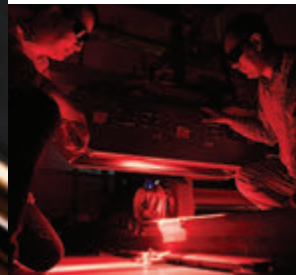
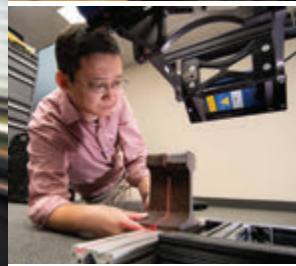
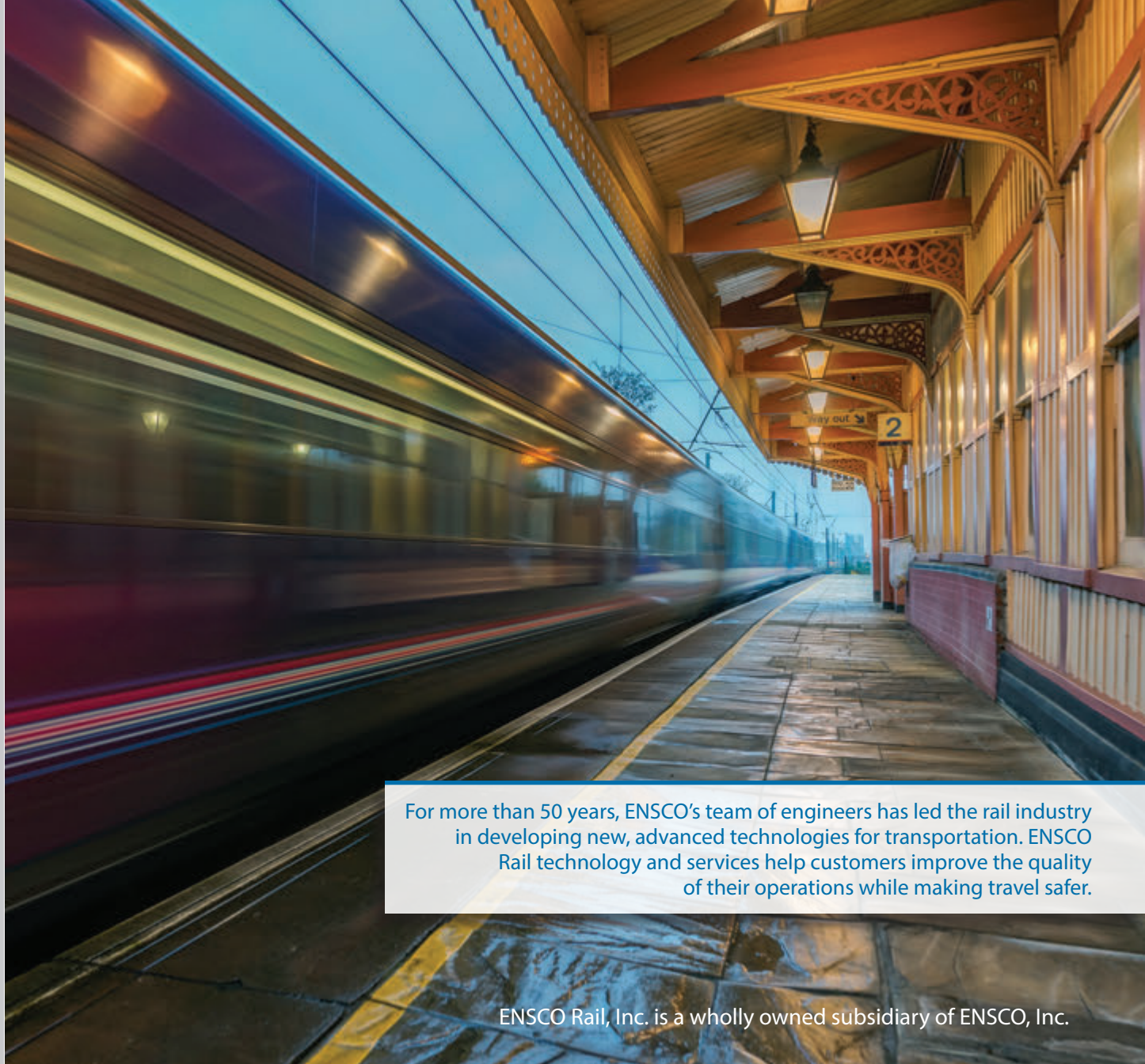


