COST Action FP1004

Enhance mechanical properties of timber, engineered wood products and timber structures

Minutes of the 2nd Management Committee Meeting

COST Office
Avenue Louise 149, Brussels, Belgium

9-10 November 2011

Chair: Richard Harris **Secretary: Dan Ridley-Ellis**

0. Welcome to participants

A total of 38 participants from the following 20 Parties attended the meeting: Austria (AT), Belgium (BE), Bulgaria (BG), Switzerland (CH), Czech Republic (CZ), Germany (DE), Denmark (DK), Spain (ES), France (FR), United Kingdom (UK), Greece (EL), Croatia (HR), Italy (IT), Ireland (IE), Former Yugoslav Republic of Macedonia (MR), Norway (NO), Portugal (PT), Poland (PL), Sweden (SE), Slovenia (SI)

With 20 of the 23 (87%) Parties having accepted the MoU to date represented at this meeting the quorum of 2/3 required under the COST rules (specifically COST 4159/10 Annex II Article 8) is attained.

1. Adoption of agenda

The Management Committee agreed to adopt the tabled agenda without modification.

2. Minutes of last meeting

Minutes of the previous Management Committee had been circulated by email. The Management Committee agreed to accept the minutes without modification.

3. Matters arising

There were two matters arising in the minutes of the previous meeting:

"The MC provisionally appointed Dan Ridley-Ellis (d.ridleyellis@napier.ac.uk) as the Action Secretary although new joining members will be asked if they would like to take this role at the next MC meeting (e.g. Annette Harte, annette.harte@nuigalway.ie). An appointment that assists with the desire for representation for early stage researchers is preferred."

The post of Action Secretary was offered to all MC members with an encouragement to early stage researchers to volunteer. Dan Ridley-Ellis said that he would assist a volunteer in undertaking this role for the first few meetings. No volunteers came forward during the meeting but MC members were invited to consider the vacancy between now

and the next MC meeting. Dan Ridley-Ellis will continue to undertake this role for the time being. **[Action: All (especially ESRs) to consider volunteering for the role of Secretary]**

"A proposal was made to form a Task Group on the subject of Cross Laminated Timber. This idea was deferred for discussion at the first Workshop."

This matter had not been discussed so far at this workshop and was in relation to a future training school. Since the training schools were under discussion at this meeting this matter was deferred to the next meeting. **[Action: All interested in CLT to consider the matter and discuss at the next full meeting]**

4. Report from the COST Office

- News from the COST Office

- Status of Action, including participating countries

- Budget Status, budget planning and allocation process

COST office representative Cassia Azevedo Zezzi said that she had nothing at this time to add to the information presented by Melae Langbein at the previous MC meeting and recorded in the minutes. Ms Azevedo Zezzi attended for the remainder of this MC meeting in order to answer questions.

5. Progress report of working groups

The working groups had met the previous day with instructions to review the brief laid out in the MoU, their membership and future work within this COST Action. There had been concern that the working groups would be unbalanced (with most people interested in WG1) but this did not appear to be the case.

Membership of the working groups was discussed. There has not yet been made a definitive list of WG members and since many people are interested in more than one WG it was asked if it was a requirement of COST that a membership list of working groups be made. Ms Azevedo Zezzi said that it was advisable, but not necessary. It was agreed that communications about WG activity should, for the meantime at least, be sent to all MC members. Mechanisms for this were briefly discussed but for the moment the Action website (agenda item 12) would be the place to go to stay informed.

Dan Ridley-Ellis said that he had received a good number of responses to the online survey that was collecting contact details of people interested in this COST Action together with WG preference.

[Action: Any MC members who have not yet completed the online survey should do so in order that their WG preference is on record]

[Action: Dan Ridley-Ellis to send the information collected in the online survey to Jan Willem Van De Kuilen so that a mailing list can be produced]

The Working Group leaders reported on the outcome of their meetings the previous day. The text in the MoU was reviewed and its intention clarified.

