

Project Scope

Bulk Material: Grain - Wheat, Durum, Barley
Equipment: Telescopic ship loading spout/chute
Problem: High dust levels during loading and limited reach leading to increased loading time
Aim: Reduce dust emission levels and improve loading trajectory t

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 trialed 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 areas
- 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 reconcentrating 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 shiploader was modified and trialed, resulting in a reduction in dust emissions of 60%.
- Subsequently all chutes were upgraded which allowed the shiploader 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.
- This technology is patented by Australian and US Patents.



Figure 1: Scale Model Chute

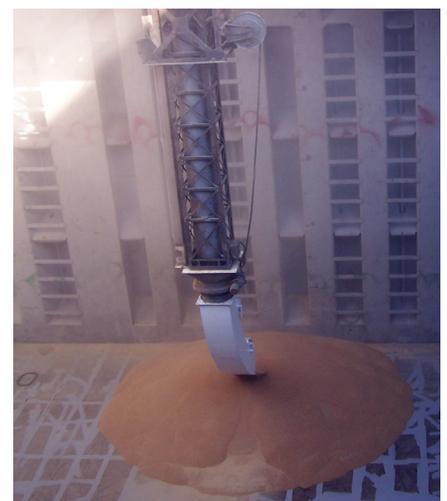


Figure 2: Full Scale Trials

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