ENSCO Rail Careers and Culture Handbook
Get your career on track at ENSCO Rail





For more than 50 years, ENSCO's team of engineers has led the rail industry in developing new, advanced technologies for transportation. ENSCO Rail technology and services help customers improve the quality of their operations while making travel safer.

ENSCO Rail, Inc. is a wholly owned subsidiary of ENSCO, Inc.

Welcome to ENSCO Rail!

We're excited to tell you what we do and hope you consider joining our team!

Our purpose is to serve the public by delivering railroad safety efficiently.

Our approach is having the best people, products and services.

At ENSCO Rail, our people are our foundation. Over the past 50+ years, we've shot our way to become the world leader in railroad track inspection technology. Our people have the pride of knowing that their work enables their friends, family and community to have the safest railway transportation possible thanks to our cutting-edge technology.

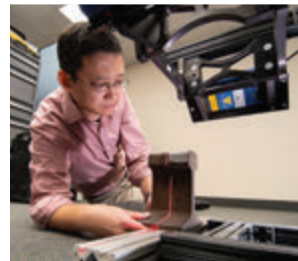
Our Purpose

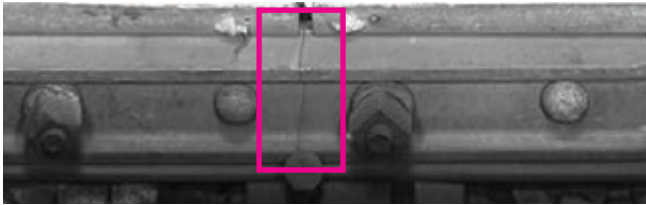
The call to action: On January 18, 2002, a freight train in Minot, North Dakota, derailed, carrying the hazardous material anhydrous ammonia. This is a key material in agriculture, without which farmers would struggle to produce the food needed for the nation. However, when anhydrous ammonia is spilled, it is toxic and a serious danger to the public. In this derailment, one person lost their life, 11 people were seriously injured and more than 300 people suffered minor injuries. At the derailment site, railcars were strewn across farmers' fields and leaked hazardous material was spilled out to the atmosphere and ground.

It was discovered that the cause of the derailment was a cracked joint bar. A joint bar is a bolted connection that connects two rails together. They can fail from a fatigue crack, which is a small crack that grows over time with repeated load cycles from the passing trains. These cracks are often extremely small and difficult to visually detect by a railroad track inspector. More information can be found at: <https://www.nts.gov/investigations/AccidentReports/Reports/RAR0401.pdf>



Aerial photo of the 2002 Minot train derailment caused by a broken joint bar

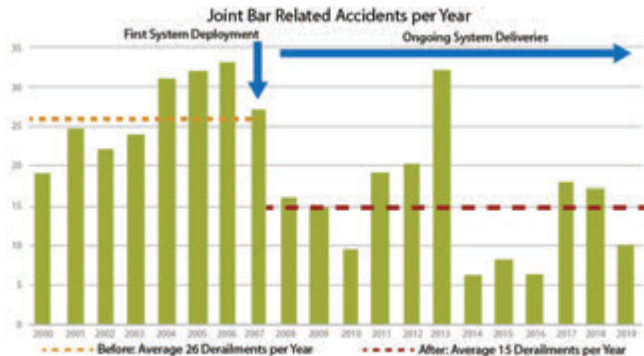




An example of a cracked joint bar detected by ENSCO Rail system

The ENSCO team rose to the challenge with support from the Federal Railroad Administration. We implemented a machine vision-based inspection system that uses linescan cameras and defect detection algorithms. Linescan cameras work similarly to a paper scanner, but instead of a scanner’s light bar scanning a piece of paper, the light bar is installed on a rail vehicle and scans the rails as it moves down the track. The result is high-resolution images. Next, we implemented machine vision algorithms to automatically detect the joint bar and any cracks in it.

