

ENERPAC 

**HOW TO DRIVE
EFFICIENCY
IN THE RAIL
INDUSTRY**

WITH HYDRAULIC TOOLS

**THE RIGHT TOOL
MAKES ALL THE DIFFERENCE**

INTRODUCTION

Thank you for downloading our document.

In this guide we explore how hydraulic technology can be used effectively within the rail sector in the areas of rolling stock manufacturing, rolling stock maintenance, and track maintenance.

Throughout this document, we've provided detailed insights that highlight how Enerpac hydraulic tools can be used in these segments. We've highlighted tools for each area, and you will see that many tools offer the versatility for use in both manufacturing and maintenance areas.

Enjoy your reading, we hope it gives you an insight into how you can enhance your rail projects.

HOW TO DRIVE EFFICIENCY IN THE RAIL INDUSTRY WITH HYDRAULIC TOOLS

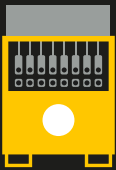
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ROLLING STOCK MANUFACTURING



In 2022 the Rolling Stock Market size was valued at

\$53.6bn



Manufacturers use hydraulic equipment to gain a competitive edge when assembling and handling rolling stock.

- ✦ Synchronous Multi-Point Lifting Systems
- ✦ Hydraulic Cylinders
- ✦ Hydraulic Pumps
- ✦ Hydraulic Turntables
- ✦ Hydraulic Torque Wrenches
- ✦ Hydraulic Presses
- ✦ Battery-Powered Machine Skates

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ROLLING STOCK MAINTENANCE



15-25% Combined Efficiency Gain

Was achieved in the rail sector through condition based and predictive maintenance

Hydraulic tools and equipment can make the toughest bolting and pulling jobs easier. E.g. complete overhauls and lifting railcars.

- Wheel and Bearing Pullers
- Hydraulic Cylinders
- Hydraulic Pumps
- Nut Splitters
- Hydraulic Gantries
- Lifting and Spreading Wedges
- Hydraulic Gantries
- Wheeled Lifting Jacks
- Custom Solutions



4

RAIL BRIDGE MAINTENANCE



More than

61,000

Class I bridges in the US

Rail bridge maintenance can require bolting tools, high-tonnage hydraulic cylinders, track tools, and cordless hydraulic pumps.

- Hydraulic Torque Wrenches
- Cordless Hydraulic Pumps
- Split Flow Hydraulic Manifolds
- Heavy Duty Impact Sockets
- High Tonnage Hydraulic Cylinders
- TL248 Track Lifting System



3

TRACK MAINTENANCE

140,000

The US freight rail network covers nearly **140,000 route miles.**

Track maintenance jobs can include rail stressing, track lifting, and checking that the track gauge and gaps meet industry standards.

- Rail Stressors & Pullers
- Track Jacks
- Nut Cutters
- Spring Frog Tester
- Portable Track Loading Fixture
- Diamond Lifting System
- Cordless Battery Pumps
- TL248 Track Lift System



**LEARN MORE.
CONTACT A RAIL SPECIALIST.**





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PART 1 **HYDRAULIC** **TOOLS FOR** **ROLLING STOCK** **MANUFACTURING**

Hydraulic tools and equipment can be used in many ways within a rolling stock manufacturing facility. Hydraulic presses shape metal components through bending, stamping, and deep drawing, while hydraulic lifts, platforms and multi point lifting systems aid in the precise positioning and assembly of large and heavy parts.

Smaller tools such as hydraulic cylinders enable controlled movement during assembly and along production lines, and hydraulic torque wrenches provide consistent high torque force needed for bolted fastenings. Let's look at each of these in more detail.



ENERPAC HYDRAULIC PRESSES

For many years, large heavy-duty hydraulic presses have formed body panels in the automotive and rail industries. These powerful machines enable the mass production of uniform and precisely shaped body panels, meeting the high-volume demands of the automotive and rail sectors.

The same working principle is used in smaller capacity presses, such as compact arbor presses, benchtop presses, workshop presses and H frame presses. These can be used in rail workshops, repair shops, or manufacturing facilities and offer portability and flexibility for optimum placement within a workspace.

The force capacity of these press types typically ranges from 10-ton to 200 tons, and typical applications are those requiring lower to medium force, such as bending, straightening, pressing, and punching.

