DYNAMIC SIMULATION – PLANT LEVEL

A plant level dynamic model applies discrete events and dynamic constraints to a flowsheet mass and energy balance.

Models are customised to each site, but normally include data such as:

- Ore grade and tonnage profile
- Equipment throughput capacity
- Equipment failure statistics
- Planned maintenance schedules
- Storage and surge capacity
- Utility and reagent supply limitations

Model outputs mimic the real production data of interest to the operation, such as tonnes processed, plant utilisation and delay times. The models are used to simulate plant operation over several years and show the likely range production profiles for each scenario considered.

The main purpose is to determine the realistic likely production rate of a process. Steady state results are often simplistically multiplied by a single plant availability number to estimate the overall production rate, however this is rarely valid. Throughout the plant, different areas and pieces of equipment have differing reliability. Inter-stage surge capacity is limited, and peak/catch-up rates may or may not be enough to compensate for downtime. Reagent and other supply constraints also come into play. The dynamic model takes a rigorous, methodical approach to simulating real plant behaviour over time.

Dynamic models have several key functions in plant design:

- Optimising the surge capacity and throughput rates in each area
- Identifying key process bottlenecks
- Evaluating debottlenecking or expansion scenarios

The true bottlenecks of a process are often not apparent, particularly when the process is subject to large fluctuations. Improvements in one area may have no effect due to constraints elsewhere.

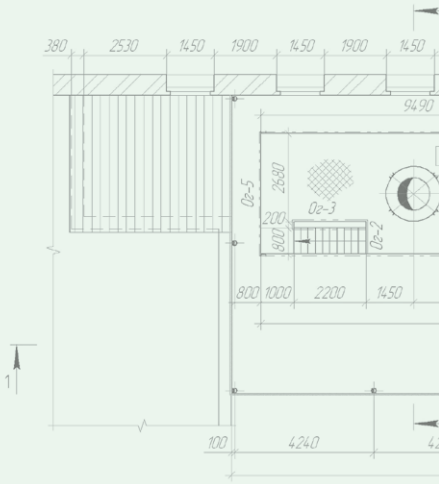
Simulus dynamic models give a full breakdown of equipment activity such as:

- Operating time
  - Full rates
  - Reduced rates
- Process delays
  - Upstream
  - Downstream
  - Reagent / Utility
- Maintenance delays
  - Planned
  - Unplanned
  - Major shutdown
  - Power outage

Area throughput rates and surge tank levels are tracked and plotted over time. By examining the output data one can answer questions such as:

- Are the surge/storage vessels big enough/too big?
- Which equipment or area is frequently holding up the process?
- Which equipment or area is being under-utilised?
- Is the reagent/utility supply ever a limitation?
- Where is standby equipment justified?
- Are parallel trains better than a single train?

The model ultimately helps find the most cost effective way to increase production.



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