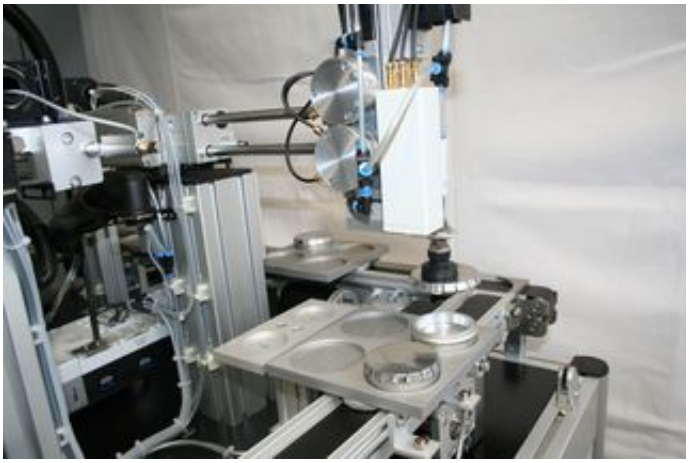
Goodbye to batteries and power sockets

June 3 2008



The demonstrator – a miniature conveyer system driven by compressed air – contains wireless sensors that provide their own power supply. © Festo

A broken cable or a soiled connector? If a machine in a factory goes on strike, it could be for any of a thousand reasons. Self-sufficient sensors that provide their own power supply will soon make these machines more robust.

When a factory machine breaks down, it's hard to know what to do. Production often comes to a standstill until the error has finally been pinpointed – and that can take hours. The causes are legion; in many cases it is all due to a single interrupted contact.

Consequently, many manufacturers have long been hoping for a technology that will work without vulnerable power and data cables. The

idea is basically feasible, using small devices that harvest energy from their surroundings and provide their own power supply rather like a solar calculator. Experts speak of energy self-sufficient sensor-actuator systems.

These high-tech components normally consist of a sensor, a processor and a radio module. They measure position, force or temperature and transmit the data instantaneously by radio. In this way, vital machine data reach the control center without using cables at all. Is the machine overheating? Is the drive shaft wearing out?

So far, however, there are hardly any off-the-shelf solutions with their own energy supply. Research scientists from the Fraunhofer Technology Development Group TEG in Stuttgart have now joined forces with industrial partners and universities in the EnAS project, sponsored by the Federal Ministry of Economics and Technology, to build a transportable demonstrator.

This is a miniature conveyer system driven by compressed air that transports small components in an endless cycle. The round workpieces are picked up by a vacuum gripper, transported a short way and set down on a small carrier, which conveys the parts back to the starting point. All steps of the process are monitored by sensors as usual.

The special feature of the demonstrator is that the sensing elements have no need of an external power supply. The machine uses photo diodes, for instance, to check whether the carrier has been correctly loaded – if so, the light from the diodes is obscured by the workpieces. Solar cells supply the energy for this workpiece detector. Another example are pressure sensors which monitor the work of the vacuum gripper. In this case, the power is supplied by piezoelectric flexural transducers.

The piezoelectric elements contain ceramics that generate electricity on

being deformed. This deformation happens when the vacuum pump is switched on and off. The electricity thus generated is sufficient to send an OK signal to the central control unit. The sensor thus draws its power from pressurized air that is present anyway. Within the next two years, the various system components are expected to make their way into everyday industrial use.

Source: Fraunhofer-Gesellschaft