

Dynamic Simulation Services



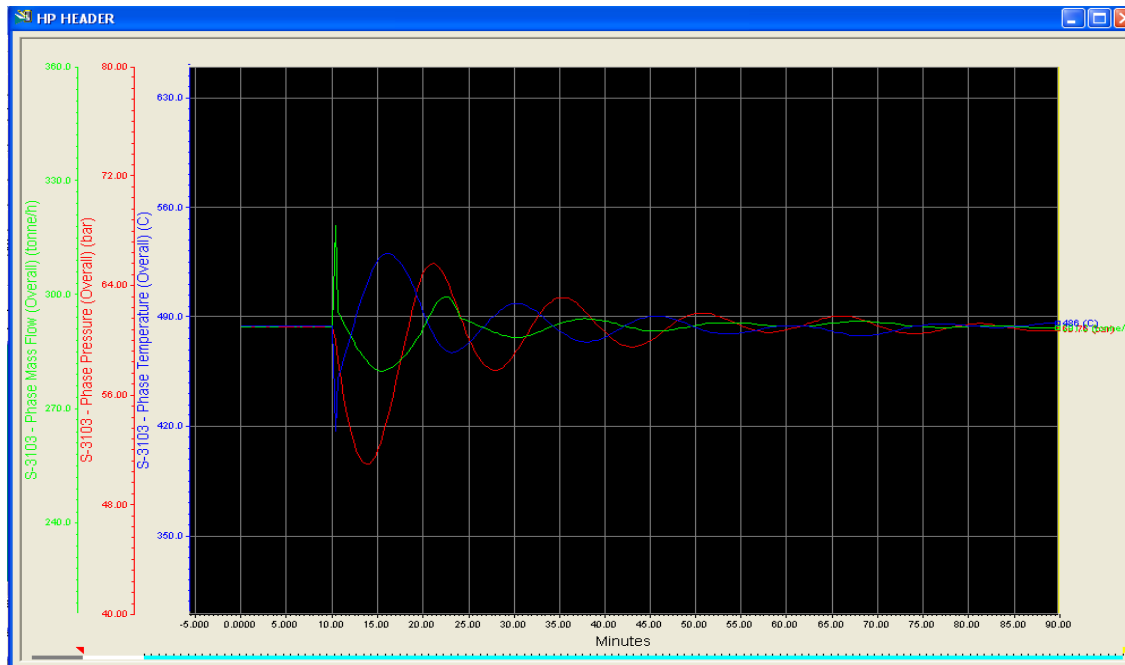
- **What is Dynamic Simulation?**
- **Why Dynamic Simulation?**
- **Fields of Application**
- **Typical Objectives**
- **Project Execution**
- **Offered Services**



What is Dynamic Simulation?

- Natural and chemical phenomena expressed in algebraic and differential equations of engineering principles
- Time dimension vs steady state

