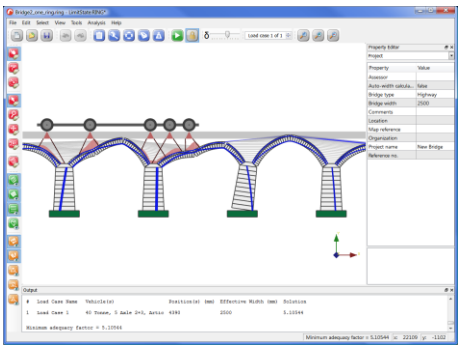
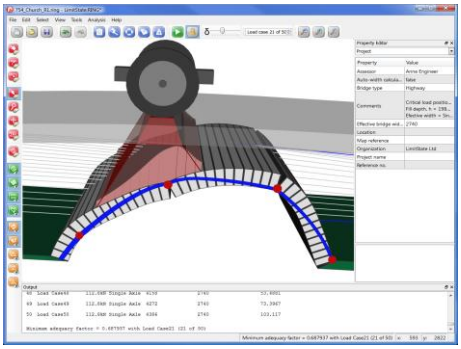
limitstate ring

Version 3.0

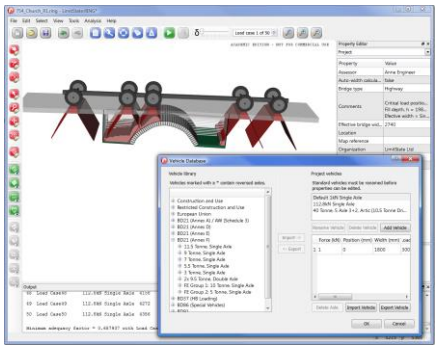
a rapid analysis tool for masonry arch bridges



Automatically analyse multi-span bridges (no need to manually balance thrusts applied at intermediate piers)



Visualize potential modes of response and gain a better understanding of the analysed structure



Includes a built-in database of railway and highway loading vehicles

Powerful masonry arch analysis software tool

LimitState:RING 3.0 is the latest version of the highly successful RING software for the analysis of masonry arch bridges.

Versatility

In use by major consulting engineering companies, universities and bridge owners across the world, LimitState:RING provides engineers with the level of flexibility and capability associated with finite element packages, yet it is as simple and intuitive to use as traditional assessment methods.

LimitState:RING has been developed in association with the International Union of Railways (UIC) and the software has been extensively validated against laboratory test data accumulated over the last few decades.

LimitState:RING is the only commercial software to implement the rigid block limit analysis technique, a method described in a key industry report as being:

'a significant improvement from basic limit analysis formulations'
'a very versatile tool'

CIRIA (2006)

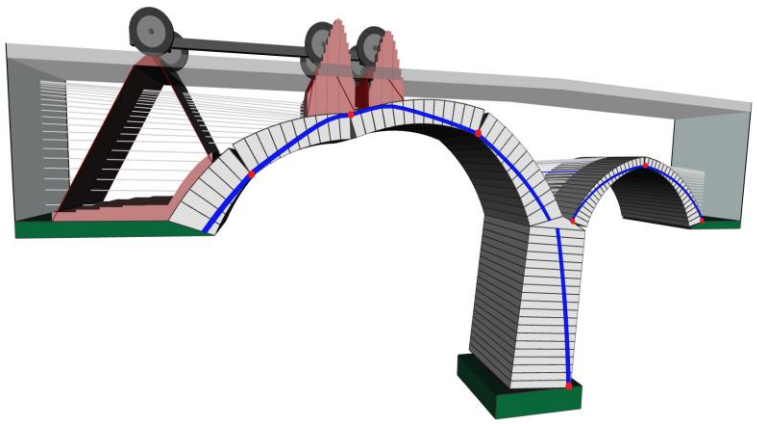
LimitState:RING can just as easily be used to rapidly check the adequacy of a simple single-span arch bridge as it can be used to perform a full analysis of a complex multi-ring, multi-span viaduct with a variety of defects.

Easy to use

LimitState believe that your time should be spent as productively as possible and have developed LimitState:RING with this in mind. By combining an intuitive user interface with a powerful analysis engine, realistic ultimate load factor or settlement analysis solutions can be obtained quickly and easily.

