

HFC™1300 upgrade takes exceptional performance even further

The redesigned HFC1300 delivered beyond expectation



Improved efficiency



Better control



Improved wear life



Reduced downtime

A partnership was formed between Whitehaven Coal and FLSmidth to develop and trial the HFC1300 Series 2 Fine Coal Centrifuge at their Maules Creek operation. Their coal handling process plant (CHPP) was ideal for this project as the Series 2 machine could be tested in parallel with four existing Series 1 units. Whitehaven Coal's full cooperation and engagement allowed, with our supervision, for a Series 2 machine to be installed and evaluated. They provided ongoing access and support throughout the project.

Series 2 upgrade ensures standout product stays ahead of the game

Despite being recognised as an industry workhorse with leading dewatering and throughput performance, we have demonstrated our commitment to continuous improvement by revamping the HFC1300. Our experts worked closely with customers to identify opportunities to improve productivity, especially in varying process conditions.

These included:

- Improving basket and wet-end component service life to increase availability and reduce consumable costs
- Stabilising clutch performance, reducing downtime
- Re-engineering of the drive system to provide superior mechanical reliability
- Enhance lubrication system and labyrinth to reduce maintenance requirements

Enhancement goals and challenges

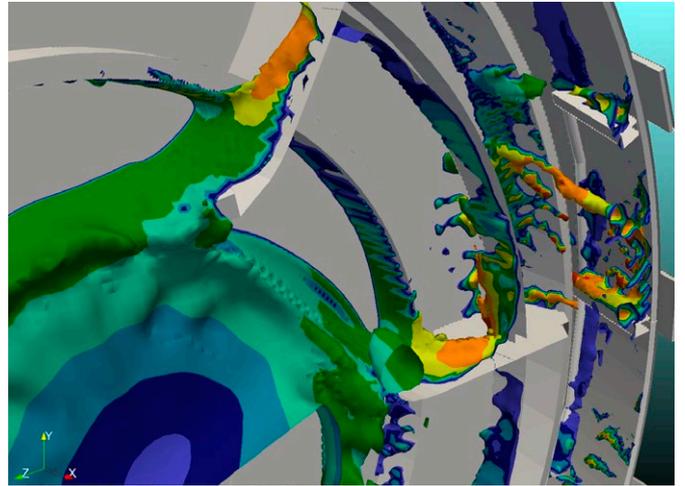
We were tasked with finding ways to improve upon the HFC1300 without modifying the plant interface points.

With customer feedback as well as workshop and field observations providing the 'wish list' of improvements, our engineers proceeded with design modifications that included several challenges to overcome. To be considered a success the new design had to satisfy the items on the wish list while maintaining the strengths of the Series 1 HFC1300 - namely its dewatering effectiveness and high-throughput capacity.

Goals

- Increase reliability of the labyrinth and drive system
- Optimise distribution of feed onto the centrifuge basket
- Minimise basket wear at the feed end
- Decrease overall surface abrasion
- Improve tolerance to instantaneous loads (surging)

At the same time, engineers were tasked with finding ways to meet these goals without modifying the mounts, input or outputs. This way, upgrades could be easily and rapidly installed as part of planned maintenance programs.



Above: Computational Fluid Dynamic (CFD) modeling was used to optimise the patented feed distributor design.



Above: Whitehaven Coal's Maules Creek Mine, in the new South Wales Gunnedah basin, was chosen as a trial site and the HFC1300 Series 2 Fine Coal Centrifuge was installed in the plant circuit in parallel with four existing Series 1 units.

Design developments and improvements

Our engineers created a number of design solutions that overcame the challenges and met all of the enhancement goals.

