

Microelectronic Expertise and Packaging Technology for New Applications

Based in Mendrisio (CH), Metallux SA (part of the Eltek Group) is not only one of the first producers of ceramic piezoresistive pressure sensors worldwide using thick-film technology, thanks to its wealth of experience in designing hybrid circuits and chip-on-board microelectronic processes with bonding technologies, it is also the perfect technological partner to integrate functions and devices into applications from various sectors ranging from industry to aerospace, from automotive to medical. For this sector Metallux already develops and produces some components with hybrid technology but today, thanks to a partnership agreement with Bioengineering Laboratories, new and important developments are arising in technologies applied to biomedicine.

Bioengineering Laboratories is one of the world leader in designing, developing and manufacturing disposable medical devices for use in cardiac surgery, urodynamics and treating acute dialysis. It recently opened a department for advanced research in the tissue engineering sector, especially for biomaterials and scaffolds for regenerative medicine. In this pioneering field, the cellular growth takes place through bio reactors equipped with control and sensor systems to fully monitor the process. It is right in these sectors that the technological expertise of the two companies is most synergistic. The new project exploits the synergy between Biomedical know-how and packaging technology with a view to creating new devices to assist life sciences.



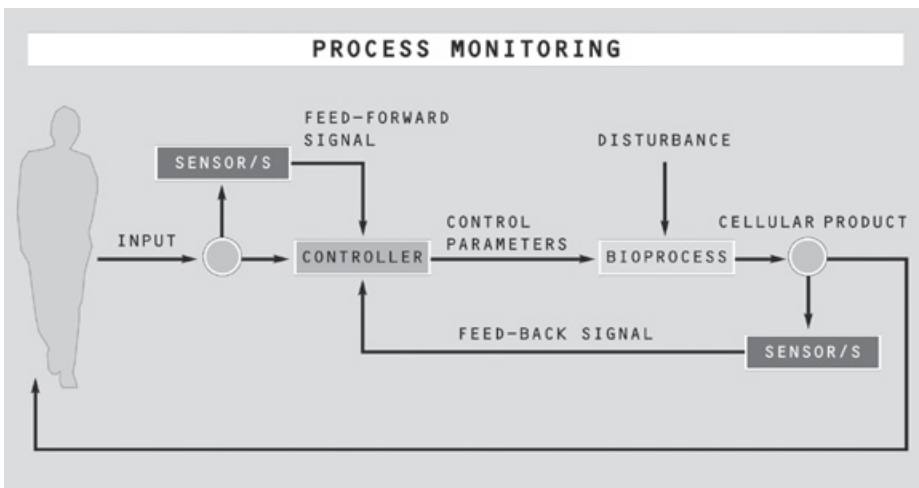
▲ BEL-Laboratory

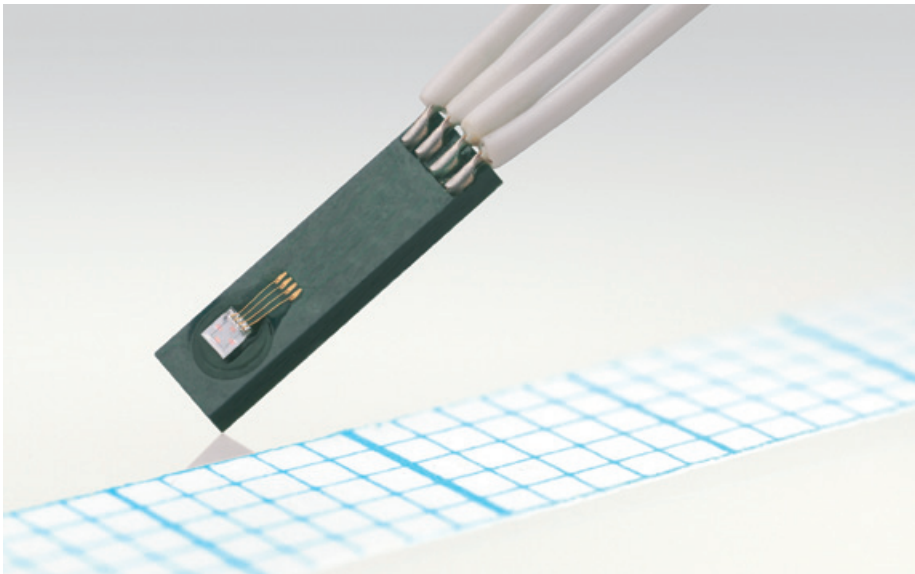
Overview of the Device

A miniature pressure sensor with reduced overall dimensions measures the pressure of biological liquids. The electrical signals are connected via cable, and the electrical characteristics together with the features of the materials guarantee compatibility with the processing systems and medical directives.

Packaging Technology

To make the device compact, die-attach, wedge-bonding and glob-top dispensing techniques were used. All the processes linked to sensor packaging take place with automatic equipment and are controlled through specific devices; all the activities are performed in a clean room with a controlled environment. The main component is a scaled down (0.6 × 0.6 mm) MEMS-Piezoresistive sensor that can measure absolute pressure up to 1.000 mBars. It is fitted on a base made of





▲ The new pressure Sensor (millimeter paper)

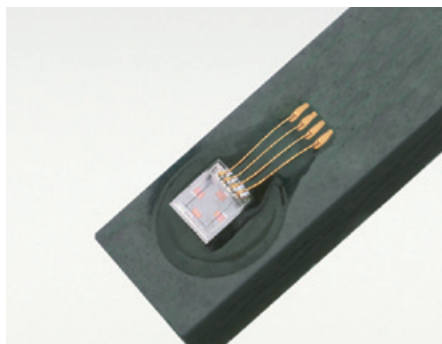


▲ Clean room (Bonding/Packaging)

special material using die-attach technology. The electrical connections of the sensor are made via wedge-bonding with a 25 μm gold wire, while the signals towards the electronics are moved along a multiple pole strip welded with an ultrasound technique.

Calibration

The sensor is calibrated and the temperature compensated by adding a special electronic module, developed



▲ Detail of the sensor

with the experience accumulated in Metallux over the years in piezoresistive ceramic pressure sensors.

Geometrical Dimensions

The height and width of the device are the most important parameters as they determine whether the device can be used in the application. To obtain the maximum overall dimensi-

ons required, a specific and in-depth study was needed to find the most compact MEMS sensor on the market (supplied by STMicroelectronics Italia) as well as the most suitable support and assembling materials. Furthermore, the maximum width defined does not only affect the choice of the sensor but also required the implementation of a special technique for the welding of the micro wires on as many contacting pads with 0.3 mm pitch, for the connection with the strip. The total area of the sensor is about 10 mm².

Standards

On top of everything, the cooperation between Bioengineering Laboratories and Metallux SA is part of the technological innovation process that concerned the entire Eltek Group and that in 2010 will lead to the ISO 13485 certification (Medical Devices) of the group's facilities.

► INFO

Authors:
Luca Salmaso
Massimo Monichino
Fabio Nebbia
Metallux SA
Via Moree 12
6850 Mendrisio, Schweiz
Phone: +41 91 640 64 50
Fax: +41 91 640 64 51
E-mail:
luca.salmaso@metallux.ch
m.monichino@metallux.ch
f.nebbia@eltekgroup.it
www.metallux.ch
www.eltekgroup.it



www.bioengineeringlab.com

You want to advertise in
SENSOR MAGAZIN?

For further information: 05723 5534 or www.sensormagazin.de