Notes on Pallet racking Testing Seminar held at UPC Barcelona on Wednesday and Thursday 20th and 21st January 2010

Attendees: –

Steve Cowen	SEMA/Cowen Associates Ltd	UK
Stefano Calzolari	ACAI / SCL	Italy
Kees Tilburgs	Nedcon	Netherlands
Francesco Roure	UPC	Spain
Riccardo Zandonini	University of Trento	Italy
Dieter Ungermann	TU Dortmund	Germany
Mike Godley	Oxford Brookes University	UK
Joseph Hepp	Whittan/Polypal	Belgium
Oliver Kraus	SSI-Schaefer	Germany
Nadia Baldassino	University of Trento	Italy
Alan Worrell	SSI-Schaefer	UK
Thomas Sowa	Verband fur Largertecnik	Germany
Karl-Gustav Carlsson	Constructor Group	Sweden
Peter Stangenberg	Isib Dr Moll	Germany
Dinar Camotin	Technical University Lisbon	Portugal
Dan Dubina	The Politechnica University	Romania
Filipe Santos	University Coimbra	Portugal
Vioriel Ungureanu	The Politechnica University	Romania
Teoman Pecos	Cornell University	USA
Guven Kiymaz	Istanbul Kultur University	Turkey
Jordi Rodriguez	Mecalux	Spain
Alberto Climent	Mecalux	Spain
Alejandro Perez	Esmena	Spain
Magdelena Pastor	UPC-ETSIB	Spain
Miquel Casafont	UPC-ETSIB	Spain
Rosa Somalo	UPC-ETSIB	Spain
Javier Ruiz	Aresante	Spain
Pablo Montes	Aresante	Spain
Loreto Gea	Yudigar	Spain
Daniel Martin	Kimer	Spain
Susana Poveda	Kimer	Spain
Eugen Talmann	SSI-Schaefer	Germany
Claudio Bernuzzi	Politecnico of Milan	Italy
Diederik Margadant	Nedcon	Netherlands
Zsolt Nagy	Universitatea Tehnica	Romania
Marti Colomina	FEM-AEM	Spain

Apologies:

Carlo Castiglioni	Politecnico of Milan	Italy

The meeting was opened with an address by Professor Francesco Roure of UPC who welcomed everyone to Catalonia. He provided a background to the University School of engineering and gave details of the specialist areas of its research. Racking testing work had been ongoing at the University from 1977 and had been intensively carried out from 1998 onwards. It was noted that in the School of Engineering the majority of students would include overseas experience as part of their studies.

Professor Xavier Gil the Vice Rector Research and Innovation at the University also welcomed all to the seminar and provided a general background of the university which has about 28,000 students. Relationships between research and practical engineering in this institution were emphasised.

A background to the meeting was provided by Mr Kees Tilburgs, Chairman of the ERF Technical Committee. He confirmed that the previous meeting in Trento had raised problems with either tests or the application of results and though this meeting had not been able to define proposals for solving these problems. Kees indicated that the purpose of the meeting was to harmonise testing perhaps with a FEM guidance document being published which might then be used to influence the revision of the standard EN 15512 when this is considered after 5 years of experience of use. He outlined that this issue had been placed before the plenary meeting of ERF who had agreed to provide funding for Steve Cowen to act as Convenor for the meeting. This would ensure that notes of the meeting were made and circulated as well as providing a service to pull together a proposal for a guidance paper as outlined above.

Steve Cowen was introduced, the proposed agenda was agreed and a note taken of names and e-mail addresses of those present to ensure that an up to date 'e-mail group' was kept to ensure that circulation to interested parties did not have to rely on messages being passed through several hands. An open copy of this list is circulated with these 'Notes of Meeting'.

Presentations:
It is intended to provide a copy of all presentations to all those who have attended the meeting however due to the size of the files involved this information has been lodged on the ERF website which you may download by using the following instructions Please note that this information is 'restricted access' and while it is accepted that delegates might well use it for various purposes it is not meant for open publication.

