

Knovel®

CHEMICAL MANUFACTURING

Solution story: Developing design and installation specifications for safety relief valves

Knovel helps a chemical engineer recommend safety improvements in a manufacturing plant



Summary

A consulting group within a large manufacturing company assigns a chemical engineer to develop up-to-date specifications for the design and installation of safety valves to improve safety at a manufacturing plant. The engineer uses Knovel to obtain accurate data on the chemicals processed at the facility, as well as the materials used in the existing valves, justifying the replacement of valves throughout the plant.



Failure of safety valves to operate properly can lead to production stoppage—or, in extreme cases, to fatalities and environmental disasters.

Challenge

A subsidiary of a multinational chemical company sought to develop a design specification and installation procedure for safety relief valves. The company operates a range of multidisciplinary engineering, management and development groups throughout the world, with revenue of more than \$1B and more than 11K employees. This particular subsidiary, a smaller consulting group, was modernizing a \$500 million titanium dioxide plant that outputs 250 kilotons per year.

The TiO₂ manufacturing process involves very aggressive chemicals at high pressures, creating a harsh environment that places intense stress on equipment. Failure of safety valves to operate properly can lead to production stoppage—or, in extreme cases, to fatalities and environmental disasters.

At this TiO₂ manufacturing plant, more than 1000 safety relief valves stood guard against those hazards. The valves ranged in size from a few inches up to 24 inches, and the larger ones could cost up to \$100,000 apiece. As part of the modernization project, an overall safety review was required to ensure compliance with regulations and safety standards. In order to ensure that each valve was installed and tested correctly, the consulting group assigned a chemical engineer to develop a clear set of procedures for the design and installation of future valves.



During the plant refurbishment, the company implemented the report's recommendations, significantly improving the plant's safety.

Solution

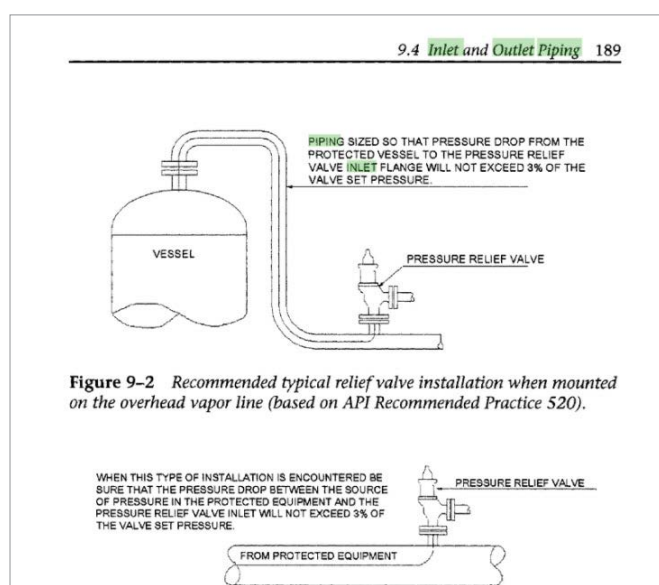
To assemble a set of safe specifications for valves operating in this context, the chemical engineer, Keith Akenzua*, turned to Knovel, which provided extensive data on the compatibilities of the chemicals being processed, the specific types of steel used in the valves and the safety parameters established in previous studies—all pre-vetted by experts.

Using Knovel, Akenzua was able to obtain quantitative data on the behavior of titanium oxide powder throughout every stage of production, as well as on necessary safety precautions for processing this compound. He also used Knovel to find schematics for the construction of similar API valves, along with descriptions of their tolerances, of the two particular types of stainless steel used in valves in the plant.

