Acoustic Detection Device « TIS-ADD »

Progress Rail
A Caterpillar Company

TIS-ADD is addressing an extremely important part of the railway undertaking, cost and track availability. It becomes more and more important to detect failures in an extremely early phase, intended to avoid train defects, impacting the normal railway operation. Within the currently applied concepts, based on identifying critical bearing defects, are resulting issues impacting train operation and managing of tracks, not fully considered. Each correctly detected alarm is ensuring safe railway operation, but in the same time reducing the availability and increasing the cost of railway undertaking. A train, which was stopped based on a recorded critical defect, will cause resulting delays and requires intervention.

For an efficient and highly productive railway operation, would it be important, to significantly reduce such events. It would be important to have a device installed, ensuring that all developing defects are recorded. This is TIS-ADD, which is listening to bearings of passing trains and their condition. TIS-ADD can identify defects long before they get critical. Proactive maintenance will become possible using TIS-ADD. It is possible to change the approach from reactive (after something did happen) towards preventive. TIS-ADD can identify trains wit arising defects, which should go in the repair shop, long before any critical problems / defects. Therefore is TIS-ADD supporting predictive and preventive train maintenance and this in a most efficient way. Using this System is making maintenance planning easier and as a result will reduce the cost of railway undertaking.

This all is achieved by implementing TIS-ADD to the railway network. TIS-ADD acoustic recording system detects typical defects of rolling bearings in an early stage while the trains are passing the system.

Bearing defects that can be detected are surface defects of inner and outer ring raceways, of rolling elements and cage defects. All typically used bearing types can be inspected and this during a single passage. Our TIS-ADD system is not requiring pattern, for comparing. This System is based on the state-of-the-art mathematical functions, which are based on frequency analysis.

As a result are bearing defects detected long before the defects develops to a hot axle box. In addition will TIS-ADD inform on the absence of defects and the kind of defect itself. The reporting does include a classification of the remaining time (km), before maintenance needs to be scheduled. So it is possible to plan the maintenance way in advance or even to extend the inspection intervals. All of this is helping to reduce costs of railway undertaking.

TIS-ADD can be used as Standalone System or fully integrated in the TIS Checkpoint.

Features of « TIS-ADD »

1. Reporting of Bearing Defects after single passage.
2. Identification of defective part within the bearing.
3. Supporting Predictive and Preventive maintenance.
4. Supporting Train Speeds of up to 200km/h.
5. No learning phase required.
6. Based on the state of technology frequency analysis.
7. Fully integrated in our Progress Rail TIS platform.
8. Combination with FUES EPOS is possible, combined alarms.
9. Combined vehicle identification "FID", with RFID
10. Supporting various RFID Sensors.
11. Web-Based access (Diagnostic)
12. XML Interface towards SCADA Systems.
13. Archive of recorded train data.
14. Easy to install, mobile version is available.
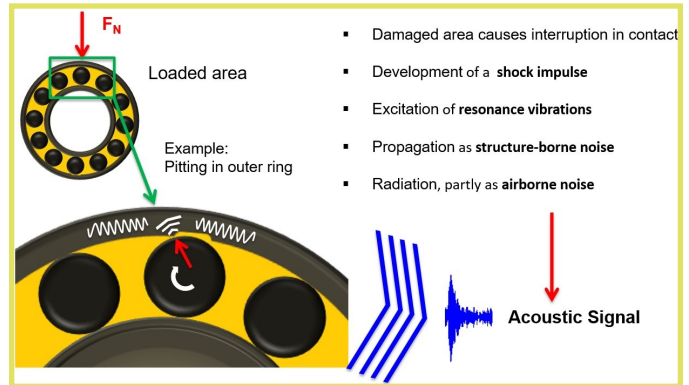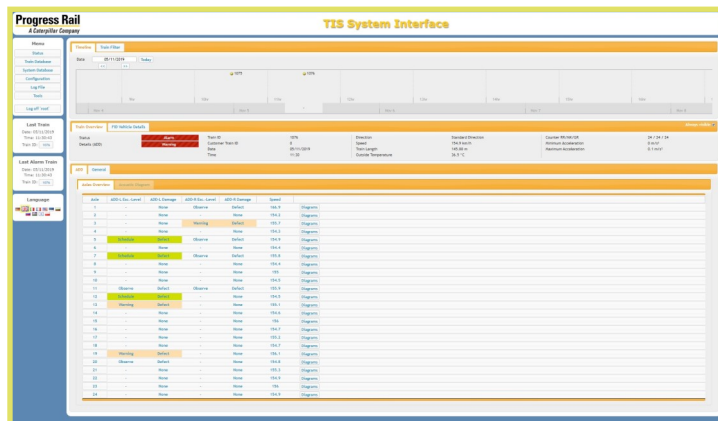15. Designed for all climatic conditions, from snow to sand.

