



THE UNIVERSITY OF  
NEWCASTLE  
AUSTRALIA



## Design of Slewing and Luffing Stacker Transfer Chute

### Project Scope

**Bulk Material:** Coal

**Equipment:** Central transfer on a slewing/luffing stacker operating at 8000t/h and speeds over 5.6m/s

**Aim:** Development of conceptual design in view of structural constraints.

Conceptual design of a stacker transfer was performed utilising the TUNRA continuum analysis approach developed by Em/ Prof Alan Roberts in 1965. The approach relies on bulk solid material properties obtained from standard flow property tests which are directly measured in TBS laboratories.

The scope of the project involved designing a curved impact plate (hood) and loading chute (spoon) through which material flow is re-directed. The head height available and horizontal position to the slew (rotation) centreline was restricted by an axisymmetric transition section (to be installed by others). Further difficulty in design was also attributed to steep conveyor luffing inclination of 12° to 15° and machine slewing range of 40° to 75° (in plan view).

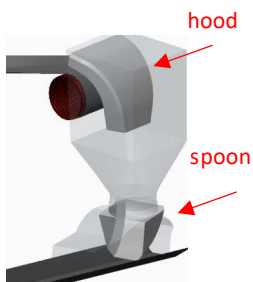


Figure 1: Design Developed

### Design and Research

Principles of transfer chute design developed by TBS over the course of over 40 years were applied. The most favourable design, under the imposed structural constraints, was selected and put forward to the client. Following successful commissioning, an in depth study of flow through the transfer was performed, applying continuum analysis in parallel with calibrated DEM.

Excellent correlation was observed between the two analysis techniques and also to site observations as an effective tool for analysing and optimizing particulate flow. The use of DEM allowed for a refinement of the implementation of the continuum analysis to such systems.

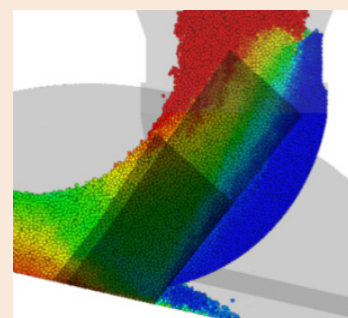
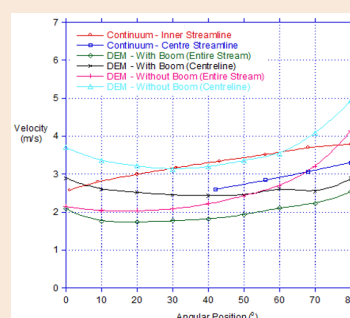
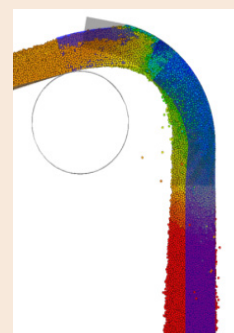
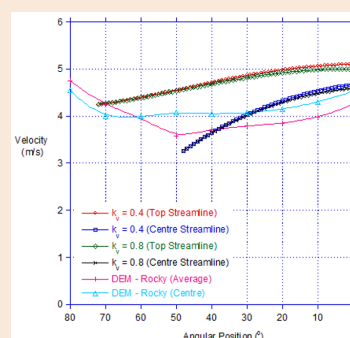


Figure 2: Continuum and DEM Analysis

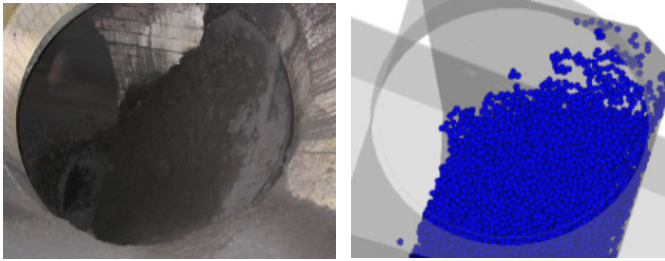


Figure 3: Comparison to site (spoon)



Figure 4: Transfer Currently Handling up to 8300t/h

### Project Outcomes

The transfer has been in operation for over 6 years, handling tonnages above the original design capacity. Subsequently, designs based on the original, developed by TBS, were installed on a further two stacking machines.



### Why TUNRA Bulk Solids?

#### Experience and Expertise

We have provided expert solutions to industry for over 45 years and are the leading organisation for materials handling research and consulting in Australia and internationally

#### Research and Development

We have a proven track record in research and development through the close association with The University of Newcastle

#### Quality Service

We have highly qualified, well-trained and specialist staff that are committed to delivering excellence

#### First Class Facilities

Our laboratory is a state of the art facility located within the Newcastle Institute of Energy and Resources (NIER) at The University of Newcastle

#### Industry Standards

We are accredited to ISO 9001, ISO 45001 and ISO 14001

#### Independent

We are independent and not for profit

## Advancing the Bulk Materials Handling Discipline Globally



### Further information

- To access our Case Studies visit [www.bulksolids.com.au](http://www.bulksolids.com.au)
- To discuss your industry and business needs phone 02 4033 9055