Scientific area 1 – WG1: Enhance performance of connections and structural timber in weak zones

In this area, scientific activities focus on increasing and consolidating the current knowledge of structural behaviour of timber and connections in weak zones and how to improve/enhance performance and reliability. This scientific area includes:

- • Identifying and categorising weak zones (type of failure, relevance) and respective mechanical properties
- Grouping of connections (load level, type of failure, dissipation of energy)
- Using glued-in rods or self-tapping screws as reinforcements
- Using densified wood or modified wood
- Using other Engineered Wood Products (EWP) e.g. plywood, LVL or cross-laminated timber (CLT) as reinforcement
- Using fibre reinforced polymers (FRPs) as reinforcement
- Evaluation of design models and identification of respective gaps
- Potential of non-destructive test (NDT) methods in identifying weak zones
- State-of-the art in reinforcing connections and weak zones
- New jointing techniques (in cross-laminated elements, or in components created with CNC machines (direct timber contact)

The key issues to be addressed for the research tasks are:

i) Resistance to crack propagation
ii) Resistance to tension perpendicular to grain and shear
iii) Enhancement of strength at supports and connections
iv) Compression perpendicular to grain – supports
v) Compression parallel and perpendicular to grain – pre-stressing
vi) Ductility and energy dissipation capacity of connections and reinforcements,

For the above areas, the strength and stiffness enhancement will be achieved mainly by means of the following techniques available:

a) Screws and steel rods
b) Fibre Reinforced Polymers (FRP)
c) Densified wood
d) Other engineered wood products
e) New developments

Scientific area 2 –WG2: Enhance the mechanical properties of heavy timber structures with particular emphasis to timber bridges.

In this area, scientific activities focus on increasing and consolidating the current knowledge of reinforcing techniques used for heavy timber structures, in particular for timber bridges and how to improve/enhance performance and reliability. This scientific area includes:

- Identification of properties to be enhanced
- More effective timber decks as a result of effective pre-stressing
- Increase stiffness and strength by reinforcement
- Energy dissipation capacity of structures

The key areas for the research tasks are:

i) Enhance the load-carrying capacity at the anchorage zones of pre-stressing bars in stress-laminated timber bridges
ii) Enhance the performance of large-span structures by means of innovative connections
iii) Seismic dissipation capability of heavy timber structures (multi-storey buildings, large-span structures, etc.)
iv) Timber-concrete composite structures with innovative shear connectors
v) Increase the level of prefabrication of heavy timber structures, mainly by use of innovative connection systems
vi) Increase the level of safety of existing timber structures, by means of reinforcing techniques
vii) Study of new shapes and technologies for enhancing the structural performance of large-span structures;
viii) Enhance the serviceability performance of timber elements and systems sensitive to vibration problems
ix) Adequate bracing system for enhancing robustness of large span structures

For the above areas, the strength and stiffness enhancement will be achieved mainly by means of the following techniques available:

a) Screws and steel rods
b) Fibre reinforced polymers (FRP)
c) Densified wood
d) Other engineered wood products
e) New developments

Scientific area 3 – WG3: Modelling the mechanical performance of enhanced wood-based systems

In this area, scientific activities focus on increasing and consolidating the current knowledge of mechanical and structural behaviour of timber elements and systems - with enhanced performance - by use of advanced numerical modelling and analysis.

This scientific area includes:

- Identification of properties to be enhanced and experimental determination of those properties
- Material properties needed in numerical models
- Design and performance models of enhanced timber structure
- Static, dynamic, environmental, fire and accidental action
- All durations and including stability and large deformations
- Cracks parallel to the grain related to moisture content variations and different longitudinal shrinkage

The key areas for the research tasks are:

i) Mechanical behaviour of clear wood
ii) Mechanical behaviour of Engineered Wood Products, Modified Wood Products and Wood Composites (e.g. glulam, laminated veneer timber, cross-laminated timber, etc.)
iii) Structural behaviour of full-size timber elements
iv) Structural behaviour of reinforced and unreinforced timber joints
v) Structural behaviour of curved timber elements - with and without reinforcement – subjected to positive bending moment
vi) Structural behaviour of timber elements with holes and/or notches, both with and without reinforcement
vii) Structural behaviour of carpentry joints, with and without reinforcement

For this scientific area, the following analysis tools will be adopted:

a) Finite element modelling
b) Fracture mechanics
c) Continuum mechanics
d) Failure criteria (e.g. Tsai-Wu criterion)
e) Weibull weakest link theory

The scope of the COST Action was discussed with reference to FP1101 and it was agreed that these two related COST Actions work in coordination. There is some potential overlap of topics and it was agreed that while FP1101 gets started, topics related to assessment and repair of existing structures could be covered within this COST Action.

