Inspecting Solid Tires with Ground Penetrating Radar

This application note describes how to locate steel rods inside large solid tires with ground penetrating radar.

Solid tire manufacturers need to check the number, depth and spacing of the steel rods inside the tire in an easy and accurate way.

Challenge

Solid tires are used for vehicles that must bear a relatively large weight e.g., forklift trucks. They are constructed from multi-layered rubber and contain steel rods for added strength.

caption

For quality and safety reasons, manufacturers need to check the steel rods inside the tires and their characteristics. Conventional methods can be slow and not precise. Ground Penetrating Radar (GPR) can be used to locate the steel rods inside the tires effortless and at a fraction of the time other methods need.

Solid tires were inspected using Proceq's ultra-portable GPR device, GP8800. The Proceq GP8800 probe can be placed on the inner radius of the tire and by emitting electromagnetic waves it can identify the metal rods inside the rubber mass.

Solution

The rods, as metallic objects, are total reflectors of the electromagnetic waves, and thus the GP8800 can get information about the depth, the quantity and the spacing between the rods. The GP8800 uses Stepped Frequency Continuous Wave (SFCW) technology that offers a large bandwidth (0.4-6 GHz), useful for applications that require both excellent resolution and depth penetration. In this case, the useful information comes from the high end of the bandwidth, as rods are relatively small and shallow.

The GP8800 on a section of the tire.

The sensor is placed on the inner radius and collects data in a matter of seconds. The Stepped Frequency Continuous Wave (SFCW) Technology enabled us to map the rods with clarity - with a **single** device and a **single** pass. The Proceq GP8800 connects wirelessly to an iPad, making it a safer and easier option – no cables to trip over or get caught around the tires. Furthermore, the iPad app is extremely intuitive so inexperienced operators can easily collect data.

The data is all stored securely on the cloud and can be accessed by any member of the team no matter where he/she is located, offering unmatched flexibility.

Learn more about Stepped Frequency Continuous Wave Technology, GPR, and NDT in our Tech Hub.