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FILTRATION ASSISTED WITH HIGH POWER ULTRASOUNDS

PROJECT OBJECTIVES

The aim of the project is to develop a new range of self-cleaning filtration products, based on the use of power ultrasonic excitation.

Two partners are involved to test the technology in two different industrial applications:

1. Metal machining based on Electrical Discharge (EDM) oil filtration with the partner ONA.
2. Urban water filtration system based on Membrane Bioreactor (MBR) with Hidrowater.

Compared with conventional urban and industrial filtration systems, the new ones will incorporate ultrasonic cleaning devices that increase system's energy efficiency and reduces the use of chemical cleaning products. For this purpose, the consortium consists of two companies that develop filtration products (ONA and HidroWater) and an ultrasonic device developer (CTEC).

Fig. 1: ONA EDM machine

Fig. 2: Hidrowater filtration plant

INNOVATION

Filter's service life prolongation and reduction of chemical residues are factors that motivate the development of the new device, and not only from the economic point of view, but also from the environmental one.

FILUSONIC proposes the development of a new product that will have competitive advantage over the existing ones (conventional MBR and EDM filtration systems). The provided development consists of:

- The design of new ultrasonic transducers, signal generators and control for different kind of membranes,
- Study of the actual filter's fouling and saturation (clogging) process,
- The design of new models of MBR and EDM filtration systems compatible with ultrasonic cleaning,
- The set up of a laboratory-testing bench with different combinations of ultrasonic transducers and filtration units,
- The validation under industrial conditions.

The ultrasonic devices must also be adapted. Since ultrasonic transducer are working at resonance frequency, the viscosity of

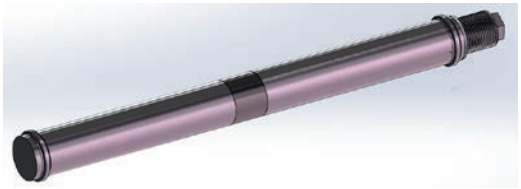

Fig. 3: CTEC's MUST device

Fig. 4: CTEC's US2000 driver

the fluid, the boundary conditions, the available size for the transducers induce to redefine the structure of the MUST with a fine tuning to the environment. Elsewhere, the process may change in real time, in terms of temperature, pressure, boundary conditions... leading to frequency swap, efficiency loss and vibrations stop. In that regards the ultrasound (US) driver shall be customised in order to track the eigen frequency within the range set by the dedicated process. This range of tracking is not infinite, so each process may require special tuning of the drive electronics.

CTEC CONTRIBUTION IN THE PROJECT

In the FILUSONIC project CTEC is in charge of the following actions:

- **Design and manufacture** the resonant devices (transducers, sonotrodes and signal generators). The signal generator must generate the high frequency signal, include the option to be regulated externally,
- **Test** the proper behavior under loaded conditions (immersed) and will send them to TEK for integration,
- **Improve** the solution for scaled-up prototype.

PARTNERS

- HIDROWATER
- ONA EDM
- CEDRAT TECHNOLOGIES

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