6. Action planning

6.1 Annual Progress Conference (preparation and/or feedback from DC)

As required under the COST rules (specifically COST 4113/11) a FPS Domain Annual Progress Conference (APC) is held each year. FPS Action Chairs have been advised of the documents that must be submitted for the APC. This includes a summary of the Action, a progress report and a financial report. At the time of this meeting this Action will have been running for about 10 months. The MC raised no further matters for discussion and agreed that chairman Richard Harris would report to the APC that the Action had begun.

6.2 Action Budget Planning

The MC agreed that since it was not practically possible to organise the first training school within year 1 that the budget allocated for this could be used instead for a meeting focussed on ESRs. Richard Harris had already checked with the COST office that this was possible within the rules (with justification for the change) and Ms Azevedo Zezzi confirmed that this was the case.

The MC agreed the following budget.

Budget: 1 July 2011 to 30 June 2012

Item	Previous budget	New budget
STSMS (6 No)	€12,000	€12,000
Meetings	€62,800	€79,000
• Meeting travel costs	€61,600	€61,600
• Workshop support	€1,200	€1,200
Training School	€16,200	€0
Dissemination	€3,000	€3,000
OERSA	€260.87	€260.87
Scientific Expenditure	**€94 260.87**	**€94 260.87**
Grant Holder	**€14 139.13**	**€14 139.13**
Budget	**€108,400**	**€108,400**

6.3 Action Planning (including meetings)

6.3.1 Location and date of next meeting

The next meeting would be a teleconference meeting of the Core Group.

The next actual meeting would be the additional meeting in place of the training school agreed under agenda item 6.2. Following discussion a date of 19-20 April was agreed for the meeting. Vlatka Rajcic (Croatia) offered to host the meeting although this would need to be confirmed after further discussion with the Core Group and University of Zagreb regarding location, budgets etc.

WG leaders provided themes for this meeting:

WG1: Glued rods and screws for reinforcing weak zones and connections in timber
WG2: Influence of connections on whole structure response in timber structures
WG3: modelling of basic wood behaviour and of connections with glued in rods and self-tapping screws.

Early Stage Researchers would be strongly encouraged to participate in this meeting. The budget would need to be reviewed in light of the expense of this meeting, but it is anticipated that about 50 reimbursements could be provided for this meeting. It is hoped to attract 30 papers, whose presenters would be reimbursed. As many of these reimbursements as possible will be reserved for ESRs and no MC members will automatically be allocated a reimbursement (there will be no MC meeting), although MC members can participate if they fund their own attendance. It was pointed out that strict signing of attendance lists will be necessary at the meeting.

It is likely that papers would be based on projects presented to MC members at the meeting on 9 November 2011. Kay-Uwe Schober has issued a template for the papers and MC member were asked to encourage ESRs to submit papers. The deadline for submission of papers would need to be 6th February on order to produce a publication with ISBN within this year's budget (Agenda item 8). Following this date, it was agreed that the Core Group will select papers for presentation as quickly as possible so that invitations can be issued. Jan Willem van der Kuillen proposed that one or two experts in the field of screws/bonded rods be invited to give keynote presentations.

6.3.2 Long-term planning (including anticipated locations and dates of future meetings)

The next WG and MC meeting would be in October 2012. This "state of the art" meeting would fall shortly before the first training school, which would be in November or December 2012 at Lund, Sweden. The organiser for this training school is Roberto Crocetti. This is based on an existing course in advanced timber engineering that takes

place every four years. Roberto has taken over running of this course and is currently writing a proposal for course topics. The MC approved this plan.

