Preliminary Proposal Reference oc-2008-2-2715

Proposer Details

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Scientific Content

Title

Safe Steel Structures in Changing Climate Conditions
(acronym: SSS-CCC)

Abstract:

The “SSS-CCC” proposal has the main objective in developing safe steel structures for buildings, bridges and large arenas. The need for research is motivated by the changing climate conditions. In case structures fail, huge losses measured in number human lives may occur.
The proposal has a main target to make high quality scientific research on the research areas of steel construction, in order to develop safe steel construction structural solutions to get ready for changed climate conditions in the future. Secondary objectives of the proposal are (1) simulation of structures on unexpected dynamic loads, (2) simulation of structures on unexpected static loads, (3) simulation of structures on impact loads and (4) investigation and development of safe design methods based on the Euro code system.
Based on the models of the Euro code system the loads are compared and analysed against the strength of the structures in the research.

Key Words:

Steel construction, robustness, strategic research, university-industry cooperation, climate change, international projecting, sustainable development, Eurocode development, impact loads, dynamic loads, risk evaluations.

Preferred COST Domain:

Materials, Physical and Nanosciences

Text of proposal:

Background, problems

The basic ideas of the SSS-CCC co-operation on this proposal are

(a) to accomplish coordinated scientific research and development actions and to

(b) distribute relevant scientific information and resources change between the partners in Europe.

The “SSS-CCC” proposal has the main objective in developing safe steel structures for buildings, bridges and large arenas. The need for research is motivated by the changing climate conditions where changes in the climate temperature and relative wetness, as well as earthquakes, higher winds, heavier snow loads and other unexpected impacts may cause new types of unexpected load on the structures. In case structures fail, huge losses measured in number human lives may occur. The scientific research area is limited to steel construction in future climate change conditions.

COST will be essential in arranging annual seminars, gradual work-shops, flexible collaboration and support, distribution of know-how as well as planning, preparing and administrating new research actions.

A number of economists have emphasized "technological innovation", "information", "knowledge", "ideas", ”science” and "brains" as the most important bases for competitiveness (For example, Solow 1956, Mytelka 1999, Garelli 2001, Dosi et al 1990). A growing body of literature has emerged in the last fifteen years that lays emphasis on these growth and competitiveness factors. According to these concepts the technical institutes as well as companies on steel construction branch in Europe can enhance their competitiveness, for example, by (1) identifying their competitive advantages which they can build and sustain, (2) developing the platforms for technological innovation and change, and (3) by developing relevant information and knowledge networks and by (4) increasing entrepreneurship. These elements form the remote targets for the proposed networked co-operation.

Benefits

1. The partners of the proposal will acquire better information covering new significant technological possibilities, finding new international partners, lowering their risk level in future steel construction recommendations and solutions new development actions and distinguish safer technology for the future. These will increase the ROI of human capital in all of the domestic networks cooperating with the partners in this proposal. Better understanding and better decisions on resource allocation for research and development decisions will be created. The local industrial companies near to the partner research institutes will have better products and better profits in the future.

2. In case the direct effect on the value added of a company cooperating within a local research unit will be increased by 20 % based on the regional networking only, the value added will locally and cumulatively be increased by 25 % (assuming the rate of interest is zero). With a combination of 25 % local network effects and an additional international networking effect 50 % out of the domestic networking effect, the total cumulative effect on the value added of the company will be 50 % (Tenhunen 2007). The benefits from international co-operation seem to be evident.

3. On the methodological level, the outputs of the proposal will produce better European level understanding of safe steel construction solutions as well as new models of governance for integrated research partnerships. As outputs there will also be a higher level of understanding of safer technology in steel construction for future conditions. Recommendations and good practices to disseminate and further exploit the results of the cooperation will be presented. Formulations of exit strategy scenarios and roadmaps to show how the partnership can continue or expand its activities after the end of the project will be presented, as well as how the results of the co-operation can be further used.

Objectives, deliverables and expected scientific impact

The proposal has a main target to make high quality scientific research on the research areas of steel construction, in order to develop safe steel construction structural solutions to get ready for changed climate conditions in the future. Secondary objectives of the proposal are (1) simulation of structures on unexpected dynamic loads, (2) simulation of structures on unexpected static loads, (3) simulation of structures on impact loads and (4) investigation and development of safe design methods based on the Euro code system.

