Pennsylvania Senate Transportation Committee Meeting
The Railroaders' Memorial Museum, Altoona
May 28th, 2025

Dr. Ron W. Darbeau, Chancellor & Dean Penn State Altoona

The Challenge and Opportunity: After almost a century of relative decline, the railroad industry is experiencing growth because of its relative fuel efficiency, avoidance of increased highway congestion, relatively lower cost, and general safety and environmental record. To sustain this growth, the industry reports an acute need for focused engineering graduates to support the management and infrastructure needs of existing Class 1, Regional, and Short Line railroads and lead their modernization in passenger and freight.

The Solution: Penn State Altoona boasts of North America's only ABET-accredited Rail Transportation Engineering baccalaureate degree. It is supported by talented teaching and research faculty, dedicated staff, generous donors, and an Advisory Board of active and retired railroad executives from every aspect of the industry. The B.S. program provides students with a well-rounded engineering education that meets the evolving needs of industry while also preparing them for roles in leadership, government, research, and academia.

There are two significant differences between our RTE program and the offerings of other universities.

- It is the only ABET-Accredited undergraduate program in North America.
- It goes beyond track (location, construction, and maintenance) to cover railroad safety, operations, communications & signals, and rolling stock.

Responsive to industry needs, we're adding courses in locomotives and air brakes, and, this fall, a Minor in Rail Transportation Engineering for students wanting to complement their mechanical engineering, EMET, business, IST, or other degrees. We have a functional SD-60i locomotive as a living lab for our students to use and shortly will add a functional Tamper to our holdings to provide additional training. We are grateful to our partners at the Railroaders Memorial Museum for their collaboration in housing both units.

Our students intern and are employed in careers covering all facets of the railroad industry, including various railroad classes, engineering consulting firms, and manufacturing suppliers of the railroad industry. Program matriculants have come from 18 states. Although graduates relocate throughout the United States, many choose to stay in Pennsylvania.

Pennsylvania Senate Transportation Committee Meeting
The Railroaders' Memorial Museum, Altoona
May 28th, 2025
Dr. Ron W. Darbeau, Chancellor & Dean Penn State Altoona

All students take a Capstone Class to apply their knowledge and skills to real-world engineering design problems. Some examples of recent projects with local ties:

- Everett Railroad Expanded yard design: Design of new track alignments and associated engine house to increase the efficiency of the railroad operation.
- Industrial spur design: Design of a new track spur to an industrial facility to increase service.
- Norfolk Southern & RJ Corman Railroads: Transload design: Constructing a new transload facility and connecting track at the Cresson Wye and Yard to enhance operational efficiency and connectivity for RJ Corman Railroad, including embankment removal, bridge modifications, and redevelopment of the old engine service area.
- SEDA CoG:Restoring Passenger Service to State College: Analysis and feasibility of restoring passenger service to the State College area. Several track alignments were analyzed which connected the Norfolk Southern line at Tyrone to State College.
- Railroad Bridge Inspection Using Drones and AI: Use of drones and AI-inspection software to test the viability of railroad bridge inspections.

Innovative faculty research impacts the local economy through research expenditures, collaboration with local communities, and funded projects from the FRA and USDOT such as:

- CRISI led by Kansas State University Federal grant to establish Rural Railroad Safety Center at Kansas State University and CIAMTIS Region 3 UTC center led by Penn State University on multimodal transportation Center for Integrated Asset Management for Multimodal Transportation Infrastructure Systems).
- The USDOT/FRA grant for the creation of the Rail Center for Research Enhancing Short-Line Transportation (Rail CREST) to address the needs of rural short-line railroads in terms of research, knowledge transfer, and adaptation of technology.

  Rural railroads are concerned with the health of their infrastructure, representing a major expense in FRA-mandated routine inspections of track structures. To complement routine inspections, our RTE faculty are researching the development of a bridge-monitoring system that can alert inspectors to pending issues. Other areas of research include the use of Artificial Intelligence to inspect track structures, bridges, and switch alignments in yards.

Pennsylvania Senate Transportation Committee Meeting
The Railroaders' Memorial Museum, Altoona
May 28th, 2025
Dr. Ron W. Darbeau, Chancellor & Dean Penn State Altoona

Since its launch in 2012 with two students, the program has graduated 71 industry professionals, more than 90% of whom are retained in the industry. The number of majors has also increased by an order of magnitude. But we are not satisfied.

The last two years have seen a full-court press to enhance enrollment through donor-funded scholarships and focused recruitment, including search engine optimization. Our industry partners have generously provided internship opportunities, mentorships, guidance on program curriculum, and key infrastructure.

We are grateful to today's hosts, the Altoona Railroaders' Memorial Museum, for their vision and partnership, including:

- A Facility Use Agreement in which they house the SD-60i locomotive – regifted from Norfolk Southern
- Robust visioning and collaboration for moving our entire RTE program to this location. We are meeting to determine the buildout of the Roundhouse and related structures to support classrooms, teaching and research labs, conference spaces, etc. Penn State Altoona is committed to supporting the infrastructure to make the RMM not just the home of the RTE program but a hub for K-12 education and rail aficionados.
- Beyond the credit-bearing RTE program, we are collaborating with the RMM to build out space and infrastructure for a rail-focused workforce development program covering a wide range of needed skills in service to PA railroads. Among these are labs for multi-process electrode welding, Track and Grade-Crossing, Air Brake, Rail Car Locomotive, and Signal.

In closing, we have a unique program that uniquely serves a resurgent industry that is the backbone of the transportation ecosystem. For a decade, the program has shown steady growth and is poised for a quantum leap forward in partnership with the Museum and its Board, our Advisory Board, donors, industry partners, a talented, dedicated faculty and staff, and exceptional students who are aggressively sought after by employers.

Penn State Altoona, by the numbers: The campus currently has an enrollment of ~2,400 students – 67% are PA residents, 37% are first-generation, and 29% are Pell-eligible. 70% of our students enroll from Blair County with most of the remaining 30% coming from Bedford, Cambria, Huntingdon, and Somerset counties.

Pennsylvania Senate Transportation Committee Meeting
The Railroaders' Memorial Museum, Altoona
May 28th, 2025

Dr. Ron W. Darbeau, Chancellor & Dean Penn State Altoona

American Short Line and Regional Railroad Association

U.S. Department of Transportation
Federal Railroad Administration

Rail CREST

RAIL CENTER FOR RESEARCH ENHANCING SHORT-LINE TRANSPORTATION

Our vision

Rail CREST is expected to become the national leader in developing and transferring affordable, practical technologies that enhance the safety, efficiency, and sustainability of short-line and regional railroads.

By leveraging collaborative research, workforce development, and industry engagement, Rail CREST aims to serve as a trusted resource and innovation hub for advancing the performance and longevity of America's short-line rail network.

Expected Outcomes

Affordable technology solutions for infrastructure monitoring; Improved grade crossing safety through data-driven tools and designs; Innovative materials and methods for sustainable track and yard upgrades; Hands-on workforce training for both new hires and incumbent workers; Access to research findings tailored to short-line operational realities; Collaboration opportunities with universities and industry experts.

Contact us

Hai Huang, Ph.D., P.E. / huh16@psu.edu
216D Penn Building / Altoona, PA 16601