



IWSS2020
1st Italian Workshop on Shell and Spatial Structures
25th – 26th June 2020 – Web meeting

endorsed by



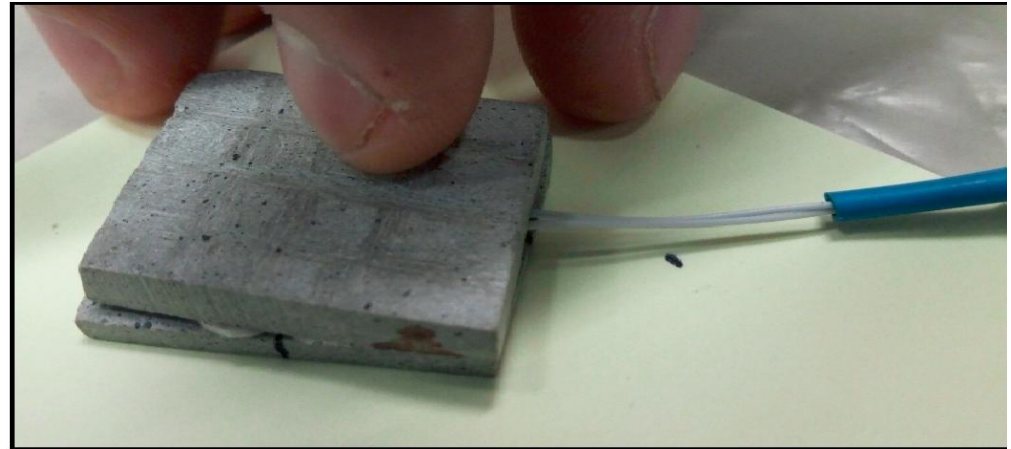
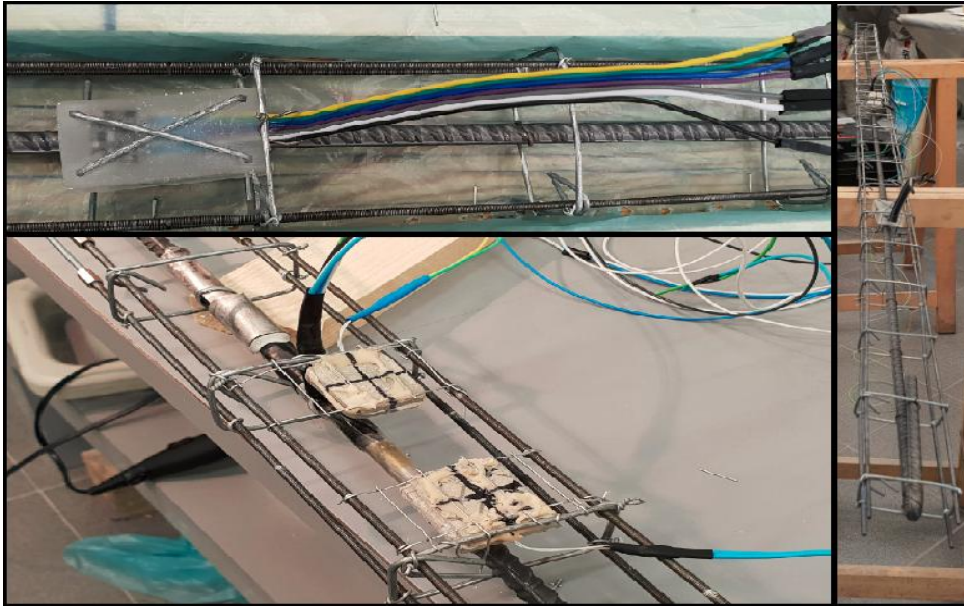
PERMANENT MONITORING OF THIN STRUCTURES *

