



 **AMTRAK**[®]
MECHANICAL SERVICES



California is one of many states that relies on Amtrak for service of its rolling stock.

“The work was done with a high degree of quality and dedication, and [we] were treated with the utmost professionalism and accommodation...The Department is looking forward to the prospect of similar work in the future.”

*— William Bronte, Chief, Division of Rail
California Department of Transportation*

NEARLY 50 MILLION PASSENGERS rely on equipment maintained by Amtrak each year. Commuters, business travelers and long-distance passengers, as well as the organizations that carry them, trust us to ensure their safety and comfort, and to provide their customers and the taxpayers with value for their money.

The Amtrak Mechanical Services team has forged a long-standing reputation for the highest quality passenger rail maintenance services and support. Using our efficient, industry-leading processes, we currently maintain more than 2,000 passenger cars of all varieties, locomotives and switcher locomotives. We also repair and refurbish various component assemblies used in both intercity and commuter rail service. Amtrak provides services to several commuter agencies and state partners including the Maryland Transit Administration (MTA), Sound Transit, the California Department of Transportation (Caltrans), the Capitol Corridor Joint Powers Authority (CCJPA) and Shore Line East (SLE). The knowledge, skill and commitment to quality of the Amtrak team are unparalleled in the passenger railroad industry.

We serve rail providers by building mutually beneficial, long-term relationships that provide the highest degree of customer service and value to our business partners. Over the past decade, Amtrak has made significant investments in technology and process improvements that create value for transportation providers by maximizing reliability, availability and cost efficiency.

PHYSICAL AND HUMAN CAPITAL

- Amtrak operates three major back shops located in Bear and Wilmington, Delaware, and Beech Grove, Indiana, encompassing almost 300 acres of facilities and over one million square feet of under-roof production space.
- More than 1,200 skilled mechanical personnel work in these three facilities, while another 3,500 personnel support day-to-day mechanical maintenance operations. Our Engineering, Standards and Compliance organization includes 150 highly skilled professionals.
- In addition to the major back shops, Amtrak provides maintenance services in 12 terminals and maintenance yards in nine other states across the country.

EQUIPMENT TYPES SERVICED

- Electric and diesel locomotives
- High-speed train sets
- Cab, passenger and food service cars
- Private rail cars

MANUFACTURER ROLLING STOCK PRODUCTS SERVICED

- Alstom
- Amerail
- Asea Brown Boveri
- Bombardier
- Budd
- Electro-Motive Diesel
- General Electric
- Kawasaki
- MotivePower
- Nippon Sharyo
- Pullman-Standard
- Sumitomo
- Talgo
- Wabtec



Careful preparation — like the residue grinding seen here — is the mark of skilled craftsmen such as this American Welding Society Certified Welder.

“As America’s railroad, we understand the need transportation agencies have to provide reliable service for passengers and a return on investment for taxpayers. The sole focus of our staff is to find innovative ways to meet these needs and expectations.”

— Mario Bergeron, Amtrak Chief Mechanical Officer



The Bear Car Shop specializes in repairs to single-level rolling stock.

Bear and Beech Grove also recondition or rebuild components such as this truck side frame.



ADVANCED SERVICE DELIVERY

MAINTENANCE PHILOSOPHY

Amtrak's maintenance philosophy is simple: we believe that equipment should be maintained in a manner that maximizes its reliability and availability for service, while minimizing maintenance costs. To do this, we have developed procedures and practices designed to maintain components before they fail, rather than on a periodic basis; this practice is known as Condition-Based Maintenance (CBM). Amtrak Mechanical Services is an industry leader in CBM. Using advanced evidence-based methods developed by the industry's foremost maintenance personnel, our staff of engineers, technicians and facilitators is able to eliminate costly and unnecessary maintenance procedures. Working with the OEM vendors, we determine specific component life cycles and work aggressively to ensure components are replaced before they fail. This enables the maintenance program to focus resources on truly essential maintenance tasks that provide value and ensure safety and regulatory compliance, while minimizing delay, disruption and shop time.

At the heart of our CBM approach is the proven engineering discipline of Reliability-Centered Maintenance (RCM). We use RCM to identify the right maintenance requirements at the right time. Using our cutting-edge RCM processes, which are based on those developed by the U.S. Navy, Amtrak can maximize equipment reliability and availability, while minimizing the operational and financial risks associated with equipment failures.

