

Mining Truck

T 282 C

Job Report

Liebherr Mining Trucks Meeting
the Noise Specification Requirement
at an Australian Coal Mine



LIEBHERR

Situation

BHP Billiton's Mt Arthur Coal mine is one of the largest individual open-cut coal production sites in the world. Located in the Hunter Valley of New South Wales, Mt Arthur Coal produces around 20 million tonnes (22 tons) of run-of-mine coal each year, and current expansion plans aim to increase coal annual production to 24 million tonnes (26.4 tons). The mine site is 9.1 km (5.6 miles) from Muswellbrook, a town of nearly 12,000 people. Due to the operation's close proximity to a residential area, stringent environmental noise limits must be met.

Assignment Report

In order to comply with these environmental noise limits, Mt Arthur Coal developed a Noise Specification that stipulates the noise emission limits from mining equipment under a range of simulated operating conditions. Planned increased production required an expanded fleet of mining trucks. This fleet must meet these Noise Specification requirements.

The exterior noise specified by Mt Arthur Coal was significantly quieter than standard, untreated mining trucks and excavators. As a reference, the noise heard by a person standing 10 meters away from sound-suppressed mining trucks in operation would experience sound levels as if he or she were standing 30 meters away. To verify compliance with the specifications, actual noise measurements of each piece of equipment under simulated operating conditions were performed by Mt Arthur Coal. The overall noise generated was then compared to the target values. In addition to the overall noise targets, there were individual targets for each octave band to address issues such as low frequency sound waves that can travel long distances away from the machines. These targets were published and provided to mining equipment OEMs, and all were given the chance to meet these noise limits. These strict requirements presented a technical challenge to the OEMs since the performance and serviceability of the equipment could not be compromised for the sake of noise reduction.

Solution

Since early 2003 Liebherr mining equipment has been working in compliance with this noise specification at Mt Arthur Coal. At the time of the first purchase, Liebherr was the only OEM able to demonstrate compliance with these noise limits. In order to meet these specifications, Liebherr developed innovative noise suppression packages for these large machines. Liebherr engineers attenuated noise at the source, which minimized the use of additional components to suppress sound after the fact. The result was a less intrusive and less cumbersome in-house design that proved to be a consistent solution.

Liebherr T 282 model haul trucks running at Mt Arthur Coal are equipped with this noise package. This sound package was designed to minimize fan and engine noise, noise associated with dynamic braking, and exhaust noise. These trucks feature an aerodynamically-designed fan combined with a larger capacity radiator. This allows ample cooling capacity even at the lower fan speeds required to minimize fan noise. A specially-designed baffled grill further mutes fan noise while still maintaining the profile of a conventional truck. To reduce noise associated with dynamic braking, a high-volume, low-noise radial fan delivers the cooling air to stainless steel quiet grids. This reduces both grid blower noise and the electrical humming often associated with dynamic braking resistors. The engine is enclosed on all sides by thick fire-resistant blankets. Belly pans under the engine are lined with acoustical foam to reflect and absorb engine noise. Exhaust noise is reduced by utilizing specially-designed mufflers.

Performance

In 2003 the first Liebherr T 282 series trucks were commissioned at Mt Arthur Coal. Since then Liebherr have filled five different reorders for Mt Arthur Coal, making this operation in the Hunter Valley the location of the largest fleet of T 282 trucks.

A comprehensive noise assessment is conducted after commissioning Liebherr T 282 model trucks at Mt Arthur Coal. The trucks are tested while stationary, traveling uphill while loaded, and traveling downhill while unloaded. In all three tests the Liebherr T 282 model trucks met the noise limit specifications. For instance, the noise measurement for a T 282 C mining truck while stationary and at maximum engine speed is 109 dbA (sound power) compared to 125 dbA for a standard truck. This represents an 84 % reduction in the noise level. However, it is important to note that because of the way that the human ear perceives loudness, an untreated truck would seem to be approximately 3 times louder than a noise-reduced truck.

In the cab, the noise is reduced from the already low value of 75 dbA (sound pressure) to 70 dbA, which represents a 44 % reduction. This reduction would also be a noticeable difference in perceived loudness by an operator. The fleet is periodically reassessed to ensure continued compliance.

Technical Data

T 282 C

Drive system: Litronic Plus AC drive system
Engine_____MTU 20V4000 C22
Engine Output_____2,722 kW / 3,650 HP
Gross vehicle weight_____600 t / 660 tons
Maximum speed_____54 km/hr / 34 mph
Payload capacity/payload class_____350 t / 385 ton
Special Requirement: Comprehensive sound suppression