

INNOVATION.
NOT DUPLICATION.™



HE PARTS
INTERNATIONAL

**BIRRANA™ ENHANCED
WHEEL GROUPS**

DIVISION OVERVIEW

H-E Parts International Mining Solutions (H-E Parts), is the leading independent supplier of replacement parts and components for haul trucks, electric shovels, hydraulic excavators and support equipment to the global mining industry. At H-E Parts, we pride ourselves on providing complete drivetrain solutions for industrial heavy equipment in the mining industry.

OUR MISSION AND CUSTOMER PROMISE

Our mission is to supply customers with the highest quality replacement parts, components and services that improve lifecycle performance and lower costs. We will deliver a superior alternative, by providing innovative engineered solutions designed to support mine and industrial maintenance professionals. Our aim is to provide the best customer service through an empowered, talented and responsive team. We will provide a safe, productive, supportive workplace that attracts and retains the best employees possible.

CORPORATE OVERVIEW

H-E Parts is a leading independent supplier of parts, remanufactured components and equipment to the global mining, quarrying, heavy construction, and energy sectors.

H-E Parts is comprised of the following divisions:

- Mining Solutions – Complete drivetrain solutions
- Crushing Solutions – Crusher liner development, parts and wear product solutions
- Engine Solutions – Diesel engine remanufacturing and service solutions

Our divisions offer solutions in support of mobile surface mining equipment, fixed crushing and minerals processing equipment and mobile construction equipment fleets.

At H-E Parts, we provide our customers with a superior alternative to many of the traditional OEM channels by responsively delivering innovative solutions that reward the customer with the lowest total cost of ownership.

SAFETY

At H-E Parts, one of our core values is that we will not compromise accident and injury prevention, or environmental compliance for profit or production.

We are working towards creating safety excellence, not just focusing on preventing accidents and as such concentrate on what goes right, not just what goes wrong.

Our “See You Tomorrow” philosophy is underpinned by a set of beliefs, behaviors and key safety promises that drive positive safety outcomes.

QUALITY

H-E Parts places priority on quality to ensure we meet or exceed clients’ expectations in design, products, services, and solutions globally.

Quality and compliance is an integral part of what we do at H-E Parts, and as such, we regularly review and improve our policies and practices to reflect this.

