



PRODUCT BULLETIN 36138

MWM Engine Failures and Preventative Maintenance

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Prepared for: MWM Owners and End Users

Prepared by: Australian Mining Equipment

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Communication: MWM Engine Failures & Preventative Maintenance

The MWM Engine package designed for use in underground coals mines is registered with the department of planning environment as MDR 114056 DES.

The Engine Package is used in later MineCruiser Products, Grader products, Predators and some PETs.

Over the past three years that Australian Mining Equipment has been manufacturing MWM Engine packages, some recurring issues have been observed that have led to premature engine failures and or excessive wear of internal components.

As the OEM, Australian Mining Equipment seeks to provide this information to end users with recommendations to avoid premature engine failures and extend engine life.



Engine Failure Modes

1. Intermittent or reduced oil pressure and or flow.

These failures may occur due to an oil hose leak, oil contamination, blockage of oil paths or galleries or from running a significantly low oil level.

Where such failure occurs due to low oil pressure / flow, they typically result in bearing damage to cylinders one or four. (rear and front of engine respectively) due to their location in the oil path from the oil pump supply.

Oil supply pressure may be reduced due to;

- Worn bearings
- Leaking oil hoses (remote filter or turbo savior)
- Contaminated oil

- Low oil level
- Blocked or restricted oil pump suction
- Damaged or blocked oil spray nozzles

GE Mining Bulletin 33700 indicated that a modified oil sump is available “with baffle to improve the diesel engine oil stability during decelerations”.

This sump reduces intermittent interruptions in the oil supply flow during heavy braking events with low oil level.

This sump has been installed on many machines since 2014 and is available as part number 7-055687-700.

2. Water pump mechanical shaft seal failure.

With this failure mode, coolant can leak through the shaft seal into the timing case, allowing contamination of the oil. Bulletin 33700 identified a detection method for this failure mode by including the water pump weep hole check and catch reservoir. This improvement does involve some modification to the front engine cover and it is therefore recommended to contact AME in relation to this improvement. It is also recommended to sample the engine oil at 250 hr intervals for signs of glycol and potential engine degradation. Further recommendation was made to change the water pump at 3,000hr intervals to ensure the seal remains serviceable.

Discussion on catastrophic engine failure

Australian Mining Equipment is aware of two reportable incidents, where an MWM has catastrophically failed in the three-year period it has operated as OEM for the MWM engine package.

The root cause of the first instance was found to be due to coolant ingress through a cracked cylinder liner on number 2 piston on an engine with approximately 10,000hr service life. Coolant ingress into the combustion chamber caused hydraulic locking of the cylinder and subsequent overloading of the conrod, retaining bolts and cap. No significant signs of wear were found on the liners, caps, bearings or bolts. The conrod had been bent and the big end cap failed through the center (not at bolt locations).

The second and more recent failure on an engine with 8,500hrs was reported by the end user to be due to a failure of the conrod cap by fatigue, initiated at the conrod cap bolt location.

Tool marks were noticeable at this location and it was evident a fatigue failure initiated at this location had occurred.

However, further review of other components, liners, crankshaft and bearings revealed that a significant interruption in the engine oil supply had occurred prior to the fatiguing of the conrod cap.

The failure occurred on number one piston (furthest from the oil pressure pump) which is a known symptom of low oil pressure in the MWM Engine.

All other cylinder liners were scored indicating a loss of oil supply to other cylinders as well.

