



DRAGLINE BUCKET DESIGN AT VR STEEL

VR STEEL USED ALTAIR EDEM™ TO OPTIMIZE DRAGLINE PERFORMANCE AND PRODUCTIVITY

About the Customer

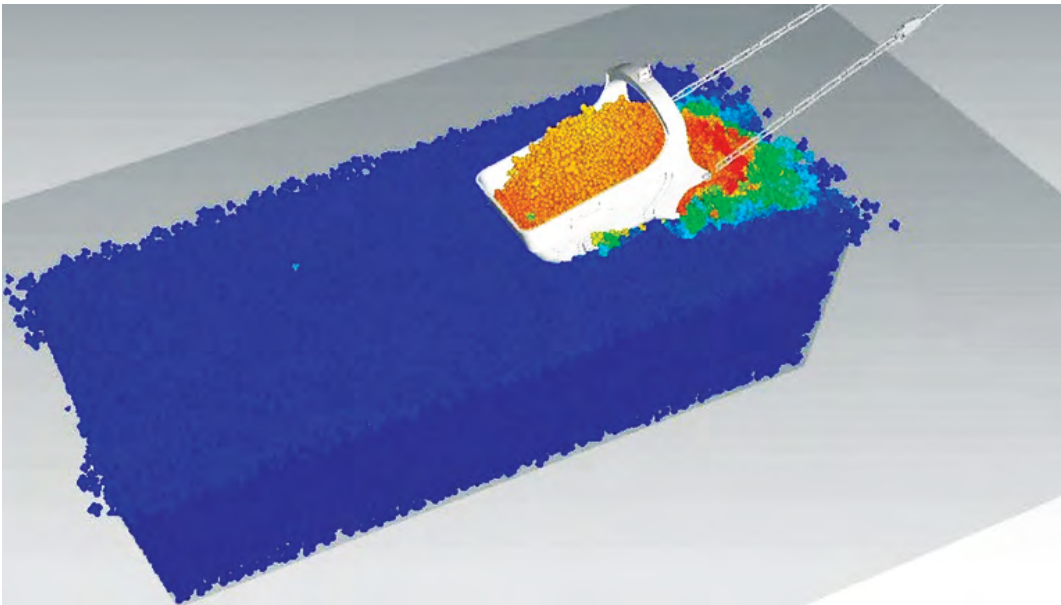
VR Steel (Pty) Ltd designs, builds, and repairs fabricated mining equipment attachments. Clients include Anglo Coal, Arch Coal, BHP Billiton, BMA Coal, Coal India, CRM, and Xstrata. VR Steel has dragline bucket customers in the US, South Africa, Australia, Brazil, and India.

With EDEM virtual prototypes VR Steel field-tests new design options, creates custom designs for specific users, builds fewer physical prototypes, shortens the design cycle, and increases customers' productivity.



The capabilities of EDEM gave us the insight to be able to minimize the level of wear and strain on equipment whilst in the design stage — before going into full production. We therefore increased the productivity for the customer while minimizing peak strains in their equipment. What more could the customer and OEM want?

Bertus Haasbroek, Chief Design Engineer, VR Steel



Their Challenge

VR Steel needed to **optimize dragline bucket performance and productivity** for a wide range of media and mining conditions around the globe. They needed to develop a new, optimized bucket design balancing efficiency, capacity, durability, and projected O&M costs. VR Steel wanted to **streamline the design process**. Their customers needed design solutions assured to:

- Fill easily and empty completely
- Operate at maximum capacity
- Boost wear protection
- Reduce operating costs
- Improve overall efficiency

Our Solution

VR Steel used EDEM, coupled with multibody dynamics simulation software, to simulate both the bulk soil dynamics and the dynamics of the bucket and lifting gear. This **cutting-edge, integrated particle-machine dynamics solution** successfully modeled the transient particle-structure interaction, simulating the complete digging cycle of a dragline bucket. This virtual performance testing predicted the prototype bucket:

- Mode and rate of fill
- Transient loading of bucket and gear
- Wear patterns and rates

Results

EDEM's ability to accurately simulate the performance of the prototype bucket designs and wear packages resulted in **engineering improvements** including:

- Increase in fill level
- Shorter filling cycle
- Reduction in bucket mass
- Lower operation costs provided an overall productivity gain of 2%

VR Steel benefited from improved bucket design delivering only one physical prototype, repetitive virtual testing under the same operating conditions, and **faster convergence to the best design**.

VR Steel uses EDEM for virtual performance testing in development of its dragline buckets.