



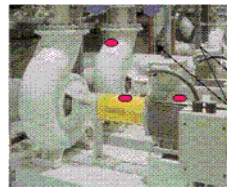
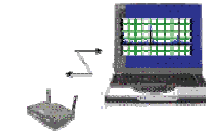
# MEMS Sensors for Robust Condition Monitoring Systems



VTT Technical Research Centre of Finland

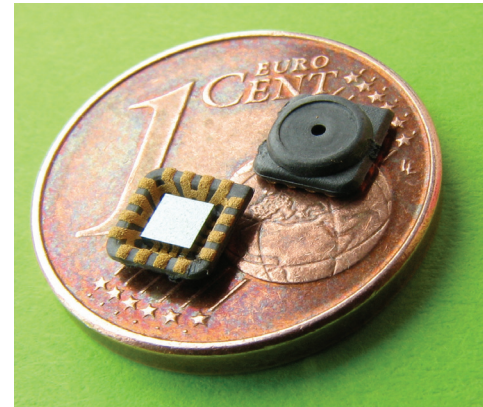
## BACKGROUND and BASICS

- The growing adoption of smart machines and auto diagnostics calls for better condition monitoring solutions. They must reliably detect
  - Leakages in valves
  - Mechanical failure like crack formation
  - Bearing faults
- However, current vibration based systems use mainly bulky, relatively expensive piezoelectric sensors, whose performance is limited by temperature creep, ringing, etc. Even though many of these issues can be solved by MEMS acoustic emission sensors, such devices are not available commercially until today.



## CONCEPT and SOLUTION

- Combining its competence in MEMS technology, electronics and data processing, VTT developed an affordable system based on embedded micromechanical sensors that can be tailored to custom specifications. Signals from an acoustic emission (AE) sensor are processed by an integrated low power electronics, which enables wireless operation.
- Since manufacturing technology for VTT's AE sensors is identical with that for acceleration sensors, these two sensing principles may be combined to deliver superior performance in future devices for specific applications.



## STATUS and OUTLOOK

- The first product consists of a MEMS sensing element, preamplifier and RMS converter mounted in a stainless steel package. Its technical performance is comparable or better than commercial piezoelectric sensor products. A spin-off from the Research Centre, Sirusens, is starting to market these sensors.
- Technology transfer to interested parties is available via licensing; a large contractor network is available for OEM manufacturing support if needed.
- For rapid customization and adaptation to specific applications, VTT Technical Research Centre of Finland can draw on the expertise of more than 2,700 scientists and technicians in various application fields.



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