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1 JULY 2020

New Features in VISUAL FLARE Safety Relief Design 2020

Americas Advisory Board October 2020

New Features by Asuman Yilmaz
Cal Depew

AVEVA

01 **New Features in VISUAL FLARE 2020**

02 AVEVA Process Simulation for Flare

03 Comparision and Current Functionality

04 Questions and Answers

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VISUAL FLARE Safety Relief Design 2020

New Features (Detailed slide available on request)

- Sound Power Level Calculation
- Tabbed Multiple Document Interface
- Option to display k (Cp/Cv ratio)
- Copy and paste SIM4ME thermo vessel composition in new flowsheet
- Relief valve actual and required data on PFD
- Add Missing Equipment/s from other Database in Equipment Manager
- Include Database DAT Files in Simulation zip file
- Data Display Options in PFD
- Support Connection Data in AVEVA Excel Simulation & Report
- Significant digits for all Unit Operations
- Option to Clear All Connections Break
- Highlight all the Loops in a Flowsheet
- Auto Connection break for faster convergence of network
- Tee mode support in tee summary reports
- Pressure Drop Calculation for Binary Node
- Intermittent Flow warning
- Back Pressure threshold Values in reports
- Warn user when Liquid Sizing Calculation uses Default Available Area
- Added additional column in percent sonic velocity report
- All selections persist in equipment diagnostics window

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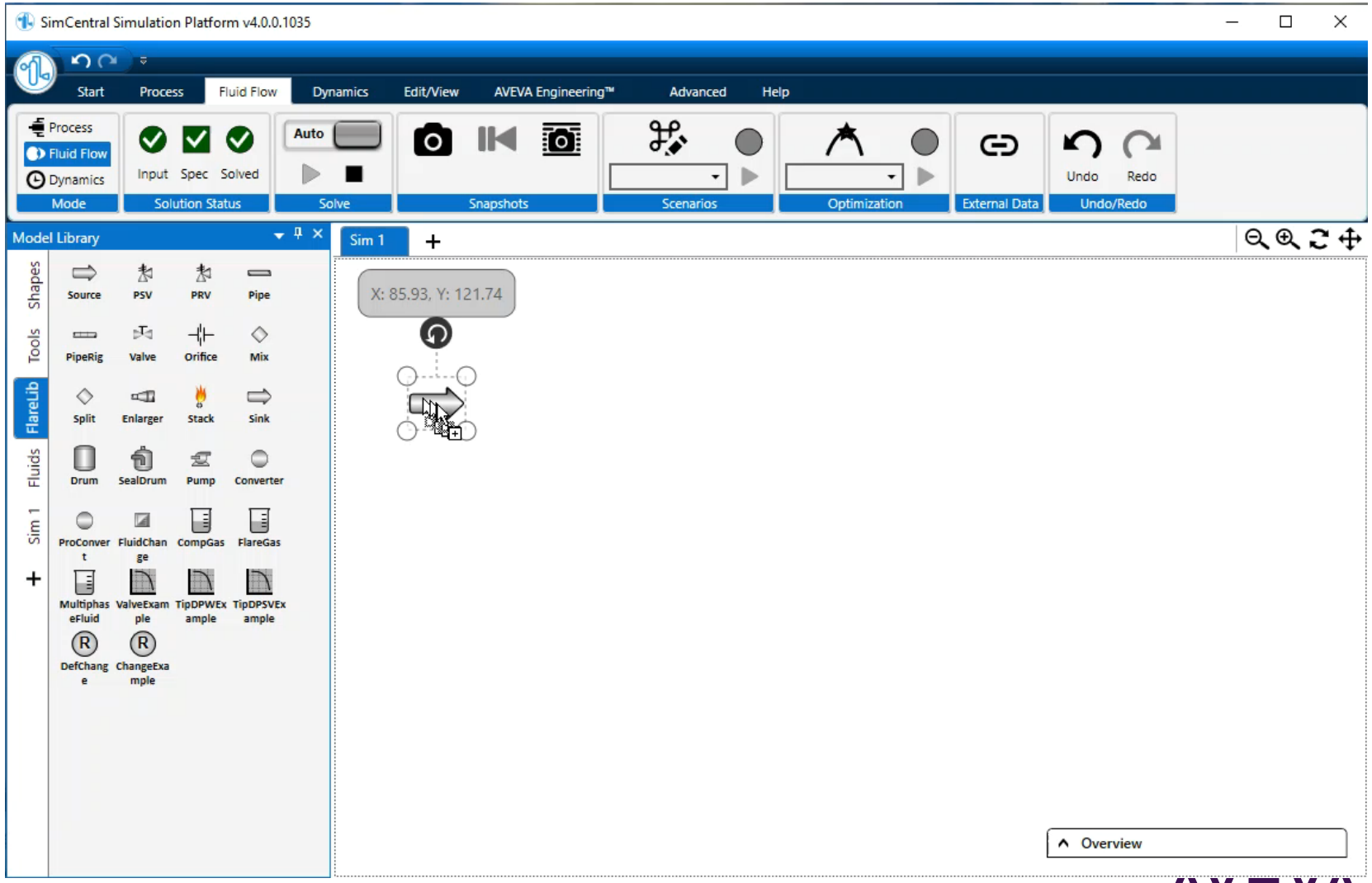
Video: Flare Systems

