

News on pipe network maintenance and cleaning

Following the successful completion of two research projects in 2014, Hammann now has new findings at its disposal for further developments. The BMBF joint project "Microbial fouling in technical systems" led to two patent applications, with one European patent "Process for removing deposits and/or biofilms in a pipeline using modulating pressure pulses" now granted. The new control system for the air pulses is currently being integrated into the vehicles. The focus for 2015 is on two main areas.

Pipe network maintenance

Complex netcare is being further expanded in the area of pipe network maintenance. In addition to cleaning in combination with valve inspections and, if necessary, valve upgrades, the focus is now also shifting to energy efficiency. To increase energy efficiency in water networks, new assessment tools will help to evaluate the effectiveness of optimized Complex cleaning. The aim is to make a concrete statement about the condition of the pipe network, including the fittings. This is based on characteristic curves (Fig. 1). While this procedure has already been tried and tested for untreated water pipes [1], this procedure is still completely new in the pipe network and currently requires further research and development.

Optimization.

Cleaning heat exchangers

In the industrial sector, Complex cleaning of heat exchangers has become increasingly popular. Here, too, the focus is on energy efficiency. A ZIM cooperation project serves to develop and validate an innovative service package for the effective chemical-free cleaning of heat exchangers [2].

In water-based cooling systems, water forms during operation.

deposits and fouling, for example through the precipitation and crystallization of salts (crystallization fouling), the accumulation of particles (particle fouling), chemical processes (reaction fouling), oxidative processes (corrosive fouling) and/or the growth of microorganisms (biofouling). These deposits lead to efficiency losses and technical problems, including system failure.

Deposits have a particularly critical effect on the function of the heat exchanger. The formation of deposits reduces the heat transfer. In operation, this requires either a reduction in heat transfer performance or an increase in the heating temperature - and thus a further thermal load on the product - or, in the case of cooling, a reduction in the coolant temperature to compensate. The increased costs incurred by companies as a result of fouling are, for example

- " higher investments and all associated costs, as the equipment is overdimensioned to compensate for the reduction in performance
- " Use of higher-quality heating or cooling media, as the driving temperature gradient for heating or cooling is too high.

- transmission must be increased
 - " Costs for cleaning and chemical cleaning agents
 - " Disposal of rinsing water and cleaning agents
 - " Loss of production due to downtime
- Cleaning measures as part of maintenance can completely eliminate or at least significantly reduce these problems. Ideally, cleaning should be carried out in good time, i.e. either preventively or condition-oriented (Table 1). Downtime-related maintenance measures are always associated with increased effort and high costs.

Complex cleaning is always carried out when the systems are installed, using adapters to connect the units to the system (Fig. 3). For drinking water pipes, it is necessary to take the cleaning sections out of operation. This makes it possible to check the function of the shut-off valves and upgrade them if necessary. For waste water pressure pipes and some heat exchangers with once-through cooling, Complex cleaning takes place during operation. However, online cleaning also offers considerable advantages in other cases

