

Keeping Structures Safe, Reliable and Operational

ADVANCED STRUCTURAL KNOWLEDGE & COMPETENT INSPECTION AND RISK ASSESSMENT PROCESSES

Understanding the condition and its impact on existing structures is vital for safety, reliability, and operational continuity. SIE assesses structural condition through the application of advanced structural design knowledge, combined with customised inspection and risk assessment processes. This enables competent evaluation and informed decision-making through contextual and standardised risk assessments for personnel safety and business risk.

SAFETY, RELIABILITY, COMPLIANCE & LONGEVITY

Structural inspections are a critical component of asset management strategies in the heavy industrial, mining and ports industries.

These environments involve large-scale structures and machines that handle significant loads, operate under harsh conditions, and are subject to wear, fatigue, and corrosion. Failure to maintain structural integrity can lead to severe deterioration, operational downtime, possible structural failure, and potentially large financial losses.

When coupled with regular and effective maintenance, inspections ensure safety, reliability, compliance, and longevity of assets.

STATUTORY REQUIREMENTS

Regular inspections are a requirement for certain high-risk items of plant, such as pressure vessels, cranes and lifts, where there is a statutory requirement to register the design with the relevant authorities.

Statutory requirements include:

- a) Section 250 and 251 of the Work Health and Safety Regulations (QLD, NSW, TAS and SA).
- b) Section 508, 509 and 510 of the Occupational Health and Safety Regulations 2017 (VIC).
- c) Parts 5.2 and 5.3 of the Work Health and Safety (Mines) Regulations 2022 (WA) and Parts 5.2 and 5.3 of the Work Health and Safety (General) Regulations 2022 (WA).

Structural inspections in mining, ports, and heavy industrial sectors are required to protect workers, the environment, and the public. These requirements are embedded in Work Health and Safety (WHS) legislation, state-specific mining regulations, and Australian Standards.

For example, Work Health and Safety Regulations in most states require that a person with management or control of plant must ensure the plant is inspected by a competent person, to ensure it is safe and without risks to health.

RELIABILITY

Well-maintained structures and machines are essential for reliable operations in mining, ports, and heavy industry.

Structural inspections help prevent unexpected breakdowns that disrupt production, often at significant financial cost. With the knowledge obtained from an effective structural inspection regime, asset Owners can schedule repairs during planned shutdown windows rather than reacting to breakdowns or failures.

FINANCIAL CONSIDERATIONS

Poorly managed deterioration to structures can have significant impact on their performance and lifecycle costs. Consequences may include poor reliability, increased maintenance, inadequate performance, or increased risk of catastrophic failure.

By detecting minor defects early, Owners can address issues before they escalate into major problems and/or failures that require costly repairs or replacements.

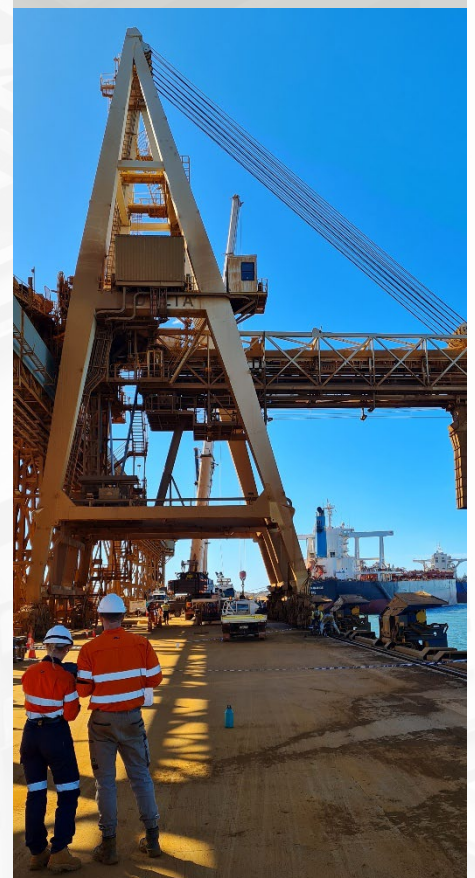
ASSET LIFE EXTENSION

Regular structural inspections play a vital role in extending the operational life of high-value mining, industrial, and maritime structures, which are typically exposed to conditions that accelerate deterioration.

Well-maintained structures are more likely to ensure safe and reliable performance over time, reducing the need for premature replacement and deferring major capital expenditure. The ability to forecast for future maintenance requirements also assists with budgeting and whole-of-life cost analysis.

“Structural inspections, coupled with regular and effective maintenance, ensure safety, reliability, compliance, and longevity of assets.”

“SIE has carried out hundreds of structural engineering inspections and risk assessments on a wide range of bulk handling equipment and fixed plant infrastructure.”



INSPECTION & RISK ASSESSMENT PROCESS

SIE use a customised structural risk assessment approach based on the qualitative risk management process described in the Australian Standard for Risk Management (AS/NZS ISO 31000 and its predecessor AS/NZS 4360). The process includes the following steps:

1. Establish the context.
2. Identify the hazards / damage.
3. Analysis of the hazards / damage.
4. Assessment of hazards / condition.
5. Recommend treatment / repairs.

SIE inspections use qualified and experienced Structural Engineers with support from experienced Engineering Technicians. Methods may include:

- a) Visual inspection techniques and targeted non-destructive testing.
- b) Rapid initial risk assessments by Structural Engineers with experience and background knowledge.
- c) Techniques such as weighing, strain, vibration and dynamic measurement where required.
- d) Use of drones for inspection of inaccessible areas of the structure.
- e) Assessment of actual loading conditions on structures against their design limits, via measurement or analysis of PLC records.
- f) Risk quantification via design review of damaged structures and determination of causes.
- g) Detailed design of remedial works, and onsite technical support throughout the execution of repairs.

SIE'S INSPECTION CAPABILITY

SIE has conducted hundreds of routine and targeted structural engineering inspections and risk assessments on a wide range of bulk handling equipment and fixed plant infrastructure at mining, ports, and heavy industrial sites across Australia and overseas. This experience spans the following asset types and activities:

- a) Bulk materials handling machines, including reclaimers, stackers, bargeloaders, shiploaders, and ship-unloaders.
- b) Bulk materials handling machine trackwork, including wharf girders, rails, sleepers on ballast, and rail on strip footing stockyard trackwork.
- c) Fixed plant structures such as ROM stations, transfer towers, crushing and screening plant, conveyor structures, fabric covered structures, workshops, and storage sheds.

- d) Port and maritime assets, including wharves, jetties, mooring dolphins, navigation aids, and structural components of vessels (e.g. transshipping vessel conveyors and ship-loading structures).
- e) Road tunnels, rail over/underpass tunnels, train loading tunnels and vaults, and conveyor tunnels.
- f) Post incident investigation inspections and damage assessments, ranging in severity from minor damage through to collapse or near collapse.
- g) Workshop inspections of structural steelwork at various stages of the fabrication process.

INSPECTION SCOPE

The type and extent of the condition assessment will depend on the type of asset. Decisions on the appropriate investigation should be risk based and proportional to the criticality of the asset, the level of redundancy within the structure, and the risk level associated with the asset type.

For complex structures with little redundancy, such as a stackers, reclaimers or shiploaders, detailed inspection and assessment methods such as confined space entry, drone inspection, non-destructive testing, thickness testing, and a review of history and operating conditions may be appropriate.

For less complex or lower risk structures, inspections and supplementary investigative tasks may be appropriately scaled back.

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

