

# Technology: Enhancing an Already Safe Network

We are living in the safest era ever for U.S. railroads.

According to Federal Railroad Administration data, recent years have been the safest on record for the rail sector. This achievement is due in large part to the industry's strong safety culture, visible in everything from training to operational protocols.

Even so, accidents sometimes occur. From 2013 to 2017, issues with track and equipment were responsible for 42% of train accidents and human error — the leading factor — was responsible for 39% of accidents. Railroads prioritize investments to address and eliminate the causes of these accidents, knowing they will have a significant impact on the long-term safety of the freight rail network.

Technology plays a crucial role in achieving that goal. Today's rail technology enables railroads to inspect their track and equipment with greater efficiency and reliability. These advanced tools also empower rail employees to make better decisions, giving them an inside view of the rail network's infrastructure, well beyond what the human eye can see.

The power and promise of rail technology will become even more evident in the years ahead as railroads seek to apply technology solutions to their ultimate goal — an accident-free future.

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## At a Glance

- **Keeping Track Structure Healthy**

Just as a doctor uses ultrasound to see inside a body, railroads use it to look inside steel rail. Similarly, ground-penetrating electromagnetic radar allows railroads to assess the condition of ballast and detect any abnormalities, such as water intrusion, which can cause degradation. Railroads use these insights to identify potential problems and proactively schedule maintenance, helping to keep small issues from becoming big problems.

- **Maintaining Equipment**

Railroads monitor the health of rail equipment in real-time using smart sensors, advanced analytics software and industry-wide data sharing. Wayside detectors along track use a host of technologies — such as infrared and lasers — to assess bearings, axles, wheels and springs as trains pass by at up to 60MPH. Machine visioning captures 50,000 images per second of service and safety critical components on a passing train. Specialized software analyzes the images and alerts rail personnel to anomalies that require further analysis.

- **Preventing Human Error**

Positive Train Control (PTC) is a set of highly advanced technologies designed to automatically slow or stop a train under certain circumstances, will address a leading factor in train accidents: human error. At the end of 2018, the nation's largest freight railroads were operating PTC across the vast majority — 83.2% — of the required Class I PTC route miles nationwide. The system will be fully active and interoperable by 2020.