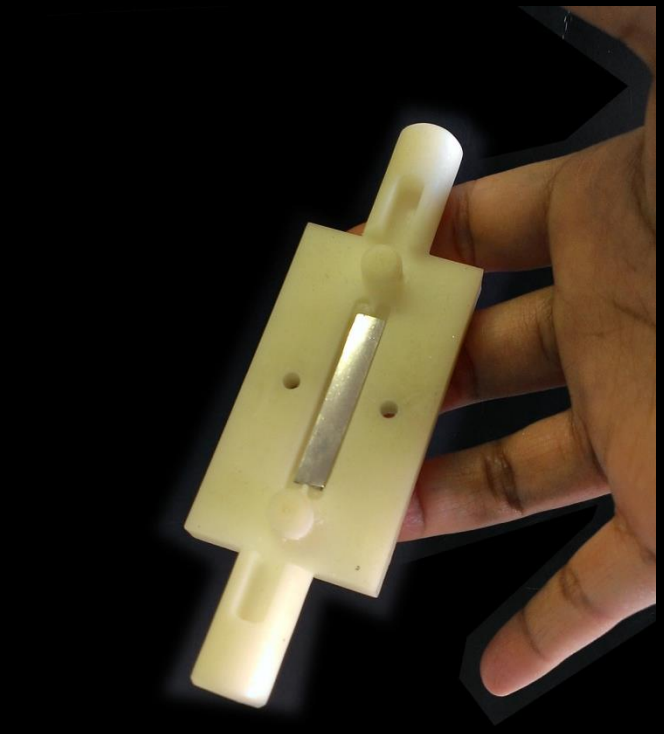
Project SENSOSTRICTIVE

Intrinsecally wireless and passive microdeformation sensor

Description



Recent developments in the field of the magnetoelastic sensors make possible to obtain a new generation of magnetoelastic sensors completely wireless and passive (any power supply) to measure microdeformations.

The basic idea of this technological application is that – thanks to their intrinsic characteristics – the magnetoelastic sensors can be excited and interrogated by means of magnetic methods, without the use of wires nor the need for a dedicated power supply for each sensor, using only a single central apparatus complex but portable.

The unit cost of each sensor, so simplified in design, would be very low.

Technology readiness level

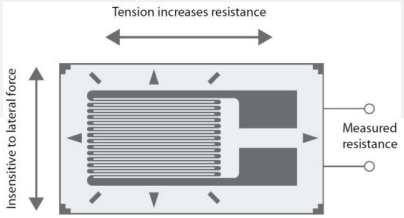
The current objectives consist in:

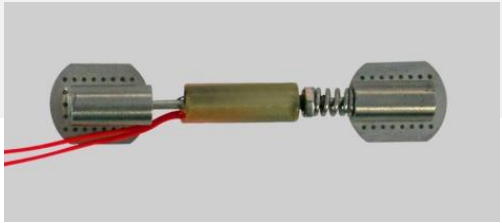
Prototype realization of a new class of low cost of microstrain sensors, wireless, passive (without need of power supply), and with the potential to "immerse" and abandon them in the structure to be monitored, and then interrogate them in remote.

Development of the excitation- receiving station for this new class of sensors.

Comparison
with other types of microstrain monitoring system

The resistive "strain gauge" or the vibrating wire sensors, are characterized by high costs





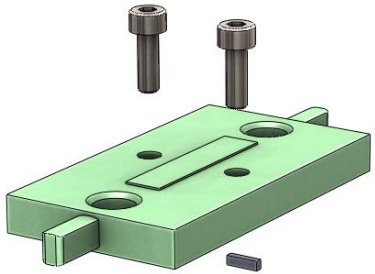
only externally use
not wireless
needs power supply
great difficulty of installation
not working in autonomy,
not suitable to be left "in situ",
needs maintenance

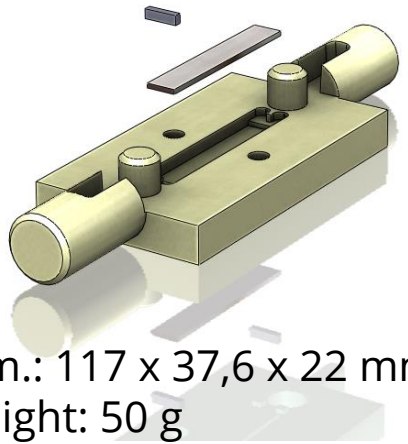
The polymers for the external structure provide excellent resistance to mechanical stresses and to the degradation caused by the action of external agents, in hostile environment, too.

extremely easy and economical assembly.

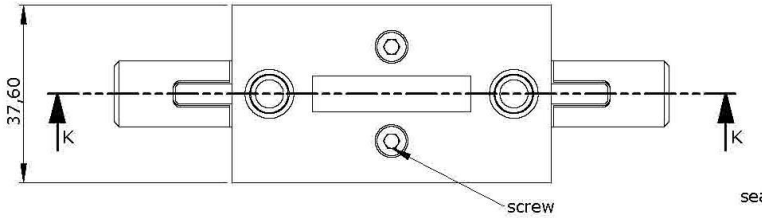
to use internally
wireless
is "passive“, does not need power supply
easy installation
measure of local microstrain and their variation in time in complete autonomy
does not need maintenance