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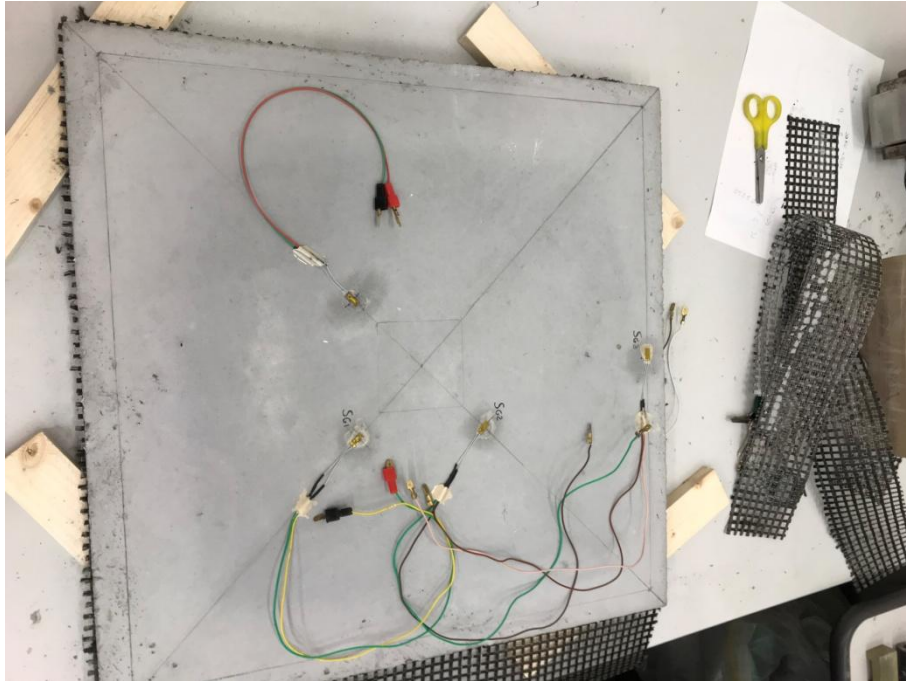


***Moni2BSafe - Project**

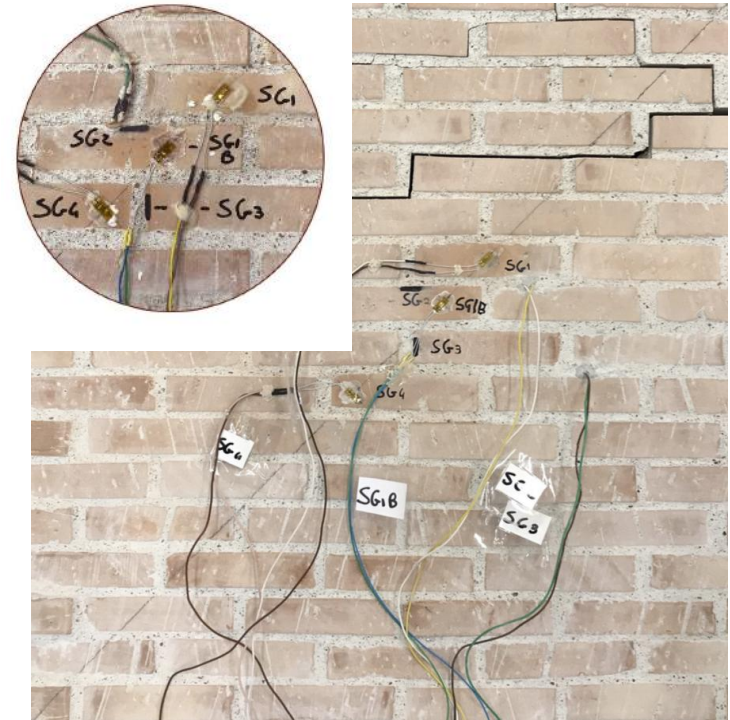
Experimental “home-made” embedded sensors for beams, plates and shells