MAX CAPACITIES

5 - 200 TONS | 45 - 1995 kN

ENERPAC HYDRAULIC TORQUE WRENCHES

Hydraulic Torque Wrenches are capable of providing precision and accuracy while generating high levels of torque. This makes them suitable for heavy-duty applications - especially on large fasteners that require significant torque. Repeatable precision is crucial in railcar manufacturing, where specific torque requirements are essential to ensure the integrity and safety of a bolted connection. Hydraulic torque wrenches excel in this area, which makes them ideal for assembling structural components, including the rail car frame, and body, or for attaching bogies or trucks to the chassis.

MAX TORQUE OUTPUT

1408 - 35000 ft/lbs | 45 - 1995 kN



HYDRAULIC TOOLS FOR ROLLING STOCK MANUFACTURING

PART 1

HYDRAULIC LIFTING EQUIPMENT FOR MANUFACTURERS

Hydraulic systems assist in critical operations that demand both strength and accuracy, ensuring the quality and structural integrity of the components. While many railcar manufacturing sites have lifting equipment permanently installed, there are other applications where other types are needed. Examples equipment and applications are summarized below.



ENERPAC HYDRAULIC CYLINDERS

In addition to their use within presses, hydraulic cylinders are used daily for a vast range of lifting, pushing, pulling, bending, and holding applications. Whether you require a compact 5-ton capacity low height cylinder for a tight clearance maintenance job, or something for a much bigger project, no matter the magnitude of force needed, there's a cylinder suitable for your high-force rail manufacturing application.

MAX CAPACITIES

5 – 1000 tons | 35 – 10644 kN

ENERPAC HYDRAULIC PUMPS

Hydraulic tools and cylinders need a source to provide hydraulic flow which is provided by a portable hydraulic pump. These can be manually operated, battery-powered, electric, or driven by compressed air (an air over hydraulic pump).

MANUAL | ELECTRIC | AIR | BATTERY



ENERPAC CONTROLLED LIFTING PUMPS

For larger multi-point lifts, controlled lifting pumps enable a single operator to control an entire lifting operation from a single device, without the need for manual monitoring of each lift point. An example application is using a synchronous lifting pump with high-tonnage hydraulic cylinders during the testing of new trains.

RESERVOIR CAPACITIES

578 – 15246 in³ | 10 – 150 l/min

MAX FLOW AT RATED PRESSURE

20 – 488 in³/min | 0.27 – 80 l/min





PART 2 **ROLLING STOCK** **MAINTENANCE**

Engineers responsible for maintaining rolling stock face very different challenges to those encountered by manufacturers. They may be expected to respond to failures and incidents (reactive maintenance) or carry out predictive or condition-based maintenance. Much of this work involves inspection, disassembly and reassembly of parts that have been exposed to years of service, sometimes seized, corroded, or damaged.

Minimizing downtime is key, so being equipped with reliable tools, detailed planning, and managing parts inventory are all crucial. Furthermore, ensuring vehicles meet safety requirements after years of operation and modifications is a constant challenge.

All these demands need to be met within the constraints of operational budgets, while at the same time ensuring the safety of workers and rail passengers is not compromised. Fortunately, the use of hydraulic equipment in rolling stock maintenance contributes towards more efficient, safe, and streamlined maintenance processes, ultimately ensuring the reliability and longevity of railway vehicles.

HEAVY LIFTING AND HANDLING

Hydraulic equipment and systems are invaluable for handling large or heavy parts such as a bogie or even a complete railcar. They assist in lifting, positioning, and securing these components, ensuring accurate placement and alignment.

Typical applications include using wheeled jacks when lifting a railcar for wheel and brake maintenance, or using a portable hydraulic gantry to lift a complete railcar from above. For moving materials and other loads around a workplace, manual and powered machine skates offer a great solution with minimal rolling resistance and protection for many floor types.