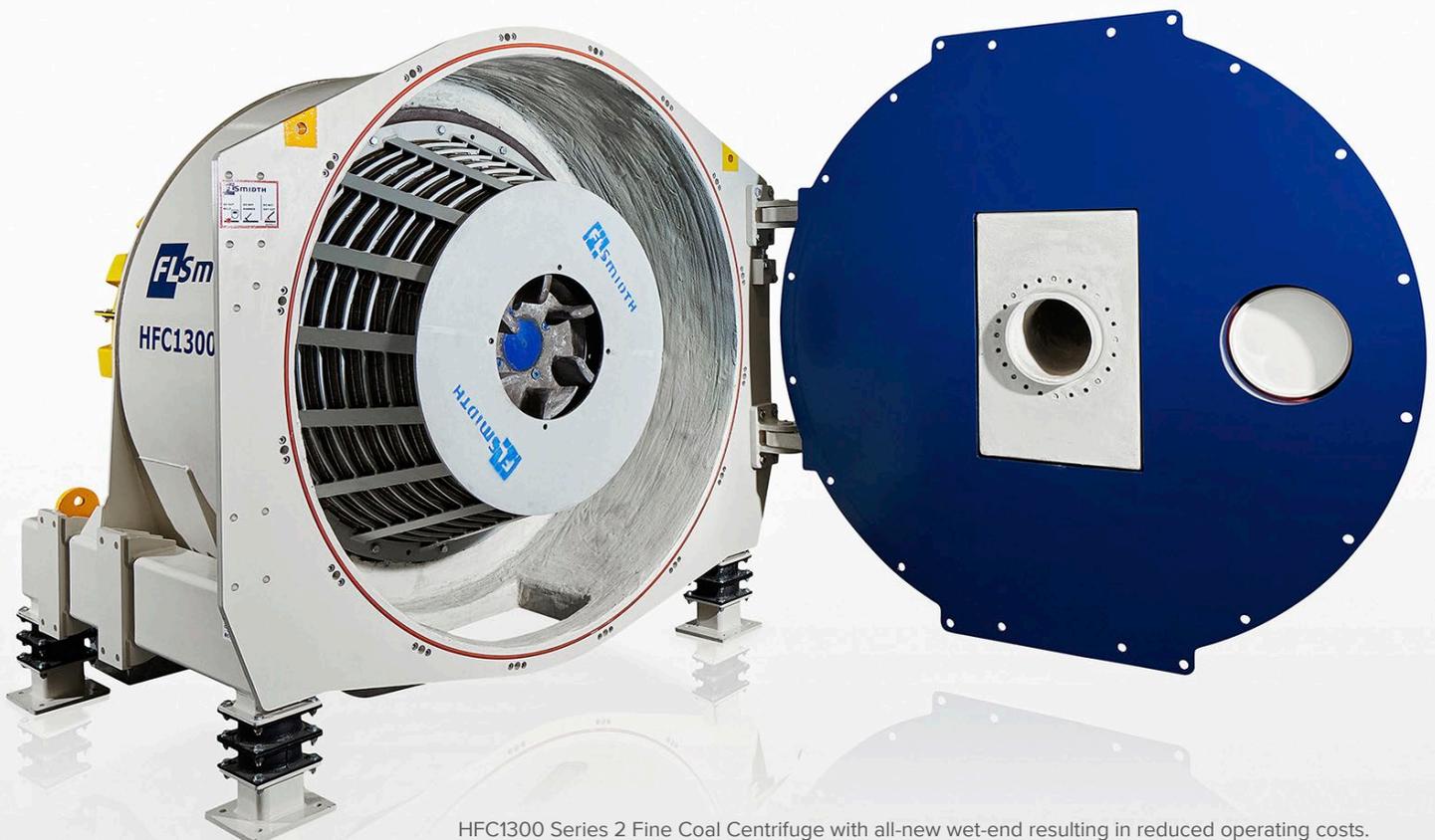
Solution

- Install a larger capacity clutch that allows for better control and is more suitable for the operational torque range
- Add a torque-monitoring sensor for real-time feedback, with an option to regulate feed to the unit and eliminate clutch trips
- Patented feed-distributor design improves supply of feed into the centrifuge and reduces localised basket wear at the point of entry
- Modify the centrifuge basket to match the new design scroll and feed distributor - improving throughput as a result of the CFD modelling
- Reduce the centrifuge's rotational speed to lessen internal sliding wear while maintaining dewatering efficiency
- Increased basket open area to maximise de-watering capacity
- Upgraded lubrication design to improve machine reliability, including a dual system with larger ports and staggered canister replacement

All external interfaces of the Series 1 machine were maintained to eliminate the need for plant modifications for installation of replacement units. This included ensuring maintenance access was unchanged.



