Preventive maintenance of rolling stock

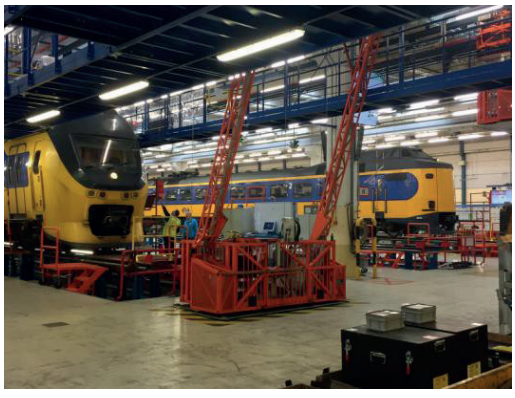
USE CASE: NedTrain is a Dutch company specialised in the modernisation and maintenance of rolling stock. As a subsidiary of NS, the Dutch Railways, the company makes sure that 1,2 million passengers can make a safe and comfortable journey every day. They maintain the rolling stock of renowned manufacturers such as Alstom, Stadler, CAF and Bombardier. NedTrain operates from 30 locations and employs approximately 3000 people.

Introduction

The test and maintenance of electrical components on rolling stock is not an easy job to do. Some maintainers dismount some of the parts and bring them to a central location for revision and maintenance. This is a cumbersome and time consuming exercise. In many cases, the electrical parts are replaced only when they break down and are not subject to periodical testing. This of course holds a risk as some parts, e.g. circuit breakers, are crucial for safety reasons. Furthermore, the systems on board of a train running the diagnostics are not always able to check all electrical components properly.

NedTrain takes a more proactive and efficient approach as it tests the electrical components like relays and circuit breakers on board of the trains. This is done in the five workshops spread over the Netherlands.

The national rail grid of the Dutch Railways (NS) is 2.300 km in length and uses a 1,5 kV DC electrification system.



NedTrain's workshop in Onnent

The solution

Each workshop is equipped with a BALTO MODULAR and a BALTO CONTROLLER. Depending on the type of trains that are maintained at the different locations, a 6 kA or 9 kA system is used. A 6kA system consists of 2 power modules and can generate a maximum current of 6.000 A, a 9kA system has 3 power modules on board and can generate a maximum current of 9.000A. The BALTO system is moved around in the workshop and connected to the different electrical parts of the train using cable lengths of maximum 6 meters.

For the DC High Speed Circuit Breakers, the Imax, opening time and contact resistance are measured by the BALTO MODULAR. For testing the relays, a connection is made between the relay's trip contact and the BALTO CONTROLLER.

BALTO 6kA system at work at NedTrain

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A NedTrain specific software is run on the BALTO system to make testing straightforward. Each user has to identify himself to the system to perform certain tests.

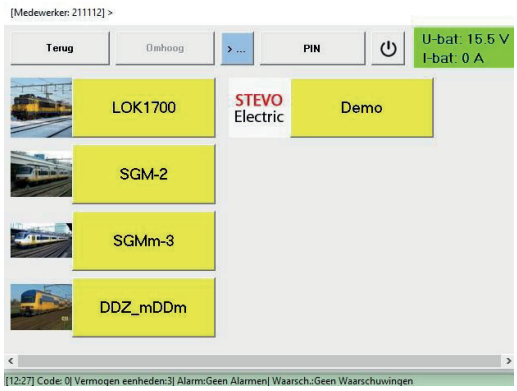
Two levels of users are defined :

- Users with standard access rights can perform fully automated tests
- Users with advanced access rights can perform troubleshooting

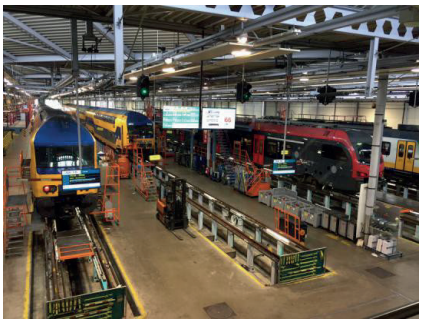
Standard users get a menu structure guiding them through the tests of the various electrical parts which should be tested on the different trains. Levels of acceptance are predefined for each individual electrical part. This is done beforehand by the expert team. The user gets a "pass" or "fail" notification after each test. All results are logged and proper reports are generated by the BALTO system. The advanced user can perform in-depth troubleshooting when appropriate.

The software is made in such a way that NedTrain can add additional electrical components at a later stage. Also the acceptance levels can be adjusted by the experts whenever necessary. New software versions are installed on the different BALTO systems automatically. Test reports are currently downloaded on a USB stick, however transmission to the central location using wifi is possible.

The BALTO system comes with remote control capabilities. Users with no direct access to the BALTO system, e.g. on board of the train, can take over full control using the BALTO Remote Controller or can use a standard PC, log into the system and perform a subset of the features.



NedTrain's easy to use menu structure



NedTrain's workshop in Leidschendam

Conclusion

By introducing a BALTO system into their workshops, NedTrain is now able to test many of the electrical parts installed on the train. This amount will continue to grow as NedTrain adds more profiles to the software. The test are fully automated and are carried out as part of a standard procedure by the maintenance people. This approach is unique in the industry. It is very effective, time saving, reduces downtime and leads to an increased safety of the passengers.

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