LONG LIFE BRIDGES

Long Life Bridges

Funding: European (7th RTD Framework Programme)
Duration: Sep 2011 - Aug 2015
Status: Complete with results
Total project cost: €890,855
EU contribution: €890,855

Call for proposal: FP7-PEOPLE-2011-IAPP
CORDIS RCN : 100243

Background & policy context:

Bridges, like many Civil Engineering products, are designed quite conservatively. For older bridges, this conservatism is very expensive – there is a great difference between the cost of strengthening an existing bridge and not doing so. Very often it is possible to prove that a bridge is perfectly safe even when it is old and has deteriorated since it was first built. Sometimes the deterioration is in a non-critical part of the bridge and very often the bridge has a lot of reserve capacity to take load that was not accounted for when it was first designed.

Objectives:

The project leader, ROD, is involved in research at the leading edge of bridge assessment and its staff have published in the best journals in the world. Nevertheless, to achieve its ambitions of expanding aggressively in the world bridge assessment market, ROD needs to develop new techniques that are better than anything available worldwide. It will achieve this by working with Professor Sørensen of Aalborg University, the best expert in the world today in the quantification of structural risk and Professor Karoumi of KTH in Sweden who has worked extensively on the monitoring of railway bridges.

Phimeca is an established SME specialising in Uncertainty Engineering. It is well established in France and works particularly in the nuclear industry and more recently in several other fields such as defence and space. Phimeca is also working increasingly in Civil Engineering and wishes to expand its market base, particularly internationally, by applying its expertise in risk analysis to the bridge assessment industry. By working with Aalborg University, it will develop its ability to assess steel bridges at risk of fatigue damage (fatigue damage is a particular expertise of Phimeca). The new techniques that will be developed in Long Life Bridges will have no equivalents in the world today and will give Phimeca the Unique Selling Point that it needs to win work in the world bridge market.

Parent Programmes:
FP7-PEOPLE - FP7-PEOPLE - Specific programme "People" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities

Institute type: Public institution
Funding type: Public (EU)
Other programmes: FP7-PEOPLE-2011-IAPP Marie Curie Action: "Industry-Academia Partnerships and Pathways"

Lead Organisation:

Roughan & O'donovan Limited

Address:
Arena Road Arena House
18
Sandyford
Ireland

EU Contribution: €474,018

Partner Organisations:

Kungliga Tekniska Hoegskolan

Address:
Brinellvagen 8
100 44 Stockholm
Sweden

EU Contribution: €109,281

Phi-Meca Engineering

Address:
Centre D'affaire Du Zenit L'arche, Rue De Sarlieve 34
63800 Cournon-D'auvergne
France

EU Contribution: €108,074

Aalborg Universitet

Address:
FREDRIK BAJERS VEJ 5
9220 AALBORG
Denmark

Organisation Website:
http://www.aau.dk

EU Contribution: €199,482

Technologies:

Road structures
Repair and strengthening methods for bridges

Development phase: Research/Invention

Key Results:

State-of-the-art assessment models to extend the lifetime of bridges

The cost of maintaining older bridges can be exorbitant. An EU initiative introduced solutions to more reliably determine the true safety of bridges, thus enabling public authorities to make informed decisions about maintenance, repair or rebuild.

To prolong the safe working lives of bridges, the EU-funded LONG LIFE BRIDGES (Long life bridges) project focused on railway bridge dynamics and life-cycle and fatigue evaluation. To achieve its aims, it carried out secondments between two leading European engineering SMEs and two academic institutes from Denmark and Sweden.

Project partners investigated railway bridges subjected to high-speed trains. They developed a damping system to minimise the effect of harmful vibrations. Testing followed on a bridge in Sweden with hangers that were susceptible to fatigue damage. Simulations showed that the existing passive damping system in place on the test bridge was partly inefficient due to changes in the dynamic response during train passages. The prototype attenuated the fatigue-related stresses by about 20% compared to the existing one.

The LONG LIFE BRIDGES team developed more accurate load models for long-span bridges that take...
Devising a global method to assess the reliability of steel cables on cable-stayed bridges will be key to new bridge design, detailed fatigue analyses and bridge assessments.

Researchers created a global methodology that considers cables as a parallel system of wires, corrosion effects and cable length. They also developed a probabilistic fatigue model for welded plate details using fracture mechanics. The developed models consider both crack width and depth and allow for the effect of bending stresses arising from misalignments.

LONG LIFE BRIDGES efforts will contribute to identifying old bridges that are safe to remain in service and those that need maintenance. This ensures maximum returns from existing bridge infrastructure, as opposed to undertaking expensive and carbon-intensive new projects.

**STRIA Roadmaps:** Vehicle design and manufacturing, Infrastructure
**Transport mode:** Multimodal transport
**Transport sectors:** Passenger transport, Freight transport
**Transport policies:** Safety/Security
**Geo-spatial type:** Infrastructure Node