

WANDA Newsletter

Issue 2006-1

In this newsletter WL | Delft Hydraulics is pleased to inform you about the latest developments for its software package WANDA.



March 2006

New Components

The WANDA team frequently develops new components. Recently we have developed the hydraulic cylinder and the Wanda External Communication component (WEC Component). These components are available as WANDA Special components. Please contact us with your request for developments of special components or other functionality of the software.

Hydraulic cylinder

For the simulation of a complex hydraulic system this component is created to simulate the action of a hydraulic cylinder as found in many systems. Piston position, velocity and acceleration are accurately simulated based on the pressures in the hydraulic oil and the external forces on the cylinder. The compressibility of the oil in the cylinder chambers is taken into account. This component was used in the performance analysis of a landing gear (See Projects).

External communication

Communication with other applications or external hardware is essential for a number of practical applications. A Wanda External Communication component (WEC) is developed to do just this.

A new and very interesting application of the WEC component was the communication of WANDA with actual PLC controllers to be implemented in a sewage water booster stations in Amsterdam. Adjusting PLC's of pumps in booster stations is usually done on site and proves to be a difficult job. The WEC component made it possible to test the PLC extensively. This use of "digital water" makes a reproducible and verifiable approach possible, and saved valuable system start-up time. It further will prevent incidents and time consuming adjustments of the control parameters.

The WEC component extends the number of applications of WANDA. Coupling of for instance SCADA systems to WANDA will result in an effective pipeline simulator. System operators are able to explore the system characteristics risk-free and will understand more about the often complex responses of a system to control operations.

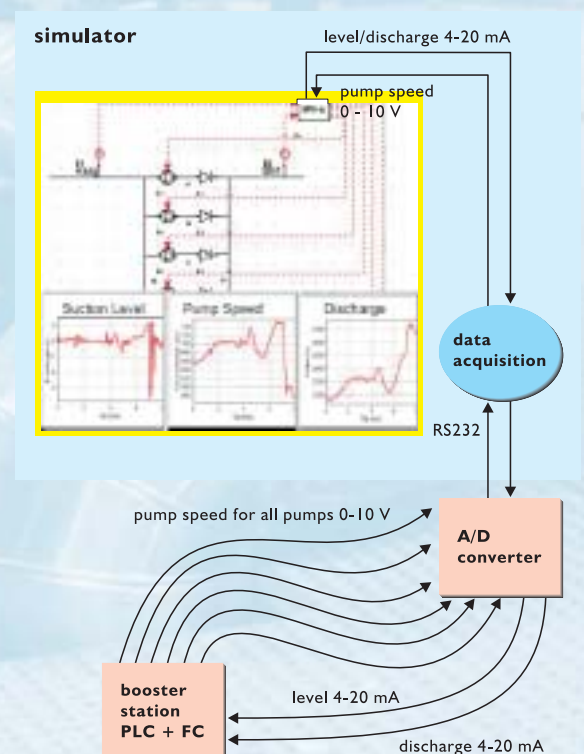
Recent Innovations

Sparse matrix solver

The non-linear hydraulic subnetworks in WANDA are solved by an iterative matrix solver. The matrix sizes become larger, due to more detailed and more extensive networks. For some typical applications such as for instance large pumping stations with many H components connected together, the matrix is mainly occupied by zeros, a so-called sparse matrix.

When storing and manipulating sparse matrices in the computer, it is often necessary to modify the standard algorithms and take advantage of the sparse structure of the matrix. This is done by implementing the sparse matrix solver, which reduces the calculation time for complex systems by a factor 60 (!) depending on the system configuration. The new sparse matrix solver is available for download through the WANDA website and will be part of the next official WANDA release.

External communication



Recent Projects

WL | Delft Hydraulics continuously conducts complex fluid transients analyses for a variety of clients and systems. In the past year some remarkable examples of non-standard projects were carried out.

Performance analysis landing gear

Stork Fokker AESP commissioned WL | Delft Hydraulics to simulate the transient behavior of the hydraulic system for the landing gear of a helicopter. Dynamic simulations for different static, flight and landing scenarios were simulated. The WANDA model includes both the hydraulic system and the mechanical landing gear system, coupled by the hydraulic cylinder of the landing gear. The numerical model accurately predicted the prototype behavior, which allowed for extrapolation of the landing gear behavior in detail and helped resolve issues that occurred in the testing phase. "We have selected WL | Delft Hydraulics for their in-depth knowledge on fluid transients and timely project planning", says Jan Postma, project leader at Stork Fokker

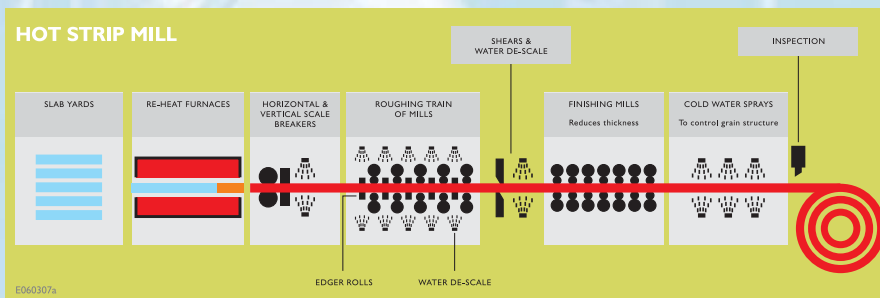


Several hydraulic components for the landing gear (Lee components)

Hot strip mill

The cooling system for the hot strip mill at the Corus Strip Products plant in IJmuiden (The Netherlands) was modelled completely in WANDA. All pumps, sedimentation basins, piping and cooling jets were included in the model. The model will be used by Corus for the analysis of modifications to the current system set-up. A mathematical model greatly enhances the understanding of the system bottlenecks and allows for exploration of the boundaries of the current system capacity.

Hot strip mill (Corus)



Announcements

WL | Delft Hydraulics organises a serie of courses and workshops. Please contact WL | Delft Hydraulics if you require dedicated in-house training of your personnel in a variety of hydraulic issues.

In 2006 the following courses will be organised:

- 6/7 April - Pumps
- 15/16 June - Water Hammer
- 18 Aug - WANDA Users Day

For more information:

ruud.lemmens@wldelft.nl



WL | Delft Hydraulics

Rotterdamseweg 185
 p.o. box 177
 2600 MH Delft
 The Netherlands
 telephone +31 15 285 85 85
 telefax +31 15 285 85 82
 e-mail info@wldelft.nl
 internet www.wldelft.nl