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LOCOMOTIVE OVERHAULS AND WRECK REPAIRS

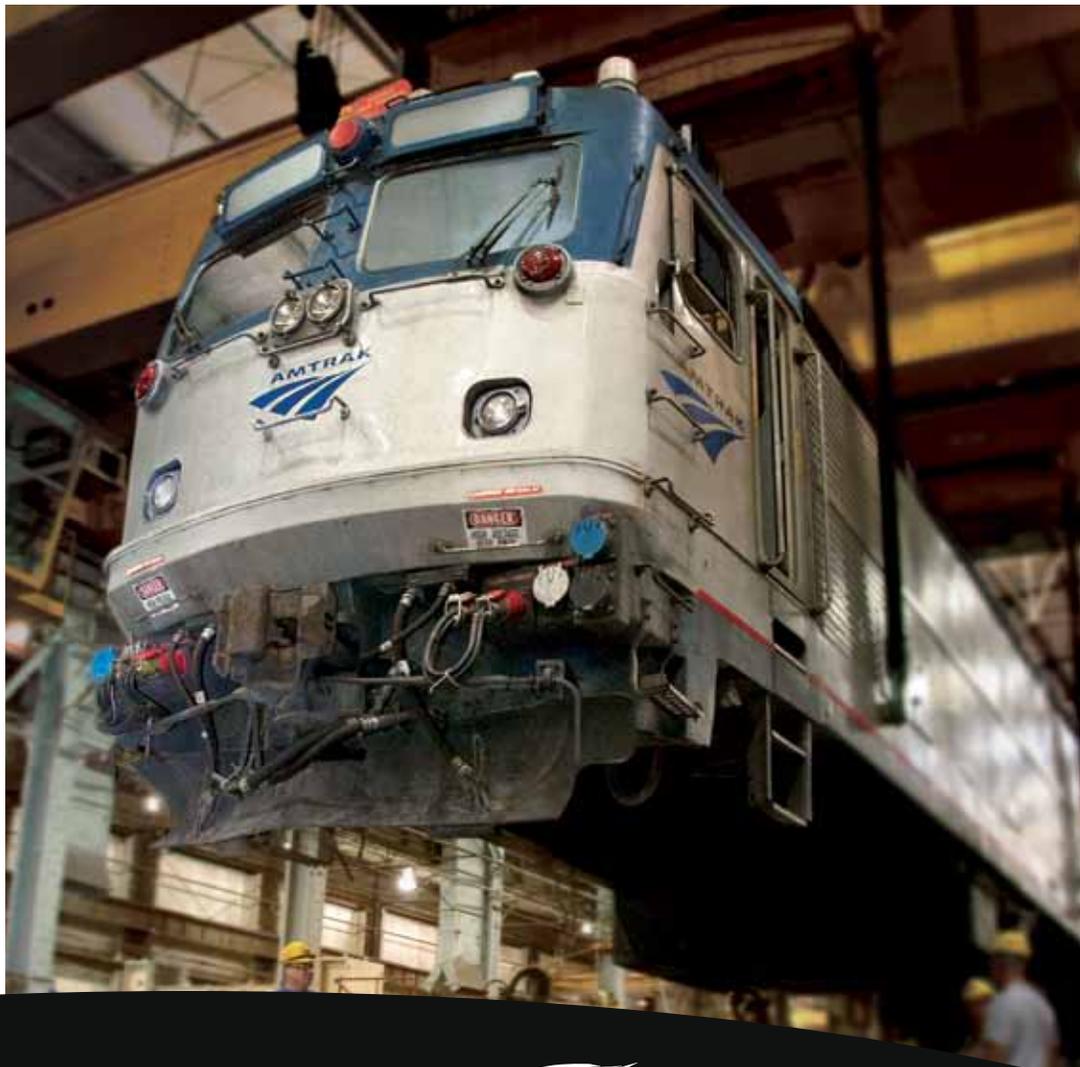
Amtrak performs major overhaul work on electric and diesel road and switcher locomotives. Our back shops provide the resources and craftsmanship to perform the highest quality work, ranging from basic maintenance to complete overhaul, rebuilding and wreck repair of all diesel and electric locomotive components and systems.