Experimental embedded sensors for plates and shells



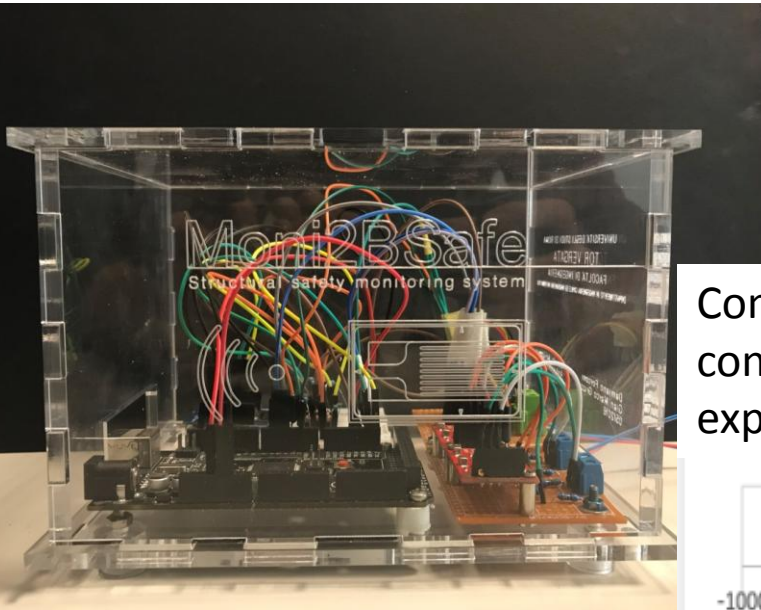
carbon fiber net reinforced concrete plate
(bending test)



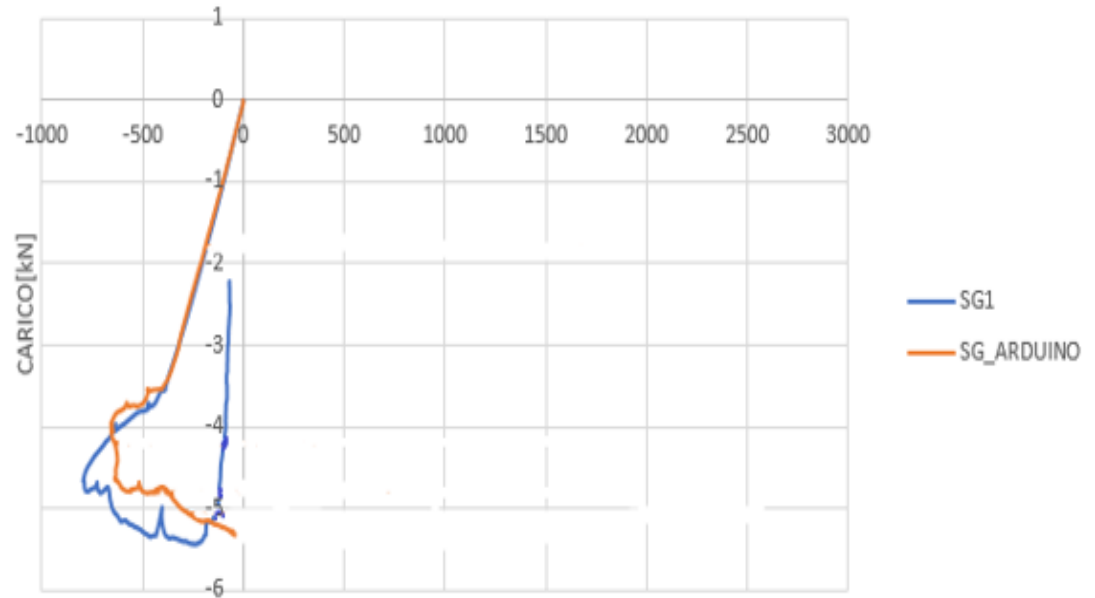
brick masonry panel
(shear test)