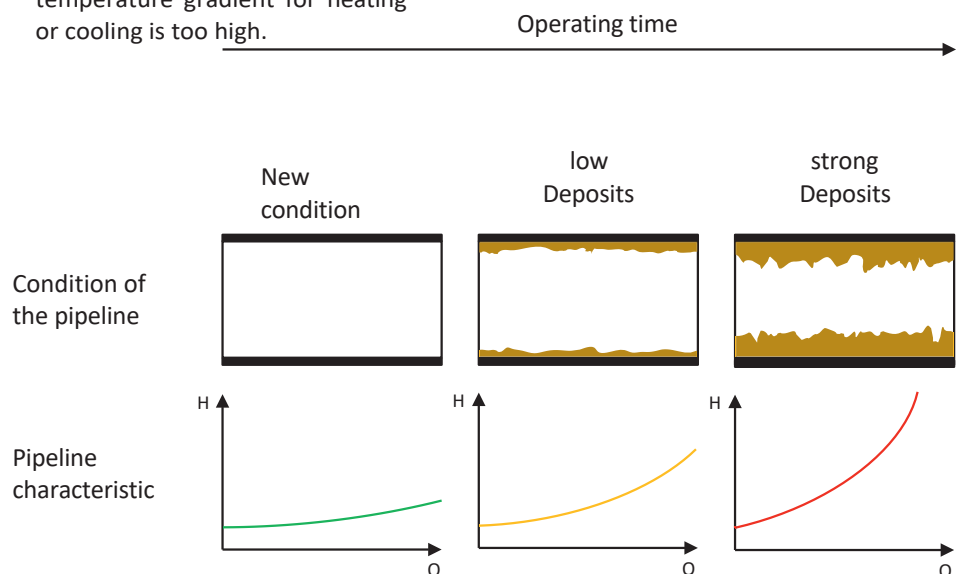


Figure 1: Relationship between deposit formation and pipeline hydraulics based on the pipeline characteristic curve

Table 1: Maintenance strategies for industrial cooling systems

Functional impairment after operating time	Maintenance
	<p>preventive</p> <p>Preventive measures in defined time intervals</p>
	<p>Condition-oriented</p> <p>Orient measures the current status and development trends identified of the systems compared to a defined Target state</p>
	<p>due to failure</p> <p>Reaction to events damage or to external events and measures</p>

and will be used more and more in the future.

Processes during cleaning cannot be monitored visually, neither in pipe networks nor in heat exchangers. Indirect verification methods such as the comparison of system characteristics are required in order to carry out cleaning and valve maintenance effectively. Transparent test systems and practical indicator systems allow the processes involved in cleaning measures to be seen in detail and also link the indirect methods with the effects actually observed. This approach has already led to considerable progress in the development of even more efficient cleaning processes and promises further improvements, especially in monitoring. At Hammann, Simmex® will in future stand for system information through measurement and monitoring. Based on the data collected, this new service will help to assess the condition of systems.

Literature

- [1] Immel, S.; Schimmelpfennig, S.; Klein, N.; Utke, C.; Gnirss, R.: Brunnengalerien und Rohwasserleitungen online reinigen, wwt wasserwirtschaft wassertechnik (2014) No. 1-2
- [2] <http://comprex.de/waermer/>

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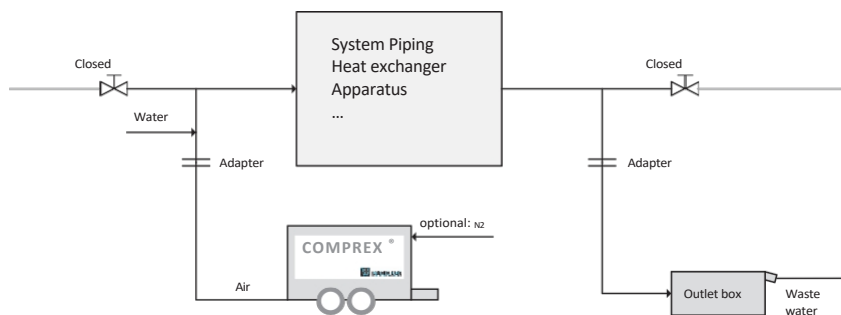


Figure 3: Diagram of the Comprex cleaning process

High-precision acoustic leak detection in water pipe networks

The electro-acoustic detection of leaks in water pipes depends primarily on the hearing and experience of the user. The AQUAPHON® system supports and simplifies this detection process with an outstanding quality of microphone and measurement technology, intelligent functions for analysis and a practical, visual presentation of the results on the display. So that

leaks are detected more reliably than ever before. The system offers the user convenient, wireless handling, simple operation, flexibility in use and a robust, ergonomic design. The AQUAPHON® system is equally suitable for both pre-location and excavation-ready localization of leaks and can handle any leak location challenge.

Professional technology for demanding tasks

The high-quality piezo microphones with a frequency response specially optimized for leak detection and the digital signal processing ensure outstanding acoustic properties. Thanks to brilliant sound quality and minimization of background noise, leaks are detected even with low sound intensity of the leak or strong ambient noise.