

Superior Outcomes with Simulation Tools

VALUE OF ADVANCED ANALYSIS

Advanced analysis techniques enable enhanced understanding of structural behaviour.

They are particularly valuable when standard or simplified structural assumptions no longer apply. For example, when assessing static stress, buckling, fatigue, or dynamic response; when thermal effects are present in irregular structures; or where deflection or vibration behaviour may impact performance.

SIE's in-house specialist analysis skills enable a detailed understanding of complex structural challenges. This allows us to provide precise evaluations and optimised engineering solutions for our clients.

SIMULATION TOOLS

SIE use a variety of structural analysis software simulation tools including:

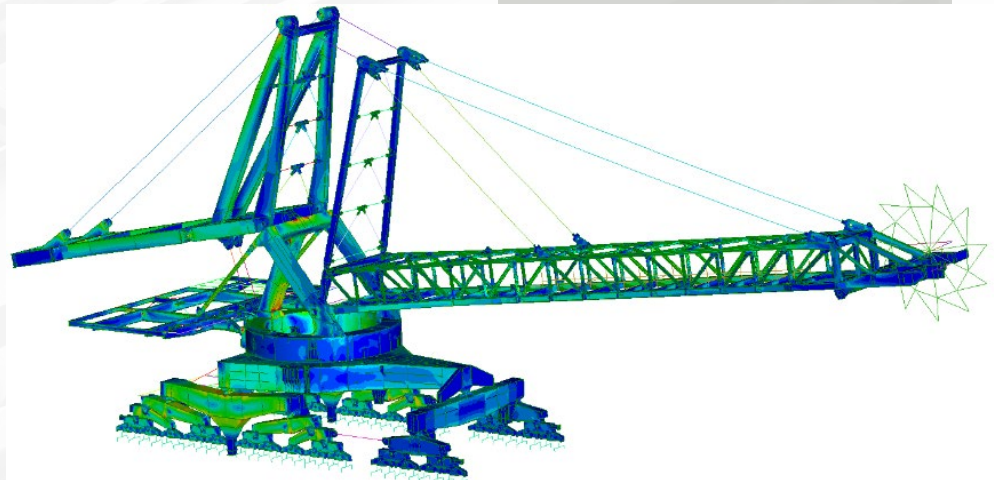
- a) Geometric modelling: traditional model creation based on drawings, as well as the creation of geometric models from existing geometry files such as IGES and STP, and from real world scanning data, including processed meshes and point clouds.
- b) Finite element model construction: SIE regularly work with parabolic and linear elements such as beams, plates and solids, various link and contact elements.
- c) Solvers: SIE has significant experience in analysis based on linear, nonlinear static and transient solvers, including nonlinear buckling, geometric and material nonlinearity, and contact analysis
- d) Results: SIE has rigorous in-house model verification systems to ensure reliability and accuracy of results. We provide results tailored to our clients' needs ranging from simple 2D images of stress contours to detailed calculation records, 3D representations, and stress overlays.

REFINED ANALYSIS

In the right circumstances and with appropriate application, advanced analysis techniques can provide precise analysis for a wide range of structural conditions. This includes static, dynamic, linear, and nonlinear modelling and analysis of structures. The benefits for asset owners include:

- a) Having structural engineers with high levels of experience working on projects, such that complex and unconventional structural components are appropriately assessed and their strength and safety status is correctly determined.
- b) Confidence that the assessment of a structure is being conducted to a level of detail commensurate with its complexity.
- c) Having tools to visualise both the issue and the solution via highly graphical and illustrative pictorial outputs from Finite Element packages; and being able to use the models for multiple purposes and investigations and assessments.
- d) In the case of structural failures, to enable investigation to the necessary degree of accuracy and detail to reliably identify the contributing factors and the requirements for prevention of a recurrence.

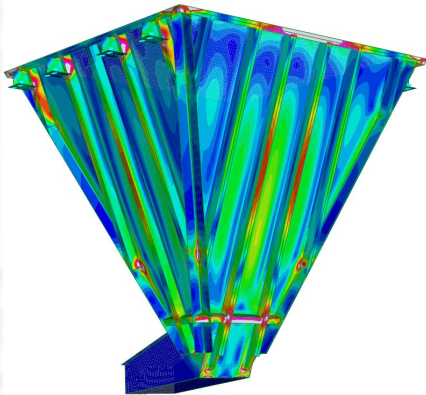
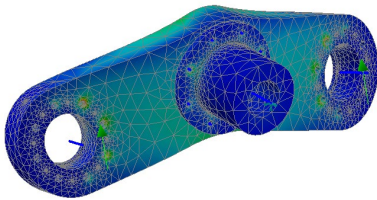
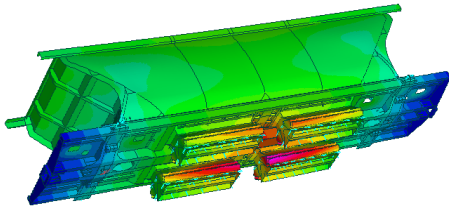
“Advanced analysis techniques are particularly valuable when standard structural design assumptions no longer apply.”



SIE ADVANCED ANALYSIS PROJECTS

Structural Assessments

SIE has completed structural performance assessments on a variety of elements such as rail car chassis, rocker arms, chutes and hoppers, maintenance tools, and lifting beams.



Performance

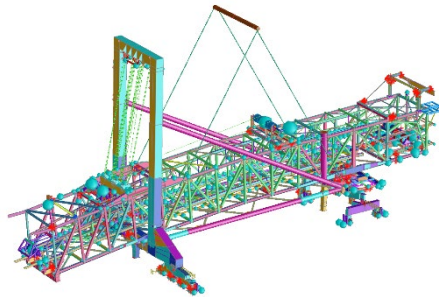
Incident Analysis and Investigation

Effective use of advanced analysis achieves accurate re-creation of failure conditions of structures, enabling identification or confirmation of root causes and various contributors to structural failures, including sensitivity and testing of failure hypotheses.

Testing and ascertainment of theoretical behaviour versus actual structural reaction to external inputs, component failure or loading forces for multiple failure hypotheses is possible.

Machine Audit Engineering

SIE provides audit engineering services for machines, with experience auditing machines with capacities up to 20,000tph, reviewing design compliance with AS 4324.1 and conducting independent detailed Finite Element Analysis (FEA) for compliance verification purposes.



These projects leverage SIE's extensive experience in machine audits and standards development.

This includes in-service and life extension assessments, as well as deconstruction/removal requirements.

About SIE

SIE is a leading Australian consulting firm with structural engineers in Perth, Brisbane, and Newcastle. We specialise in structural engineering; it is what sets us apart. Our senior engineers are highly experienced, state registered and Chartered in the structural field.

Since 2000, we have managed critical, complex, and challenging structural projects in Australia and overseas.

We are proud of our technical team. Their expertise and experience mean we are well equipped to manage and advise on your structural project or business critical asset.

Place your next enquiry with a Specialist Structural Engineer at SIE at info@siepl.com.au

Mooring Bollard Integrity Review

This project involved a visual inspection and engineering review of various mooring bollards to assess structural integrity and mitigate failure risks. It built on previous bollard assessments across multiple ports and focused on documentation review, inspection planning, and condition reporting.

