



Wireless communicating sensor systems for condition and process monitoring

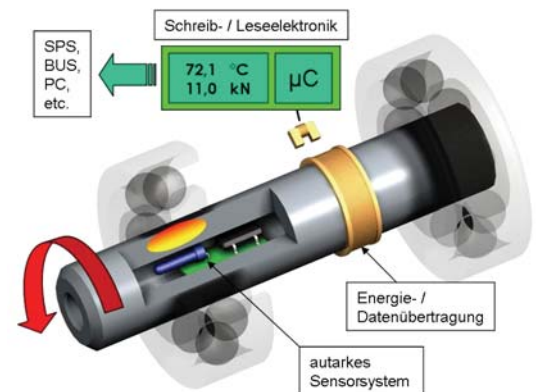
pro-micron GmbH & Co. KG
Applikationszentrum hybride Mikrosysteme



33

BACKGROUND and BASICS

- The integration of condition and process monitoring systems in machines and their components is gaining increasing importance. In most cases, application specific sensing solutions on rotating subjects combined with wireless energy and data communication are required.
- The company pro-micron has specialized on development of wireless condition and process monitoring systems for use in engineering and factory automation.
- The products are based on micro system technology and are therefore very small in size, quite robust and have low energy consumption. They can easily be integrated into machines and withstand harsh environments.



Sketch of a wireless sensor system

CONCEPT and SOLUTION

- Micro sensor systems have been integrated to monitor the current status of a CNC machining spindle such as e.g. temperature of the bearings as well as important parameters during the machining process, e.g. the cutting forces or rotating momentums during milling.
- The sensor systems are highly miniaturized and are custom-built integrated into the corresponding components of the machine to ensure that the original properties e.g. the stability and dynamics of the machine are not effected by the additional sensor components.

intelligent spindle for modern CNC machining centers



Wireless sensor systems for condition and process monitoring at a rotating spindle

STATUS and OUTLOOK

- An example of a pro-micron development, assigned with the IHK innovation price 2008, is an intelligent tool holder with an integrated sensor system for measuring forces and momentums during a machining process such as milling or drilling. The whole sensor system including sensing elements, highly miniaturized electronics, power supply and modules for radio communication is fitted as a small ring onto a standard tool holder as shown in the picture beside. With the sensor system, the machining process can be monitored online due to data are sent from the tool holder wireless via radio to the machine control unit, allowing a real time process optimization.
- The sensor system can be adapted on every tool holder, so a bunch of further applications, i.e. monitoring of forces and momentums in handling or assembling processes are possible. The system has been tested in field at industrial partners and is available in various designs. Optional, the sensor ring can be upgraded with further components to allow a permanent energy supply of the system by inductive coupling.



Intelligent tool holder with integrated sensors

Contact

Dr. Richard Huber, pro-micron GmbH & Co. KG Applikationszentrum hybride Mikrosysteme, Innovapark 20, D-87600 Kaufbeuren, Phone: +49 (0)8341-9164-14, richard.huber@pro-micron.de, www.pro-micron.de