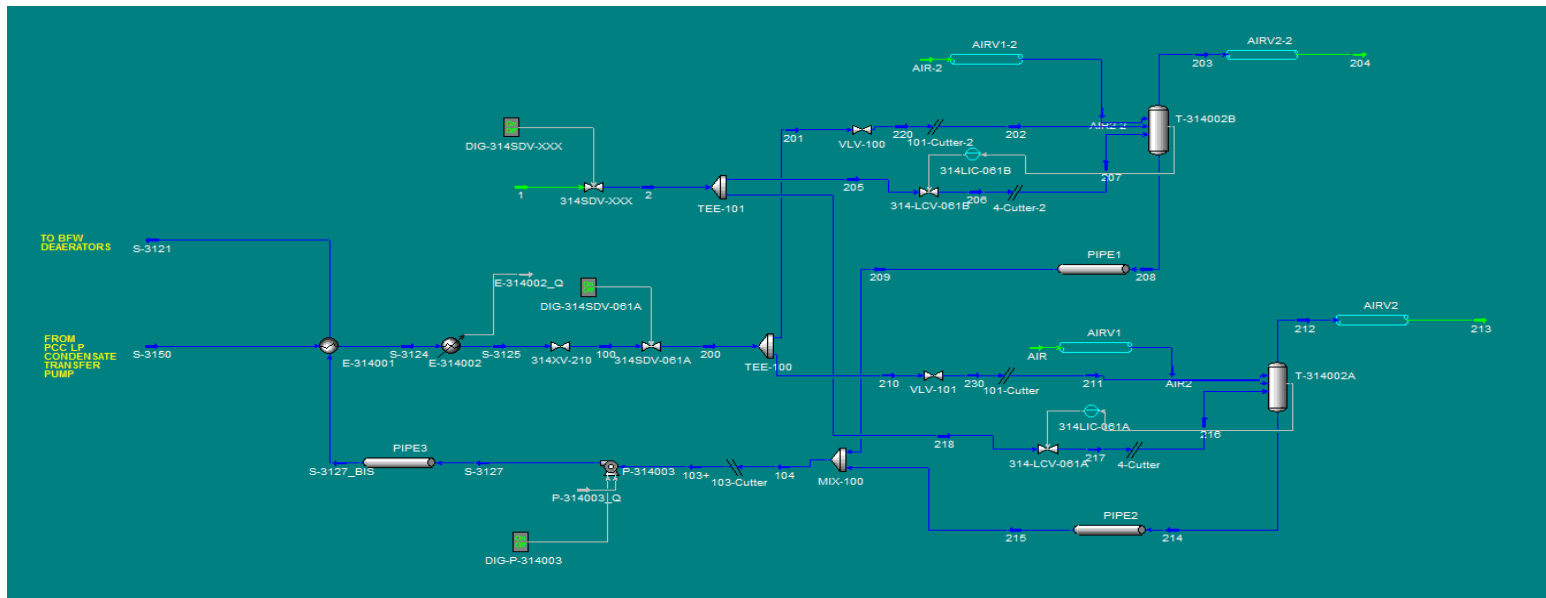
STEADY STATE = A SNAPSHOT OF A SETTLED DYNAMIC STATE



What is Dynamic Simulation?

➤ Dynamic simulation includes:

- ❑ All process equipment commissioned with process and mechanical details
- ❑ Instruments, e.g. valves, controllers, transmitters, alarms, etc.
- ❑ Piping isometrics (if high fidelity is required)
- ❑ ESD (Emergency Shut Down) system and any logic required by scope
- ❑ DCS details e.g. sequencing, complex loops, Advanced Process Control



➤ Design Validation

- Controllability check
- Optimization of start-up and shutdown procedures
- Validation of safety measures

➤ Process Optimization

- Improve product specifications
- What-if analysis
- Incidents investigations
- Debottlenecking

➤ Operator Training



- LNG
- Refineries
- Petrochemicals
- Utilities
- Power Plants



- Determine the effects of specific upset scenarios;
- Debottlenecking;
- Indicate suitable operating modes for spare equipment, e.g. hot or cold standby;
- Check the adequacy of safety equipment; e.g. overpressure valves, PSVs loading;
- Suggest appropriate opening of valves in emergency cases, e.g. anti-surge;
- Minimize venting for environmental purposes;
- Avoid loss of production due to undesired shutdown;
- Develop changeover philosophy in alternative operating modes;

- Suggest and optimize controller tuning;
- Develop start up/shutdown operating procedures;
- Validate design in general;
- Process and operators training



- Kick-Off Meeting
- Data Gathering
- Model Building and Testing
- Model Validation Meeting and Report
- Scenarios Runs and Final Report
- Final Meeting for Results Presentation
- Client Comments and Final Report

- Kick-Off Meeting
- Data Gathering
- Model Building in small Process Areas
- Model Integration and ESD (Emergency Shut Down) component
- Operational Testing
- Model Review Test (MRT) with client
- Development of DCS component (Emulation/Stimulation)
- Final Acceptance Test (FAT) with client
- FAT Observations
- Site Acceptance Test (SAT) and final delivery

➤ OTS (Operator Training Simulator)

- Development
- Maintenance
- Upgrade
- Management

➤ Dynamic Simulation for

- Design Validation
- “What-if” Analysis
- Process Optimization

