

**Call for application for research scholarships
for post-graduate international candidates**

RESEARCH PROJECT N. 45

Title
Multi-functional materials and technologies for monitoring, conservation and rehabilitation of XX century concrete spatial structures
Scientific responsible (name, surname, role)
Rosario Ceravolo, Associate Professor (rosario.ceravolo@polito.it)
Short description of the research activity (max 250 words)
Great architects and structural engineers such as Berg (1870-1947), Maillart (1872-1940), Freyssinet (1879- 1962), Torroja (1899 -1961), Nervi (1891-1979), Candela (1910-1997), Isler (1926-2009) etc., have designed recognized works of art in their discipline. They conceived extraordinary concrete spatial structures that are located mostly in Europe and represent a unique legacy. The project will take a multidisciplinary approach, involving different scientific and human sciences expertise to realise architectural heritage preservation. The idea is to use new intelligent materials, capable of repair and self-diagnosis, which allow real-time monitoring of the performance of large scale concrete heritage buildings. The new materials and their interrogation components will be non-invasive, sustainable and durable. The intelligent materials incorporate a wireless interface through microcontrollers, connected to wireless radio-transmitters and a cloud/internet-of-the-things system. Structural data is collected at a central database and is compared, using an interpretation model, against pre-validated behaviour at the material, sensor, component, substructure level. The findings of the substructural interpretation model are fed in to a full-scale structural model to allow a condition or reliability assessment of the entire XX century building. At this point, predictive models will be used to estimate structural safety during the current life cycle and the residual life going forward.
Specific requirements (experiences, skills)
Experiences, skills and interests in structural engineering, architecture, earthquake engineering, structural health monitoring, materials, sensors.
Website of the research group (if any)
http://www.diseg.polito.it/en/ ; http://dottorato.polito.it/bep/en/overview
Keywords (min 3, max 6)
Concrete spatial structures; preservation and restoration of architecture; sensing materials and technologies; life-cycle monitoring of structures; advanced materials supporting sensing systems.
Research Area (max 1)
Structural, Geotechnical and Building Engineering