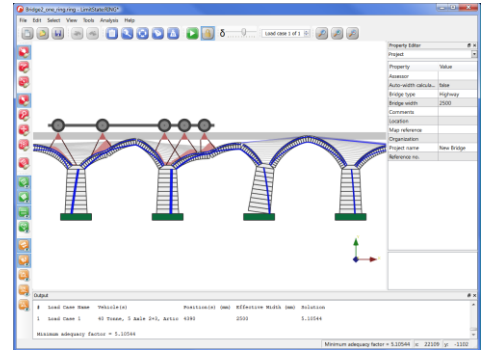


Technical Sessions | November 2015

Use of modern limit analysis methods to assess masonry arch bridges.

Modern limit analysis methods are providing engineers with a better understanding of the influence of real-world features in masonry arch bridges, leading to more-informed asset management recommendations and improved productivity.



Session overview and benefits:

The UK has a large stock of masonry arch bridges which require regular assessment. Refurbishment and repair of these bridges to enable continued use represents a significant capital cost for bridge owners. However, assessing masonry arch bridges can be a labour intensive and uncertain process. This session will show how modern limit analysis methods can be used to furnish an improved understanding of the likely mode of response of masonry arch bridges, in turn enabling owners to optimise bridge maintenance and refurbishment expenditure. As well as being more informative, these limit analysis methods can also obtain solutions quickly, with consequent benefits in terms of engineer productivity.

In this session the basis of modern limit analysis methods will be explained, and compared with other methods, including the MEXE method and non-linear finite elements. Participants will gain an awareness of how the methods can be applied to practical problems, using the well-known LimitState:RING software, widely used in industry.

Session description:

In this session, participants will gain a technical briefing on the following:

- The principles of modern limit analysis methods, and how these compare with other methods (e.g. the MEXE method and non-linear finite elements). Awareness of the approximations present in traditional methods.
- Explanation of how the rigid-block limit analysis method used by LimitState:RING works, and how it has been validated against a wide range of experimental tests.
- Practical application of limit analysis methods to masonry arch bridges, including bridges involving multi-ring barrel construction, multiple spans and/or railway loading. Modelling of localized features such as loss of mortar and low masonry strength.
- How the influence of the backfill inside a bridge on load carrying capacity can be more reliably assessed.
- Use of the support movement modelling capability to better understand the mode of response of a masonry arch bridge. Exploration of how to translate findings into asset management decision-making.
- Modelling tips and tricks which enable engineers to get the most out of the LimitState:RING software.

Who should attend:

The seminar is designed to benefit technical directors and practicing bridge engineers of all levels. The material covered will be relevant to both potential and current users of masonry arch analysis software.

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Programme:

13:30 - 14:00	Arrival / tea and coffee	-
14:00 - 14:10	Welcome	Prof. Matthew Gilbert
14:10 - 14:40	Introduction to modelling masonry arch bridges	Prof. Matthew Gilbert
14:40 - 15:00	Modelling localized defects	Prof. Matthew Gilbert
15:00 - 15:20	Tea / coffee break	-
15:20 - 15:40	What's inside matters! (the influence of backfill)	Dr Colin Smith
15:40 - 16:05	Support movement modelling capability	Prof. Matthew Gilbert
16:05 - 16:20	Modelling tips and tricks	Dr Tom Pritchard
16:20 - 16:30	Summing up / closure	Prof. Matthew Gilbert and Dr Tom Pritchard

Speakers:

The seminars will be delivered by world leaders in the development and application of modern limit analysis methods, Dr Tom Pritchard of LimitState and Dr Colin Smith and Professor Matthew Gilbert of the Department of Civil and Structural Engineering at the University of Sheffield.



Prof. Matthew Gilbert

BEng PhD CEng MICE MASCE

Prof. Gilbert is a chartered civil engineer who has over 25 years experience in investigating the behaviour of masonry arch bridges. He has a long track record of development and practical application of ultimate limit state analysis techniques. He co-founded LimitState in 2006 in order to bring the powerful methods developed in academia to a wider audience.



Dr Tom Pritchard

MEng PhD

Dr Pritchard holds a MEng and PhD in Civil Engineering from the University of Sheffield. He joined LimitState in 2008 and heads up the technical support team. He has a wide range of experience in the modelling and assessment of masonry arch bridges using LimitState software.



Dr Colin Smith

MA PhD (Cantab.)

Dr Smith holds MA and PhD degrees in engineering from the University of Cambridge. He is a Senior Lecturer at the University of Sheffield and was a recipient of the Institution of Civil Engineers' Baker Medal for a paper which demonstrates the effects of flooding on the load carrying capacity of masonry arch bridges.

Register online:

Manchester | 17th November | 13:30 – 16:30

<http://ls-tech-sessions-manchester.eventbrite.co.uk>

London | 18th November | 13:30 – 16:30

<http://ls-tech-sessions-london.eventbrite.co.uk>

Edinburgh | 24th November | 13:30 – 16:30

<http://ls-tech-sessions-edinburgh.eventbrite.co.uk>

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