

Enhancing project delivery through operational experience

Lessons from Operations, Design, and Commissioning

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Optimisation Team Lead



- Mill Rat
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- Operations
- Maintenance
- Management
- Consultant
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- Hockey Coach
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- Father
- Leader
- Innovator
- Change Catalyst



Operational excellence



40 years of practice



- Japanese Artist Katsushika Hokusai - The Great Wave off Kanagawa
- His last print incorporated **“Prussian Blue” ink** an innovation that had become cheap enough to be used for the woodblock medium.
- Digital tools are the “Prussian Blue” to improved plant design. They are becoming readily available and cheaper to use. Enabling the feedback loop to be faster and more efficient.

1. Catalyst for change

Repeated commissioning war stories

- The weightometer lag time
- The thickener by supplier “X”
- “that” reagent set-up again

Design Time

- The client hasn't paid for it to be fixed
- We can iron the bugs out during commissioning
- Let's get the design done quickly/cheap so we can get to market sooner

Comments

- “I commissioned one of these last year, I know how to fix it”
- These units always do this, the fix is known
- Next time we should.....

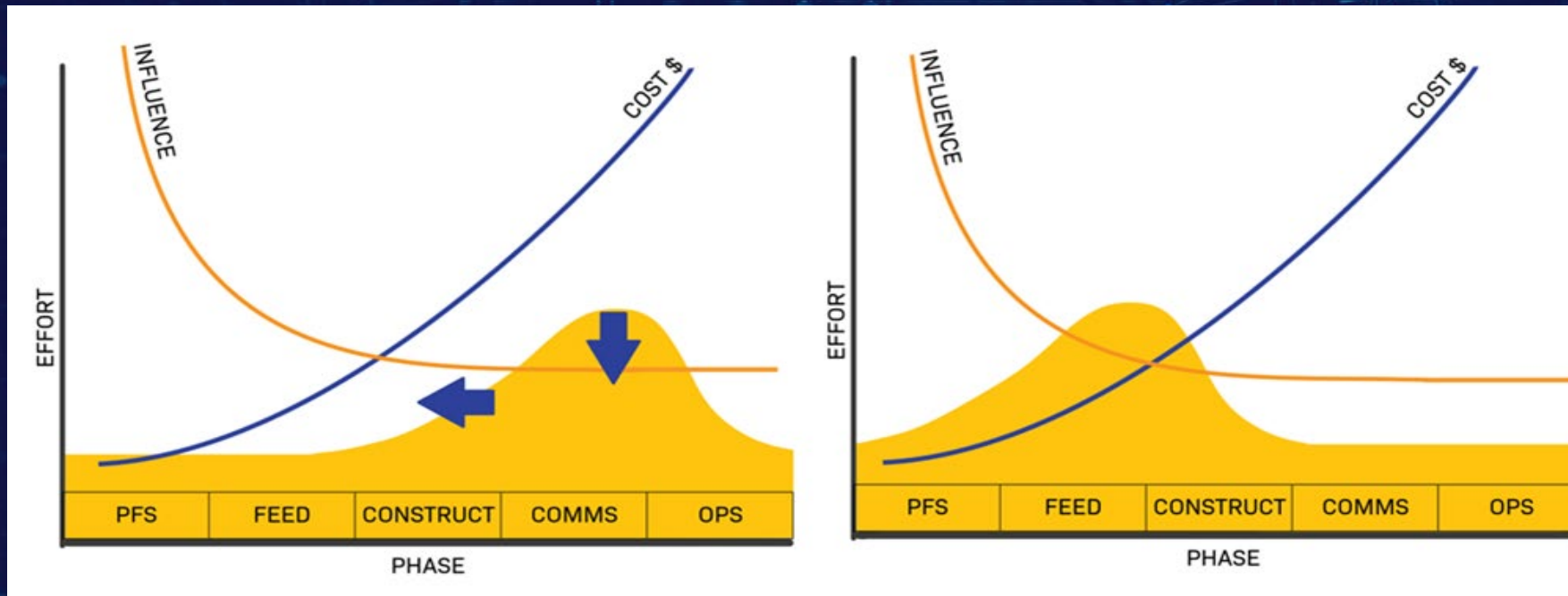
2. The core challenge

- **EPCM models create structural gaps between design, commissioning and operations. Operational issues are frequently discovered too late, leading to:**
 - Design deficiencies repeating across projects
 - Longer ramp-up durations
 - Increased CAPEX and investor risk

PRE-FEASIBILITY STUDY	FRONT END ENGINEERING DESIGN	CONSTRUCTION	COMMISSIONING	OPERATIONS
High Influence Low Expense	Medium Influence Medium Expense		Low Influence High Expense	

3. Early operational involvement

- Identifies issues when they are cheap to fix
- Strengthens baseline designs
- Reduces schedule and cost pressures downstream



4. Improving feed design with digital tools

Mine Information Modelling

- MIM enables the assessment of design quality to ensure structures can be built efficiently, safely, and cost-effectively, reducing on-site rework.

Historizing design costs and CAPEX spend

- By using digital tools to analyze historical project data, EPCM companies are enhancing design accuracy and reducing overruns

Improved decision making

- AI-powered analytics process vast amounts of operational and geological data, providing actionable insights for better-informed, data-driven decisions in the FEED stage.

Digital twin and simulation models

- Enabling Operators to walkthrough the design and spot design improvements.
- Simulators that allow geological data to be put through the concentrator and find metallurgical recovery improvement.

5. Incorporating innovation

Poppet samplers are still relatively expensive but the operational payback in time saving on a daily basis, and the safety improvements from not having to carry buckets down stairways





Putting line breaks into a TSF line to stop slack flow condition

Designing angles in SAG Mill head chutes

Simple things like design notes to cut the install lugs off.



6. Real-world operational insight

Operational experience reveals practical realities not shown in engineering documents

- MIM enables the assessment of design quality to ensure structures can be built efficiently, safely, and cost-effectively, reducing on-site rework.
- Instrument locations that don't work with the control philosophy of the plant, or improved camera placement
- Pop-ups and constant alarms for operational ranges of control
- Place of control rooms in locations that provide a good view of the plant, or improved camera placement

7. Empirical and measured feedback



8. Why the feedback loop fails

- **Fragmented project lifecycle**

- Projects treat lifecycle stages as separate activities with different teams and success metrics, limiting knowledge transfer.

- **Misaligned incentives**

- Engineers focus on schedule and budget, while operators prioritize safety and reliability, causing collaboration challenges.

- **Loss of tacit knowledge**

- High staff turnover and informal documentation lead to loss of crucial operational knowledge after project completion.

- **Ineffective use of digital tools**

- Digital data models exist but lack governance and cultural support, preventing effective learning and feedback.

9. Reflection

- Has the **designer of the mine** visited since handover, or a year after handover to see what has had to be changed and adapted to make the plant more effective?
- If you're undertaking **a study**, have you brought in a greybeard to stress test your design?
- If you're a **supplier of equipment** and you're seeing the same “optimisation improvement being applied” why not adopt it earlier or build it into the product? (Applies to hardware and software)
- Have you engaged current plant operators for the **upcoming plant expansion**? (Don't make the same mistake twice)

Operational insight is empirical knowledge complementing design, enhancing reliability and usability.

