



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA



Passive Dust Control in Ship Loading Chutes

Project Scope:

Bulk Solid Material: Grain - wheat, durum, barley

Equipment: Telescopic ship loading chute

Problem: High dust levels during loading and limited reach leading to increased loading time

Aim: Reduce dust emission levels and improve loading trajectory

Problem Solving Approach:

A replica of the original chute and spoon was built to provide a benchmark to measure the performance of the optimised designs. A number of designs were trialled to reduce the material velocity inside the telescopic section (such as cascade chutes), however those were found to only shift the generation of dust to other area.

An optimised spoon design was developed using a first principle approach to minimise impact and streamline material flow. A constant radius spoon (see Figure 1) was developed and found to significantly reduce dust emissions by re-concentrating the stream, which also resulted in an increased reach.

Project Outcomes:

The improved design forces the dust-laden air

normally travelling in a detached boundary layer on top of the product stream to be redirected into the product stream, aiding in reducing the dust emissions. In an initial full scale trial, one chute within the ship-loader was modified and trialled, resulting in a reduction in dust emissions of 60%.

Subsequently all chutes were upgraded which allowed the ship-loader to continue to operate under current legislation. The reach was significantly improved due to the curved design which allowed loading to be completed in a shorter period of time.

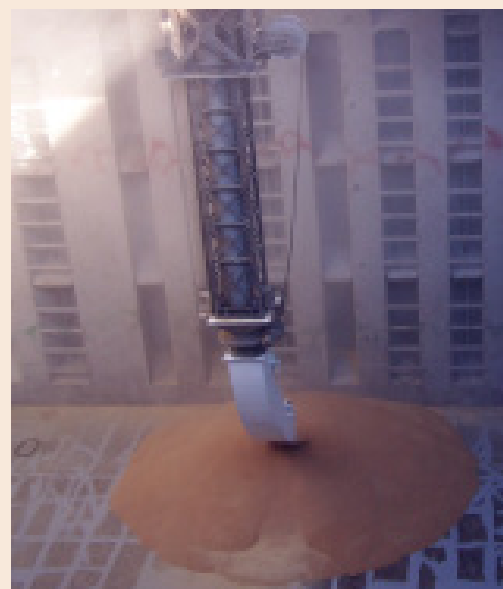
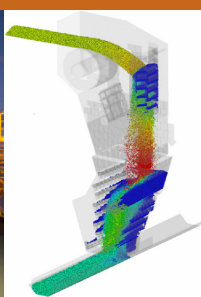
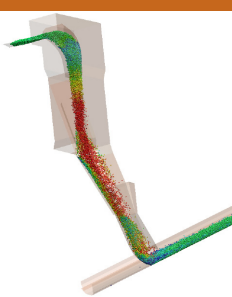


Figure 1: Full Scale Trials

Advancing the Bulk Materials Handling Discipline Globally



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