MARKAL INSIGHTS

Recommendations for safety and efficiency following bolt failure that caused factory fire in England

A mining equipment manufacturer based in West Midlands focused on investigating a bolt failure within their oil housing unit for an engine.The customer explained that the bolts were used to hold a filter plate on the top of an oil pump housing. These bolts had experienced a failure., As a consequence, oil leaked onto the exhaust manifold igniting a fire that resulted in the destruction of the factory.

Current State

A thorough investigation was crucial for this industrial due to the severity of the failure, as the fire almost resulted in loss of life. BES Group collaborated through their failure investigation service. When fires happen, regulating bodies such as councils, government and fire safety officers usually require a detailed investigation of the industrial accident. Compliance with these investigations will help to understand the cause of the fire and support any legal, safety, and insurance proceedings. In this case, the fire of their factory almost resulted in fatalities of their workers, so an in-depth analysis of the root cause of failure would help them with their own safety investigations.

Goal

As part of their failure analysis, they also provide their customer with vital information about what went wrong, so that they can put preventative measures in place to avoid future incidents from happening.

Date: October, 2025
Creator: La-Co Industries Europe

Industry: Manufacturing
Product Category: Security check Paint Markers

SECURITY CHECK

PAINT MARKER

SECURITY CHECK PAINT MARKERS provide a convenient visual method for identification of vibratory loosening or tampering in nuts, bolts, fasteners, and assemblies. High visibility paint mark becomes a hard film that breaks easily. Ideal for quality control and warranty work. Safe on most surfaces, adheres perfectly to metal.

Solution Process

During BES investigations, they analysed the bolts, filter plates, and filter housing. Chemical analysis and hardness testing confirmed that each sample was made of the right material for the application. Bolts also met the required chemical, metallurgical and mechanical requirements of BS EN ISO 898-1 grade 10.9.

The main cause of the failure showed that the bolts had experience fatigue cracking, small microscopic cracks within the material. These cracks were likely caused by alternating stresses on the bolt over a prolonged period of time. BES suspected that there were two main causes for this:

- The bolts had not been tightened enough when they were installed on the pump housing unit
- The bolts had become loose during service, due to the vibration effect of the pump housing unit.
- As the bolts were loose during service, this had also caused minor surface damage to the filter plate around the area where the bolts were installed, likely caused by friction or burnishing.

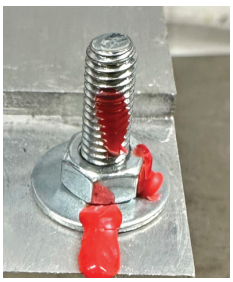
Some minor surface damage was observed on the surface of the filter plates, around the area where the bolts were installed. This damage was likely caused by the loosening of the bolts causing friction against the plate.

They also found damage to the surface of the filter housing, which was likely caused by cyclic stresses resulting from the loosened bolt, or shock tensile stresses at the point of final failure.

After conducting a thorough analysis, their team of technologists provided the customer with some recommendations to help avoid future incidents, and also support the longevity of their equipment.

- Using vibration damping washers in future installations would help to prevent the bolts from loosening in service.
- **Introducing a regular, preventative maintenance program would ensure that regular checks are carried out on the bolts and oil housing. This way, adjustments can be made if the bolts are becoming loose, and would identify any early signs of defects and damage.**
- As part of the preventative maintenance program, the customer should also consider periodically replacing the bolts, to maintain the reliability, safety and efficiency of the equipment.

How Markal helps



VISUAL CONTROL FOR SAFER, SMARTER MAINTENANCE

Even though Markal products were not used in this case, this incident clearly highlights how visual control solutions can prevent similar failures before they happen.

Security Check Paint Markers provide an easy, reliable way to make critical bolt movement visible. A single line of high-visibility paint creates a tamper-evident mark that fractures with vibration or loosening—instantly revealing loss of torque or unwanted rotation.

By integrating this simple yet powerful tool into regular maintenance routines, operators can:

- ✔ Detect early signs of mechanical stress or bolt loosening.
- ✔ Take corrective action before friction, leaks, or heat build-up cause damage.
- ✔ Reinforce preventive maintenance programs with clear visual evidence.
- ✔ Improve overall reliability, traceability, and operator confidence.

A small visible mark can make a major difference — transforming hidden risks into actionable insight, and helping maintenance teams keep equipment safe, efficient, and operational.

More Info

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