

Title:

Clean-ups without Shut-downs through a synthesis of technology and hard labour.

Introduction:

Shutting down bulk handling machinery like conveyor belt systems to clean up spilled processed ore and other debris is a costly business and complex. Work schedules, logistics of maintenance planning and timing, lost revenue in both spilled content and the loss of production means progressive mine sites are looking for innovative solutions. This white paper discusses the benefits, reclaimed revenue, safety and good old-fashioned hard-core labour robotics can offer through ingenious designs.

A case study of the Dugless 900/903® remote controlled Mini Loader.

Abstract:

Machinery is at the heart of the mining industry supported by a strong and healthy workforce. Maintenance is imperative for both and how this is carried out is evolving as technology enables industries to harness the power of robotics thereby resting their workforce without resting their machinery. In other words, innovative remote-controlled machines, like the Dugless series, do the work of an exceptionally strong and efficient team without the need for a halt in production and only one operator. The benefits of this approach, maintenance without stoppage, are far reaching. Every hour that a plant is idle costs operators thousands of dollars in potential revenue. Inventions like the Dugless play their part in the evolution towards Industry 4.0.

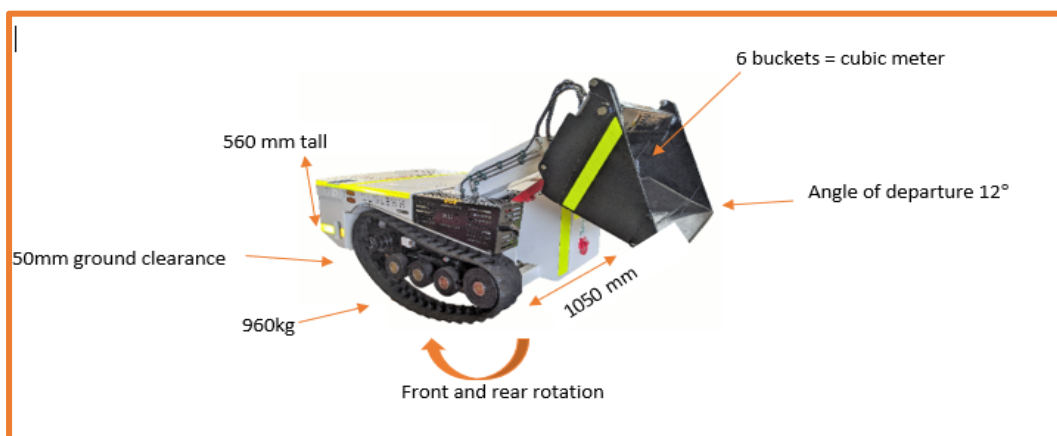
What is the Dugless 900/903®?

Simply put, it's a remote-controlled automated digging and cleaning unit, also known as a mini loader.

What's the ingenuity of the machine?

Mini loaders and digging units are a well occupied space and competitive, but in this instance, it really is a matter of size counting and the smaller, the better. With a miniscule 50mm ground clearance and standing just 560mm tall, a length of 2255mm and width of 1050mm this machine can get under and into small spaces that other machines just cannot access.

It's not just size, but agility, moveability and overall ability that enables the Dugless 903 to clear vast amounts of debris and spillage in spaces usually inaccessible without shutting down the plant, for example underneath conveyor belts. Operated by one person standing as much as 50m away ensures safety. This little beast has a tight front and rear turning radius. One bucket equals approximately 20 shovels full of debris, in spaces a human can't access never mind bigger machinery.



Case Study 1: Eight Years of product spillage cleared up in 3 days.

The material build up in the area was a result of eight years product spillage; the small boulders densely consumed the underside of the conveyor system, in places totally suffocating the return rollers rendering them incapacitated.

Over three full shifts the Dugless 900® removed the problematic build up and stacked it alongside the system ready for collection by site auxiliary equipment.

Material running against the underside of the conveyor belt like this, removes the cover and can reduce the life of the belt by years in just a few days. Overland belts can have a replacement value of more than \$10 million.