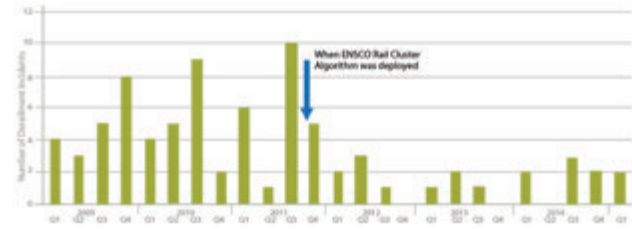
Since the deployment of the ENSCO Rail Joint Bar Imaging System following the 2002 derailment, there has been a significant decrease in broken joint bar derailments throughout the country. The graph below illustrates this dramatic dip.



Preventing Train Derailments with Software

Energized to continue to reduce train derailments to zero, we took on a challenge of data analytics. We looked at past derailments caused by the track failing and identified a specific pattern in the derailments that was still slipping through the cracks: there was not one major problem leading up to the derailment, but many small problems, all clustered at the same location.

We built an algorithm to detect the cluster pattern and report it to the railroad for repair before it causes a derailment. At first deployment, it detected a high severity cluster location, but within a few weeks a derailment occurred because the railroad was not able to correct the issue in time. However, since then, the railroad has aggressively corrected cluster sites, confident that the algorithm worked.



Transforming the industry: derailments dropped significantly after ENSCO Rail Cluster Algorithm was deployed

And ever since the algorithm’s deployment and the railroad’s subsequent track maintenance, we’ve seen a **significant drop in train derailments nationwide**. Our team was able to achieve great things by simply looking at the data in a different way — evaluating it critically and creatively in a way companies rarely have the freedom, support and resources to do. *This is the ENSCO spirit!*

Our People

We are a diverse and talented group from various backgrounds. We work together passionately and relentlessly to accomplish our goals.



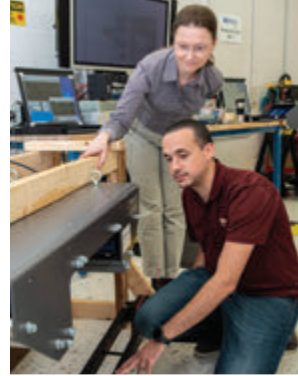
Our employees closely interact with multi-discipline engineering teams, allowing them to gain significant knowledge and to develop professionally. ENSCO Rail is comprised of the following groups:

- **Engineering**
 - Mechanical Group – Designs the mechanical hardware for our track inspection systems.
 - Electrical Group – Designs the electrical hardware for our track inspection systems.
 - Software Group – Builds software for data processing and user interfaces.
 - Signal Processing Group – Builds software algorithms to detect track defects in the measured data.
- **Production** – Builds the track inspection systems.
- **Project Management Group** – Organizes the design, construction and delivery of track inspection technologies.
- **Field Service** – Installs and provides after-sale support of the track inspection systems.
- **V/TI Monitor Product Group** – Responsible for sales, engineering, delivery and support of the Vehicle/Track Interaction (V/TI) Monitor product.

- **Data Management Product Group** – Responsible for sales, engineering, delivery and support of ENSCO cloud-hosted data management products.
- **Track Inspection Services Group** – Conducts track inspections as a service to Commercial customers by utilizing ENSCO track inspection systems via the ENSCO rail vehicle fleet.
- **Automated Track Inspection Program Group** – Conducts track inspections as a service to Federal customers by utilizing ENSCO track inspection systems via the ENSCO rail vehicle fleet.
- **Research and Development Group** – Conducts R&D in the areas of vehicle dynamics, track structure and instrumentation for Federal customers.
- **Vehicle Track Interaction Services Group** – Conducts R&D in the areas of vehicle dynamics, track structure and instrumentation for Commercial customers.
- **Business Development Group** – Leads business development, sales and marketing efforts for ENSCO Rail.
- **Administration Group** – Provides administrative support.

