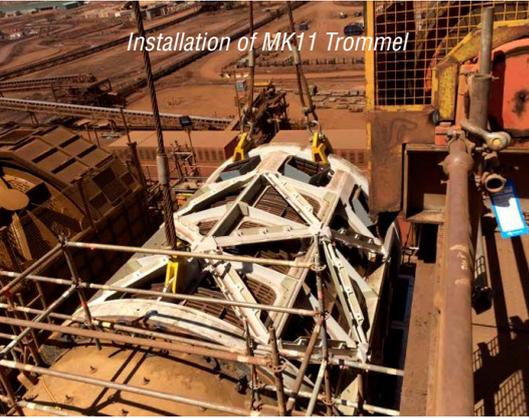

Measure. Plan. Optimise.

The key to maximum productivity



Installation of MK11 Trommel



Iron Ore scrubber screens offer a unique solution for washing and improving the quality of Iron Ore and other minerals.

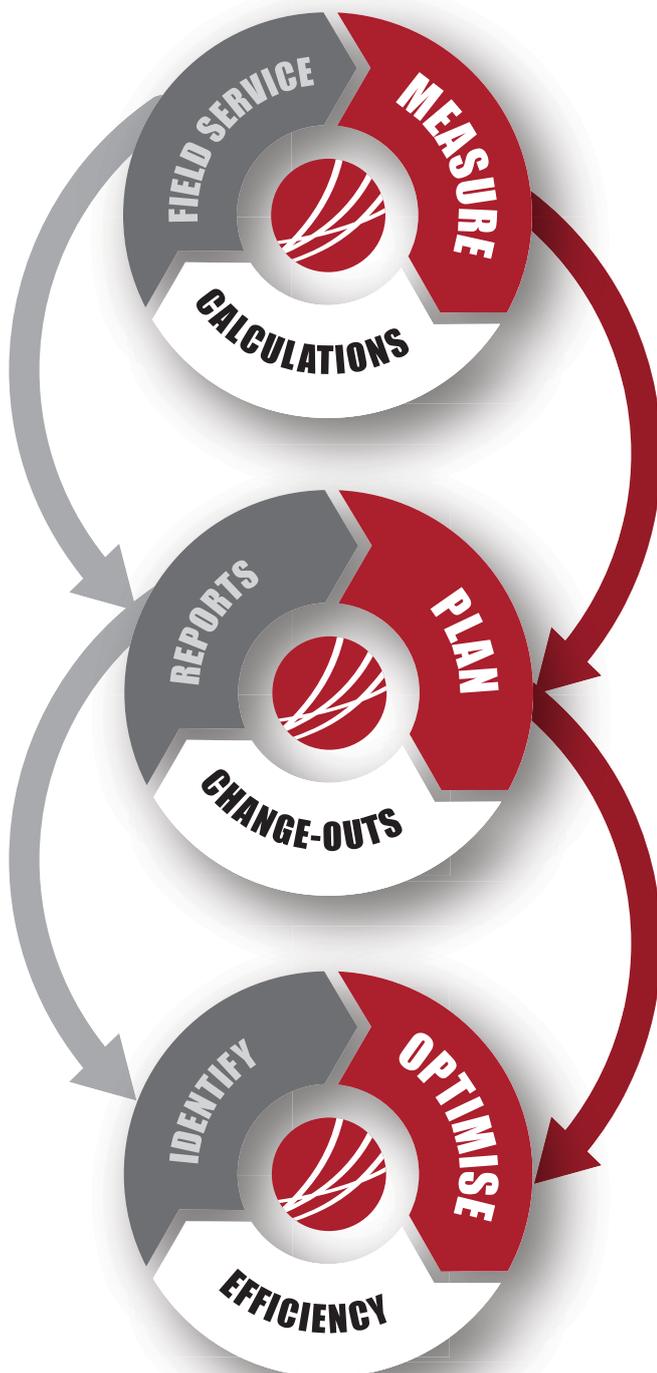
In 2010 the first combination Iron Ore Scrubber Screen machine was installed in Australia.

This type of equipment is selected because it is considered to have a more efficient layout; two functions are combined and connected at the same plant level.

Never-the-less, the investment is considerable and operators must be laser focussed on maximising the productive life of the equipment.

By engaging directly with the customer to develop an ongoing strategy of **measurement, planning and optimisation**, McLanahan Corporation helped to deliver significant performance improvements.

Originally the operator organised long shutdowns for maintenance based on a full re-line of scrubber shell wear components. The rubber components accounted for approximately 30t of new wear liners. This strategy impinged on the overall plant maintenance regime and increased operating costs.



McLanahan have Field Service personnel attending every shutdown, measuring and tracking the wear life of all components.