Skin sensors (membrane behaviour) – partially embedded

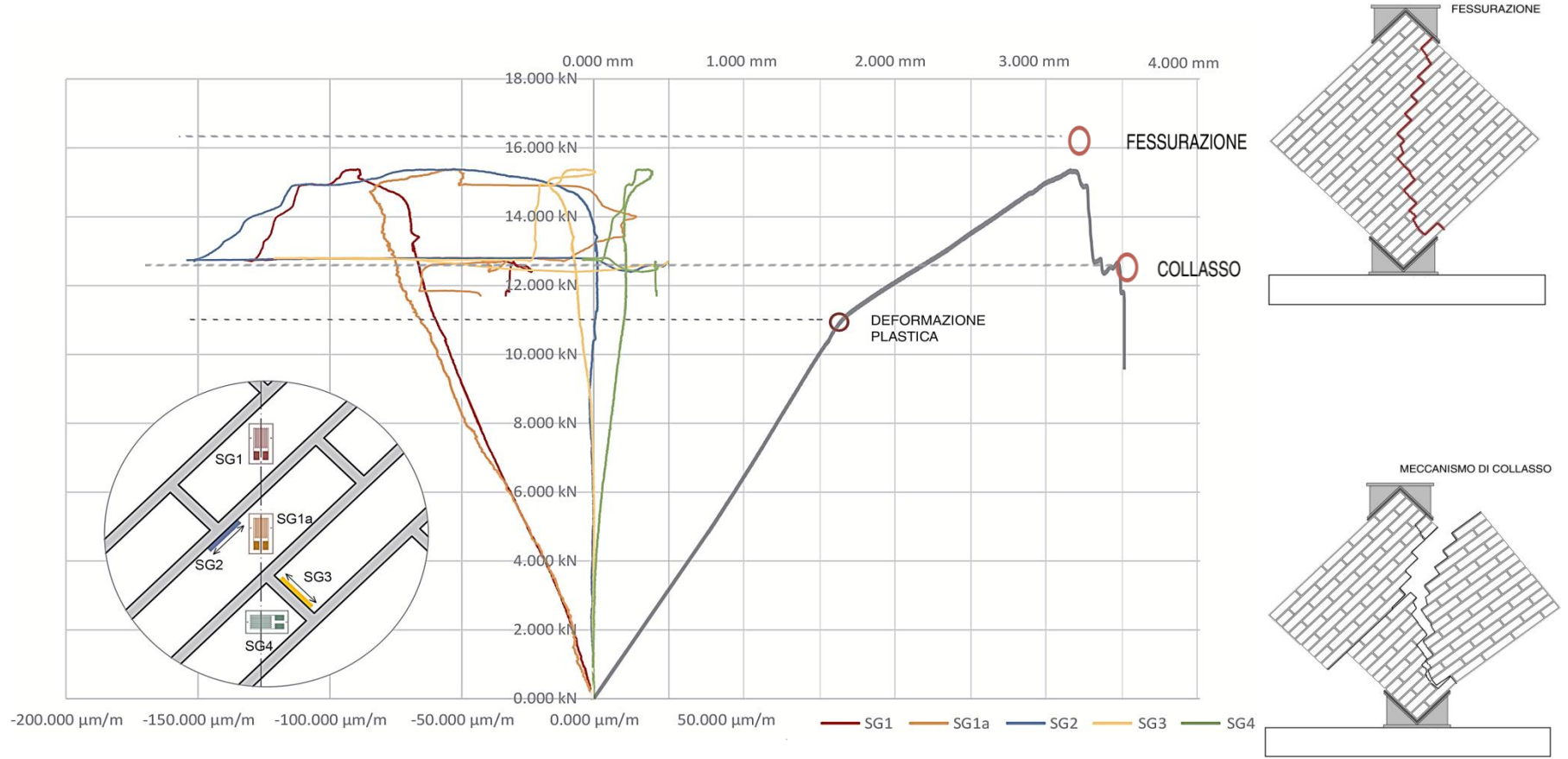
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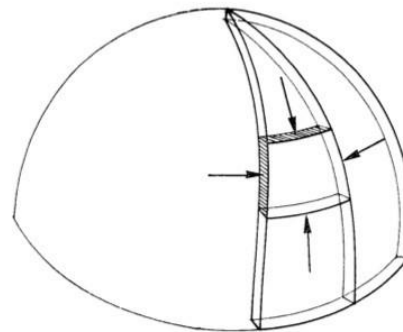
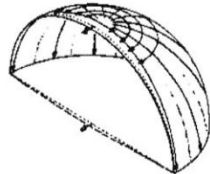
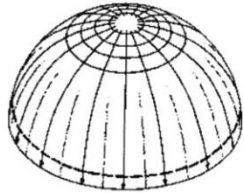
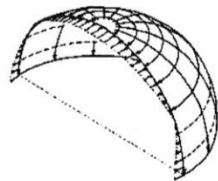
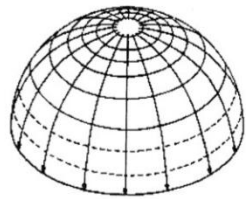
Comparison between expensive HBM strain-gauge control instrument and the “Arduino-based” experimental tool