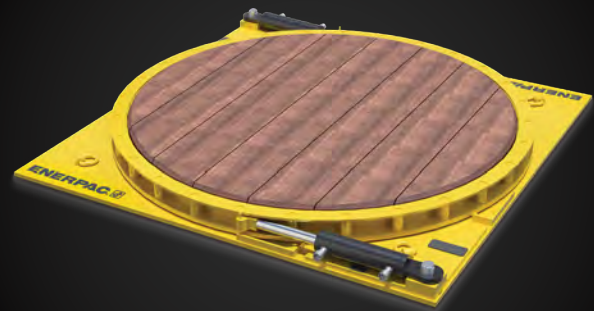


ENERPAC HYDRAULIC CYLINDERS

Hydraulic cylinders are the core components in many types of lifting equipment and tools; however, their versatility extends beyond lifting applications. A hydraulic cylinder can be used for a myriad of maintenance tasks that demand hydraulic force, for actions such as pushing, pulling, lifting, and spreading.

ENERPAC HYDRAULIC TURNTABLES

Hydraulic turntables are often used by specialist heavy lifting contractors and machine movers. However, they also offer an effective solution within the rail industry for maintenance teams needing to rotate large assemblies during an overhaul.



ENERPAC POW'R-RISER

Enerpac Pow'R-Risers are wheeled jacks that offer safe lifting and lowering of heavy loads. Their portability and rugged, fully enclosed frame without any exposed fittings makes them ideal for rolling stock maintenance applications. Choose from a wide range of tonnage capacities and models driven either by compressed air or an electric power source.



ENERPAC PULLING

Inevitably, during service, many rail parts become seized, corroded, or simply too difficult and heavy to separate with handheld tools. This is where hydraulic or mechanical pullers can help. They're generally safer to use than alternative methods, such as torching or hammering, and the combination of precise and synchronized jaw movement helps to avoid potential component damage caused by off-center pulling.

Use a hydraulic puller for removing shaft mounted items such as wheels, bearings, gears, sleeves, and sprockets. Capacities vary from small 1-ton mechanical pullers all the way up to 100-ton hydraulic pullers for removing wheels from a bogie assembly.

ENERPAC SPREADING

For creating space between components, such as wheels or couplings, hydraulic spreaders can be used to create gaps safely and evenly between parts to allow easier maintenance access. They're also used during lifting operations to increase the initial gap, allowing other equipment such as low height cylinders or load skates to be inserted.

ENERPAC CUTTING

During maintenance, repair or decommissioning, hydraulic cutters can be used to cut through nuts, bolts, cables, or hoses, or sheet metal. Powerful hydraulic force applied to sharp blades or jaws enables efficient and controlled cutting, therefore reducing the time and effort required for disassembly. Types of cutters include wire cutters, chain cutters, nut splitters, self-contained cutters, and cutter heads.



MAINTENANCE SETS

For maintenance teams, it can be advantageous to buy a complete set of tools in preparation for everyday and unexpected jobs.

These hydraulic tool sets are available in options to suit a variety of general force applications, and generally include a selection of hydraulic cylinders, a hand pump, spreader, hydraulic oil, and hoses. Component boxes are also available with the ancillaries needed to address common field issues.



ESSENTIAL PARTS SET

Convenient all-in-one component toolbox that includes everything a maintenance, repair, and operations technician needs to address the most common field issues. Packed with high-quality and reliable Enerpac components, compatible with the user's existing hydraulic tools, and ideal for handling unexpected needs onsite.

The industrial-strength aluminum container keeps everything organized and secure.

5-TON MRO TOOLBOX SET

Tailored specifically towards technicians requiring up to 5-tons of force for lifting and pushing jobs, this toolbox includes three 5-ton hydraulic cylinders with different heights for maximum versatility.

Also included are an Enerpac hand pump, wedge spreader, and all the essential components needed to get to work immediately.

The industrial-strength aluminum container keeps everything organized and secure.

10-TON MRO TOOLBOX SET

Multifunctional Enerpac 10-Ton Toolbox Set that enhances job-site performance by providing a convenient and portable solution for a vast range of jobs onsite.

Includes a 10-ton capacity general-purpose cylinder, two 10-ton low-height cylinders, a spread cylinder, and a 10-ton hollow plunger cylinder for pulling applications.

The industrial-strength aluminum container keeps everything organized and secure.

PART 3 TOOLS FOR TRACK & RAIL BRIDGE MAINTENANCE

Rail track maintenance presents many challenges such as wear and tear from constant train use, the effects of adverse weather conditions, aging infrastructure, and ballast maintenance to ensure track stability.



