A FORCE AT THE COAL FACE

Haul truck and excavator fleet at Maules Creek will mine around 12 million tonnes of coal in FY20.

Whitehaven Coal, in its own words 'the emerging force in the Australian coal mining industry', has three operating open cut mines in the NSW Gunnedah Basin – Maules Creek, Tarrawonga and Werris Creek – as well as its underground Narrabri mine and two sites under rehabilitation, Sunnyside and Rocglen.

The company points out that its run-of-mine (ROM) production is set to grow strongly over the next 10 or so years, from the current 23 Mtpa (million tonnes per annum) to 50 Mtpa, through a combination of greenfield and brownfield developments.

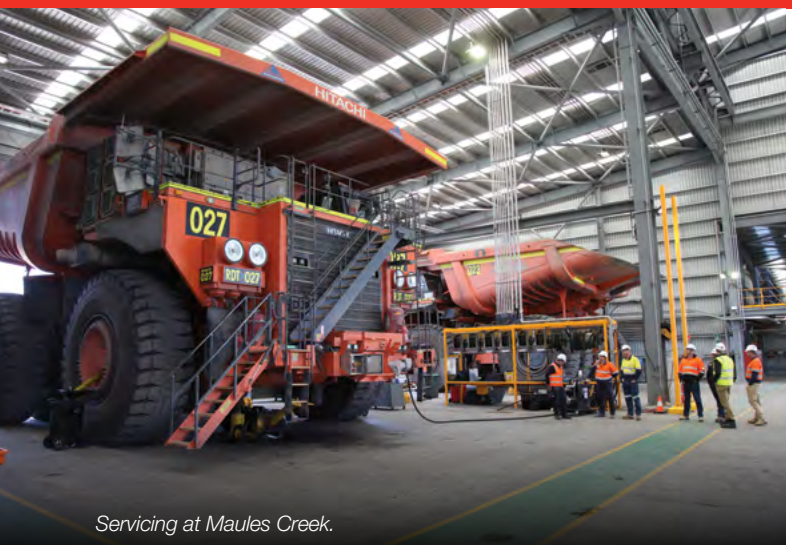
These developments are subject to regulatory approval which the company says are "advancing in line with expectations".

At Maules Creek – Whitehaven's newest and largest mine – Cummins-powered Hitachi excavators and haul trucks dominate the scene and in FY20 are set to mine around 12 million tonnes of coal.

The first coal was railed from Maules Creek in 2015, and ROM production has since ramped up from 7.8 Mtpa in 2016 to 11.7 Mtpa in 2019. The company is currently preparing an application to increase its approved production rate to 16 Mtpa.

The mine has an operating life of over 30 years and its saleable coal is railed to Newcastle port for export as premium, low ash thermal coal and metallurgical (coking) coal to customers across SE and NE Asia.

Mark Irwin, maintenance manager at Maules Creek (centre) with Cummins mining business manager Jason Linke (left) and Ben Murray, Hitachi key account manager – mining.



Servicing at Maules Creek.

Alistair Christie, Whitehaven group maintenance manager – open cut mines (right) with Cummins Tamworth branch manager Cambell Carmichael (left) and product support rep Mick Karafilis.


Engineering review of QSK60 disassembled after 22,821 hours' operation in an EX3600 excavator at Maules Creek showed it could have comfortably reached the targeted 24,000 hours life-to-overhaul.

New EX5600 being prepared for service at Tarrawonga.

By mid-2020, the Hitachi fleet at Maules Creek is expected to include 45 ultra-class EH5000 haul trucks, with 296-tonne payloads, along with five 800-tonne EX8000 excavators and four 360-tonne EX3600 excavators.

First driverless Hitachi fleet.

The big news is that autonomous (driverless) operation of the Hitachi haul truck fleet will begin in December 2019, with the entire 45 EH5000 trucks planned to be autonomous by FY23. Maules Creek is the first mine in the world to implement the Hitachi autonomous haul system.

Whitehaven calculates that the operating cost benefit of the 45-truck autonomous truck fleet, including the production increase to 16 Mtpa, will be in the range of $3.70 to $4.10 per-product-tonne.

> *"We wanted high engine hours in terms of life-to-overhaul, and the trend we're seeing is those hours being achieved."*

Cummins' involvement in the Maules Creek operation is significant with 59 QSK60 MCRS engines in service, spanning 1,944 hp to 2,850 hp. At the nearby Tarrawonga mine, a further 23 QSK50 MCRS and QSK60 MCRS engines will soon be operating in new Hitachi equipment, requiring a dedicated team of Cummins technicians at both sites. Site based Cummins technicians work under Whitehaven Coal safety management systems and have an excellent safety record with nil safety breaches or injuries.

"When we first got involved in the Maules Creek project – during the tender stage – we were told it would be a low-cost business model and that total cost of ownership and local service support would be critical elements," says Jason Linke, Cummins South Pacific mining business manager.

"To meet the life cycle cost requirement for the haul trucks, we were able to eliminate one engine and one midlife from the 90,000 to 100,000-hour life of the chassis and support the product to those hours.