These partial reline strategies minimise the machine rotation needed each shut and thus optimise the efficiency of work at each time.

Measure

As a part a collaborative effort with the mine operator, McLanahan have Field Service personnel attending every shutdown, measuring and tracking the wear life of all components. Regular wear measurements have been monitored since March 2014. This enables the wear rates in mm/Mt for wear components in all installed configurations to be calculated. McLanahan wear reports captures and relays the data to the operator.

Plan

Based on recorded wear profiling data, subsequent maintenance shuts and reline scope are now being planned in detail, because liner change out dates are known well in advance. This has facilitated the introduction of pre-determined change-out periods matching to expected component life.

Optimise

The data collected enabled the operator to identify ways to optimise maintenance planning. Rotary Scrubber wear components are broken down into three equal segments, and only one of these segments is changed out in a given shutdown. These partial reline strategies minimise the machine rotation needed each shut and thus optimise the efficiency of work at each time.

Machine rotations on this sort of rotary equipment require full crew de-isolation. This halts all planned works being carried out on the work permit, and impacts adjacent shutdown activities. Avoiding rotations allows for efficiency gains and shorter overall shut time.



McLanahan Employees on Site



Collaboration between the plant operator and McLanahan Corporation delivered a “prolongation strategy”.

During 2014, the regular inspections and measurements were extended to monitor fatigue and wear on structural components.

Measure

Over time, fatigue indicators were identified and the data recorded to allow for further assessments.

Collaboration between the plant operator and McLanahan Corporation delivered a “prolongation strategy”. This strategy was based on ongoing measurement, data collection and extrapolation of operating conditions which contribute to fatigue. This collaborative effort resulted in extending the operational life of the existing trommels, by systematically measuring the changes to the structural condition of the trommels on a 12 weekly basis to ensure catastrophic failure was not imminent.

Plan

The joint prolongation team planned a series of actions and activities that could be achieved in sync with the modular shut strategy, including:

- Inspection and weld repair of fatigue related cracking. Finite Element Analysis of existing “as worn” structure to identify critical areas
- Installation of “doubler” plates on worn members. “Doubler” plates consisted of additional steel plate welded to the outside of structural members.

The same principle of measure, plan, optimise continues to drive performance improvements across the plant.



Manufacture of MK11 Trommels

Optimise

During prolongation works McLanahan worked on designs for not only eliminating fatigue loadings but to actually increase throughput and screening capacity of the trommel screen section.

Optimisations included:

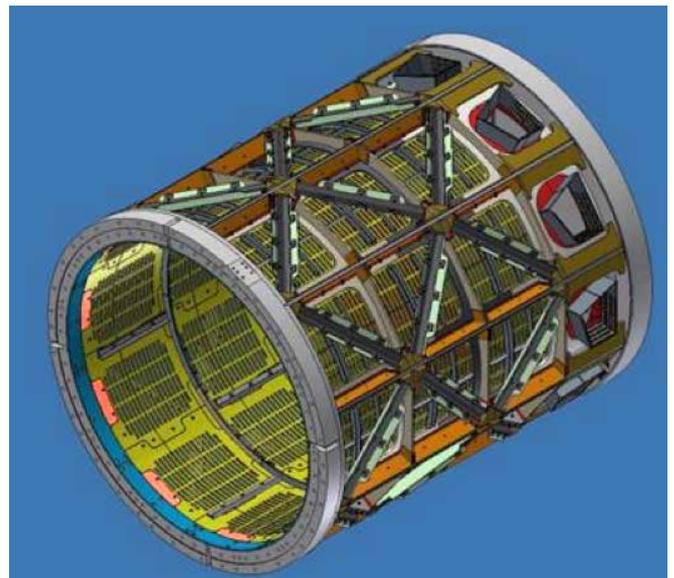
- Increase in open aperture of 50% to provide better screening and water drainage
- Structural members relocated outside shell to increase available shell area for apertures
- Single size screen plates to enable easier change-out and simplified stock holding
- Oversize discharge ports re-aligned to minimise wear on exit
- Increased protection on structural members.

McLanahan Corporation and the plant operator continue to collaborate and operate under the same principle of measure, plan, optimise, which continues to drive performance improvements across the plant. Improvements to the feed, drive and discharge segments, have been designed and installed, and performance, wear and fatigue continue to be measured.

New trommel screen sections have been successfully installed onsite and are monitored for outcomes including:

- Increased mechanical operating life
- Increased capacity
- Improved washing capability
- Lower maintenance cost.

The collection and collation of data from a variety of sources within this operation, has delivered the business case for a second set of upgraded trommel screens at a second site.



Model of Redesigned Trommel Sections

Measure. Plan. Optimise.

The key to maximum productivity



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