



## MEMSONIC2

Development of a miniaturized pressure sensor and its readout circuit

### Project Summary

The role of hydro power plants is increasing as water power is a renewable, non-polluting, and reliable energy source. The increase of the efficiency of turbo-machines is linked to the increase of the knowledge for fully 3D unsteady flow. A lot of progress has already been achieved, but still, to investigate a region, sensors are often producing perturbations.

Goal of this project is to conceive and realize a miniaturized pressure sensor in a "MEMS-on-IC" technique presenting small volume, extremely low thickness, high sensitivity and low power consumption. The main tasks inside this project can be summarized as follows:

- Modeling of a capacitive pressure sensor;
- Fabrication and test of the sensor;
- CMOS readout circuit development and
- Full integration (MEMS-on-IC).

A CBCM (**C**harge-**B**ased **C**apacitance **M**easurement) technique has been investigated and developed for detecting capacitance variations of the pressure sensor. This technique shows good sensitivities and accurate responses for different sizes of the sensor.

The sensor developed on a flat PDMS layer seems to be the best solution. The measurements performed between 1 to 100 bar of pressure were very promising. In addition the sensor is easily adaptable to be manufactured directly on top of the electronics, with a "MEMS-on-IC" technique.

### Valorisation

The capacitive sensors are used in various applications, including those to detect and measure position, displacement or proximity. The latter application has been investigated and a demonstrator, based on the readout circuit for the pressure sensor has been developed. Measurements have been performed and promising detection ranges, up to 10 cm, have been observed.

Contact / Mr Marco Mazza (marco.mazza@hefr.ch)

Authors / Mr M. Mazza, H. Keppner, Mrs E.-L. Niderhäuser, Mr L. Pirrami, Mr B. Graf

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