THE KEY CHALLENGES OF TRACK MAINTENANCE

WEAR AND TEAR

Rail tracks are subject to constant wear and tear due to the passage of trains, leading to issues such as rail corrugation, track deformation, and wear on the railhead. Regular maintenance is required to address these issues and ultimately to prevent accidents.

WEATHER IMPACT

Adverse weather conditions, such as extreme temperatures, heavy rainfall, and snow, can all affect rail tracks. Changes in temperature causes rail expansion or contraction, which can lead to track misalignment and stress. Additionally, unexpected severe weather events like flooding can damage tracks, requiring prompt maintenance.

INFRASTRUCTURE AGING

Many rail networks around the world have aging infrastructure. Tracks, rail bridges and tunnels require ongoing maintenance and, in some cases, extensive rehabilitation.

BALLAST MAINTENANCE

The ballast, the crushed stone layer beneath the tracks, provides stability and drainage. Over time, it can become compacted or contaminated, leading to reduced track stability and drainage issues. Ballast maintenance involves regular cleaning, replenishment, and proper compaction.

TRACK GEOMETRY

Maintaining the correct track geometry is crucial for safe and smooth train operations. Issues such as track misalignment, unevenness, and improper curvature can lead to increased wear on wheels and rails, affecting both safety and efficiency.

INSPECTION AND MONITORING

Regular inspection and monitoring of rail tracks are essential for identifying potential issues before they escalate. However, conducting comprehensive inspections across extensive rail networks can be time-consuming and challenging.

BUDGET CONSTRAINTS

Rail maintenance requires significant financial investment. Limited budgets can impact the ability to address all maintenance needs promptly, potentially leading to deferred maintenance and increased risks.

TRAFFIC DISRUPTIONS

Performing maintenance activities often requires temporary closures or slowdowns of rail traffic. Minimizing disruptions to train schedules while ensuring the safety of maintenance personnel is a constant challenge.

TECHNOLOGICAL ADVANCES

Keeping pace with technological advances in track maintenance equipment and methods can be challenging. Implementing new technologies requires investment and training for maintenance staff.

Given these challenges, maintenance teams need access to quality tools and equipment they can rely on to get the job right first time, while working efficiently and safely.



EXAMPLES OF HYDRAULIC TOOLS USED FOR TRACK MAINTENANCE



HYDRAULIC TRACK JACKS

For applications such as frogs, turn-outs, diamonds and concrete tie sections. Common features include overload protection, low handle effort, and an anti-kickback design.



MECHANICAL AND RATCHET TRACK JACKS

Mechanically operated track jacks incorporating multiple-tooth pawls and double-lever sockets for jacking in close quarters. Available as lever or crank operated.



NUT SPLITTERS

Hydraulic nut splitters and cutters are safer than alternative methods. It takes less time and avoids costly damage to joint components.



SPRING FROG TESTER

Inspection and maintenance kit for spring frogs or swing nose crossings. Allows the user to jack the frog, check tension, check the stops and measure the openings and gaps to verify they adhere to industry requirements and standards.



PORTABLE TRACK LOADING FIXTURE (PTLF)

Applies 4,000 lbs of lateral force to measure change in gauge while under load. Helps to verify track integrity in critical turnout areas.



RAIL STRESSOR

Used to adjust the gap between rail ends for rail stressing, rail welding, repairing rail failures and servicing insulators.



CORDLESS HYDRAULIC PUMPS

Battery driven power packs available in options for rail stressors and various hydraulic tools. High Performance, Zero Emission and featuring a Lithium-ion battery



THE CHALLENGES OF RAIL BRIDGE MAINTENANCE

In addition to tracks, railway bridges require regular maintenance to ensure safety, structural integrity, and optimal functionality. The specific parts of a railway bridge that may need maintenance may include:

PIERS AND ABUTMENTS

Regular inspection of piers and abutments is essential to identify any signs of deterioration, such as cracks or settlement. Repairs or reinforcements may be necessary.

FOUNDATIONS

The foundations supporting the bridge need inspection to ensure they are stable and not compromised by erosion or other factors.

BEARING PADS

Bearings provide flexibility and movement. Maintenance involves inspecting and replacing worn or damaged bearing pads.

