Bulk Materials Handling Machines

Capability Statement
Engenium has a team of highly qualified structural, mechanical and electrical engineers who have experience in the design, inspection and improvement of mobile bulk materials handling (BMH) machines including stackers, reclaimers and shiploaders.

We have been involved in third party Design Auditing, Structural, Mechanical and Electrical Instrumentation and Control (EIC) Engineering Design, Finite Element Analysis (FEA), Fatigue Analysis, Structural, Mechanical and EIC Inspection and Risk Assessment to both Australian and international standards.

By choosing to take advantage of Engenium’s BMH machines capabilities, you will benefit from:

- A reliable and flexible resource, providing an unparalleled level of responsiveness to your needs
- Knowledge of machine operation and functionality and comprehensive understanding of the load paths in the machine
- Comprehensive understanding of the fatigue mechanics allowing efficient fatigue analyses and targeted inspection
- Experience in determining fatigue cycles of machines, based on actual operations and remaining life
- Technical support to the established standards.

Engenium has a track record in providing robust, innovative and cost-effective solutions. We utilise the latest engineering technology to deliver a wide range of smart services for BMH machines. These services are listed below.

**Bulk Materials Handling Machinery**
- Third party design audit of bulk materials handling machinery to AS4324.1 and international standards, including:
  - Stackers
  - Reclaimers
  - Shiploaders
- Detailed design of new and upgrade machine structures, equipment and components
- Bucketwheel remnant life assessment.

**Finite Element Analysis and Structural Analysis**
- Strength and fatigue assessment using finite element analysis (FEA) to AS4324.1 and international standards.
- Extensive analysis capabilities, including:
  - Linear and non-linear static analysis
  - Linear and non-linear buckling analysis
  - Fatigue analysis to AS4100, BS7608, Eurocode and international standards
  - Natural frequency analysis
  - Harmonic response analysis
  - Spectral response and earthquake analysis
  - Linear and non-linear transient dynamic analysis.

**Asset Life Extension and Asset Management**
- Inspection services, including:
  - Structural, mechanical and EIC inspections
We understand that all of our Clients have unique project requirements, are structured differently and have varying levels of in-house project capability.

- Risk assessment
- Root cause analysis
- Life extension studies
- Design of upgrades for existing machines
- Production increase and re-certification
- Due diligence and expert witness
- Plant integrity reviews (PIRs)
- Machine safety reviews
- Asset management and maintenance planning
- Life cycle cost analysis
- Weight and balance reviews
- Functional safety
- Machine books.

**Complex Structural Repairs**
- Failure investigation and certification to restart production
- Fatigue assessment and crack repair
- Condition assessment and repair design.

**Total Life Cycle Support Services**
- Design
- Fabrication
- Construction
- Operation
- Maintenance
- Deconstruction.

**EIC Engineering Design**
- High voltage and low voltage design
- Switchroom, switchboard and motor control centre design
- Earthing
- Instrumentation selection and design
- Remote I/O panel design
- PLC selection
- P&ID’s
- Site inspections and audits.

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**Our Experience**

Engenium has been involved in the following BMH machines projects:

**CBH Group, Kwinana Shiploaders:** Removal of shiploader SL2 for decommissioning. Optimisation, repair and upgrade of the remaining shiploaders at Kwinana Port in Western Australia.

**CBH Group, CLS Tripper Modifications:** Redesign of the CLS tripper system, used in grain handling facilities across the Wheatbelt of Western Australia, to increase its capacity to 550 tonnes per hour.

**CBH Group, CLS Stacker Modifications:** Redesign of the CLS stacker, used in grain handling facilities across the Wheatbelt of Western Australia, to increase its capacity. Main modifications included increasing the luff angle, the length of the boom by 2.4 metres and introducing a new deflector plate arrangement.

**Fortescue Metals Group, Eliwana Project Technical Support for the Design of a Stacker Reclaimer:** Technical review of the design of the materials handling equipment (chutes and conveyors). Technical review of the structural design and design documentation. Technical review of the mechanical equipment design and design documentation. Compliance review of the design to Australian and international standards. Review of third party auditor activity and documentation. Participation in design and functional safety reviews.

**Mid West Ports Authority Berth 5 Shiploader:** Visual inspection for condition assessment of the structure and mechanical and electrical systems.