HFC1300 Series 2 - new larger basket, new design scroll, patented distributor (WEAR-RESIST™)



HFC1300 Series 2 Fine Coal Centrifuge with all-new wet-end resulting in reduced operating costs.

Industrial trial results

At Whitehaven Coal's Maules Creek Mine the HFC1300 Series 2 Fine Coal Centrifuge was installed in the plant circuit in parallel with existing Series 1 units. A Series 2 machine was installed in October 2018 and commenced operations the following month.

Performance of the Series 2 machine, as well as two Series 1 machines, has been closely monitored by FLSmidth experts and site personnel. Data is being collected to compare the two designs on the following criteria:

- dewatering efficiency;
- machine availability;
- basket service life; and
- product throughput.

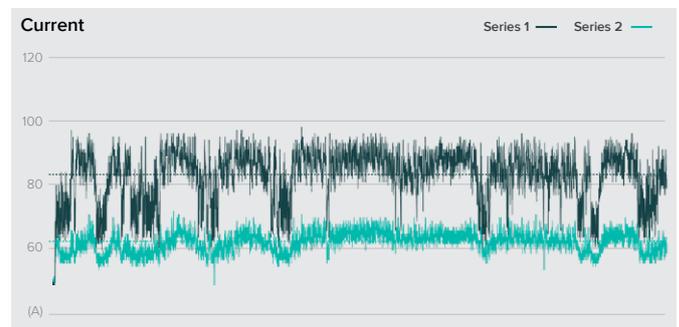
Both performance and wear-life achieved better than anticipated results

The following results were derived from data collected at the Maules Creek Mine site from November 2018 – April 2019. These results are site specific and will vary in other process conditions.

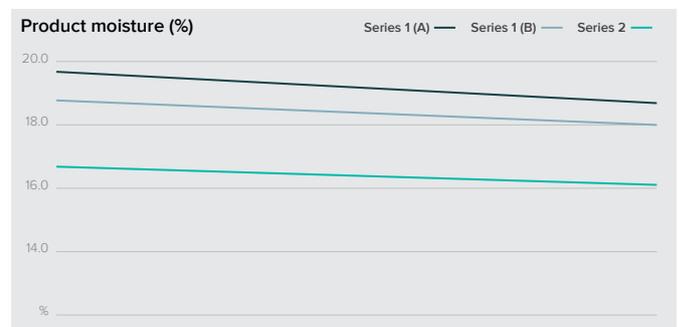
- Service life of the Series 2 centrifuge basket has exceeded that of the Series 1
- Zero clutch trips were recorded on the Series 2 centrifuge since the installation date
- No high-torque spikes were recorded on the Series 2 machine, compared to several on the Series 1 machine
- No blockages or operating issues were identified with the enhanced lubrication system
- Product moisture decreased by at least 1.9% compared to Series 1 machines
- During parallel testing there was evidence of greater capacity with the series 2 design



Above: Series 2 demonstrates a more-consistent operating torque



Above: Series 2 increased efficiency resulted in lower current draw



Above: product moisture sampling as conducted by ALS Global

8.7 kWhr

reduction in energy

0

clutch-trip events

1.9%

decrease in moisture

Up to

45%

torque reduction

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WWW.FLSMIDTH.COM

Australian Regional Office

FLSmidth Pty Limited
 67 Randle Road
 Pinkenba QLD 4008
 Tel: +61 7 3121 2900
info.australia@flsmidth.com