

CROSS Safety Report

Risks associated with using outdated design software

This month's report relates to a concern about the use of outdated software that may be leading to incorrect, and potentially unsafe, analysis and/or design results.

Report

According to a reporter, the use of outdated software may be leading to incorrect, and potentially unsafe, analysis and/or design results in cases where known issues have already been identified and corrected in later updates.

In one instance, a review of analysis and design results for a large structure involving finite element analysis (FEA) revealed inconsistencies between the original design and a later review. The discrepancy was ultimately traced to the use of an older version of the software, which contained a very significant bug. Under certain circumstances, this bug caused a significant portion of laterally applied loads to be effectively excluded from the analysis.

The software producer had previously identified and corrected the bug, listing the correction in their list of software fixes and updates. However, this listing only became available after the bug had been discovered and resolved. The bug was noted as critical due to its potential to produce unsafe design results.

The reporter believes that there are two factors here:

- 1) Many engineers are using outdated software without recognising the inherent dangers. The reporter feels that users may be missing out on important updates that can affect the analysis and/or design.
- 2) An ongoing problem in the industry of a severe lack of checking of the outputs produced from software analysis and design packages.



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There is another aspect to this issue: the question of what testing is carried out by the software producer. A review of their published lists of software fixes reveals a rather extensive number of corrections. While not all of these affected the analysis and design, a significant number did.

The reporter emphasises that engineers should perform more

Key learning outcomes

For civil and structural design engineers:

- | Be aware that if you are using older versions of software, you may be missing out on important updates that can affect the analysis and/or design
- | Before using any new software, it is good practice to create a simple model to which vertical and lateral loads are applied and a basic check made to ensure the loads are distributed correctly. Note that this would not constitute a full validation
- | The establishment of every project in a certified quality assurance (QA) system should include a check on the status of the software before starting the job
- | The receipt of a notification of a critical error in commercial software should instigate a review of previous projects where it was used

Expert Panel comments

Design software programs serve as essential tools for civil and structural design engineers. It is important to emphasise the term 'tools' to underscore their role in assisting rather than replacing professional expertise. The overreliance on design software is a known issue.

A key learning outcome highlighted in these reports is that validation checks should be performed on design outputs generated by software to ensure accurate analysis and design.

Before using any new software, it is good practice to create a simple model to which vertical and lateral loads are applied and a basic check made to ensure the loads are distributed correctly. Note that this would not constitute a full validation.

It is essential that engineers can use basic techniques to verify if something feels right and the numbers make sense. The reporter does not mention if validation checks were carried out on the design where a significant portion of the laterally applied loads were missing. It is hoped that a validation check would have picked up the issue.

On the issue of software versions, if engineers are using licensed software packages and paying an annual subscription fee, it is reasonable to expect the software company to proactively notify them of all critical updates, rather than simply listing an update passively.

There are instances where engineers purchase a design software package but choose not to pay the annual fee for updates and support. In such cases, there may be a risk if a critical bug is later identified and fixed in an update they do not receive.

However, within a certified QA system, the initiation of every project should include a check on the status of the software being used. Likewise, if a critical error is later reported in a commercial software package, it should trigger a review of past projects where that software was used.

validation checks of their software, highlighting that this should be an essential requirement of a company's quality assurance (QA) policies.

Users of software should ensure they are using the most up-to-date version and be aware of the nature of any updates applied by the manufacturer. Where necessary, designs created using older software versions potentially affected by a bug should be reviewed.

The reporter believes that software producers should provide more information about the checking, testing and QA processes undertaken for their products.

The full CROSS Safety Report, including links to guidance mentioned, is available on the CROSS website (report ID: 1436) at www.cross-safety.org/uk/safety-information/cross-safety-report/risks-associated-using-outdated-design-software-1436.

What is CROSS?

Collaborative Reporting for Safer Structures (CROSS) helps professionals to make structures safer by publishing safety information based on the reports it receives and information in the public domain.

CROSS operates internationally in the UK, US, and Australasia. All regions cover structural safety, while CROSS-UK also covers fire safety.



How reporting to CROSS works

The secure and confidential safety reporting system allows professionals to share their experiences to help others.

Professionals can submit reports on safety issues related to buildings and

other structures in the built environment. Reports typically relate to concerns, near misses or incidents. Find out more, including how to submit a safety report, at <https://bit.ly/cross-safety>. Your report will make a difference.

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