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.

Figure 1: Existing Design and Dust Emission Observed

Prototype

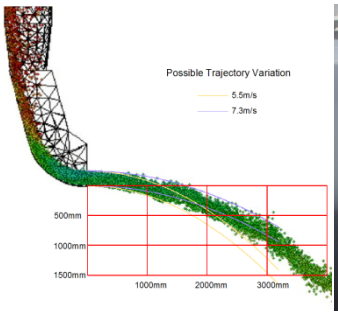

Figure 2: Prototype

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.

The design was endorsed by operators - reduced operational movement (due to greater throw) and visible dust reduction were reported.

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.

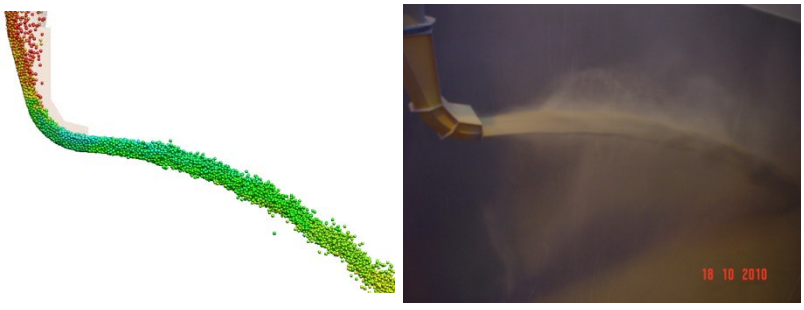

Figure 3: Revised Design

For more information regarding this project or if you wish to make an enquiry, please contact:

TUNRA BULK SOLIDS
Dr Dusan Ilic

Newcastle Institute for Energy and Resources (NIER)
The University of Newcastle
Off Vale Street
Shortland NSW 2307, Australia

Email: enquiries@bulksolids.com.au
Ph.: +61 2 4033 9055
Fax: +61 2 4033 9044
http://www.bulksolids.com.au