SHEAR TEST on MASONRY PANEL with EMBEDDED SENSORS

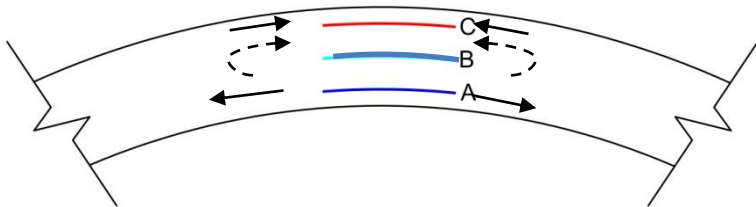
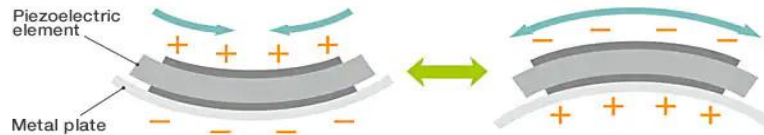
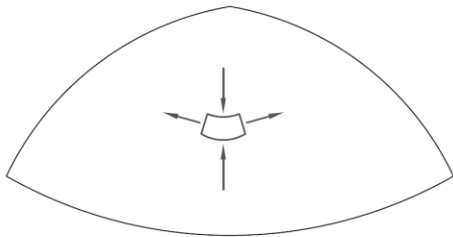


Typical N_φ and N_ϑ stress in a double curvature shell

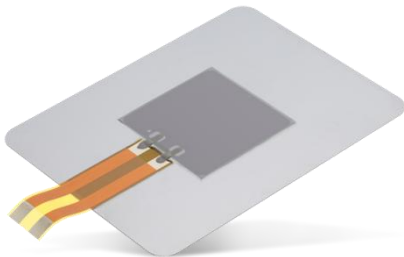


Embedded sensors

The case of the concrete thin shell



Skin sensors (membrane behaviour)
+ inner embedded sensors (flexural behaviour)