Quickly snap together flare models using advanced flowsheet building tools (42 seconds)

Quickly put together flare system models to calculate:

- Relief valve backpressure
- Pipe velocity
- Pipe kinetic energy (rho-v2)
- Sound Power Level

Snapshots represent relief contingencies (such as power failure)



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How does AVEVA Process Simulation work for Flares?

Modes and Libraries

- Modes
  - **Process** for design, heat and material balances, and equipment sizing (like PRO/II)
  - **Fluid Flow** for flow network analysis (Like Visual Flare, InPlant, and PipePhase))
  - **Dynamics** for dynamic simulation and transient analysis (like Dynsim)
- Libraries
  - **Cooling Water** for incompressible flow networks
  - **Steam** for compressible flow networks
  - **Flare** for flare collection networks
  - **Process** for chemical process plants
  - **Transient Flow** for pressure surge (water hammer) and heat exchanger tube rupture

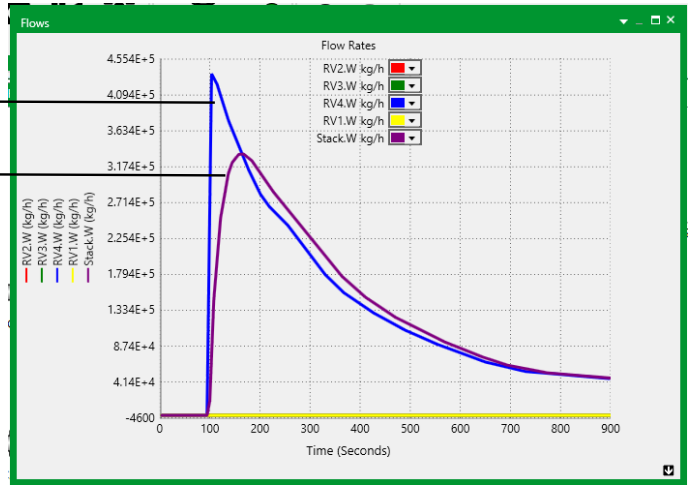
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AVEVA Process Simulation Planned Development

Dynamic Simulation for Packing to reduce CAPEX by millions

- Problem
  - Flare stack radiation calculations are very conservative assuming that the sum of all required flow rates occur simultaneously at the stack.
- Solution
  - Use Dynamic Simulation to take credit for packing the flare piping
  - Depressuring flows will subside before the flow in the stack reaches its full rate

Savings!



Reduced flow in stack compared to source when major amount of the flow is from depressuring

Work Process

1. Import depressuring curve(s) into SimCentral Flare model
2. Check volumes
3. Run dynamics
4. See difference in peak vs stack flowrate
5. Size flare boom length based on maximum flow in stack which is dampened by packing flare piping system.