On the same site, in another problematic area within the loop, a second Dugless 900® reclaimed a calculated iron ore total of 50 tonnes and re-instated the haulage into the site operation process thereby adding to overall yield. In June 2021, iron ore was valued at approximately AUD \$295.23 AUD per dry metric tonne (Businessinsider.com). Three days, two operators and one machine recovered \$14 761.50 AUD with zero loss due to a halt in production and further damage to the conveyor system avoided.



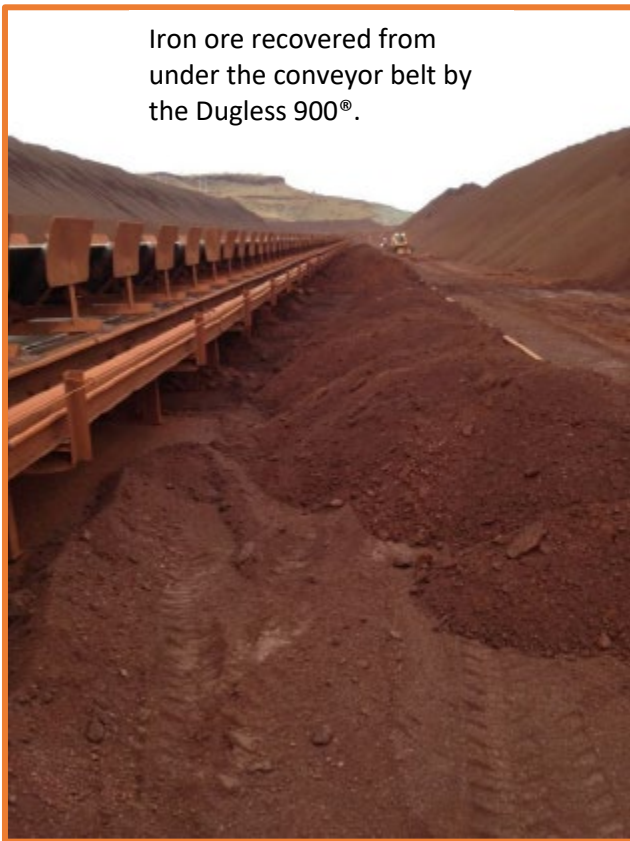
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Case Study 2: 100 tonnes of iron ore recovered and reinstated with no shutdown required.

A major stock feed conveyor in the Pilbara region, WA, required cleaning and servicing. Product below the system had been building over an extended period becoming dense, more problematic and posing a serious risk to the conveyor return rollers. Premature roller failure was inevitable due to product ingress. This system needed to be cleared of the dormant Iron Ore below, fast and efficiently. The spillage topped an average height of 400mm and 200m of the conveyor needed to be serviced.

Two Dugless machines, manoeuvred by skilled operators, worked side by side for 15 hours and reclaimed an estimated 100 tonnes of iron ore that was re-instated into the site operation process. No roller failure. No shutdown in production. The conveyor system continued to operate. Based on today's iron ore prices, AUD \$29 52.00 revenue was added.

Iron ore recovered from under the conveyor belt by the Dugless 900®.



Benefits and Features

- No conveyor shutdown required during maintenance
 - Easily accesses low ground clearance conveyor frames
 - No manual labour needed
 - Improved safety, Lower accident risk
 - Improved productivity
 - Greater cost efficiency
 - Designed to prevent drive machinery breakdowns
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- Remote-controlled
 - Simple 2 joystick hand remote harness
 - Only 560mm tall
 - Self-levelling 4 in 1 bucket heaped capacity of 0.13m3
 - Upgraded 8-Chamber Cyclone Design Airbox

The Gallery





Conclusion

Shutting down bulk handling machinery like conveyor belt systems to clean up spilled iron ore and other debris is almost a thing of the past, as this paper has shown, advances in robotics and remote-controlled machinery literally turns debris into yield. Clean-ups without Shut-downs through a synthesis of technology and hard labour doesn't always mean air conditioned control rooms and computerised equipment. It also means the hot sun, dry and dusty conditions, one skilled operator and a powerful 2-cylinder, air cooled, fuel injected Diesel continuous power little machine designed to go where no other can, to retrieve what wasn't thought possible. It may be just a small cog in the wheel turning towards continuous production, less shut-downs and safer workplaces – but it's a crucial one. As Thomas Edison said, "there's a way to do it better – find it". You just have.

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