

The engineering change approval process - why is it mandatory?

Steve Curphey, Senior Engineer, AEGIS Certification Services, describes the activities undertaken in implementing a recent engineering change to a rail trailer.

Engineering change

There are several reasons why a plant asset manager might want to modify its already certified On-Track Plant (OTP) machinery. New opportunities may have been identified within the industry where the machine would be more profitable as a different machine type, resulting in a change of use - for example converting a MEWP to a personnel carrier. Modifications could be made to an existing machine to improve its performance and efficiency using new technology.

Modifications could also be made mandatory by the infrastructure manager. In 2010, Network Rail had a number of issues involving OTP. These were traced back to the brake systems proving to be unreliable on certain machine types and in certain conditions. The solution was to ensure all OTP was sufficiently braked and met an increased level of safety and performance. This led to Network Rail writing a technical specification and making it mandatory for all machines on Network Rail infrastructure to comply to it. Consequently, many of the machines currently certified for use on Network Rail infrastructure required an engineering change. All machines that were modified were assessed by VABs and new Engineering Acceptance Certificates issued.

In accordance with RIS-1710-PLT issue 2.1 clause 3.3, all types of modifications must go through the appropriate engineering change approval process to ensure that their current Engineering Conformance Certificate is appropriate to the machine's current configuration. There are many engineering modifications that are undertaken on plant machinery that do not undertake the correct approval process and can go unnoticed. This undermines and devalues the requirement for an Engineering Conformance Certificate, as the certificate is only as good as the day it is issued. It also means that there is no evidence that the machine meets the current requirements.

These modifications would typically only be detected during the machine's seven-year upgrade or after an incident, potentially resulting in an industry standard report in the form of a NIR, Network Rail safety bulletin or RAIB report being circulated throughout the industry. By following a considered process when modifying a machine, this will help to ensure all risks have been identified and mitigated to an acceptable level for safe use on the rail infrastructure. Any changes to a machine should also be reflected in the Product Acceptance (PA) certificate for the machine.

Good practice

QTS Group has recently modified an approved rail trailer to accommodate a demountable



module in the form of a vegetation compactor. The company has addressed the engineering change in a well-considered way.

Where did they start?

RIS-1530-PLT issue 6 - Clause 5.24.3 - 'Demountable modules, when fixed to the machine, become an integral part of the machine and shall meet every appropriate requirement of this document.'

This clause clearly states that the trailer and the demountable module must be considered as one machine and, therefore, has the potential to affect compliance with all clauses within RIS-1530-PLT issue 6. A thorough compliance review of the machine was carried out by QTS Group against these requirements and assessed by AEGIS Certification Services through its accredited Plant Acceptance Body (PAB) process.

The following are some key points that were addressed during the approval process.

How is the module fastened to the trailer?

'It just uses industry standard twist-locks' is a typical answer that is regularly received from companies undertaking modifications. However, it is often not as simple as that. Not all trailers have suitably-located mounting points for such devices and the strength of these points is not always known. So, how do we demonstrate that the mounting points that have been added to the trailer have the strength to withstand the applied loads? In this instance, a structural assessment has been undertaken by QTS Group including multiple Finite Element Analysis (FEA) and weld strength calculations to confirm and demonstrate to the

PAB that the modifications made to the trailer are adequate to resist the specified loads applied by the addition of the module.

How does the module affect stability on rail?

For OTP, there are two modes to consider when assessing the dynamic stability of a machine. The machine in travelling mode and the machine in working mode. In travelling mode, when the moving parts of this machine are held within the applicable gauge, it can be considered as a laden trailer as the module is below the previously approved maximum payload.

It is, therefore, fair to assume that the dynamic stability of the trailer in travelling mode is unaffected. In working mode, when the wings of the compactor can be spread to accommodate a vegetation load, there is an obvious potential for the stability to be affected when compared to the trailer's previous approval. This machine was tested in the most adverse combination of track and loaded machine conditions to demonstrate that the vertical wheel load on any rail wheel is not reduced by more than 50%.

Assessing risk

The questions above are some of the more obvious areas in which an engineering change can increase risk and would be picked up when an adequate PAB assessment to RIS-1530-PLT issue 6 is carried out - that said, it does not cover all eventualities. A key activity that must be carried out by the manufacturer as part of an engineering change is a complete risk assessment. This will help identify hazards and mitigate them to an acceptable level.

by either altering the design of the machine, implementing operational controls and effectively communicating them to the operator, or by adding preventative tasks to the maintenance plan.

It is mandatory for all engineering changes to be submitted through the Network Rail PA process. When a machine is put through the PA process the risk assessment forms a major part of the evidence to be assessed by the product reviewer. This helps to give the manufacturer peace of mind that their risk assessment is comprehensive and covers all relevant areas. Network Rail has defined a list of standard hazards that must be considered as part of this process. These hazards are specific to machines used on or near Network Rail-Managed Infrastructure. Additional hazards, specific to the machine under review, are considered in addition to the standard

Network Rail hazards. The Network Rail PA process also states that the machine must also comply with the applicable modules in the Network Rail Plant Manual and its applicable standards. PABs are authorised to carry out the review of PA submissions on behalf of Network Rail as this is within their specialist subject knowledge area. This was covered in the article 'Product Acceptance of a Rail Rascal' in *Rail Infrastructure* Issue No: 135.

Completing the change

It is clear that an engineering change is not as simple as just making the physical modification. There is a process to follow that ensures that the machine meets the applicable standards, identifies risks and reduces them to a level as low as reasonably practical to ensure the machine can operate safely and effectively on the rail network.



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