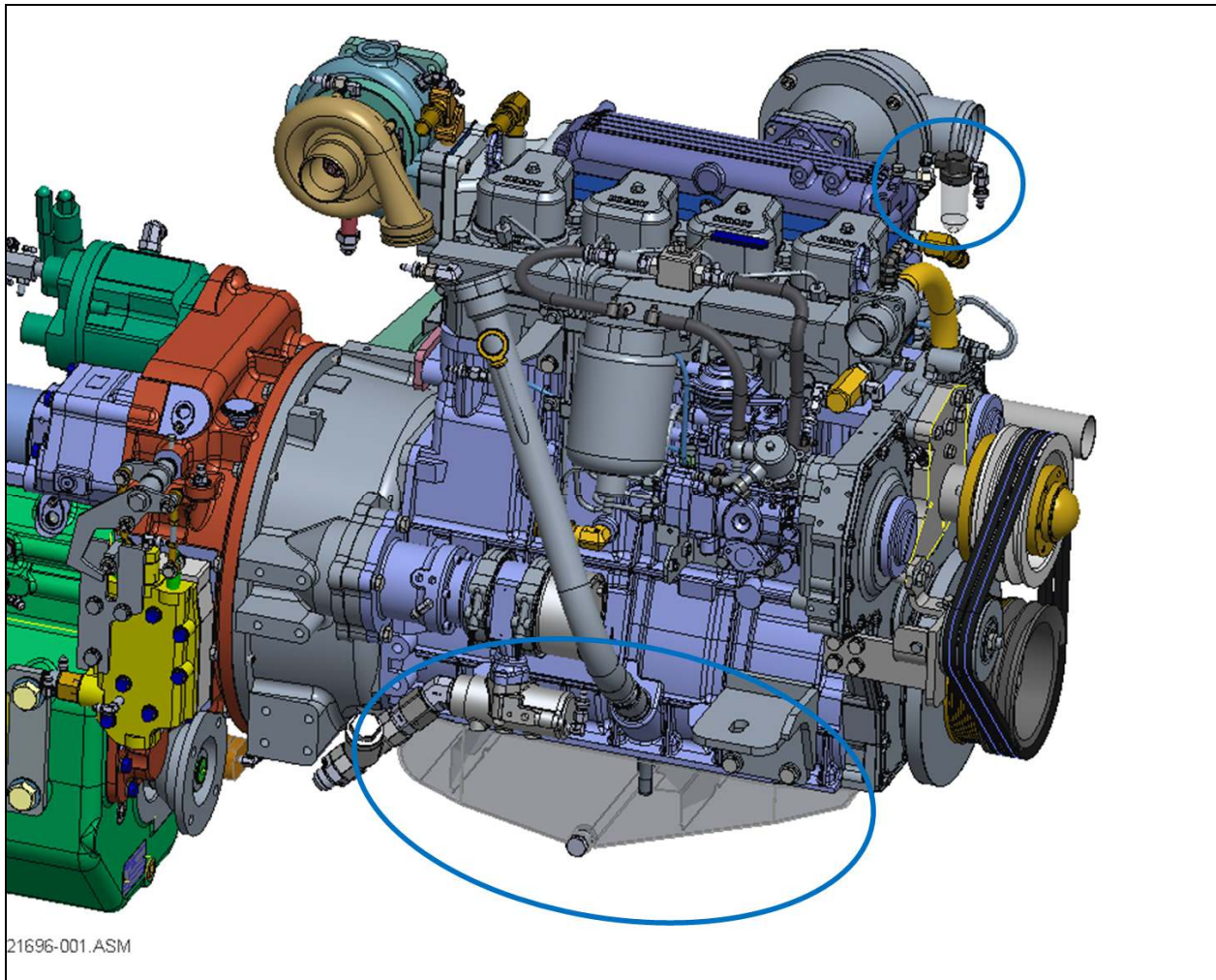
The connecting rod bearings had suffered significant wear and slipped whilst in situ on the number one big end connecting rod (prior to failure of connecting rod cap).

The piston top edge had made metal to metal contact with the liner.

A significant oil leak was found on the supply line.

Product improvements

Based on the evidence reviewed in AME's investigation of this failure, it is acknowledged that improvements can and should be made to the low oil detection system to lift the actuation oil pressure at which the machine shuts down. AME has investigated and performed a fit, form and function validation testing and recommends an improved low oil detection valve for installation with end users. Furthermore, although the remote oil filter solution provides better access to the engine oil filter, it does introduce the risk of remote filter hosing leaks. Where installed, remote filter hosing should be subject to frequent inspection, for leaks and hose damage, and be addressed immediately if found. Additionally, hoses should be of type Pirtek HT1 or equivalent for the best performance in the operating environment.



Engine and transmission assembly with Upgraded sump / Water pump weep hole reservoir

Engine maintenance

The MWM Engine is expected to have a serviceable life in excess of 10,000 hours without major overhaul.

However, given the risk of potential engine failure where components are worn AME recommends Engine overhaul at intervals not exceeding 10,000 hrs.

Compression testing and a review of oil pressure should be undertaken at Code D intervals

Where found to be low, overhaul should be considered at lower hours.

Recommended Action:

- Implement improved low oil detection valve 7-162011-700 in consultation with AME engineering (this recommendation is not applicable to SEMS control circuits).
- Implement regular Inspection on remote oil filter & turbo saviour hosing where installed for leaks and hosing damage, particularly at or adjacent to connections
- If not already installed, fitment of the upgraded sump with baffles is highly recommended 7-055687-700
- If not already installed, fitment of the water pump weep hole reservoir is highly recommended
- Engine overhaul is recommended at a maximum of 10,000 operating hrs. earlier overhaul may be required if compression is low or oil pressure operating guide is not achieved.

Components may be ordered through orders@amequip.com.au.

Please distribute this bulletin to all relevant personnel

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