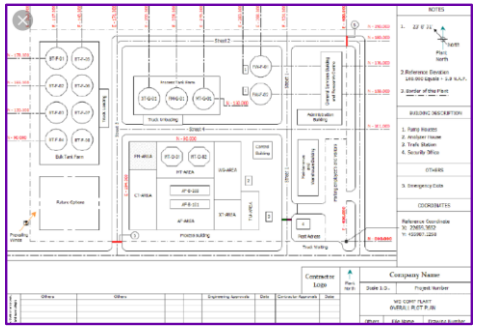
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AVEVA Process Simulation Planned Development

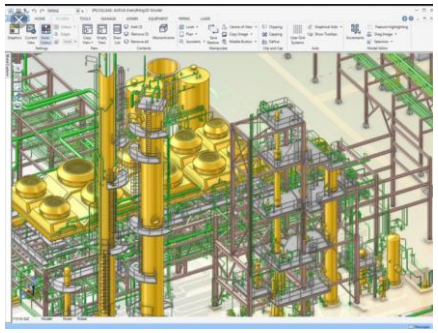
Link 3D piping data to find design exceptions without 100s of hours of mind numbing data input

- Problem
  - Per API 521 and Company standards, RV backpressure, pipe velocity (Mach), or pipe rho-v2 must not exceed design criteria for safe flare design.
  - After 3D pipe routing, it takes 100s of engineering hours to enter isometric data to check design
- Solution
  - Use UE to transfer 3D/isometric piping design
- Benefit
  - No reliance on judgment (like the old days)
  - Reduce menial process engineering hours
  - Find out right away before piping is ordered
  - Safety is never compromised and can always be documented

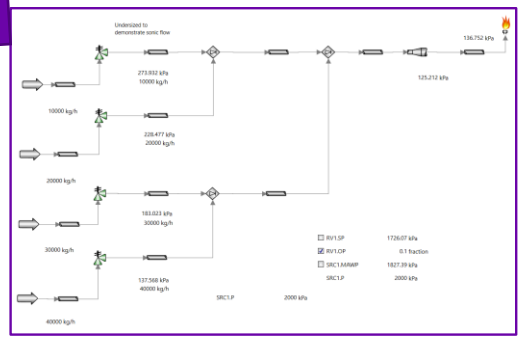
1) FEED: Rough Plot Plan piping estimates



2) Detailed: 3D piping layout



3) Automated transfer of changed data



One evolving flare simulation updates from 3D piping layout

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AVEVA™ Process Simulation 5.0 New Features

Flare Dynamics

Objectives/Background

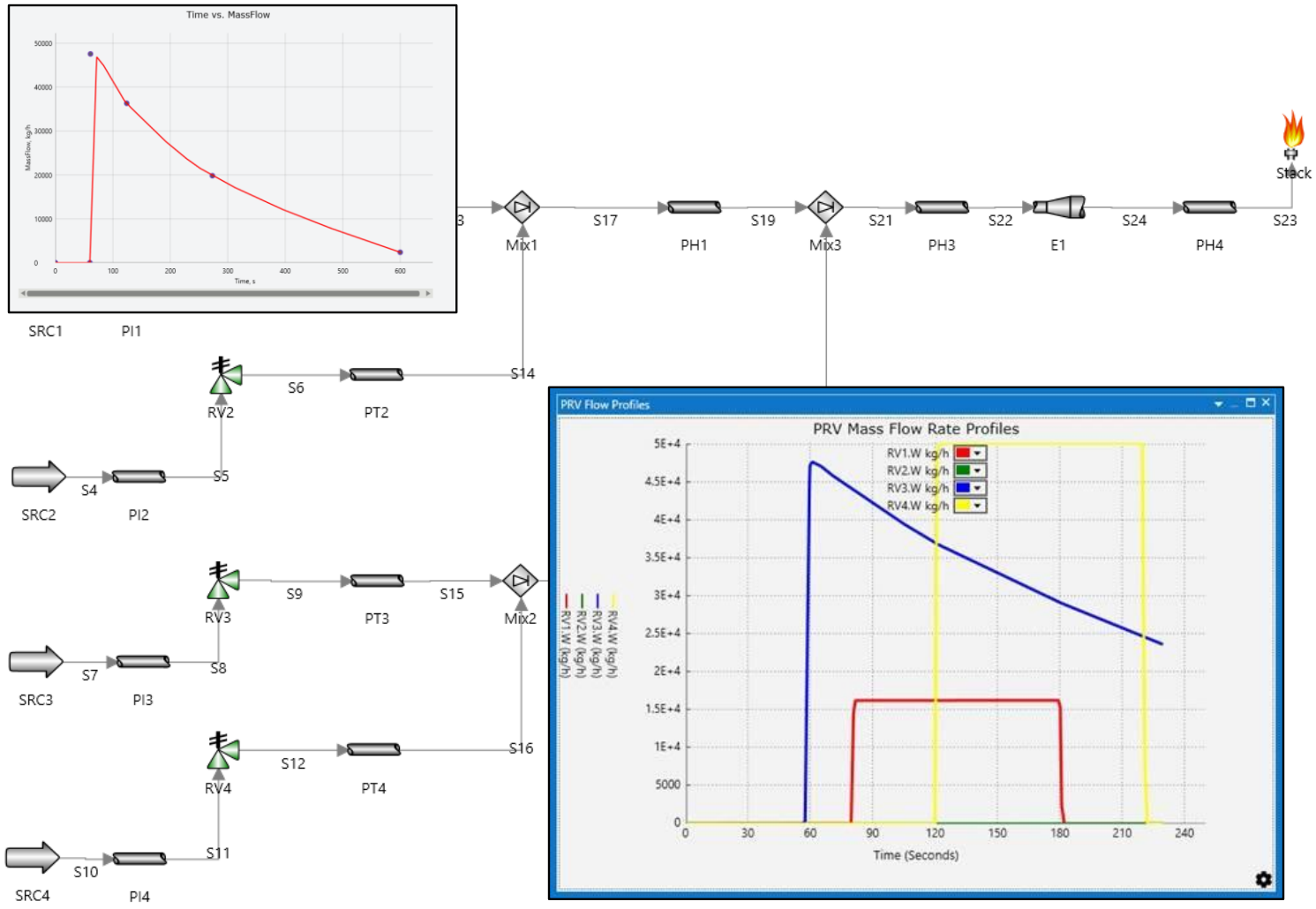
- All relief valves do not relieve at the same time. Consider the packing effect of the flare network piping by staggering the relief using known timing data.

