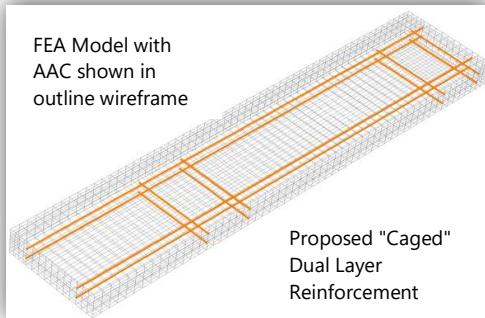


CAGED POWERPANEL ASSESSMENT Non-Linear Material Analysis

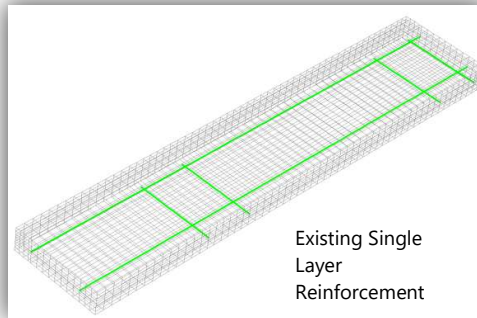
Date: January 2010

Client: CSR Panel Systems

FEA Model with
AAC shown in
outline wireframe



Proposed "Caged"
Dual Layer
Reinforcement



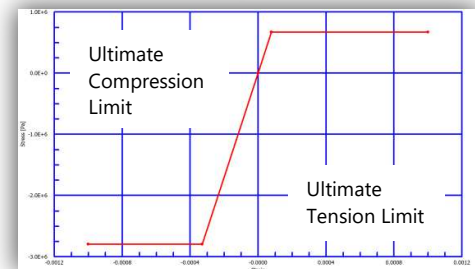
Existing Single
Layer
Reinforcement

Project Description:

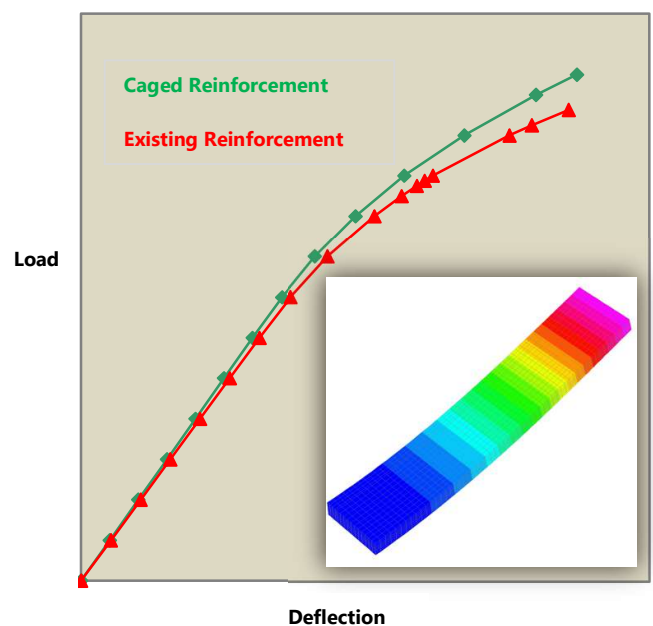
David Beneke Consulting was commissioned by CSR Panel Systems to assist in the investigations into different methods of reinforcing CSR Hebel PowerPanels. The object of the investigation was to determine whether having a "caged" dual layer reinforcement system would have any beneficial effect on the mechanical properties of the panels as opposed to the current single layer system.

Part of the scope involved some finite element analysis (FEA) modelling of the PowerPanels to investigate the stiffness characteristic for either reinforcement option. Accordingly, an FEA doubly symmetric model of a 75mm thick was created. The autoclaved aerated concrete material (AAC) was modelled using 3D HEX8 elements whilst the reinforcement within was modelled using 1D line elements. The AAC material was assigned a non-linear stress strain curve. The stress strain curve was tri-linear with both ultimate tensile and ultimate compressive limits (as defined by AS3600) represented.

A non-linear analysis incorporating non-linear material was conducted. The results indicated that when the panels operated in the elastic zone, the difference in stiffness was negligible. However once cracking of the AAC occurred the PowerPanel with the caged reinforcement had an enhanced stiffness.



Tri-Linear Stress Strain Curve for the AAC Material



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