Since the start of COST Action FP1004, a new COST Action, FP1101 Assessment, Reinforcement and Monitoring of Timber Structures has begun. It was agreed that in the work of COST Action FP1004, there should be collaboration with FP1101. It was further agreed that at present COST Action FP1004 has clear topics to develop and joint working, for example a joint meeting, would be something to consider in later years of the COST Action.

[Action: MC members to consider hosting the October meeting and discuss with Richard Harris].

7. STSM status, applications

STSM manager Kay-Uwe Schober reported that he had received 3 proposals for STSMs so far. There are already intentions for at least a further 2 or 3. The target is 6 per year. The MC was informed that STSMs for researchers going to Australia and New Zealand would come from a separate budget and so could be in addition to these 6 STMS. Members are encouraged to contact Kay-Uwe as soon as possible if they wish to submit a proposal as there would most likely be more proposals than could be funded and the STSMs have to be complete by May in order for the finances to be processed in time for the end of this COST Action year.

[Action: All considering submitting proposals for STSM to contact Kay-Uwe Schober as soon as possible]

8. Publications, dissemination and outreach activities

This meeting began the process for collection of state-of-the-art papers and it is proposed to publish these in a report to be presented at the next full meeting (October 2012). This publication would carry an ISBN and be available in both hard copy and e-publishing format. The MC approved the use of the €3,000 dissemination budget for this purpose.

The Action's new web page and logo was covered under agenda item 12.

9. Request for new members

New member countries are able to join the action until the first anniversary (30th May 2012) after which new member countries can join with MC approval. Part of the budget is proportional to the number of participating countries and so additional members would permit also additional reimbursements in future years. Antanas Baltrusaitis attended this meeting and Lithuania is intending to sign the MoU.

[Action: Robert Kliger to contact representatives of further countries (Latvia, Estonia etc.) for possible membership as agreed in the Core Group meeting]

10. Promotion of gender balance and of Early Stage Researchers (ESR)

Richard Harris observed that while the gender balance of the meeting was far from equal, it was good for engineering.

The MC was reminded to encourage ESRs to participate at the planned meeting in April 2012. It was suggested that participation might be positively skewed towards female researchers, but the MC agreed instead that quality of papers be the deciding criterion for reimbursements and that participation of female researchers be instead encouraged through invitations to submit papers to the meeting.

11. Non-COST country participations

University of British Columbia (Canada) and University of Technology (Sydney) are already in this COST Action. The University of Auckland (New Zealand) is expected but not currently signed up.

[Action: Richard Harris to email Pierre Quenneville to enquire on joining the Action]

12. Web news

Jan Willem Van De Kuilen presented the new Action website http://costfp1004.holz.wzw.tum.de and logo. The website has a mailing address for contacting the webmaster and a link to the COST webpage for the Action. A reciprocal link will be made by the COST office now they know the address of Action website.

The website also has pages for the management committee, and steering committee names (to be checked for typographical errors) as well as pages for each of the Working Groups that will contain descriptions of WG activity and, perhaps, membership.

There are menu headings for the meetings under which details and documents can be placed. Ms Azevedo Zezzi confirmed that MC minutes were not to be made public and there was some discussion about the need for a secure area on the website. DC rapporteur Radovan Despot informed the MC that all Action publications must be held in a secure area prior to the end of the Action as they are, until this time, considered working drafts.

There is a page for STSMs, which will contain instructions on how to submit proposals and contact details for STSM manager Kay-Uwe Schober. At the moment this page holds a guidance document about STSMs (not the COST one).

There was a proposal that a LinkedIn group be formed for the COST Action. This has since been created and the link is: www.linkedin.com/groups?gid=4170149

The 230 slides from the first day of meeting will be placed on the website. Jan Willem Van De Kuilen pointed out that copyright will be the responsibility of the authors and not TUM.

13. AOB

Radovan Despot suggested that the MC consider organising a special meeting within WCTE 2012 but Jan Willem Van De Kuilen confirmed that this would not be practicable. Instead it was agreed that other actions be taken to raise awareness of this COST Action at the conference.

[Action: All to think of ways to raise awareness of FP1004 at WCTE2012]