Key Aspects of our People

ENSCO Rail is proud of its progressive environment. We're dedicated to being an inclusive, diverse place to work. Our team members come from all professional, educational and cultural backgrounds, and we believe there is strength in our diversity. **Our team members include citizens of 17 different countries and ENSCO Rail is a member of the League of Railway Women.**



Meet an ENSCO Rail Team Member

"My name is Tarek Shalaby and I am a Project Manager at ENSCO Rail. I began my railroad career as an undergraduate researcher at Virginia Tech. I graduated in 2014 and joined ENSCO Rail as an Associate Mechanical Engineer. Given that ENSCO Rail is a smaller company, I was able to get involved in all different aspects of projects. These included design, drafting, analysis and even field work. The experience gained in these different areas has helped me grow professionally and diversify my skillset. The field work offered several opportunities to travel all over the world, which were all great experiences both personally and professionally.

Employees are encouraged to venture out of their regular duties and get involved in different areas, helping recruit new talent at university career fairs, assisting with proposals and business development, attending conferences and many others. ENSCO Rail encourages innovation, and even has dedicated programs for employees to work on relevant research projects of their choosing. There's also a generous education reimbursement program, which I have been utilizing since 2016 towards my master's degree. Not only was this option available to me, it was very much encouraged by my supervisors and upper management. I had always known that ENSCO encourages growth, given the number of people who have worked here for decades. However, I personally experienced that in 2018, when I was offered an opportunity to join the project management team and began leading the projects I used to work on as an engineer. With this move came a completely different and new set of experiences and challenges.

Although ENSCO Rail was my first employer out of college, my relatively short time here has already been a fulfilling and rewarding experience. I've been able to work on things I'm



passionate about, had my name on two patents (one awarded and one pending), gotten my master's degree supported, worked as both an engineer and a project manager and traveled to several countries. Every day is a new adventure, and I'm anxious to see what my future at ENSCO Rail has to offer."

A Great Place to Work

The ENSCO Rail culture is one that enables employees to bring their ideas and efforts to reality through collaborative teamwork and innovation. Getting down to zero train derailments is not easy, but on the ENSCO Rail team, it is fun and fulfilling beyond words.

We host an annual **Railroad Bootcamp**, a five-day lunchtime seminar that walks our staff through the railway issues we tackle, the technology we're developing and deploying and the impact we're making on railroad safety. The Railroad Bootcamp is recorded so new employees get a chance to learn as soon as they join ENSCO Rail.

We also hold **Innovation Friday**, which any employee is free to join. In this funded program, the last Friday afternoon of every month is set aside for members to work on any project they want, as long as it's relevant to ENSCO Rail. Innovation Friday allows associates to express their innovative ideas in a collaborative incubator environment. Since the start of Innovation Friday, four teams have converted their projects to internal R&D-funded projects and have generated two patents.

One Innovation Friday project currently underway is building an autonomous multicopter drone to navigate railroad tracks using machine vision algorithms. The algorithms see the track under the drone so that the drone always follows the direction of the track. This allows the drone to navigate the track in GPS-denied areas, such as tunnels and subways, or in locations where GPS-based maps are not available. This technology could be used to inspect for obstructions and track conditions in front of trains. The team has built the drone from scratch and conducted test flights, and will continue to develop the machine vision algorithms and more test flights. A great bonus to the team was they were able



Innovation Friday team building an autonomous drone



Completed autonomous drone built by Innovation Friday team

to apply for a patent of autonomous drone flight using the railroad track as navigation. The whole team was named in the patent.

Our Technology

ENSCO Rail utilizes the following key technology types:

- Laser Measurement Sensors
- Gyros and Accelerometers
- LiDAR Sensors
- Linescan and Area Scan Digital Cameras
- High Tech Signal Processing Methods
- Embedded Software
- Rich UI Software
- Amazon Web Services (AWS)
- Internet-of-Things (IoT) Technologies
- Deep Learning Machine Vision



5400 Port Royal Road
Springfield, Virginia 22151
1-800-ENSCO-VA (1-800-367-2682)
rail@ensco.com

Visit us at
ensco.com/rail