SimCentral 2.1
The Digital Twin for Your Entire Process Plant Lifecycle

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We address both lifecycles in the markets we address through the key elements of our platform.
What is SimCentral?

• Purpose: An equation oriented platform built from scratch for the simulation of continuous processing facilities. SimCentral represents the most important investment in the simulation industry for many years.

• Modes
  – Process for design, heat and material balances, and equipment sizing (like PRO/II) – Flow Driven
  – Fluid Flow for flow network analysis (Like Visual Flare, InPlant, and PipePhase) – Pressure Driven
  – Dynamics for dynamic simulation and transient analysis (like Dynsim)

• Currently Available Libraries
  – Cooling Water for incompressible flow networks
  – Steam for compressible flow networks
  – Flare for flare collections networks
  – Process for chemical process plants (Includes Compression & Distillation, Reaction Prototypes)
  – Transient Flow for pressure surge (water hammer) and heat exchanger tube rupture
# SimCentral Platform Features

<table>
<thead>
<tr>
<th>Platform Feature</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Flexible Specs</strong></td>
<td>Freely swap specifications.</td>
</tr>
<tr>
<td><strong>Continuously Solved</strong></td>
<td>Solves whenever it can. You can also turn it off and solve when you want</td>
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<tr>
<td><strong>Undo</strong></td>
<td>First Simulator with an Undo button</td>
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<tr>
<td><strong>Snapshots</strong></td>
<td>Save multiple results with a single simulation topology.</td>
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<td><strong>Roles</strong></td>
<td>Separate roles to build simulations and to write new custom models.</td>
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<tr>
<td><strong>Excel Reporting</strong></td>
<td>SimCentral Functions allow you to create detailed reports</td>
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<tr>
<td><strong>Model Writing</strong></td>
<td>Write your own models or entire libraries by typing in the variables and equations.</td>
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<tr>
<td><strong>Multi User Ready</strong></td>
<td>Multiple users can access the same simulation at the same time.</td>
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![Image of SimCentral platform interface](image)

- **Change Variable Specs by Checking Them.**
- **Undo Changes.**
- **Excel Variable Function Selection.**
SimCentral Capabilities
Cooling Water Networks

Engineering Problem

– Cooling water systems must be designed to remove process duty but engineers must use separate tools to balance water demand and confirm hydraulics.

SimCentral Benefits

– Integrated tool allows simultaneous process duty specification and flow network analysis
– Size new piping in Process Mode
– Evaluate flow distribution in Fluid Flow mode

SimCentral allows unified modeling of process heat balances and network flow distribution.
Chemical Distillation

Engineering Problem

– Design distillation columns with a single simulation for design, relief, and controls.

SimCentral Benefits

– Dry Trays
– Flexible Specifications
– Conceptual to Detailed Engineering Workflow

SimCentral—a engineering workflow that allows a single simulation to be used for both steady state and dynamic simulation
Column Relief

Engineering Problem

– Conventional calculation methods for column relief are too conservative

SimCentral Benefits

– Use the same detailed engineering simulation.
– Dynamic simulation can reduce the size of the relief valve.
– For retrofits, can avoid the replacement of flare header laterals.

With SimCentral, the steady state process design simulation can be used for flare relief without creating a dedicate dynamic model.
Steam Balances

Engineering Problem

- Engineers use complex Excel Spreadsheets to model steam balances which are hard to maintain.

SimCentral Benefits

- Specify steam consumption at the user
- Specialty steam models like Turbine and Desuperheater.
- Snapshots save multiple cases for one steam system.
- Specify power, duty, or flow.
- Can be evolved to Fluid Flow and Dynamics

SimCentral may be the only simulator capable of handling the complex specifications associated with detailed steam balances.
Flare Systems

Engineering Problem

- Evaluate relief valve backpressure can reduce the capacity

SimCentral Benefits

- Size PSVs
- Size inlet and tail pipes on rated flow
- Multiple stacks with jumper valves
- Stack flare radiation radius
- Multiple phases

SimCentral’s vision is that it will unify flare and process dynamic simulation.
Flare Pipe Cryogenic Metal Selection

Engineering Problem

– Stainless steel pipe can be very expensive and is selected based on static calculations.
– Dynamic simulation of depressuring can provide more realistic results to save on metallurgy expenses.

SimCentral Benefits

– Considers upstream inventory
– Considers mean metal temperature of pipe

SimCentral can reduce the cost of flare piping significantly for upstream and gas processing plants.
Vacuum Transfer Lines

Engineering Problem

- Critical flow in a vacuum transfer line entrains droplets that lead to heavy vacuum residue in the vacuum gas oil.

SimCentral Benefits

- High velocity and critical flow including discontinuities for multi-phase flow with petro components.
- Easy to use sizing and rating environment.

Excel report of the velocity and pressure profile in an expanding vacuum transfer line.

Only SimCentral allows rigorous design and rating of vacuum transfer lines to avoid critical flow in an easy to use general purpose simulation platform.
Heat Exchanger Tube Rupture

Engineering Problem

- Exchangers that do not meet the 10/13ths rule should be rerated, replaced, or evaluated by transient analysis.

SimCentral Benefits

- Exchanger includes high pressure side gas expanding inside low pressure equipment.
- Pipe considers inertia of low pressure fluid.
- Relief valve considers inertia of moving disk.

SimCentral can predict the pressure surge in low pressure equipment and piping per (API 521 4.4..12.2)
Pressure Surge

Engineering Problem

- Pressure surge / water hammer analysis can be required to determine peak pressure after the sudden close of a discharge valve.
- Process engineers do not have ready access to pressure surge software and presents a new learning curve for them.

SimCentral Benefits

- Accurately predicts pressure surge as validated against published data for liquid fluids.
- Provided in a consistent process engineering interface.
- Demonstrates the ability to write custom models.

Water hammer and pressure surge analysis can be performed using a consistent process engineering platform.
Steam System Dynamic Studies

- **Engineering Problem**
  - Steam system reliability is important to protect the refinery or petrochemical complex after a steam system upset.

- **SimCentral Benefits**
  - One integrated model for steam balances hydraulics and dynamics.
  - Test complex header pressure controls for normal operation and prioritization of letdowns and turbines.
  - Predict header pressures after a loss of a boiler or steam turbine generator. Size letdown valves

Only SimCentral has one integrated model that can be used for both steam balances and dynamics

High, Medium, and Low header pressure response after a steam turbine generator trip.
Compressors

Engineering Problem

- Compressors must be designed for off design and transient operations

SimCentral Benefits

- Design compressors
- Evaluate pressure profiles for multi stage compressors.
- Evaluate surge control design in dynamic simulation.
- Evaluate hot vs cold recycles in dynamics.
- MW invariant (future)
- High pressures near critical point (future)

SimCentral compressor simulation to evaluate hot vs cold recycle valve.

SimCentral provides compressor simulation for process design, equipment rating, and dynamic simulation.
Questions?