"Low emission engines were another key requirement because the mine operates under strict environmental standards. For that reason, all the Cummins engines at Maules Creek are Tier 2 emissions compliant."

At a recent meeting of Whitehaven, Hitachi and Cummins personnel, a clear picture emerged of how the equipment is progressing versus expectations.

Alistair Christie, group maintenance manager of Whitehaven's open cut mines, and Mark Irwin, maintenance manager at Maules Creek, expressed quiet confidence in the way the product is performing and being supported.

Mark Irwin says the support from Cummins has been impressive. The work of Linke, Cambell Carmichael's team at Cummins Tamworth branch, Cummins product support representative Mick Karafilis and Cummins mine site representative Phil U'Ren rate special mention.

The partnership between Hitachi, Cummins and Whitehaven has also resulted in cost saving initiatives through a 6 Sigma project led by Linke to further reduce the total cost of ownership of the engines.

This support has cemented Cummins' position at Maules Creek in the face of a big push from competitors for repowering when the first engine change-outs occur in 2020. The replacement engines will be remanufactured units from the Cummins Master Rebuild Centre in Brisbane.

Long life-to-overhaul.

Cummins' QSK60 engine with its high-pressure modular common rail fuel system (MCRS) technology is making its mark at Maules Creek.

"We had high expectations from the start based on our conversations with Cummins and those expectations are being met," says Irwin. "We wanted high engine hours in terms of life-to-overhaul, and the trend we're seeing is those hours being achieved."

He points out the original target for the QSK60 MCRS engines in the excavators (EX8000 and EX3600) was 20,000 hours, but inspection of one engine at 22,821 hours indicated that 24,000 hours was achievable. The 24,000-hour interval ideally fits with the second change-out of the excavators' hydraulic pumps.

The five EX8000 excavators at Maules Creek have dual 1944 hp QSK60 MCRS engines. The twin 60-litre V16 Cummins engines power the EX8000's hydraulics system of 16 main pumps which move 8000 litres of oil a minute to achieve maximum working force.

The EX3600 excavators are also operating efficiently, digging coal with their single 1944 hp QSK60 engines.

"We're seeing minimal midlife engine component change-out which is obviously a cost benefit," Irwin points out. "That's due to the success of components such as the water pump, fuel pump and injectors which are lasting the life of the engine."

The EH5000 haul trucks at Maules Creek are powered by Cummins' QSK60 MCRS engine rated at 2,850 hp with two-stage turbocharging – a Tier 2 calibration specifically for the 500-tonne Hitachi hauler with its payload capacity of 296 tonnes. Life-to-overhaul target is 30,000 hours, and the oldest engines had clocked up 26,000 hours at the time of writing and were looking good to reach the desired mark.

Longer service intervals.

A cost initiative project to extend engine service intervals from 500 to 1000 hours is also being considered. Fitment of a larger oil pan and the Cummins Eliminator oil filtration system that replaces the traditional spin-on filter elements are key elements of the longer intervals. Oil sampling is currently carried out every 250 hours.

Cummins' new digital monitoring and reporting solution, PrevenTech, is also being trialed at Maules Creek. The aim of PrevenTech is to help a mine to identify and diagnose performance issues faster and more accurately.

Mark Irwin sees this remote monitoring technology as the "norm of the future" and a logical step for integration in the fleet. "Anything that helps us trend data and get ahead of issues is important," he says. "We've already had several potentially major down events picked up with PrevenTech prior to failure. The machine was diagnosed then repaired in a short period so as not to interrupt production."

Fuel savings are another area being studied closely. Testing has already indicated an annual saving of around 1.1 million litres for the EH5000 truck fleet if engine downspeeding was introduced. This would see maximum engine speed reduced from 1900 to 1800 rpm. Would haul truck cycle times be affected? That's the question yet to be answered at Maules Creek.

A further fuel saving – estimated to range between 1.5 and 5 percent – is achievable by reducing the amount of time the engine fan operates. By installing electric fans for brake and fuel cooling, engine fan operation is reduced by 30 percent.

Strict environmental standards.

As mentioned earlier, strict environmental standards apply at the mine, especially in relation to noise. If noise at the mine's boundaries exceeds a certain limit at night, a total pit shutdown can occur. A significant 4 dBA noise reduction has been achieved with a new sound suppression package for the haul trucks which includes double-skin exhaust pipes and partial enclosure of the engine.

The same environmental standards apply at the nearby Tarrawonga mine where ROM production is ramping up from 2.5 to 3 Mtpa. The mine has been operating for 10 years and the original fleet of haul trucks and excavators has been replaced with new Cummins-powered Hitachi equipment.

The Hitachi truck fleet comprises 17 EH4000 units with 2,500 hp Cummins QSK60 MCRS engines moving payloads of 220 tonnes, while the excavator line-up includes three 560-tonne EX5600 units with dual 1,500 hp Cummins QSK50 MCRS engines.

The life-to-overhaul target for the 50-litre QSK50 engines in the excavators is 24,000 hours, while the QSK60 engines in the truck fleet have a 35,000-hour target. ■

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