EXPANSION JOINTS

These allow for the bridge to expand and contract with temperature changes and should be checked and maintained as needed.

BRIDGE DECK

Regular inspections of the deck surface are necessary to identify and repair any damage, such as cracks, spalling, or corrosion.

WATERPROOFING

Applying and maintaining waterproofing systems on the deck helps protect the bridge from water infiltration and corrosion of structural components.

PAINT AND COATINGS

Protective coatings on the bridge structure need regular inspection and maintenance to prevent corrosion and extend the lifespan of the components.

LIGHTING

If the bridge is equipped with lighting, regular checks and maintenance are required to ensure proper visibility and safety.

SIGNALS AND COMMUNICATION SYSTEMS

For movable or electrified bridges, the signals, communication systems, and other electrical components need regular inspection and maintenance.

APPROACH RAMPS AND EMBANKMENTS

These need inspection for stability and erosion, and any necessary repairs or reinforcements should be performed.

RAILINGS AND PARAPETS

Ensuring that railings and parapets are secure is crucial for the safety of pedestrians and vehicles passing under or over the bridge.



TOOLS FOR RAIL BRIDGE MAINTENANCE

PART 3

EXAMPLES OF HYDRAULIC TOOLS USED FOR RAIL BRIDGE MAINTENANCE



HYDRAULIC TORQUE WRENCHES

Provides high torque for bolted fastenings on track fixings, railings other and bridge components.



SPLIT FLOW MANIFOLDS

Allows multiple hydraulic connections at one central location to direct oil between the pump and multiple hydraulic cylinders.



NUT SPLITTERS

Powerful hand-held tools for removing corroded nuts without the need for torching or hammering.



HYDRAULIC CYLINDERS

Used to support the deck while inspecting and replacing worn or damaged bearing pads.



CORDLESS HYDRAULIC PUMPS

Ideal for use in remote locations without access to power. No electric or pneumatic power cords are needed so this reduces trip hazards.