CAR OVERHAULS AND WRECK REPAIRS

Amtrak has established a three-tiered overhaul program based on data-driven life cycle analysis. These programs can be customized to meet specific customer requirements and cost targets:

- **Level I Overhaul** — The lightest overhaul includes complete rebuilding of trucks, HVAC units, brake valves, door operators and system critical components as well as heavy cleaning of carpeted surfaces and seat cushion replacement.
- **Level II Overhaul** — A Level I overhaul that also includes a complete replacement of all major components such as seats, diaphragms, windows and 480V trainline cabling.
- **Level III Overhaul** — A Level II overhaul in addition to a complete interior upgrade or reconfiguration, including bathroom modules and any required modifications.

Our electric locomotive shop in Wilmington is one of the very few back shops in America capable of overhauls and major repairs of electric locomotives.





Our Beech Grove and Bear facilities can maintain and remanufacture both tread and disc brakes for the full range of passenger equipment.

Amtrak has wheel shop capabilities at 11 locations nationwide.



AIR BRAKE SERVICES

At our two air brake shops in Beech Grove, IN, and Bear, DE, Amtrak can clean, rebuild and test almost all air brake valves thanks to the versatility provided by our modern automated test racks, AB test racks and 4C test racks. To provide additional value to customers, Amtrak has patented an automated tread brake and disc brake actuator test device that can simulate and test modern brake cylinders used on passenger equipment under service conditions.

HEATING, VENTILATION AND AIR CONDITIONING (HVAC)

Amtrak currently maintains several different types of HVAC systems found on rolling stock at our Beech Grove and Wilmington maintenance facilities. With the help of our experienced rolling stock engineering group, Amtrak has the ability to develop, troubleshoot, maintain and modify a variety of HVAC systems used on passenger rolling stock. This breadth of knowledge and experience brings a unique ability to not only maintain but also improve the reliability and performance of your HVAC systems. Amtrak can provide a "full-service" operation with the ability to design, modify and maintain HVAC systems for our customers. This experience and capability also provides a foundation for being able to adjust to changing requirements as different types of refrigerants are required by law.

WHEEL MAINTENANCE

Amtrak has 11 wheel shops located throughout the country, including two major AAR-certified wheel set fabrication shops located in Wilmington, DE, and Beech Grove, IN. These shops perform day-to-day maintenance and can machine wheels, axles and brake discs. These components can also be assembled into axle sets for passenger equipment. The Amtrak wheel shops produce over 14 different types of wheel sets for all varieties of rolling stock ranging from Heritage Budd built cars and Gallery Bi-level commuter cars to Amfleet inboard bearing wheel sets and the 52" diameter AEM-7 wheel set. Wheel sets are machined and fabricated to the strictest standards, thus ensuring the highest quality product for our customers.

SEAT REPAIR AND REPLACEMENT

Amtrak's state-of-the-art seat rebuild shop in Bear, DE, can completely rebuild an entire set of passenger car seats in a single day. This facility was designed with innovation in mind, from the ergonomic workbenches to the programmable logic controlled (PLC) automatic overhead track seat indexing conveyor. The seat shop can handle a wide variety of seat types and maintenance requirements.

ELECTRONIC TESTING AND MAINTENANCE

To ensure Amtrak is on the leading edge of advancing technology in the railroad industry, we have invested in a high-tech electronics shop at Wilmington capable of repairing or rebuilding the latest microprocessor-controlled devices to relay logic card technology. Our highly motivated, well-trained craftsmen are capable of finding innovative repair solutions for all types of equipment as well as the technically demanding maintenance required on the newest technology.

Amtrak developed a high-tech electronics shop capable of repairing or rebuilding the latest microprocessor-controlled devices to relay logic card technology.



Quality interiors contribute to passenger satisfaction — and quality work is the key to such vital components as seats, toilets, HVAC systems and other interior elements.

Bench testing of repaired electronic equipment ensures efficiency and reliable performance.





HVAC systems contribute significantly to customer satisfaction — and good maintenance assures great performance.

Mechanics at Beech Grove work on a diesel prime mover. Amtrak has extensive diesel overhaul facilities at Beech Grove, IN, and can also maintain diesel road locomotives and switchers at our Wilmington, DE, shops.



DAY-TO-DAY EQUIPMENT SERVICING

Amtrak offers the full range of mechanical services that are required by today's passenger railroads. We currently provide mechanical services for daily maintenance, turnaround and layover servicing, preventive maintenance and unscheduled defect maintenance for several commuter and state partners. Amtrak has an established history of working with agencies from conception and implementation through growth stages, working collaboratively to develop and implement maintenance practices that provide the highest value to our customers and the passengers who rely on them.

