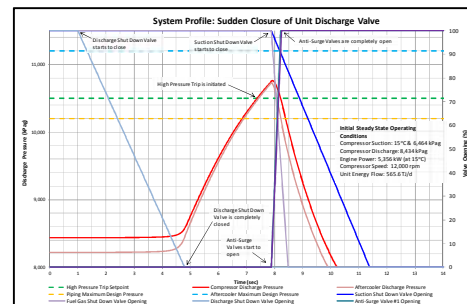


## Dynamic Simulation - Centrifugal Gas Compressor System

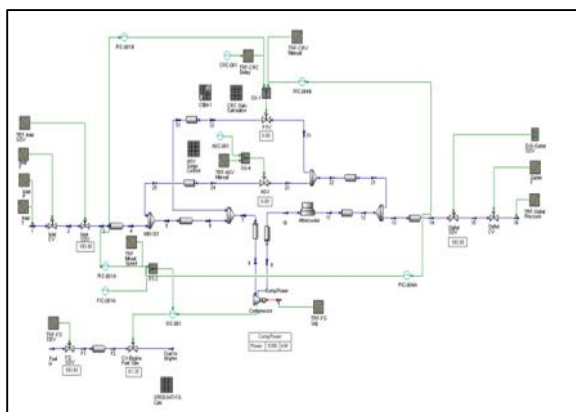
**Challenge** To determine if a Safety Instrumented Function (SIF) can protect the discharge system of a centrifugal compressor unit from overpressure due to blocked discharge if the unit discharge isolation valve was to close suddenly.

**Assessment** A compressor unit is designed to compress low pressure gas from the suction header to a set pressure for delivery to the discharge header. If the discharge isolation valve was to close suddenly, the pressure in the compressor discharge system would increase rapidly which may result in over-pressure of the compressor aftercooler and discharge piping system.



There are three potential solutions to protecting the compressor discharge system from over-pressure:

- 1) Designing the discharge system for the maximum compressor discharge pressure;
- 2) Installing a Pressure Safety Valve (PSV); or
- 3) Utilising a Safety Instrumented System (SIS) which will initiate a unit shutdown on detection of high pressure.



The ability of a SIS to protect the compressor discharge system from overpressure due to a blocked discharge can be assessed using Aspen HYSYS Dynamics™ to model a compressor unit, simulate the sudden closure of the discharge isolation valve and determine the peak pressure and duration of an over-pressure scenario that is experienced in the discharge system. This peak pressure is reviewed against the applicable design codes (e.g. AS 1210) to determine if the SIS protects the system from over-pressure by limiting the peak pressure within the design code requirements.

**Results** This type of assessment has been used on numerous pipeline compressor stations to determine that the SIS can protect the compressor unit from overpressure on sudden closure of the discharge isolation valve, and hence there is no requirement to design the discharge system for the maximum compressor discharge pressure or to install a full-flow PSV designed for blocked discharge scenario.

For more information on this type of assessment please contact us or refer to our paper which was published at CHEMECA in 2014.