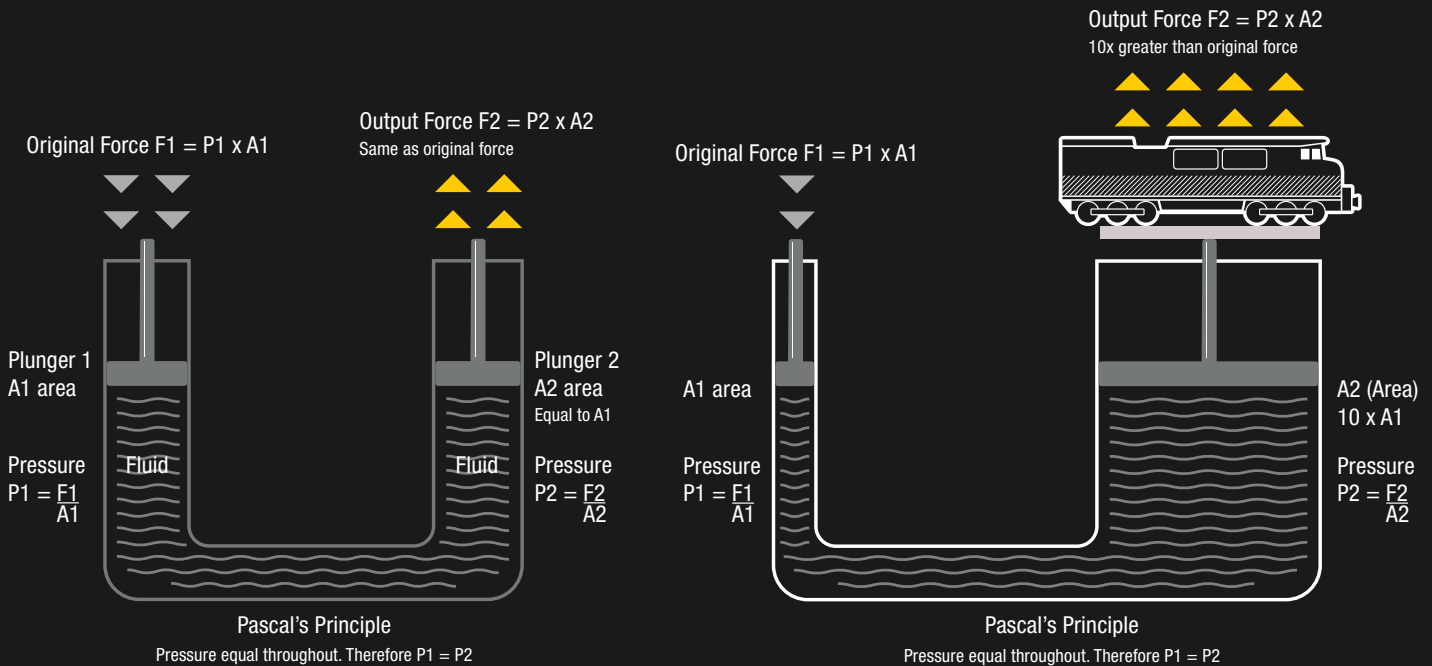
PART 4 **KEY BENEFITS** **OF HYDRAULIC** **TOOLS AND** **EQUIPMENT**



KEY BENEFITS OF HYDRAULIC TOOLS AND EQUIPMENT

PART 4

WHAT MAKES HYDRAULIC TOOLS AND SYSTEMS SO EFFECTIVE?



The inherent characteristics of hydraulics, rooted in fluid mechanics and engineering principles, contribute to their efficiency, reliability, and wide-ranging applicability in different industries, offering substantial advantages over alternative methods and systems.

HIGH POWER THROUGH FORCE MULTIPLICATION

Hydraulics use incompressible fluids to transmit force. Applying a relatively small force to a confined fluid generates a more substantial force at another point due to the principles of Pascal's law. (see fig 1 and fig 2 above). This force multiplication enables high power output, making hydraulics ideal for high force and heavy-duty applications.

WIDE RANGE OF APPLICATIONS

Hydraulic systems power a wide range of equipment and tools equipment such as cranes, forklifts, presses, and heavy machinery.

COMPACT AND LIGHTWEIGHT DESIGN

They often have a high power-to-weight ratio and a more compact design compared to other power transmission systems, making them more portable and easier to handle.

PRECISE CONTROL

Hydraulic systems provide precise control over speed and force, allowing for delicate and accurate operations. This level of control is essential in the various industries, especially the wind sector.

SAFETY

Hydraulic systems are designed with safety features that prevent sudden overloading and provide more controlled operations, reducing the risk of accidents. Hydraulic tools often provide a safer alternative to manual hammering, cutting, grinding, and torching.

DURABILITY AND LOW MAINTENANCE

Hydraulic systems are generally durable, reliable, and require less frequent maintenance compared to some alternatives. This robustness contributes to their long-term cost-effectiveness.

CONSTANT FORCE AND SPEED

Hydraulic tools offer constant force or speed even under varying loads, ensuring consistent performance regardless of the application's demands.

ADAPTABILITY TO AUTOMATION

Hydraulic systems can be easily integrated into automated processes, making them suitable for modern manufacturing and industrial automation. Examples include hydraulic cylinders designed to push, pull, lift, and lower.

