APPLICATION OF FLOWNEX® IN THE SAFETY INDUSTRY

Safety plays a fundamental role in the engineering society. The use of Flownex® can ensure that systems are designed safe and reliable, and can also aid in accident prevention.

Flownex® enables users to design and optimize a system, while ensuring that the highest quality and standards are met.
Flownex® Simulation Environment delivers technology that enables the user to analyze how systems concerned with fluid motion and heat transfer will behave in the real world.

Flownex® system simulation relays the overall effect of changing specific component properties, allowing clients to extensively examine all possible variations in the design and optimization of systems.

On a global scale leading organizations apply our software and service offerings to achieve maximum potential of their systems both in design and operational states. Our promise of fast, reliable and accurate system and subsystem level simulation has immensely benefited our clients. The use of Flownex® has set our clients apart from their competitors allowing them to pursue frontiers of engineering simulation. The global demand for Flownex® has shown exponential growth over the last few years, and as more organizations adopt our technology we are continuously striving to push the boundaries in system simulation.
CAVITATION DETECTION

Flownex® has the capability to detect whether cavitation can occur. Knowing whether there is a possibility of cavitation helps to minimize the risk of equipment damage.

GAS CONCENTRATIONS & PRESSURE PULSES

Flownex® can be used to model pressure pulses and to track gas concentrations, for example, when modelling mine blasting fumes. The gas concentration can be modelled by either using trace elements convective transport or specifying a gas mixture in Flownex® and then observing the dilution and propagation through the network.

Nicolaas Hallatt (Pr.Eng.)
Turbine Plant Engineer
FORCE ANALYSIS

Flownex® calculates the forces due to the pressure difference and velocity changes on the pipe and bend components in a network.

WATER HAMMER ANALYSIS

Water hammer effects can easily be investigated in simple and complex networks, while taking the fluid and pipe wall elasticity into account.

- Prediction of the maximum pressure in the pipeline.
- Create a safe design and save on costs.
- Ability to perform sensitivity analysis.
- Ability to model different scenarios.

Flownex® provided a convenient way of obtaining all the fluid forces on the pipe system, as required for the pipe stress analysis. The flexibility of the modelling approach in Flownex® made it possible to include all the remote systems that influence the local pressure waves, but only at the level of detail that was necessary. This valve closure and pressure wave simulation definitely saved money and time by preventing an overly conservative high-pressure pipe design.

Herman van Antwerpen
Simulation Design Engineer
TWO PHASE CAPABILITIES

Flownex® can be used to determine the type of two-phase flow regime.

The root cause analysis of dynamically hazardous movements in the distillate lines to a plant deaerator was investigated with Flownex®. Flownex®'s simulation optimization tool was used to determine the preferred two-phase flow regime. By using Flownex® to identify the cause, it was possible to maintain the planned commissioning schedule and improve the existing plant design, thereby also removing the safety risk of unwanted dynamic line movements.

BOILER HEADER-CRACKING

Flownex® has the capability to simulate, design and analyze two-phase flow.

HEAT TRANSFER

REGULATOR TEMPERATURE ANALYSIS

Operation of the pressure regulators during the start-up of the turbines at a gas-fired power station was studied and simulated in Flownex®. The major advantage of using Flownex® is that the capacitance of the pipe material and the full Joule-Thompson effect could be simulated. The model was also able to determine if the proposed trace heating and insulation system would be sufficient.
Flownex® can be used to do parametric studies to determine the effect of varying different parameters in a system through a sensitivity analysis or optimize the system by using the optimizer feature in Flownex®.

Through a sensitivity analysis, the relationship between the excess power of the shaft, compared to the heat removed from the system by the pre-cooler for different water inlet temperatures, can be determined.

An air cycle chiller was simulated to show the ability of the controller in Flownex® to control the heat exchanger thermal inertia and turbo machine rotational inertia during a transient simulation.

Anyone familiar with transient heat transfer of flow systems with complicated geometries will tell you that such an analysis would be beyond the capability of most engineering houses. Flownex® enabled me to obtain reliable ball-park results in a matter of a few hours. When the potential cost of equipment failure is tens of millions of dollars, this is an amazing result which highlights the incredible power and flexibility of Flownex®.

Hannes van der Walt
Senior Thermal & Process Engineer
Flownex® Simulation Environment enables engineers to predict, design and optimise for flow rates, pressures, temperature and heat transfer rates in fluid systems. Such systems include anything from ventilation systems and water and gas distribution systems up to boiler designs and complete power generation cycles.

The ability to simulate systems with any combination of liquid, gas, two-phase, slurry and mixture flows in both steady state and dynamic cases makes Flownex® the most powerful simulation tool of its kind.

Flownex® is sold around the globe (visit our site for resellers in your area): www.flownex.com

We employ masters’ and doctorate level qualified engineers to develop and support Flownex®, guiding you on how to use our software tools more effectively and maximize your return on investment.

| 1986 | Initial development. |
| 1990 | Development of the Implicit Pressure Correction Method (IPCM) algorithm. |
| 1992 | Aircraft engine combustion systems for Rolls-Royce. |
| 1997 | Transient/Dynamic simulations. |
| 1999 | HTGR simulation. |
| 2000 | Gas mixtures & conduction. |
| 2001 | Object oriented. |
| 2004 | Rotating components. |
| 2005 | Two phase. |
| 2006 | Combustion. |
| 2007 | Equation element, API. |
| 2009 | Control & electric, MS Excel. |
| 2010 | Simulation Environment, in-condensables. |
| 2011 | Slurry, expanded combustion. |
| 2013 | Expanded two-phase, expanded heat transfer, trace elements, RELAP coupling. |