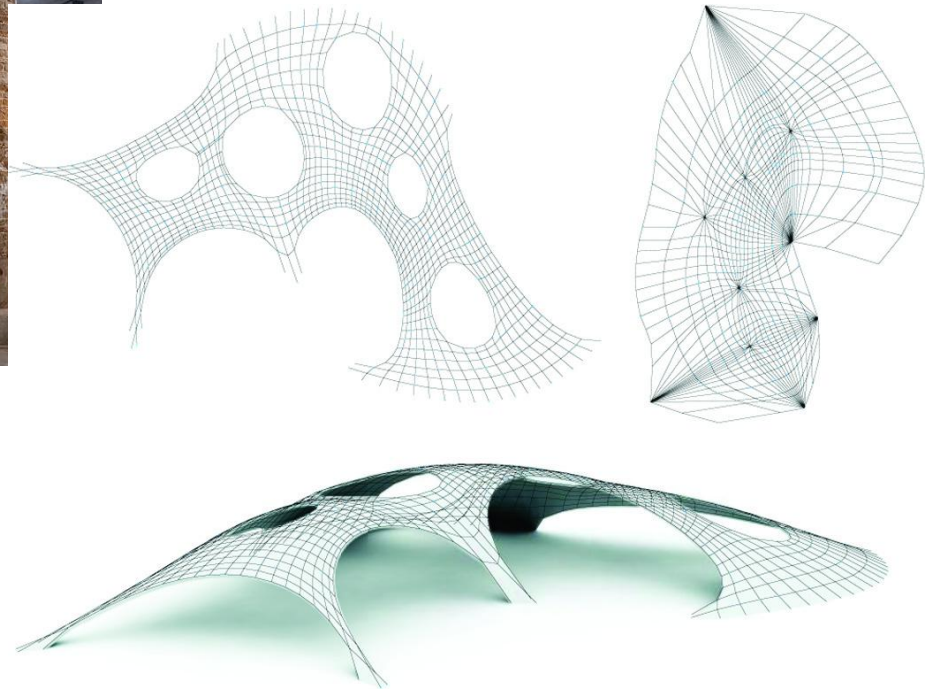


Piezo – actuator / sensors (TDK production)
(potential inner embedded sensors - flexural behaviour)

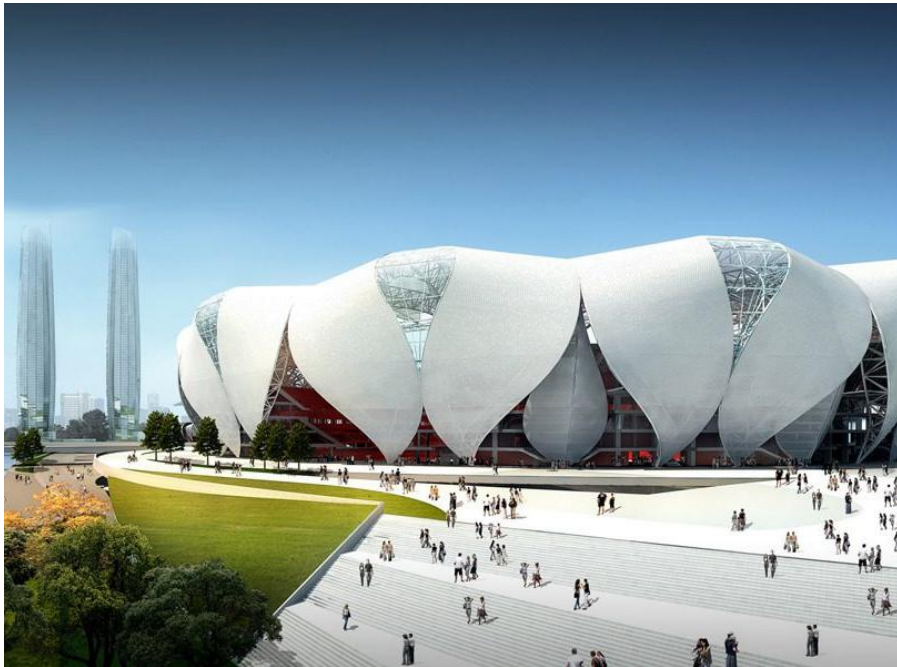
Possible thin shell application for the embedded sensors

TWA terminal in NY – Eero Saarinen 1962





from *Interactive Vault design*, 2012
by M. Rippmann, L. Lachauer, P. Block



Tennis Center in Hangzhou, China
80.000 capacity
(Grasshopper assisted design,
constructed from 2011 until 2017.)





!! SMART SHELLS !!

THANK YOU !!

*Moni2BSafe - Project