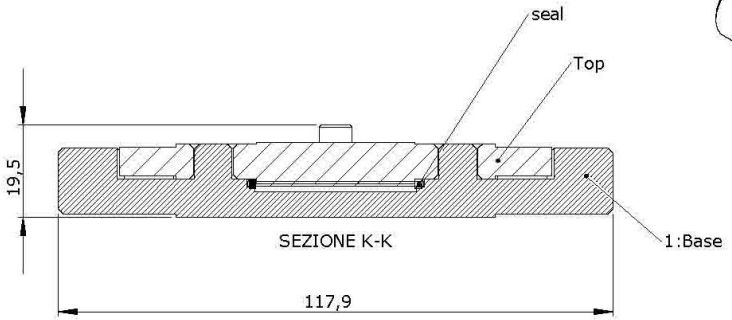
From concept to engineering

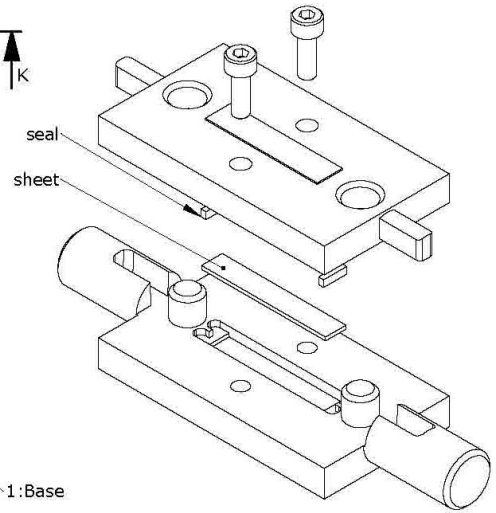




Dim.: 117 x 37,6 x 22 mm
Weight: 50 g
Volume: 0,05 L





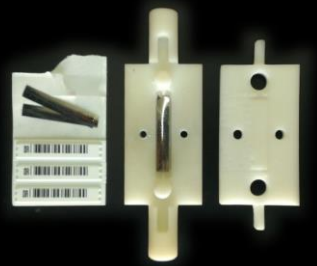


Intellectual property

Italian patent
n. PD2001A000204:
"Sensore e metodo di misura di microdeformazioni statiche e dinamiche“.

International patent
n. WO/2003/016891:
“Static and dynamic measurements method and sensor”

Italian Patent
Dimension 220 x75x75 mm



Sensostrictive 1.0
Dimension 117 x38x22 mm

Potential applications

In any situation where is required a microstrain monitoring system

materials lab testing;
nondestructive analysis;
static & dynamic analysis
of components or mechanical systems in situ;
monitoring of structural components or systems

outdoor/indoor buildings

static & dynamic analysis

cultural heritage

basement of buildings

civil infrastructures

materials science

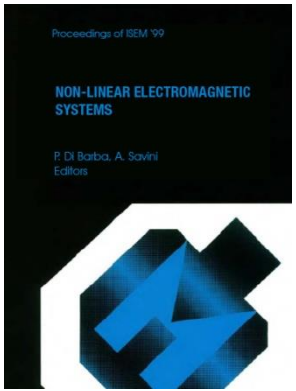
References

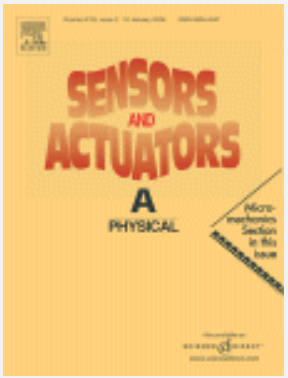
G. Ausanio, A. C.Barone, C.Hison, E.Pepe, L.Lanotte, “Magnetoelastic sensor for real-time monitoring of elastic deformation and fractures alarm”, **Sensors and Actuators A125** (2005) 10-14

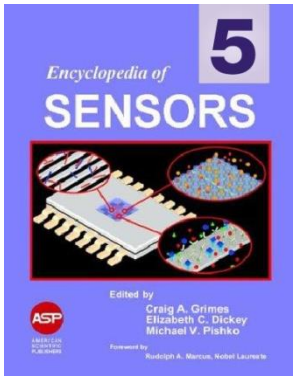
G.Ausanio, C.Hison, V.Iannotti, A. C.Barone, G.Mannara, L.Lanotte, “Magnetoelastic sensor application in civil buildings monitoring”, **Sensors and Actuators A: 123-124** (2005) 290-295

G.Ausanio, V.Iannotti, L Lanotte, C.Luponio, R.Germano, A.D’Agostino, M.Inverno, and R. Sorrentino, Potential application of innovative magnetoelastic resonators for vibration detection, **Sensors and Actuators A: Physical 91**, 1-2 (2001) 123-125.

L.Lanotte, and R.Germano, Application of magnetoelastic waves for sensors of displacement, **Sensors and Actuators A: Physical 59** (1997) 337-341.







G. Ausanio, C.Hison, V Iannotti, C. Luponio, L.Lanotte “Magnetoelastic Stress and Strain Sensors” **Encyclopedia of Sensors,** Craig A. Grimes, Elizabeth C.Dickey, Michael V. Pishko (Eds.), American Scientific Publishers, Stevenson Ranch, California, vol 5 (2006) 489-528

R. Germano, A. D’Agostino, V. Iannotti, and L. Lanotte, The use of a magnetoelastic sensor as an alternative to the resistive strain gauge, in **Proceedings of ISEM '99 NON-LINEAR ELECTROMAGNETIC SYSTEMS**, P. Di Barba, A.Savini (Eds.), IOS Press, Amsterdam 2000.

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