CONCLUSION

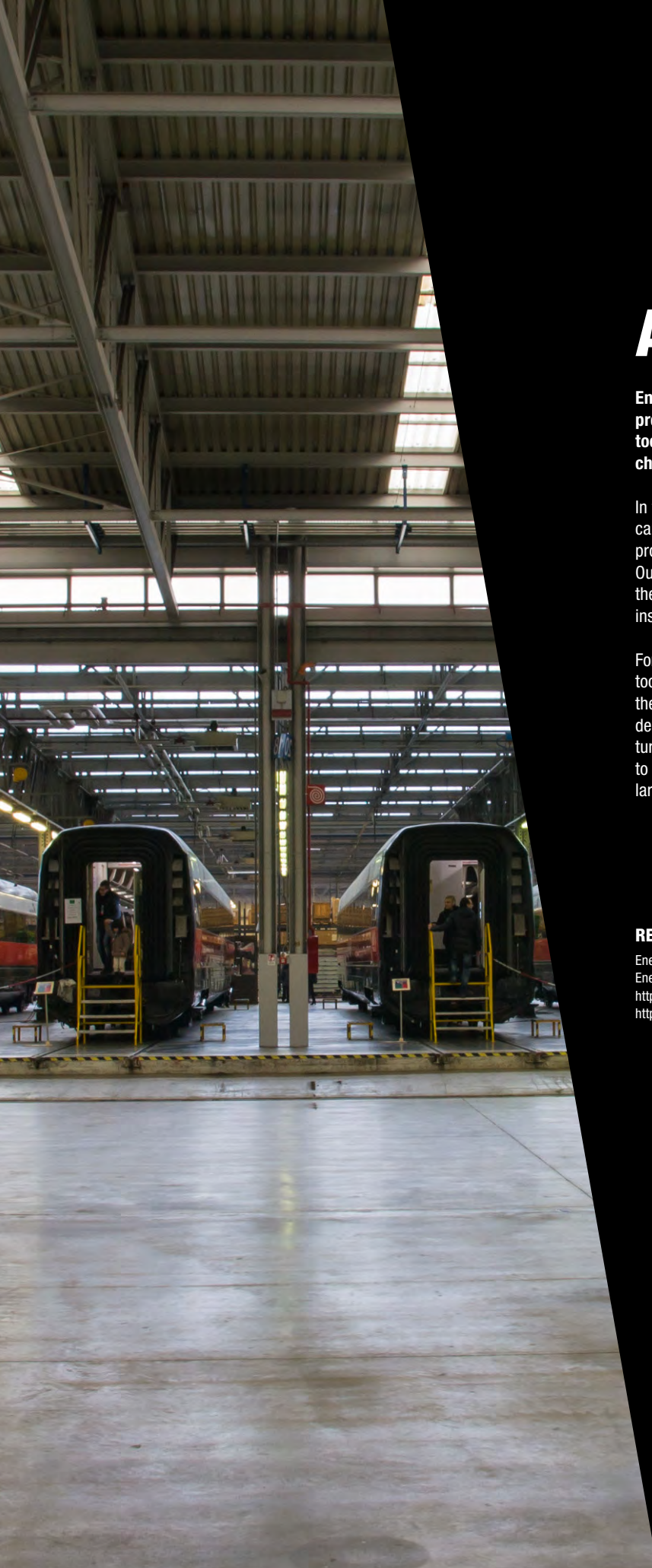
Hydraulic tools and equipment are pivotal in the rail industry, from manufacturing to maintenance. The force amplification through the principles of Pascal's law is a key driving force behind hydraulic systems. Leveraging incompressible fluids to transmit force, these systems apply a small force to generate a substantial force elsewhere, making them ideal for high-force and heavy-duty applications.

In rolling stock manufacturing, hydraulic presses shape metal components, and torque wrenches ensure secure bolted fastenings. Hydraulic cylinders and pumps enhance efficiency in controlled movement and assembly. In rolling stock maintenance, hydraulic pullers, spreaders, and cutters offer a safer and efficient alternative methods, minimizing downtime. Heavy lifting and handling equipment can streamline maintenance, addressing challenges in a cost-effective and safety-conscious manner.

For track and rail bridge maintenance, hydraulic tools provide solutions for tasks such as track geometry maintenance and lifting diamond crossings. The adoption of hydraulic track jacks, torque wrenches, and cordless hydraulic pumps ensures safety and functionality.

The efficiency, precision, and safety features of hydraulic tools make them indispensable in various industrial operations. Enerpac, a global leader in precision hydraulic tools, stands as a reliable partner in enhancing productivity, safety, and precision across the rail industry.





ABOUT ENERPAC

Enerpac Tools offer ultra-reliable quality, safety, and precision. As a global market leader in precision hydraulic tools, our products are trusted to perform in the most challenging and extreme conditions worldwide.

In the realm of manufacturing, we believe that our tools can significantly boost productivity, facilitating the profitable production of wind components on a large scale. Our equipment also serves as an asset for streamlining the transport and installation of wind turbines, reducing installation times, and enhancing the safety of your teams.

For wind turbine maintenance teams, Enerpac maintenance tools and solutions stand as the cornerstone for ensuring the safety and productivity of your technicians. Specifically designed to support even the tallest and most advanced wind turbines globally, our products provide the essential capabilities to lift, move, secure, disassemble, and maintain the world's largest wind turbines with absolute safety and precision.

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