentation maintained:

- Batch interface records
- Data logs and monitoring
- Performance metrics tracking



Next Steps

Integrate validated processes into predictive SCADA models for enhanced operational efficiency and real-time monitoring capabilities.



Process Optimization



Technology Validation



SCADA Integration

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Industry Replication Potential



Transforming pipeline operations through innovative technology with global scalability and strategic industry impact.



Steps Initiated : Patent Protection Secured

Patent filed in India & USA, establishing intellectual property foundation for technology commercialization.



Knowledge Sharing : Industry Engagement

- Presented to internal H MEL forums, CHT.
- Potential case for OISD, PNGRB & Industry bodies.



Platform Progression : Future Demonstrations

Planned showcasing in industry seminars, global pipeline summits to accelerate adoption.



Strategic Upside : This innovative solution presents unprecedented opportunities for industry-wide transformation:

Immediate Market Application

Can effectively be used by major Oil refineries including PSU and other pipeline operators with multiple pipelines terminating or originating from Refinery/Petrochemical facilities.

Global Industry Impact

Potential to **redefine cross-country pipeline usage across oil & gas sector globally**, creating new standards for operational efficiency.



Market Opportunity: Revolutionary technology ready for widespread industry adoption across global oil & gas infrastructure.

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Challenges & Countermeasures



Comprehensive solutions addressing technical, administrative, and operational challenges through innovation and strategic implementation.



Technical Solutions

Contamination Risk: Custom pig design & advanced sequencing resolved contamination.

Deposit Management: Patented cleaning pigs eliminated asphaltenes & wax buildup.

Quality Assurance: Real-time density & color monitoring at SV & RT.



Administrative Excellence

Streamlined Approvals: A special taskforce expedites multi-departmental decision-making.

Cross-functional teams ensure rapid response, eliminating bureaucratic bottlenecks.



Digital Transformation

Real-time Monitoring: Advanced SCADA & OFC systems provide continuous operational oversight.

Enhanced Protocols: Digitized inspection Checklists improve consistency.

Staff Development: Comprehensive training for field personnel on new techniques.

Implementation Impact These integrated countermeasures transformed operational capabilities, delivering measurable improvements:

- Zero contamination incidents since implementation
- 50% faster approval cycles through taskforce coordination
- Real-time visibility across all monitoring points

Key Success Factor: Synergy between technical innovation, administrative efficiency, and digital transformation provides a comprehensive solution for current and future operations.

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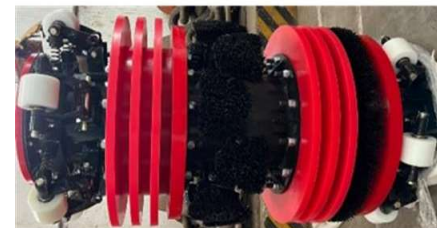
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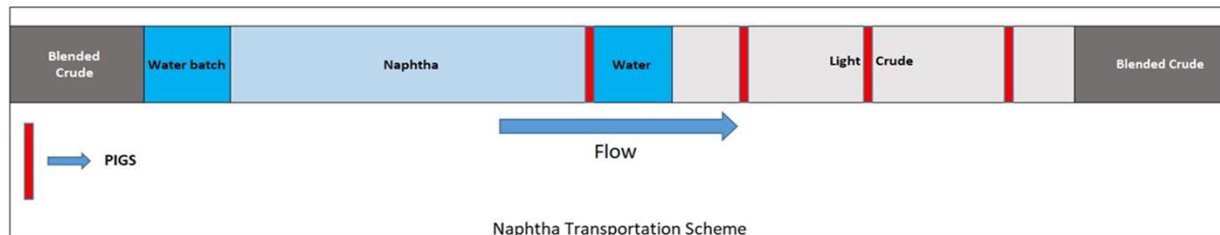
Challenges & Countermeasures



Product Class & Appearance Difference



PIG Design



Naphtha Transportation Scheme

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Benchmarking vs Industry



Unmatched Energy Efficiency

HMPL Innovation: Minimum energy use.
Conventional Rail: High energy consumption.
Conventional Road: Very High energy consumption.
Achieves 75-90% lower energy intensity.



Drastically Reduced Carbon Emissions

HMPL Innovation: ~5,085 t CO₂/ MT, setting a clear industry benchmark.
Rail: ~22,374 t CO₂/MMT.
Road: ~63,054 t CO₂/MMT.



