

DIGITAL TRANSFORMATION USING SIMULATION IN A PROJECT LIFE CYCLE

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ABSTRACT

Mineral processing operations tend to follow a typical lifecycle starting with feasibility studies (PFS and DFS), followed by detailed engineering design, construction, commissioning, operation, and improvements. At all stages, but especially in the early stages, different process options may be considered, and decisions will need to be made as to which process to select. These decisions will be based on factors such as capital cost, operating cost, and technical risk. Other important factors include product quality, secondary products, operational safety, water use, carbon footprint, environmental emissions, and energy use.

The use of Process Simulation (or Modelling) is well established in design phases and has achieved some level of use in operations. What is not established is a clear understanding of benefits that can be achieved through implementation of best practices in regards the use of Simulation throughout the life cycle. The earlier you adopt Simulation in the mining processing plant life cycle, the earlier potential issues are identified affecting design change, and the greater the quality of your simulation models for transition to use in Operations.

In April 2021 DECHMA published a Position Paper titled “Process Simulation – Fit for the future?” [1]. Our paper aims to contribute to this discussion and answer some of the questions.

This paper looks at many current and proposed practices for the use of Simulation through all of the mining processing plant life cycle phases. The paper presents some practical simulation applications such as “Asset Utilisation and Planning”, “Carbon Footprint Visualisation”, and a “Dry Laboratory”.

There is a growing focus on the Fourth Industrial Revolution (or Industry 4.0), Digital Transformation and Digital Twins (Process Models). Process Simulation is a key component of all of these.

Process simulation can support decisions in operations. In the future, the use of process simulation tools will further increase, as industry is working towards the adoption of Digital Twins for its value chains. Digital Twins are designed to facilitate interaction with complex data sets, analytics and is used to investigate scenarios and validate assumptions.

The demands, role and use of Simulation within the lifecycle changes. This is a transition from design centric use to operational support and optimization. For example, a process design modeller has very different requirements for a simulation tool than an operations team. The same applies to selection of tools, workflows, use of data and problem analysis.

It is difficult to achieve operations simulation support with a single Simulation system as it is known today. Progress in technologies, systems integration, and adaptation in operations of simulation tools is required to fully achieve the benefits of using Simulation. Organizations and vendors have recognized these challenges and are actively working on Digital Transformation solutions leveraging evolving technologies including the use of Simulation systems.

In response to the title question posed by DECHMA Position paper: - “The next generation of Process Simulation Systems will be fit for the future and is an essential component to achieve industry goals for Digital Transformation.”

Reference:

[1] Process Simulation – Fit for the future? – Published by DECHMA

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