





# AI inspections at the edge increase railroad safety

Duos Technologies automates 360-degree, real-time inspections of fast-moving trains with AI at the edge for safety and savings.

## Business needs

Global demand for passenger and freight trains is expected to more than double by 2050 due to railroads' low carbon emissions. Duos Technologies developed an automated Railcar Inspection Portal (rip®) with a trackside edge data center that uses AI image analysis to inspect trains in real time, unleash railroad growth and improve safety.

## Business results

-  8x increase in inspection accuracy by using AI at the edge for automated inspections rather than manual processes.
-  120x performance boost using rip® inspections.
-  Improves railroad safety and reduces costs.
-  Automates server updates and maintenance processes so that server repairs take just hours not days.

## Solutions at a glance

- [Dell PowerEdge servers with NVIDIA GPUs and Intel® Xeon® Platinum processors](#)
- [Dell PowerVault storage](#)
- [Dell Networking PowerSwitch](#)
- [Dell ProSupport Plus](#)





**By collaborating with Dell Technologies, we continue to solve bigger problems with AI – and GenAI in the future – putting railroads at the forefront of innovation and environmental sustainability.”**

**Jeff Necciai,**  
Chief Technology Officer, Duos Technologies

To meet the growing need for efficient freight and passenger train operations, railroads are seeking modernization solutions. Recognizing this demand, Duos Technologies developed an innovative AI-driven approach to inspect trains in real time, even at full speed. Recently awarded a patent for this proprietary artificial intelligence (AI) technology, Duos’ high-performance offerings, developed with input from rail industry experts, are rapidly becoming the standard for automated inspection in railroads, both in North America and beyond. This advancement not only enhances safety for the public and railroad workers, who work tirelessly to inspect trains in all weather conditions, but also represents a significant step forward in the industry’s journey toward sustainability.

Duos partnered with Dell Technologies and developed the Railcar Inspection Portal (rip®) powered by AI. “We run predictive AI analytics on Dell PowerEdge servers because they offer the specialized I/O, GPUs, RAM, and reliability we need at the edge and in our core data center,” says Derrick Schmenk, vice president of research development and innovation at Duos Technologies.

Trains can pass through a rip® at high speeds without slowing down, including passenger trains traveling over 125 mph. Trackside Dell PowerEdge XR Edge servers

with NVIDIA GPUs and Intel® Xeon® Platinum processors run AI algorithms that capture and analyze 360-degree images of every train car in just seconds. When the edge-based AI algorithms detect an anomaly, the system sends an alert within 60 seconds so that the railroad personnel can initiate the appropriate response. Images that have been analyzed are sent to Dell PowerVault storage, which also resides in the rip®, and then on to Duos’ core data center for AI model training on PowerEdge servers.



**Increasing the speed and accuracy of train inspections.**

## Faster, safer trains.

The portals’ computer vision and edge AI is eight times more accurate than a manual inspection, which is projected to improve safety. The CENTRACO® platform allows the user to identify anomalies 120x faster than with manual inspections.



**Improving railroad and worker safety.**



“ **Railroads operate in extreme environments, which are not exactly server friendly. However, Dell PowerEdge servers stand up in harsh environments, delivering mission-critical reliability in our edge data centers.**”

**Jeff Necciai,**  
Chief Technology Officer, Duos Technologies



## Days saved in IT maintenance.

Duos saves time and money with AI edge and data center solutions from Dell Technologies. IT staff remotely manage and update PowerEdge servers using automated processes and proactive maintenance strategies enabled by the iDRAC management platform. They also automate parts-ordering processes through Dell ProSupport Plus. As a result, repairs that took days to complete on previous solutions now take minutes.

## Generative AI development enabled.

Duos is now developing a Generative AI (GenAI) solution that will run on PowerEdge servers in the data center to improve AI model training. By analyzing pictures of a part when it's new and when it's broken, GenAI can create images that depict the part's lifecycle, including what it looks like just before it breaks. The company's AI models can use these images to improve inspection accuracy and

predictive insights. Jeff Necciai, chief technology officer at Duos Technologies, says, “By collaborating with Dell Technologies, we continue to solve bigger problems with AI — and GenAI in the future — putting railroads at the forefront of innovation and environmental sustainability.”

“ **By freeing up more people to be fixers instead of finders, railroads decrease their dwell time and improve their bottom line.**”

**Mark Smith,**  
Chief Mechanical Officer, Duos Technologies

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