To ensure the safe, efficient, and reliable movement of people and goods by rail through applied research and development of innovative technologies and solutions.
RD&T Strategic Plan 2020–2024

• Published July 2020
• Supports DOT’s strategic goals – Safety, Infrastructure, Innovation, Accountability
• Mission achieved by collaboration with public and private industry partners to develop and deploy technologies
• Research includes:
  o Track
  o Rolling Stock
  o Train Control and Communication
  o Human Factors
Track Research

**Focus:** Develop track inspection technologies; develop computer modeling capabilities; expand the use of autonomous inspection methods; and develop new techniques for monitoring difficult-to-detect safety issues.

**Core Research Priorities**
- Autonomous Inspection Technologies
- Artificial Intelligence (AI)-Based Risk Analysis
- Safety Assurance Performance Measures
- Rail Safety Simulations and Testing
- Advanced Defect Detection Measures

**Goals:** Safety, Infrastructure, Innovation, and Accountability
Rolling Stock

**Focus:** Examine the structural integrity of trains to increase passenger safety and reduce hazardous materials releases. Target the causes of derailment due to rolling stock component failures and poor train handling.

**Core Research Priorities**

- Automated Inspection Technologies and Techniques
- Improved Materials and Component Designs for Rolling Stock Components
- Energy and Environmental Sustainability
- Occupant Protection Enhancements
- Improving the Safety of Hazardous Materials Transportation

**Goals:** Safety, Infrastructure, Innovation, and Accountability
**Train Control and Communication**

**Focus:** Reduce train collisions with other trains and with objects at highway-rail grade crossings.

**Core Research Priorities**
- PTC Performance Monitoring and Reporting
- Next Generation PTC Technologies
- Intelligent Transportation Systems (ITS)
- AI and Computer Learning (CL)

**Goals:** Safety, Infrastructure, Innovation, and Accountability
**Focus:** Addresses accidents caused by human error, which is the most common cause of railroad accidents.

**Core Research Priorities**
- Fatigue
- Human Automation Interaction
- Grade-Crossing Safety
- Trespass/Suicide Prevention
- Monitoring and Support to Short Line Safety Institute (SLSI)

**Goals:** Safety, Infrastructure, Innovation, and Accountability
Project Highlights
Predictive Analytics Platform for ATGMS Data

• Establish a practical procedure for employing an AI-driven automated process that identify safety-related issues in autonomous track geometry measurement system (ATGMS) data.

• Frequently acquired ATGMS data used to:
  o Identify and report on large deviations in track geometry parameters.
  o Monitor size and growth rate of identified deviations.
  o Report on potential safety-critical deviations.

• Leverage machine learning to develop and implement automated procedures, from data transfer and alignment to analytics and reporting.

• Currently in Phase II of 3-phase project, in which automation techniques are being implemented.
Performance of Pressure Relief Valve Under Fire Conditions

- **Objective:** Document, by scale testing under nominal fire conditions, PRV performance with respect to opening pressure, reclosing, and evacuating the tank.

- Initial tests planned with water as lading; subsequent tests conducted with flammable lading.

- Results will be used to validate detailed analytical models being developed by agencies such as Transport Canada.

- Quantification of PRV performance will help industry with designs and standards of PRDs appropriate for flammable liquid service.
• PRV valve performed nominally, releasing at 75 psi with a subsequent loss of internal pressure.
• Pressure stabilized at 35 PSI with multiple releases.
• Notable changes in mass were observed during the more energetic releases.
• PRV survived and functioned safely when subjected to moderately high temperatures for 40 to 60 minutes.
FRA examined the potential improvement in shell puncture resistance for a DOT-113 tank car with an outer shell made of 9/16” TC128, compared to a baseline DOT-113 using 7/16” A516-70.
Specification DOT-113 tank cars are a tank-within-a-tank design.

Used to transport cryogenic liquids such as nitrogen, ethylene and liquefied natural gas (LNG)

In July 2020, PHMSA & FRA published its Final Rule, allowing LNG to be carried via DOT-113 with additional features, including:

- Thicker outer tank shell
- Improved outer tank steel alloy
In Oct. 2019, RD&T, Battelle, and Honda Motors R&D conducted a 3-day Rail Crossing Vehicle Warning (RCVW) requirement validation test.

100 test cases in two locations under different weather conditions conducted at the Transportation Test Center in Ohio.

Honda supplied passengers and Class 3 heavy-utility truck was used in the testing.

Additional testing planned for the summer of 2020.

The data collected will be used to enhance the performance of the RCVW.
Vehicle-to-Vehicle Impact Test

- Test performed to demonstrate effectiveness of retrofit push-back coupler (PBC) and deformable anti-climber (DAC) in preventing override in head-on collisions.
- Impact speed: 19.3 mph (target was 21 mph)
- Part of a series of tests of increasing complexity
- Full-scale train-to-train test including occupant protection experiments planned for end of CY 2020.
- Post-test damage (below):
CONTACT US

Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

For more information visit us at www.fra.dot.gov

Connect with us USDOTFRA

DIRECTOR
Maryam Allahyar - maryam.allahyar@dot.gov

PROGRAM MANAGERS
Jay Baillargeon – jay.baillargeon@dot.gov
Francisco Gonzalez – Francisco.gonzalez@dot.gov
Jared Withers - jared.withers@dot.gov
Jeff Gordon – jeffrey.gordon@dot.gov