The partners will increase knowledge of relevant steel construction know-how areas, capabilities and resources for sharing through network. They will support cooperation in European level by finding new areas for further research. The partners will produce international seminars, workshops, training, consultation, analyses, design, virtual testing and prototyping. They may prepare international projects on a larger scale. It is also possible to agree about the mutual use of resources and equipment over country borders and agree about common terms on European level. As results, new scientific synthesis, recommendations and good practices may be presented on basis of the research of the proposal.

Deliverables

1. Meetings

Two scientific forums (Virtual Forum, R & D Forum) will be created, Annual seminars will be arranged and meetings of the Management Committee will take place. Each conference/seminar will be organized by the coordinating body. Travel and subsistence will be reimbursed for scientists for their attendance of the meetings/conferences etc.

2. Short-term scientific missions (STSM) – Inter-Laboratory Exchange Visits

The STSM arrangements vary between one week minimum (5 working days), and 3 months maximum (6 months for Early Stage Researchers).

3. Training Schools

Even the senior scientists are interested to discuss deeper the Eurocode system (Structural designing codes of EC) as well as the requirements of the strategic research plans of the European technical platforms. The European scientific term bank as well as IPR questions requires training and planning. The participants are basically but not exclusively young researchers from across Europe, but these schools also cover appropriate re-training as part of ‘life-long learning’.

4. Action General Support Grant (GASG)

GASG will be used to develop and maintain the Action website as well as for general support of the Action’s MC operation, secretarial support, small-scale Action-related ad-hoc activities and support for preparatory events.

5. Dissemination

All scientific results of the co-operation based on this proposal are actively disseminated e.g. through websites, scientific articles (appr. 12 during the project) and proceedings of the workshops and conferences. Based on the proposed networking, the partners are able to publish a scientific research plan under the work name e.g. “Strategic research areas of steel construction in Europe”. The virtual forum will especially serve the dissemination purposes. All important results and papers of the cooperation will be collected on the virtual forum. The Lisbon strategy guidelines are being followed by inviting policy makers to the annual seminars. Editors of the magazines and newspapers are invited to the most significant scientific meetings.

6. Assessment, monitoring and evaluation

A brief high quality external evaluation process will be executed during the 4rd year of the proposed co-operation. Self-evaluation report will be included to the final report of the project.

7. COST Workshops

The partners will participate to the workshops and other events when invited and needed. They will also be active in Strategic Initiatives in cooperation with other COST projects as well as the Committee of Senior Officials (CSO).

8. Participation from non-COST countries

The cooperation includes also partners from non-COST countries like Russia, Belarus and Ukraine. They will participate the proposed activities only when applicable.

9. Early Stage Researchers

The limited number of early stage researchers will participate in the project activities e.g. STSM.

The proposed has the following scientific impacts:

(a) Accomplishing the applicable research plans made by the European Steel Technology Platform (ESTEP) and other European technical platforms e.g.
• Structural safety of houses and infrastructure in environmental, accidental and exceptional loading situations
• Advanced prefabrication technologies, better constructability of the structures and integrated management.
• More customer, risk and performance orientation in design
(b) Adopting sustainable and safe steel construction in future climate conditions Europe
• Resource savings and waste reduction
• Recycling with steel oriented products
• Structural quality in renovations
• Improvement of urban environment
• Sustainable development
• Environmental friendly manufacturing processes
Scientific programme & innovation
The scientific areas of the European interests are mainly pointed out by technological platforms of EC, such like ESTEP and construction platform, for example the Eurocode research guidelines, e.g.
- Structural safety
- Impact loading
- Dynamic loads
- Loads caused by climate changes
- Strong connections
- Heat treatments
- Risk evaluations
- Structural analysis
- Coatings
- Frame systems
- Eurocode development etc.
Organisation
Coordinating organization HAMK is a multidisciplinary university of applied sciences in Finland (www.hamk.fi). HAMK R&D projects involve about 250 people with a volume of approximately 100 person-years. The most noteworthy customers in HAMK in research and development projects are businesses and industries in the region – especially SMEs – and the public sector. The HAMK competence is of international standard and with the ability to serve the industrial customers on an even larger scale.

Participants interested in network:

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2-. Lassi Martikainen, HAMK University of Applied Sciences, FI
3-. Markku Heinisuo, Tampere University of Technology, FI
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5-. Jyrki Kesti, Rautaruukki Oyj , FI
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