



Challenge

Rail operator Banedanmark needs to monitor and mend rail conditions in a precise and effective way

Solution

G.R.A.S. developed and configured a complete sensor and acquisition solution to check the condition of the rails during a 2 x 250 km (2 x 155 miles) trip with an ordinary train set

Banedanmark monitor rail conditions with no downtime or delays

Noise from all kinds of traffic is an annoying – and a growing - problem. The reasons are many; higher speed, traffic density, heavy loaded vehicles, etc. Thus, there are many business opportunities for companies that can help analyze the problems in order to find cost-effective methods for noise reduction.

The rails in Denmark are owned and maintained by the company “Banedanmark”, whereas the train engines, wagons and wheels are owned by DSB (The Danish Railways). The passenger’s experience is a combination of noise generated by the wheels and by the rails.

It is expensive to reduce noise by means of noise barriers, as they only reduce the noise by 3 to 6 dB. In comparison, the difference in noise between smooth rail sections and sections where the roughness is high can be more than 12 dB. It is therefore more beneficial to focus on the conditions of the rails.

To reduce the noise from the rails you have to grind them. This is time consuming and inconvenient, so you have to focus your efforts and resources on finding the noisiest sections. But how do you do that?

Teaming up with professional partners, Banedanmark has found a solution and installed measurement microphones underneath the train wagon on a bogie, close to the wheels. The microphones are exposed to chocks, vibration, strong winds and dust.

Two G.R.A.S. 46BD microphone sets, mounted with standard spherical windscreens, were installed on chock absorbing material; one on each side of the central train wagons and 60 cm (24”) above the rails. The microphones were connected to the CCP input of a National Instruments 9234 Dynamic Data Acquisition System and was connected to a laptop. In addition, a Garmin GPS was used to map the position 5 times per second. The equipment was placed in the passenger compartment and the microphone cables were led through the door seals.

Train speed and GPS position were recorded synchronously with the real-time noise spectrum and saved for later analysis.