Re-Design of Grain Ship Loading Chute

Project Scope

**Bulk Solid Material**: Grain - wheat, barley  
**Equipment**: Telescopic ship loading spout/chute  
**Problem**: High dust levels and non-standard operating procedure  
**Aim**: Reduce dust emission levels and improve loading trajectory to a 3.0m horiz. throw for a 1.0m vert. drop

Existing design required non-standard operational procedure (operating spout in non-vertical position) to aid in filling of vessel.

Conceptual re-design of existing ship loading chute was performed within structural and geometrical constraints, notably limited head height (under 2.0m) and slew ring located above.

Prototype

![Figure 2: Prototype](image)

Design based on minimising impact angle and maintaining dust encapsulated within a fast moving material stream. Analysis performed utilising a continuum approach in parallel with Discrete Element Modelling (DEM).

Prototype design included a removable top cover allowing for incorporation of “thinning wall” to reduce amount of air or space within the chute.

Revised Design and Project Outcomes

In consultation with the client, the prototype was revised and “thinning wall” with flap incorporated.

Further “visible reduction in airborne dust” was reported. Unfortunately no quantifying measurements were taken.

Future plans to increase the head height and incorporate a circular chute cross section were also investigated.