ROLLING STOCK ENGINEERING (RSE)

Amtrak can provide its partners with expert capabilities in all areas of specialized equipment engineering, design and maintenance process development. Our human and technological assets in this technical discipline can be applied to create added value for any railroad. The diverse specialists within the RSE group have more than 500 years of combined experience working with nearly every industry supplier. Unique to Amtrak is the broad spectrum of experience with leading-edge technologies such as Insulated Gate Bipolar Transistor (IGBT) and microprocessor controls, as well as a grounded knowledge base with older technology such as relay logic.

POSITIVE TRAIN CONTROL IMPLEMENTATION AND ADVISING

Over the last decade, Amtrak has established itself as a leader in Positive Train Control (PTC) — technology that ensures safety for passengers and employees. We have led the way in North America by designing, developing, installing and operating the first PTC system in high-speed territory in the United States. Amtrak's installation of the Advanced Civil Speed Enforcement System (ACSES) on the Northeast Corridor has set the benchmark for PTC technology. As the government-mandated implementation dates approach, we have the expertise to assist industry partners with any PTC implementation.

TYPE OF WORK	WILMINGTON	BEECH GROVE	BEAR
HVAC WORK	■	■	■
ELECTRIC LOCOMOTIVES	■		
DIESEL LOCOMOTIVES		■	
TRACTION MOTOR REPAIR	■	■	
WRECK REPAIR	■	■	■
PASSENGER CAR OVERHAUL		■	■
CAB CAR OVERHAUL		■	■
AIR BRAKE WORK		■	■
SEAT REMANUFACTURE			■
TREAD AND DISC BRAKE WORK		■	■
LIVERY		■	■
COMPONENT REPAIR AND REMANUFACTURE	■	■	■
TRUCK REPAIR	■	■	■
DINING CAR OVERHAUL		■	

• **Major maintenance facilities** (“w” indicates on-site wheel shop):

- Albany, NY (w)
- Boston, MA (w)
- New York, NY (w)
- Wilmington, DE (w)
- Washington, DC (w)
- Chicago, IL (w)
- Beech Grove, IN (w)
- Bear, DE
- Sanford, FL
- Hialeah, FL (w)
- New Haven, CT
- New Orleans, LA
- Seattle, WA (w)
- Oakland, CA (w)
- Los Angeles, CA (w)

All major facilities are capable of carrying out a spectrum of services ranging from mandatory inspections and periodic maintenance (PM) to heavy repairs and special projects. Those facilities with wheel shops can carry out wheel truing work, and our major equipment facilities are able to offer the whole range of electric, diesel and other rolling stock support services for rail customers.



Day-to-day maintenance includes more than just mechanical reliability — appearance and cleanliness send a message of reliability, pride and quality.

OTHER SERVICES OFFERED BY AMTRAK INCLUDE:

- **Root Cause Analysis** — Using our Predictive Maintenance technologies, we can diagnose the causes of chronic equipment problems and recommend maintenance remedies.
- **Continuous Maintenance** — This formal process streamlines the scheduling of preventive maintenance tasks, allowing for better equipment utilization.
- **Management Training** — Amtrak has developed effective facility supervisor training programs to increase operational effectiveness.
- **Equipment Painting and Trim Work** — Skilled craftsmen keep rolling stock looking its best, supporting a positive image and boosting passenger satisfaction levels.
- **HVAC and Restroom Care** — Maximize passenger comfort by ensuring climate control and toilet systems remain in proper working order.
- **Technical and Advisory Services** — Including oversight of other contracted mechanical services and technical field support.



These before-and-after photos of an Amtrak Horizon coach illustrate the quality and scope of Amtrak's ability to rebuild passenger railcars.