Understand more

Unlike some traditional arch bridge assessment methods, LimitState:RING users can quickly explore a large number of 'what if' scenarios, each time viewing the corresponding failure mechanism and building up a clear understanding of the likely mode of response and the key parameters influencing overall safety. Users can also gain an understanding of the underlying causes of existing cracks and easily identify the resulting load paths.



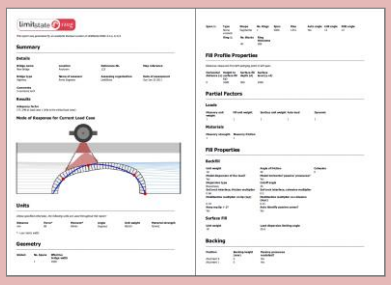
Model multi-span, variable thickness arches

limitstate

analysis & design software for engineers

Comprehensive report

Automatically generate a pdf document containing all the relevant project information, including the computed load carrying capacity and an image of the associated failure mechanism.



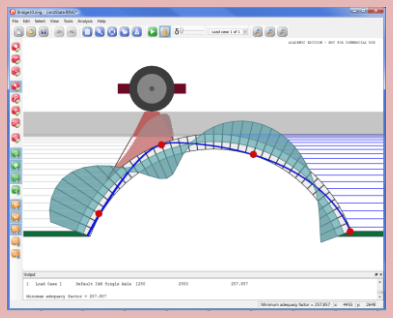
LimitState:RING report output

Built-in database of road and rail vehicles

LimitState:RING comes complete with a comprehensive library of industry standard road and rail vehicles. User-defined, bespoke loading vehicles can also be easily specified and saved for repeated use.

Force diagrams

Gain a better understanding of the mode of response by viewing moment, shear and normal force diagrams for the analysed structure.



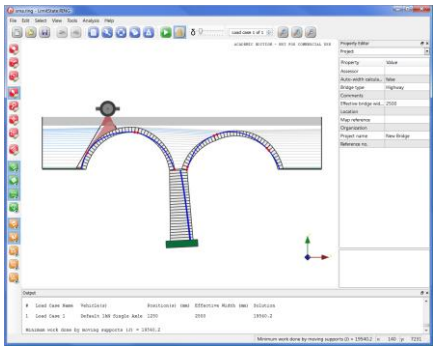
LimitState:RING force diagrams

Multi-language support

LimitState:RING can be easily switched between English, French and Spanish languages (and also has partial support for German and Arabic).

Key features

- Multi-ring and multi-span modelling capability
- Choose from a wide variety of arch profile shapes, including segmental, user-defined (interpolated or multi-segment), three-centered and pointed
- Model variable thickness arches - with and without multiple rings
- Edit blocks and contacts to include defects such as localized areas of weak masonry, mortar loss etc.
- Place supports at arbitrary positions and model support settlements



Model support settlements

- Allocate separate properties to near-surface and deep fill
- Model an unlimited number of spans, arch rings and load cases
- Perform automatic effective bridge width calculations
- Specify partial safety factors
- Include reinforcement and assess a range of reinforced masonry or concrete arch bridges
- View moment, shear and normal force diagrams for the analysed structure

Technology

The rigid block analysis technique used by LimitState:RING uses rigorous mathematical optimization solvers to directly identify a wide range of potential modes of response, including those involving:

- Hinging and/or masonry material failure
- Radial sliding failure between voussoirs
- Slippage between rings (‘ring separation’)
- Single or multi-span failure for multi-span bridges with stocky or slender intermediate piers
- Support movement

User-interface

- The easy-to-use wizard guide users through each step of setting up a bridge analysis
- Select on-screen objects to view and modify their properties
- Benefit from a comprehensive context sensitive help system
- 2D and 3D visualization
- Position vehicles by dragging the mouse
- Modern, customizable interface

Users can use the 'Property Editor' to select any object (or group of objects) in the model, viewing properties and making changes as necessary. This allows local changes to be made to blocks and contacts. (There is therefore no need to unnecessarily condemn a bridge because the arch thickness has been globally reduced to account for a local defect).

Fully supported

Whether you are in need of technical advice or assistance with your model, our support team are on hand to offer expert advice on all aspects of the software.

Try LimitState:RING for yourself

Visit www.limitstate.com/ring to find out how you can obtain your copy of the latest version of LimitState:RING and then try it for free.

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