

SIMULATION MODEL SET TO EASE THE FLOW OF MATERIALS HANDLING

A CSIRO scientist hopes a simulation program about to be implemented for coal loading operations in Queensland may soon have wide-ranging application in materials handling for manufacturing in Australia.

David Sier is applying the simulation software for scheduling operations at Dalrymple Bay Coal Terminal in Queensland to make best use of transport, storage and loading facilities.

"Many manufacturers transporting or receiving bulk materials are aware of the huge costs associated with planning, scheduling and operating equipment associated with raw or manufactured materials," Sier says.

"Our software incorporates the knowledge of human planners in linking different parts of a company's information and communication systems for an efficient total operation," he says.

Sier points to the suitability of the simulation model for the operation of the Dalrymple Bay Coal Terminal, which handles a throughput of 30 million tonnes of coal a year.

"The whole operation is extremely complex, with many difficult and often conflicting constraints needing to be included in the software model," Sier explains.

"Outloading and inloading use the same stockyard equipment which creates a potential for conflict in their use."

"Ships must be loaded with the right type and amount of product, with cost penalties being applied for delays in loading."

"In addition, only two trains can inload at a time, and the fact that the transport system is managed by a separate authority adds to the complexity," Sier explains.

CSIRO sees the model being used in a number of materials handling operations as a result of its flexibility.

For the Dalrymple Bay operation the simulation model can operate over a one-year decision time horizon to arrive at macro-production, railing and shipping strategies for each user of the terminal. The predominant objective of this module is the fair and equitable distribution of the resources to each user in proportion to their investment in the terminal.

The simulation tool is able to schedule the trains, determine the placement of inloaded product, schedule the usage of the stockyard equipment and determine the ship loading sequences.

As a management tool, it can assist the terminal management with decision-making in the dynamic operational environment.

CSIRO's David Sier says the simulation model can capture all aspects of the system operation such as shipping, railing, stockyard layout, yard machine operations and even the weather.

"The ship arrivals are based on orders written ahead of time so you have an approximate idea of when the ships will arrive and how much coal each will ship.

But the loading plans need to be adjusted as a result of weather, tides and any breakdowns that can cause delays in the operations,” he says.

“The arrival of the ship into view in the model will occur twelve days before berthing. This is the basic trigger for sending trains into operation, and stacking and reclaiming coal from the stockyards.”

“The complexity of the system even includes the configuration and size of coal trucks and rail engines, and yet, using the simulation system, it will all run smoothly,” Sier says.

“The problems of scheduling bulk materials in this operation are the very same as those encountered by many major manufacturers, and we see the adoption of this or similar simulation models across industry as the way forward.”

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