

Material Recovery Plant Upgrade

SMITHFIELD, NSW, AUSTRALIA / ENGINEERING DESIGN

CHALLENGE

The client needed the structural members supporting the waste handling machines optimised for a proposed upgrade to the plant. The defining constraint was geometric: existing infrastructure sat close against the upgraded section, restricting where structural members could be placed. The design had to deliver strength, serviceability and economy within a footprint that was largely fixed.

APPROACH

Mincka starts every project by understanding the engineering problem, so the work began with the operational parameters: material bulk density, conveyor speeds and dimensions, and how the machinery operates, supported by geotechnical information and as-built drawings of the existing facility. The plant was 3D scanned, and the point cloud, combined with CAD data, set the global geometry of the structure and captured the true position of the surrounding infrastructure, allowing the design to be developed remotely within the geometric constraints. A finite element model of the structure was built, with load cases and combinations applied to AS/NZS 1170.0, 1170.1 and 1170.2 and AS 1170.4 and internal member loads checked for coherence. Steel member sizes were then iterated to optimise the solution for strength, cost and serviceability, and the dynamic response of the structure under operating conditions, including machine vibration, was checked to prevent undesirable outcomes.

OUTCOME

Mincka identified the optimal cross-section for the steel members and the ideal width and topology for the truss support, delivering a significant reduction in the client's fabrication costs. Lateral strength was enhanced with cross-bracing and knee braces at critical locations, ensuring proper operation under dynamic loads. The recommendations gave the client the optimum solution: the most practical arrangement and the most economical one.

CAPABILITIES APPLIED

- STRUCTURAL DESIGN OPTIMISATION
- FINITE ELEMENT ANALYSIS
- REMOTE DESIGN USING 3D SCAN DATA
- DYNAMIC AND VIBRATION ASSESSMENT