Solutions

- Drive the required flow rate to each relief valve per a timed relief flow curve connected to the source.
- Specify the timed relief flow, capacity, temperature, pressure of the gas.

Delivery Plan

- Flare Library
- Version 5.0 (October 2020)



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Flare / Visual Flare Comparison

Developed SimCentral Features (Version 4.3)		Future SimCentral Features	
In VF (now) and SimCentral (now)	SimCentral (now) Only	In VF (now) and SimCentral (future)	Difficult in VF SimCentral (future) Only
• Simple fluids based on T, MW, and estimated Cp/Cv ratio • Compositional fluids • Pipe sonic flow with discontinuity • Multiple stacks • Tail pipes use rated flow • Tee Kfactor (Crane and Miller) ** • Inlet pipe 3% rule • Pipe connection model • Two phase pipes (BBMHV) • Two phase relief valves (HDI and Omega) • Pipe and RV Tables • PipeRig pressure profile plot • Isolation valves (VF ver 6.0) • Tee acceleration term • Sound power level (Acoustic Induced Vibration) • User added thermo interface (UAT)	• Excel reporting (governing RV sizing case report possible) • Hybrid simple fluid / compositional networks • Dynamic pipe wall mean metal temperature (F5 Example) • Stack radiation (API 521 Simple Approach) • Pipe heat transfer • KO Drums with multiple inlets • Water seal drum • Pipe kinetic energy (rho-v^2) • Thermal dosing units • Sub flowsheets	• Siemens PS PPM Link • Component aggregation in mixers • DIERS compliance testing (all 19 cases) • Isometrics data entry • Customer specific thermodynamics (Coming in SimCentral 4.2)	• Dynamic Simulation with packing of headers • Dynamic interaction with process units such as distillation columns • Unified Engineering with 3D isometric file data import from AVEVA engineering • Common fluid with source component recharacterization. • Visual Flare migration ☺ • Aspen Flare Analyzer migration

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AVEVA is a global leader in engineering and industrial software driving digital transformation across the entire asset and operational life cycle of capital-intensive industries.

The company's engineering, planning and operations, asset performance, and monitoring and control solutions deliver proven results to over 16,000 customers across the globe. Its customers are supported by the largest industrial software ecosystem, including 4,200 partners and 5,700 certified developers. AVEVA is headquartered in Cambridge, UK, with over 4,400 employees at 80 locations in over 40 countries.

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