

## Streamlining processes to ensure optimal plant safety designs

Staying on schedule with plant safety design is fundamental in the oil & gas, chemical and petrochemical industries. In order to be compliant, cost-effective and meet project deadlines, organisations need to eliminate issues that arise with safety projects such as timeline bottlenecks, allowing engineers to improve workflows and reduce project cycle time. Additionally, improved, integrated safety tools and processes will enable Engineering and Construction (E&C) firms to serve more clients, while at the same time maintaining stringent safety standards. While there are currently advanced solutions available to address these issues and bottlenecks, many companies are still deploying traditional manual methods to design their process safety systems and using internal, rudimentary tools to deliver them. This suboptimal workflow can introduce inaccuracies, which may result in dangerous and costly design of a project.

Today's engineers need to equip

themselves with the right tools that elevate their safety expertise and allow them to respond quickly, cost effectively and safely in any situation. With cutting-edge software, engineers can increase accuracy to save both time and money.

### Minimising costs

Greater accuracy saves time and money. Achieving greater safety saves lives. With blowdown software, detailed analysis and protection of key process equipment can be performed more quickly and effectively, including rigorous and rapid depressurisation studies.

With the right tools, performing the most accurate minimum design metal temperature (MDMT) analysis saves costs while ensuring materials of construction used in the system will not fracture. Determining the certainty of values is imperative to avoid unnecessary expenses and preclude the risk of over-conservative specifications. For

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a comprehensive end-to-end depressurisation solution, robust blowdown simulation software enables oil & gas companies to help every process engineering project, ranging from new build facilities to a revamp project on an existing process and design or rate blowdown systems that ultimately assure proper safety and are economically feasible.

For engineers, better modelling of temperatures, pressures and maximum flow rates during the blowdown process will reduce over designs and save enormous engineering costs. Accurately depressurising the system minimises the risk of harm to the process equipment, product and personnel. It is also crucial to ensure that this analysis determines not only safe materials of construction, but also provides the correct orifice sizes that depressure systems in accordance with leading industry standards, such as API and NORSOCK for fire cases.

With powerful simulation tools it is possible to create concurrent designs with simulation, which minimises reworks, enabling engineers to reuse and refine safety analysis at each stage of the design life cycle. In addition, they have complete control to push assets to the limit to maximise throughput, troubleshoot efficiently with confidence and more accuracy while conducting safety analysis.





The ‘Blowdown’ software technology, recently acquired by AspenTech, was integrated with an advanced process simulation tool that enables engineers to determine orifice sizes and pinpoint areas of low temperature concerns, providing less conservative MDMT values. In some cases, this can lead to three to four times cost savings resulting from less expensive materials of construction. The ‘Blowdown’ technology, developed by the professors at Imperial College in London, has been used in over 400 projects in oil & gas and chemical companies to model depressurisation.

The software identifies specific locations in a system where temperatures can decline dramatically during depressurisation. With these enhanced safety features, engineers can best serve workflows and safety projects easily, as well as perform accurate safety analysis and leverage data from powerful simulators – all within ‘aspenONE software’ integrated engineering simulation environment.

### **Saving time with an integrated solution**

In addition to costs, time is another massive expense within any organisation. Safety often consists of a manual workflow that requires laborious data transfer between tools. While some organisations continue to use traditional tools, such as ‘MS Excel’, they are finding that these processes are extremely time intensive and can lead to inaccuracies in data collections. With an integrated solution, companies have the tools to remove time barriers and make more effective use of their time.

For example, many companies have adopted advanced engineering software solutions to rigorously improve Front End Engineering Design (FEED) and perform revalidation studies to find capital savings and improve process safety and reliability. The best process safety software tools offer multiple options to complete pressure relief analysis projects. Companies can use these tools to easily conduct safety studies, including pressure safety valve sizing, depres-

surisation, flare system design and rating, and dynamic analysis for start-up, shutdown, emergencies and compressor surge with the option to use simulation data from integrated engineering application environments.

By integrating safety analysis solutions within engineering software suites, users can leverage the rigorous thermodynamic engine when completing pressure relief analysis projects in addition to quickly adding and sizing relief valves early in the design process while incorporating industry standards, such as API 520, 521 and 2000, into calculations. Further, this pressure relief analysis can be continued to discharge those sized relief devices by automatically importing sized pressure safety valve results into flare analysis software to streamline pressure relief analysis. Further, leveraging dynamic models in analysis helps avoid the risk of over conservative and potentially more expensive designs, by taking a more rigorous look at your system.



Integrated software solutions improve relief load calculations for both FEED and revalidation projects. The best engineering tools include these enhancements to reduce the time required to conduct pressure relief analysis workflows and improve the accuracy of the analysis by eliminating manual data transfer steps and subsequently transcription errors. Ultimately, with process safety software tools engineers gain enormous benefits, which include:

- Saving engineering time by up to 50%;
- Reducing mistakes and manual transfer to ensure data accuracy;
- An increased ability to integrate results into flare system models;
- An increased scope of relief load calculations;
- Avoiding unnecessary capital investment through under-designs or over-designs;
- Avoiding the consequence of inaccurate pressure safety valve sizing;
- Upholding quality safety standards;
- The ability to model multiple scenarios;

- Automated regulatory reports and documentation for compliance; and
- Tools that support engineering knowledge and ease of use.

### Case study

Hunt, Guillot & Associates (HGA), a midsized E&C firm that performs project work in engineering, pipelines and programme management/emergency recovery recently upgraded its integrated single unified platform of engineering solutions in an effort to boost their ability to efficiently complete relief sizing. HGA's engineering division experienced an expanding work volume with an increasing design complexity, which generated the need for a superior engineering environment.

HGA's process department performs overpressure protection analysis as a regular part of the process design workflow. An obstacle they faced was a lack of a commercial product for pressure safety device sizing. This required a more tedious work process, involving separate calculations for overpressure protection performed with additional

software not utilised for the process modelling work. This coincided with an increase in project work over the past two years, since HGA services the rapidly paced unconventional gas and oil booms in North America.

By integrating an advanced PSV sizing tool into the organisation engineering suite, the company was able to eliminate the time consuming custom calculations, analyse multiple overpressure scenarios systematically and reduce the time spent sizing relief valves by 50%.

### Process safety

Safety is the mainstay of any sustainable business. Ultimately, risk is managed by identifying hazards quickly, assessing consequences and probabilities, and implementing effective mitigation measures. As plants become increasingly complex, organisations can manage this risk through the successful adoption of cutting-edge integrated safety engineering software to manage risk more effectively and improve overall operational conditions for clients.

Additionally, as organisations continue to standardise on integrated safety environments, they will have the tools to conduct analysis faster and easier, enabling greater accessibility to users of all levels of expertise, which leads to safer designs and reduced maintenance costs. By adopting easy-to-use process safety software as part of an integrated engineering application environment, businesses will improve safety performance across their operations, increase accuracy to save both time and money and ultimately achieve the highest standards in operational excellence.