Pioneering Technology Innovation

HMPL's dual transport system is patent-applied in India and the US, world-first technology in the transportation industry.



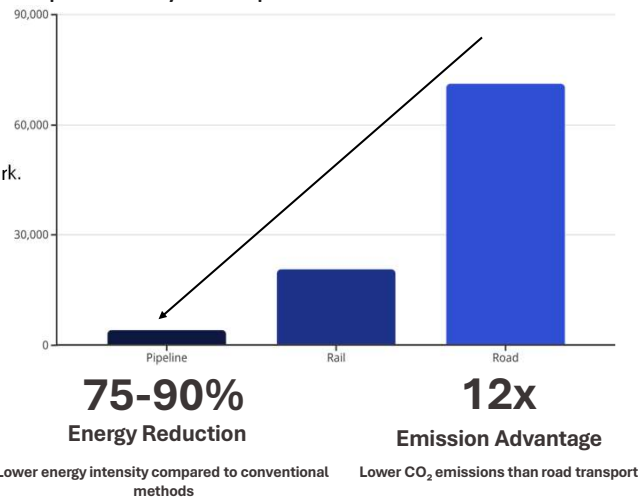
Significant Capital Cost Savings

HMPL: Nil capital expenditure due to repurposed assets
Rail: High Operational Expenditure.
Road/New Pipeline: >₹3,000 Cr investment required.

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Comparative Analysis: Transportation Methods



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Priority Plans: Strategic Pipeline Optimization



Roadmap for Enhanced Throughput & Industry Leadership

FY26: Operational Excellence

+1 Year Strategic Focus

Building foundation for enhanced pipeline performance through targeted optimization initiatives and technological advancement.

- **Optimize batch scheduling** for higher throughputs
- **Continuous refinement** → lower pigging costs
- **Digital control upgrades** for enhanced monitoring

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FY27: Industry Leadership

+2 Years Strategic Expansion

Leveraging proven success to drive industry-wide transformation & establish thought leadership in pipeline operations.

- **Tie-ups with other Pipelines** for replication
- **Share best practices** at global pipeline bodies
- **Knowledge transfer** and industry collaboration

Strategic Vision

Transform from operational optimization to industry leadership, positioning our organization as the benchmark for pipeline excellence across global Pipeline networks.

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Major Learnings & Best Practices



Best Practices (Future Core Approach)

Net Zero Alignment

Strategic alignment with India's ambitious Net Zero goals.

Digital Mindset

Advanced SCADA systems with density and color batch tracking.

Internal Skill Development

Reducing vendor dependency through capability building.

Industry Benchmark Solution

Ready-to-scale model for global multi-pipeline operators.

Lifecycle Cost Optimization

Comprehensive cost modeling for long-term value creation.

Key Insight: Scalability Matters

This innovation isn't a one-off solution- It creates replicable models that can transform the entire industry, proving that constraint-driven innovation leads to scalable, sustainable breakthroughs.

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Challenge Status Quo

Innovation emerges when we turn constraints into opportunities, transforming limitations into breakthrough solutions.



In-House Expertise

Building self-reliance through internal capability development, reducing vendor dependency.

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Asset Repurpose Strategy

Unlocking billions in savings while cutting carbon footprint through intelligent repurpose of existing infrastructure.



Sustainable Profitability

Demonstrating that profitability and sustainability work hand in hand For long-term success.

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Impact Mapping – Aligning with SDGs & Net Zero 2070



Environmental Excellence



Reduced Carbon Footprint
19,709 MT CO₂ Saved/Year vs Rail transport



Significant Emission Savings
66,084 MT CO₂ Saved vs Road transport



Avoided New Emissions
406,800 MT CO₂ Avoided from new pipeline construction

Atmanirbhar Bharat

Make in India

Skill India

PM Gati Shakti
Alignment

Digital India Integration



Supports SDG 13 – Climate Action & Net Zero 2030/2070 targets

Strengthens India's energy economy & reduces forex outflow (SDG 12 – Responsible Consumption & Production)

SDG 9 – Industry, Innovation & Infrastructure → World's first crude + naphtha dual transport

Innovation with Impact – Saving Cost, Cutting Carbon, Strengthening the Nation.

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