



Abstract

A Flemish industry-driven research institute has developed a module for active noise and vibration reduction in rotating machinery. The fully modular device can be placed around conventional bearings. It uses piezo-stacks for actuation and both force and acceleration measurements as sensing signals. The research institute is looking for industrial partners interested in further developing and applying the technology in their machines.

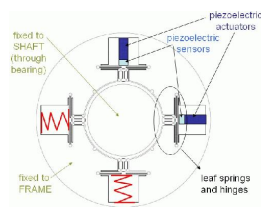
Description

A Flemish industry-driven research institute has developed a module for active noise and vibration reduction in rotating machinery. The technology is relying on active structural acoustic control (ASAC). The ASAC approach is based on intervening in the vibrational pattern of a structure, leading to an attenuation of the radiated noise levels.

The technology offered consists of a piezo-active ring-shaped module, to be placed around a bearing. The design of the active module is shown in Figure 1. In horizontal and in vertical direction, a collocated sensor/actuator pair is integrated in the module, together with a leaf spring and hinge. Both feedback and feedforward (learning) control schemes have been implemented for this bearing, using force and frame acceleration measurements.

The performance of the active module has been experimentally verified on the set-up shown in Figure 2. For this set-up, a noise reduction of more than 10 dB is achieved at the most important resonance frequencies of the system below 1 kHz.

The proposing research centre is closely linked to the Flemish machine building industry, as well as to the relevant Flemish universities in this field. The research centre develops and improves generic mechatronic competences and technologies and in so doing strengthens the competitive edge of its member companies. For achieving this, the centre executes industry driven research projects. The research group is looking for industrial partners interested in further



developing and applying the technology in their machines.

Innovations and advantages of the offer

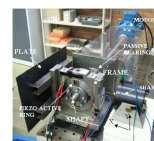
Traditional passive techniques based on absorption or isolation are effective at high frequencies, but become bulky and inefficient at lower frequencies. Contrary to this, active control methods are particularly suitable for the control of low frequency noise and carry a high potential for more performant and more silent machines.

To date however, the implementation of commercialised piezo-based active structural control techniques is only applied in a limited number of high-end applications such as wafer steppers or MRI-scanners. These techniques have not yet been applied to a broader class of rotating machinery for vibration and noise reduction because of the necessary development and component cost, which is considerable. Although costly components still have to be used, development time can be reduced significantly using the acquired expertise.

The developed module allows blocking the vibrations in the force transmission path of rotating machines. Next to lowering the noise emission level, reducing the structural vibration of the machine will also be beneficial with respect to fatigue and failure of the machine.

Current and Potential Domain of Application

All machinery with rotating axes that are vibrating and generating noise.





ELECTRONICS, IT AND TELECOMMS, INDUSTRIAL MANUFACTURING,

Technology Offer

Active piezo-based bearing for noise and vibration control of rotating machines

(08 BE 0427 2RWR)



For further information (including IPR status)

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