MINCKA.

ASSET INTEGRITY ENGINEERS

PROJECT RECORD

CASE 05

COAL HANDLING

CHPP Vibration Diagnosis and Mitigation

EMERALD, QLD, AUSTRALIA / STRUCTURAL

CHALLENGE

A coal handling and preparation plant was experiencing excessive vibration on its centrifuge and screen floors. The vibration threatened the structural integrity of the building and its connections, drove up maintenance cost and downtime, and in several areas exposed workers to vibration levels beyond the acceptable limits of engineering standards. The operator needed to understand the root cause and how to fix it without disrupting production.

APPROACH

Mincka carried out a plant-wide vibration survey, instrumenting the structure and its machinery with accelerometers under real operating conditions. Signal processing and system identification traced the high vibration levels to their root cause: resonance between the operating frequencies of the machines and the natural frequencies of the supporting structure. Finite element models of the building and its critical components were built and calibrated against the measured data, giving a reliable digital representation of how the plant actually behaves. Targeted mitigation strategies were then engineered and verified in the calibrated models before any steel was cut, and human exposure to vibration was assessed against the relevant engineering standards.

OUTCOME

The diagnosis turned a persistent, poorly understood vibration problem into a defined set of practical structural modifications, each verified by simulation before implementation. The client implemented the recommended changes and the vibration levels reduced across the identified hotspots, protecting the structure from fatigue damage, improving working conditions for personnel, and reducing the maintenance burden on the plant. The calibrated models also informed the ongoing maintenance and inspection strategy, so the operator now manages the dynamic behaviour of the asset rather than reacting to it.

CAPABILITIES APPLIED

- VIBRATION SURVEY AND ROOT CAUSE ANALYSIS
- CALIBRATED FINITE ELEMENT MODELLING
- VIBRATION MITIGATION DESIGN
- HUMAN VIBRATION EXPOSURE ASSESSMENT

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