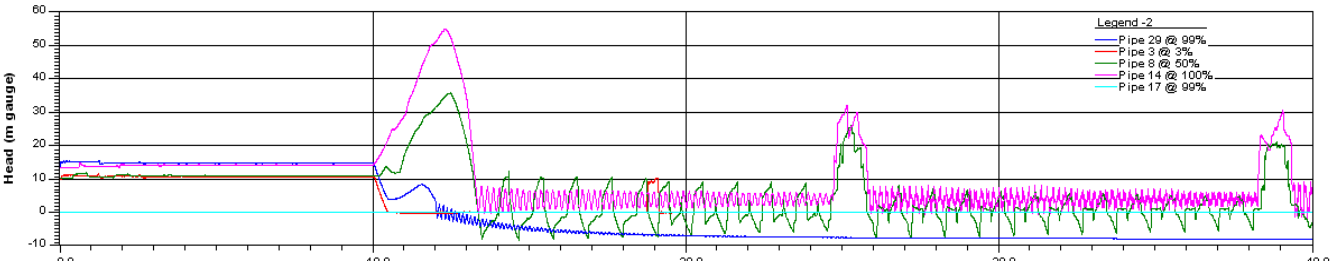
Water-hammer calculation



Case: New 30" piping in existing pipe system, Dow Terneuzen (2008)

As a result of the dynamic nature of liquid and gas flows, pressures may build up within a pipe system much higher or lower than the design pressure of the system. In addition, extra forces are exerted on the pipe system that have to be discharged by way of the support structure.

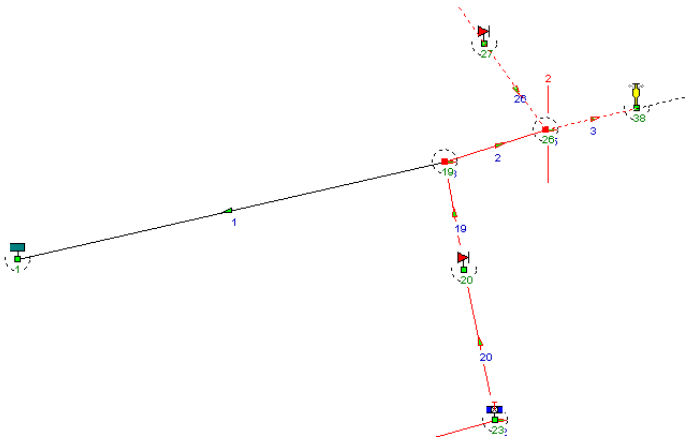
Water hammer occurs in all types of piping. Problems especially arise in pipes with a large diameter or a large flow, as is the case with the cooling-water pipes at Dow Terneuzen, which have a diameter of 30 inch.

Water-hammer calculation

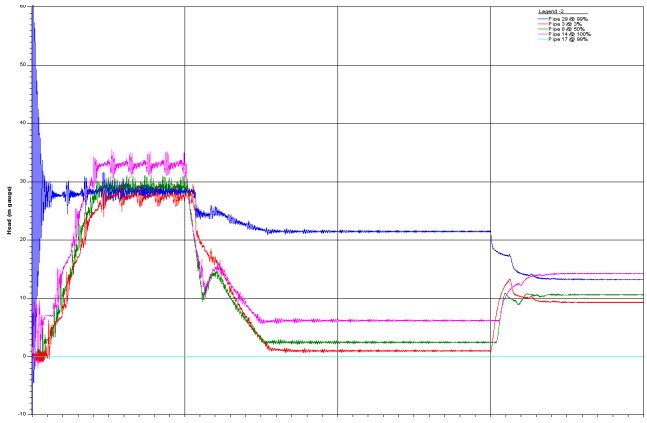
Based on the supplied isometrics and procedures, the maximum and minimum pressures within the pipeline as a result of water hammer were calculated. All equipment present in the pipeline was taken into account.

Different situations have been calculated for the pipeline, such as a pump failing (see above) and a startup procedure (see below).

The design pressure for the pipeline is + 3.5 bar (g). As a result of water hammer, the pressures may vary between -1.0 and + 7.9 bar (g). Therefore, the pipeline should be able to handle pressures from -1.0 up to + 7.9 bar.



Detail of the calculation model, with valve, backflow prevention valve, aeration and deaeration



The results can be influenced by varying the valve types and valve-closing times, aerators and vents, and various other equipment. If you want, Engiplast BV will optimise your system as well, in order to limit water hammer.

In 2003, Engiplast started 3D laser scanning and processing the scanning results into 3D models and measuring reports. Engiplast has gained a wide experience with this measuring technique, especially in the process industry.

For nformation, please contact Engiplast; Sjaak Riemens, +31 (0) 118 633 199, s.riemens@engiplast.com.

Determination of the dynamic effects of liquid flows