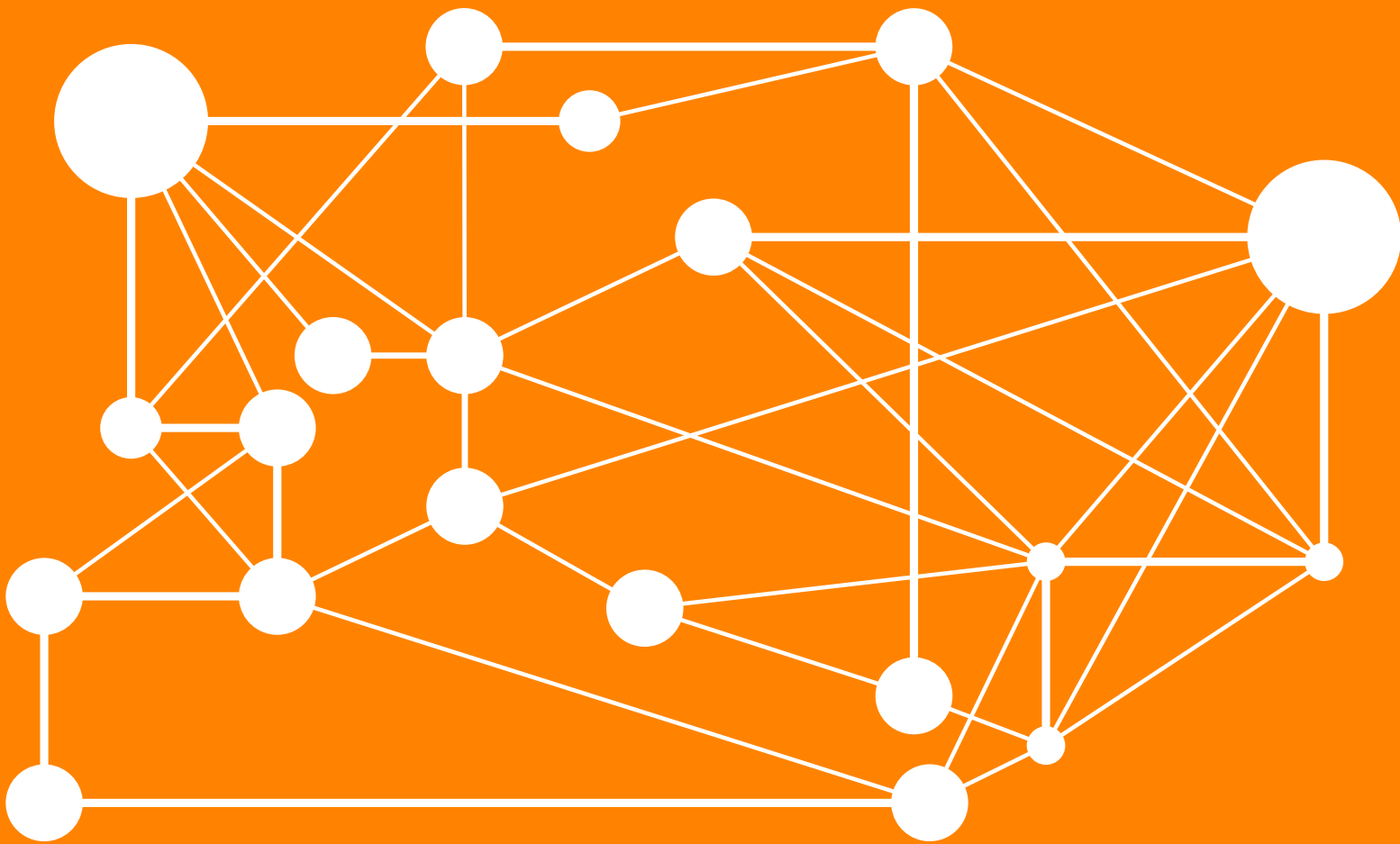
Impact

Using the information gathered from Knovel, Akenzua prepared a safety report for each type of valve. He was confident that the report presented well-informed proposals based on hard data and verified evidence. His report provided justifications for replacing 5 percent of the pressure relief valves in the plant—an expenditure of more than \$1 million. During the plant refurbishment, the company implemented the report's recommendations, significantly improving the plant's safety.

By performing the preventative maintenance recommended by Akenzua, the organization substantially reduced risks to its employees and to the surrounding ecosystems. Throughout these modernization procedures, the company was able to keep other areas of the plant up and running, ensuring revenue continuity.



* Names have been changed to protect rights to innovation



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