

## Experts on Bulk Handling Machines

### RESPECTED EXPERTS

From design audits to maintenance programs to remedial design to life extension: SIE are recognised experts in the field of Bulk Handling Machines.

SIE has specialised in Bulk Handling Machines since 2000, building on the existing experience of its founding Structural Engineers. Since then, SIE has accumulated a wealth of design review and audit, inspection, in-service, life extension and risk assessment experience and can assist clients with machines at any stage of the life cycle.

While intentionally excluding the design of new bulk handling machines to maintain independence as design auditors, we have been involved in all aspects of assisting clients purchase, procure, commission, manage, and maintain Bulk Handling Machines. This includes machine procurement advice, new machine audit reviews to AS 4324.1, workshop audits, erection engineering, machine risk management programs, remedial maintenance prescription, remedial designs, upgrades, in-service life assessments and life extensions.

### WORKING WITH VERY LARGE MACHINES TO AS 4324.1

Bulk Handling Machines are carefully balanced structures crucial to mining and ports operations. They have personnel working on, around and underneath them. Downtime is expensive and incidents or accidents can lead to loss of life. Strict compliance to statutory duties is essential to ensure these machines are stable and safe to operate.

Our clients benefit from working with Doug Hawkes, revision drafting leader and member of Standards Australia Committee ME-043 for the bulk materials handling equipment structural design standard AS 4324.1 (2017 & 2025 revisions).

### INDEPENDENT DESIGN AUDITS

SIE has conducted over 80 design audits for Reclaimers (up to 20,000tph), Stackers (up to 20,000tph), and Shiploaders (up to 13,500tph).

The correctness of a design is essential for technical, legal and commercial reasons. An independent structural design review or audit can assist suppliers and owners complying with their internal requirements and statutory duties, including due diligence.

Our structured approach to design review and auditing allows clients to understand the status of a provided design by others and what corrective actions are necessary to achieve compliance to the contract, specification, standard, or statutory obligations.

“From design audits to maintenance programs to remedial designs to upgrades to life extension or demolition: SIE are experts on Bulk Handling Machines.”



SIE provides:

- a) Assistance with establishing the project design criteria.
- b) Early identification of issues and problems that may arise in design, fabrication, erection, or remedial works.
- c) Independent verification methods, such as FE modelling.
- d) Clear identification of risks and strategies to avoid them.
- e) User-friendly reports.
- f) Site attendance and supervision of remedial works and/or major maintenance activities.

## CONDITION AND RISK ASSESSMENT

Competent structural condition and risk assessment requires detailed knowledge of the design basis of structures, including loading and resistance parameters.

SIE uses internally developed and customised risk assessment processes, which include:

- a) Visual inspection techniques.
- b) In-house drone inspection of difficult to access areas.
- c) Testing techniques such as non-destructive testing, weighing, strain, vibration, and dynamic measurement.
- d) Rapid initial risk assessments by Structural Engineers.
- e) Concise inspection reports with recommendations for remedial work actions, considering risk.

## REMEDIAL DESIGN

SIE provides a broad range of complex, customised remedial designs with specifications, drawings, and scopes of work for the fabrication, construction, and maintenance of machines. Our well-honed processes and clear documentation achieve:

- a) Coherent and consistent design criteria from the start of a project.
- b) Workable solutions for complex challenges.
- c) Justifying calculations to assess the compliance status of structural elements.
- d) Drawings and specifications to convey the information required for correct fabrication and construction.

## ADVANCED ANALYSIS

SIE use a variety of structural analysis software tools for geometric modelling, frame analysis, and advanced finite element analysis. Effective use of these tools achieves:

- a) A better understanding of structural behaviour in complex structures through simulation methods.
- b) Accurate methods of assessment for strength, fatigue life, and safety of structures, whether existing or in the design phase.
- c) Optimised design of structures, remediation or strengthening via use of parametric investigations or what-if scenarios.
- d) Accurate re-creation of failure conditions of structures enabling identification of root causes and contributors to structural failures.

## MACHINE UPGRADES & LIFE EXTENSION

SIE provides upgrade engineering designs and reviews for Bulk Handling Machines.

To upgrade a machine, various parameters need to be considered, including application of design criteria, impact on the original design, changes of weights and loads, reinforcement requirements, changes to balance and impacts on fatigue life.

## RAIL AND SUPPORTING STRUCTURES

SIE has extensive knowledge of rail and supporting infrastructure, including wharf girders, rails, clips, sleepers, ballast, alignment, and wear.

We produce maintenance procedures and emergency recovery plans, including comprehensive re-railment procedures for machine make-safe, jacking appliances, required equipment, and instructions for maintenance jacking and re-railments.

## 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](mailto:info@siepl.com.au)