You will need the following to allow access:

Website: www.fem-eur.com	Click on "Members Area"
Insert Username: PGRS	Password: rack2007
Click "submit"	Click on "Racking & Shelving" for documents

You will need a reasonable broadband connection to access these files. My broadband took over an hour to download all the files however we are in the Digital Stone Age in the UK where I live so hopefully if I can do it you should not have too many problems. If you have any issues in downloading please feel free to contact Mr Brian Huxley the

Secretary General of ERF as this is the first time that ERF have tried to circulate information in this way however it seems to work for me with my very poor download speeds. The material will not be left on the ERF website for an indefinite period so delegates may wish to download what they need as soon as is convenient. Presentations included the following:

1. Nedcon's experience in setting up their own testing laboratory was the subject of a paper introduced by Kees Tilburgs and presented by Diederik Margadant. This was a wide ranging presentation which covered Nedcon's experience with most of the tests required to comply with EN 15512 though it emphasised issues with upright bending and frame shear and came to certain conclusions relating to distortional buckling for the Nedcon sections tested in this series.

2. Prof. Zandonini presented a paper outlining work carried out at the University of Trento covering some 100 frames incorporating 23 different kinds of uprights. The possibility of carrying out tests as outlined in the code with excessively loose frames resulting in problems due to an incautious use of looseness imperfection was outlined. Some discussion took place both on the setup of the tests and on the interpretation of the test results both of which appear to be significant.

3. Prof. Roure presented a paper outlining work done on the compression testing of uprights trying to replicate the practical application of uprights where strictly pin ended and strictly fixed ended situations probably never actually occur. Some conclusions were arrived at in comparing the carrying capacity of the two kinds of end restraint for particular upright sections.

4. A paper was presented covering an investigation into required specimen lengths needed to investigate distortional and global buckling types. This paper was prepared by Miquel Casafont, Prof. Francesc Roure, Maria Magdelena Pastor, Rosa Somalo and Antonio Pernia in collaboration with Prof. Teoman Pecos of Cornell University.

5. A paper reporting on investigation work carried out by Miguel Casafont, Maria Magdalena Pastor, Eduard Caamano and Francesc Roure in collaboration with Guven Kiymaz of Istanbul Kultur University where an attempt had been made to eliminate or reduce the need for full scale upright frame tests required by the FEM / CEN codes.

6. Prof. Pecos presented a paper outlining ideas on the design of semi-rigid frames using a joint fixity factor which could remove the need for some significant amount of testing

A brief debate took place on the possible 'deliverable outcomes' from this series of meetings. It is anticipated that the next meeting in Dortmund will be the final one as ERF wishes to identify problems and come up with proposed solutions for them rather than have these meetings continue indefinitely.

The meeting felt that a lot of clarification had resulted from the discussions even from the rather negative point of view of merely identifying the problems.
All felt that they had gained a lot from attending the meetings however there was no clear opinion on recommendations for formal outcomes from these meetings.

At one extreme it would be possible to say that the EN 15512 as it is currently written is a workable document for 'experienced' test houses though it is possible that tests might be carried out incorrectly and some 'strange' results might be achieved by the incautious and inexperienced test engineer. One point of view might be to accept that Racking is a complex structural system and it is correct that EN 15512 should assume a high level of skill and expertise on the part of those applying it.

At the other extreme it might be suggested that there might be room for an 'Idiots Guide to Rack Testing' which is more of the nature of a laboratory handbook giving exact details of test setups that would provide step by step instructions for those who had never worked in this area before to slavishly follow the instructions and thereby achieve sensible results. In order to do this effectively it might be necessary to illustrate this document with very detailed, sketched or even photographic representation on how such tests should be set up and carried out. There was reluctance of those attending the meeting to support such a proposal as it was felt that commercial confidences might be revealed.

A compromise outcome might be to provide a little more information for the more difficult tests using the Technical Bulletin System currently used by ERF for matters of interest and importance but not of sufficient magnitude to require the production of a full document. The opinion of the meeting appeared to indicate that something of this nature is required however it should not attempt to simplify the procedure to the extent that skill and expertise were not required. Identifying what needs to be covered and the extent of any advice given is likely be a major item for consideration at the next and final meeting.

Please note that this next meeting is scheduled for 1st and 2nd July 2010 at the Technical University of Dortmund, Germany by kind permission of Prof. Dieter Ungermann. Formal invitations will be sent out shortly however it would be appreciated if those intending to attend could confirm this to both Prof. Ungermann and myself as soon as possible so that appropriate planning can be made for the likely numbers involved.

It would also be appreciated that if anyone wishes to present a relevant paper at Dortmund they could also let us know the subject and likely running time for the presentation so that this can be included in the agenda.

The meeting concluded with a formal 'thank you' to Prof. Roure and his team who had provided excellent facilities for the meeting and provided a much appreciated guided tour of the Racking testing facilities at UPC Barcelona.

SC 9th April 2010
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