The look and feel of the TIS V7 platform was reused for the TIS-ADD. It is possible to have the same TIS platform supporting TIS-ADD, FUES EPOS, DED / HWL, RHT, WILD and RFID. TIS-ADD is one part of the combined Progress Rail Checkpoint.
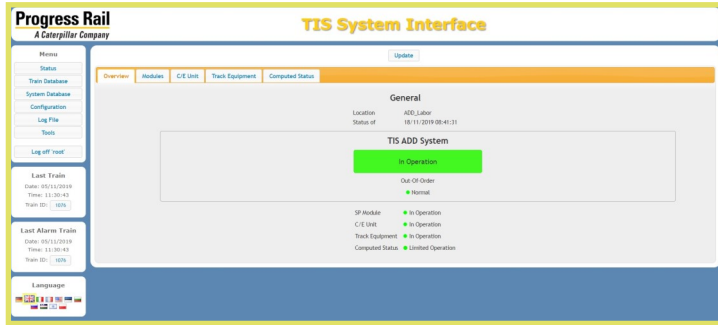
The entire handling of the TIS-ADD system is very simple, for all trained TIS Checkpoint users. Despite the fact that the user display of the results will be done in a centralized System, like "RAD-X", does the TIS-ADD include all tools for configuration, verification and analysis. The recorded data is internally processed within TIS-ADD, without any external uplink. The resulting report after each single train passage can be verified and inspected on the local TIS-ADD computer.

The core of the TIS-ADD system is based on frequency analysis, using state-of-the-art mathematical functions. It is not required to "teach" the TIS-ADD using "good" units, with perfect bearings, passing the TIS-ADD system.

- Damaged area causes interruption in contact
- Development of a **shock impulse**
- Excitation of **resonance vibrations**
- Propagation as **structure-borne noise**
- Radiation, partly as **airborne noise**

Acoustic Signal

The TIS-ADD system does archive the acoustic data for a later verification of the reported statuses or alarms. All of this processing is done, within the core of the TIS V7 software and not externally hosted.

The TIS-ADD system integration inside RAD-X is fully available.
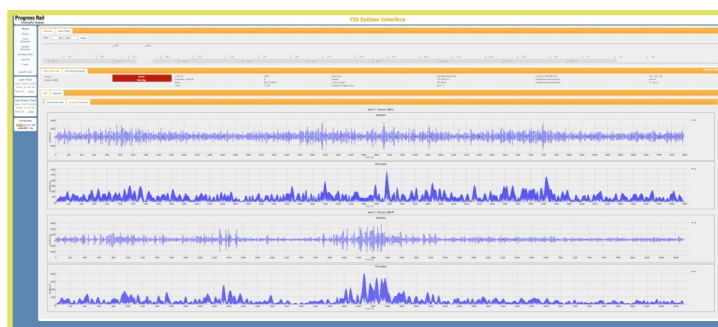

Options:

TIS-ADD "Double Track":
The System can be mounted on one track side or on both, the Location Electronic is supporting, both options. Different options for mounting TIS-ADD are available.
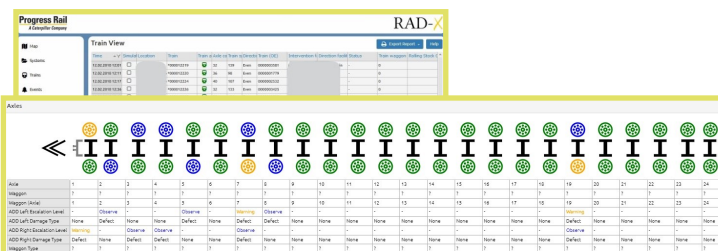
TIS-ADD combined with RAD-X:
This combination is easily supporting, reporting of predictive and preventive maintenance reports, based on (example) RFID identification. It allows in addition trending on various installed TIS-ADD, using unique identification data, like RFID.

TIS-ADD combined with FUES EPOS (TIS Checkpoint):
New Alarms are possible, in example the combined / confirmed alarm. This alarm is based on the data of both systems and would require immediate actions.

Technical Requirements (TIS-ADD)

Required	Remarks
TIS Platform	Platform using release 2019
Enhanced TIS Boxed PC	Required for hosting the TIS-ADD Option
RFID Reader	Recommended Option, to identify the rolling stock unit
Standalone	Available Option
TIS Integrated	Available Option
Enhanced Alarms	TIS Checkpoint
TIS V7 Web Interface	included
TIS V7 XML Interface	included