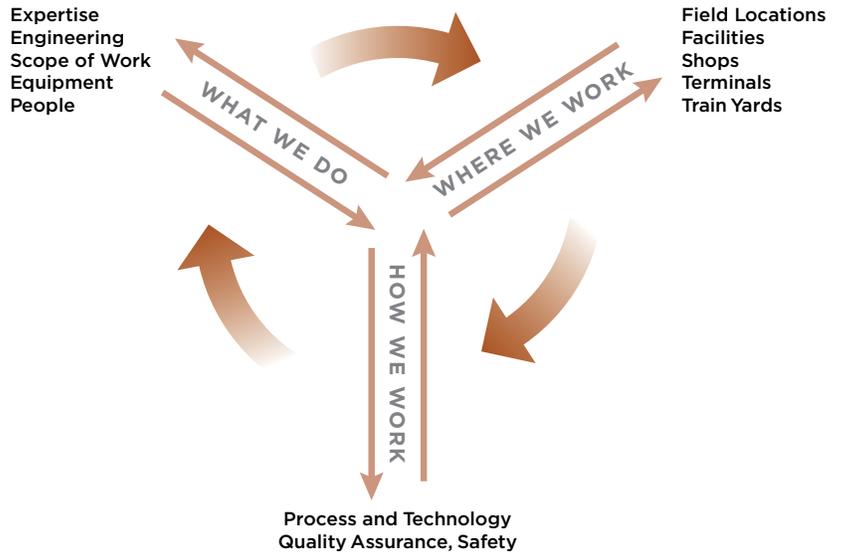


A HISTORY OF PROVEN PERFORMANCE

On a day-to-day basis, Amtrak maintains some 369 locomotives (both diesel and electric) and 1,384 pieces of rolling stock for daily Amtrak intercity service. Because of the length of our trips, and our daily, weekend and round-the-clock service profiles, Amtrak's equipment presents a unique maintenance challenge: our fleet is the hardest-run passenger fleet in the United States. In spite of the constant challenges imposed by the nature of our service (such as abbreviated turn times), Amtrak was able to avoid equipment-related departure delays 97.4% of the time in FY 2009.

We currently provide mechanical services to four commuter rail services and more than 250 privately owned railcars that are registered with Amtrak. These providers vary in size from those with fewer than one million riders, up to multi-million rider corridor operations; some are 79-mph diesel driven, while others operate electric equipment at speeds up to 125 mph.

AMTRAK MECHANICAL



AWARD-WINNING WORK

- International Innovation and Excellence Award from *Railway Interiors* magazine for "Refurbishment of the Year."
- Amtrak employees have won the Dr. Gary Burch Memorial Safety Award from the National Association of Railroad Passengers in nine of the last sixteen years.

ADVANCED TECHNOLOGY

Amtrak has a full range of technologies at its disposal to support its maintenance services. When combined with the expertise of our skilled craftsmen, these tools allow us to provide the results and cost reductions our customers demand. Selected technologies include:

- **Onboard Equipment Health Monitoring** — Critical system information is recorded and transmitted via satellite to predict and detect failures, allowing for faster repairs and troubleshooting.
- **Infrared and Acoustic Detection Equipment** — Quick troubleshooting of live electrical circuits allows us to find problems that would otherwise not be apparent. Catching problems before they become a failure is key to cost reduction and equipment availability.
- **ARGUS Wheel Measurement System** — Precise information allows wheel profiles to be maintained, extending wheel life, improving ride quality and reducing costs.
- **Ultrasonic Wheel Defect Detection** — Early detection of microscopic wheel defects and anomalies prevents problems before they occur.
- **Vibration Analysis** — Advanced sensors are used on rotating components.

ENVIRONMENTAL CONCERN

Amtrak has long made it a priority to reduce its environmental impact. At our mechanical facilities, we are constantly seeking new ways to recycle and reduce energy consumption. In an average year, Amtrak recycles approximately 7,200 tons of industrial materials, as well as 218,000 gallons of used oil.

- Metals such as scrap steel, used parts, cables and wire
- Batteries
- Foam from mattresses and seat cushions
- Polycarbonate windows

For more information, visit MechanicalServices.Amtrak.com or contact us at 1-888-920-6378



State-of-the-art facilities at our Ivy City shops support every kind of passenger rolling stock and operation.

Overhead crane capacity is a vital capability for heavy locomotive repair — and it's a capability you'll find at all three of our back shops.





Amtrak is proud to partner with the following organizations to provide mechanical services:

American Railway and Airway Supervisors Association, Maintenance of Equipment

International Association of Machinists and Aerospace Workers

International Brotherhood of Electrical Workers

International Brotherhood of Boilermakers and Blacksmiths

National Conference of Firemen and Oilers

Sheet Metal Workers' International Association

Transportation Communications International Union, Brotherhood Railway Carmen Division

Transport Workers Union of America, Railroad Division

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