



Free Afternoon Workshop | Thursday 26 February 2015

Institution of Structural Engineers HQ, Bastwick Street, London

In association with:



The yield-line method for concrete slabs: automated at last.

Intended for:

This event will be of interest to structural engineers involved in the assessment or design of reinforced concrete slabs in buildings or bridges.

Synopsis:

The well-known yield-line method can be used to analyse or design reinforced concrete slabs. First featured in issue no. 1 of *The Structural Engineer* almost a century ago, the yield-line method will often show that an existing slab has additional reserves of capacity, or that a new slab requires considerably less reinforcement than indicated by other methods.

Following research at the University of Sheffield, the yield-line method has now been systematically automated, enabling slabs of arbitrary geometry to be treated without the worry that the critical mechanism has been missed. This is achieved through the use of Discontinuity Layout Optimization (DLO), a procedure which has already been applied to geotechnical problems; see recent *Proceedings of the Royal Society* [article](#).

At the event, details of the new automated method - which is conceptually very simple - will be briefly outlined. The method will then be used to determine the critical failure mechanism and associated collapse load for a wide range of benchmark and 'real world' problems. A complementary lower bound analysis tool will also be briefly outlined, and practical scenarios where plastic methods of analysis can prove particularly useful will be described.

Finally, to ensure that structural engineers can take advantage of the new method, University of Sheffield spinout company LimitState has developed [LimitState:SLAB](#), a software program which allows practical slabs, with real-world geometries and load conditions, to be analysed quickly and easily. Thus LimitState:SLAB will be used in the workshop to demonstrate that yield-line analysis can now be applied to a wide range of problems.

Programme:

14:00 - 14:15	Arrival / tea and coffee	
14:15 - 14:55	Event welcome / How the new automated method works	Matthew Gilbert University of Sheffield
14:55 - 15:05	Complementary technology: lower bound computational analysis	Angus Ramsay Ramsay Maunder Associates
15:05 - 15:35	Tea / coffee break	
15:35 - 15:50	Benefits of plastic analysis methods in practical structural assessment	Jon Shave Parsons Brinkerhoff
15:50 - 16:30	Application of the LimitState:SLAB software to slab analysis problems	Tom Pritchard LimitState
16:30 - 17:00	Panel discussion. Panel: John Morrison (<i>Buro Happold</i>) and workshop speakers.	

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Contributors:



Matthew Gilbert

BEng PhD CEng MICE MASCE
Matthew is Director of Research in the Department of Civil and Structural Engineering at the University of Sheffield. He has a longstanding interest in limit state analysis and design methods, for a wide range of engineering applications. He is the author of papers awarded prizes by the Institution of Civil Engineers and the Institution of Structural Engineers.



Thomas Pritchard

MEng PhD
Tom is a Senior Engineer at LimitState, a company that develops software now used by most major UK civil and structural engineering consultancies, and in more than 30 countries worldwide. Tom has over 10 years experience in the field, and has a special interest in 'layout optimization' technology. He is the LimitState:SLAB Product Manager.



Angus Ramsay

MEng PhD CEng FIMechE
Angus is the Managing Director of Ramsay Maunder Associates, a company founded in 2009 to provide specialist consultancy services to industry. He is currently acting as an Independent Technical Editor for the NAFEMS Benchmark Challenge initiative, is a member of their Education and Training Working Group and is a NAFEMS Registered Analyst (Advanced Level).



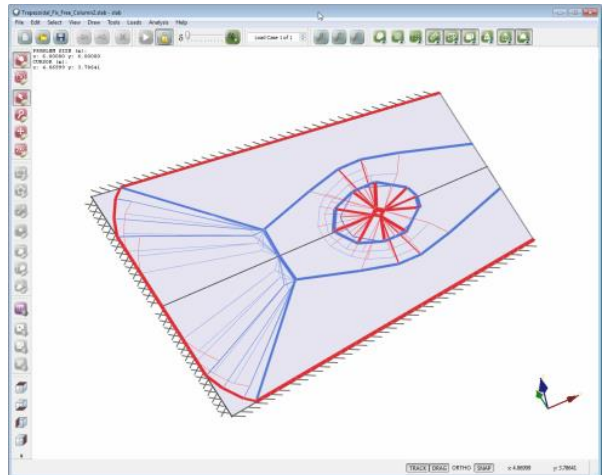
Jon Shave

MA (Cantab) PhD
Jon is UK Head of Specialist Consultancy Services at Parsons Brinkerhoff. He has a special interest in the assessment of concrete bridges and is a member of the Council of the Concrete Bridge Development Group.



John Morrison

CEng FICE FStructE
John Morrison is a consultant at Buro Happold, having previously been a founding Partner at the practice. In his career he has specialized in hotel projects, and has developed a strong interest in the analysis and design of flat slabs. He has also developed an in-house approximate design guide which makes use of the yield-line method.



Registration:

<http://yield-line-workshop.eventbrite.com>

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