BIRRANA™ PRODUCT ENGINEERING

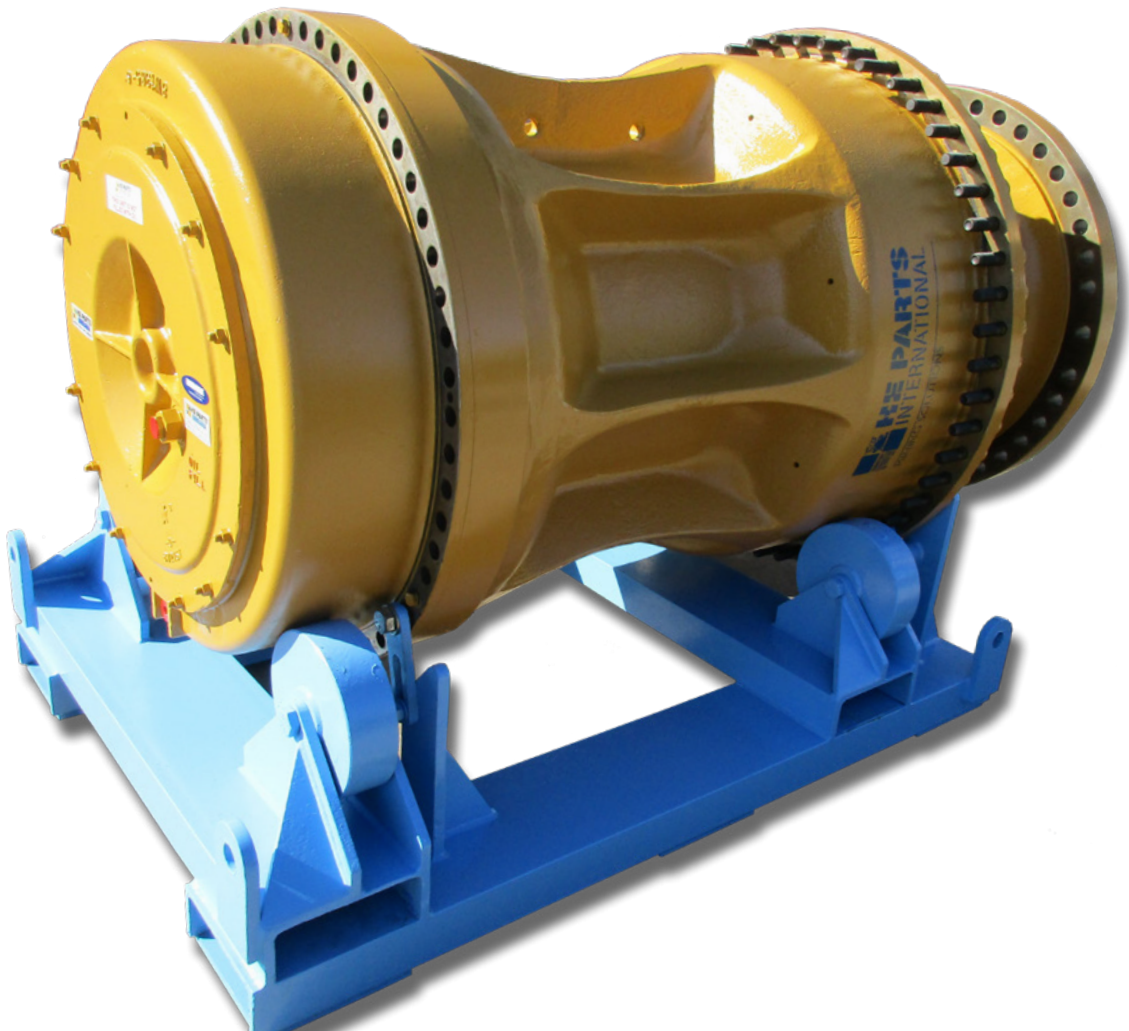
For many decades the Birrana™ brand has been synonymous with product innovation and service excellence. The Birrana™ brand was originally formed as a race car manufacturer before evolving into the Mining industry with a strategic focus on the redesign and upgrading of major components for heavy mobile equipment operating at mine sites globally.

FOCUS ON INNOVATION

The Birrana™ product line has a consistent record of creating proprietary processes and application specific components that improve service life and machine availability. Some of H-E Parts innovations under the Birrana™ brand include:

- Planetary and brake redesigns
- Underground drive axle design and manufacture
- Gearing, differential, final drive and other major component design and re-manufacture
- Mechanical drive wheel group redesign and manufacturing
- Birrana™ oil sample plugs and brake wear gauges
- Electric drive wheel group redesign and manufacturing
- Suspensions systems and associated Birrana™ collated pins

Backed by a dedicated engineering Center of Excellence based in Adelaide, Australia, H-E Parts is able to ensure our global re-manufacturing and distribution centers adhere to global best practices and are supported with the latest technical advancements. This allows re-manufacturing of components back to zero hour life and lets our customers benefit from extended component life, increased ease of maintenance and superior performance.



BIRRANA™ FRONT WHEEL GROUP

Innovative sealing solutions for longer life. Separates Cooling and Braking Oils.

Birrana™ Control Fit System Includes

- Proprietary Hub and Spindle Repair Process
- Custom Bearings
- Flexible Spacer

Engineered repair and refurbishment of major components keep rebuilds economical while providing excellent reliability.

Birrana™ BEST plugs and oil sampling plugs for rapid spill-free condition monitoring

BIRRANA™ FRONT CORNER GROUP

Proprietary engineering standards of major components keep remanufacturing costs economical.

MECHANICAL DRIVE REAR WHEEL GROUP

Birrana™ Brake Wear Gauge

- Easy and fast brake wear measurement.
- Reduced down time.
- Prevent oil spills and contamination.
- Improve safety.

High performance, long lasting brake components.

Birrana™ plugs (BEST plugs) facilitate rapid magnetic plug monitoring without oil spills and reduces truck down time.

Engineered repairs and re-manufacturing of major components keep rebuilds economical while providing excellent reliability.

Birrana™ Control Fit System

- Extends wheel-group component life, increasing equipment availability.
- Maintains wheel bearing preload for entire component life.
- Lengthens maintenance cycles.

ELECTRIC WHEEL MOTOR

Proprietary parts provide improved service life and performance.

Engineered repairs to major components provide excellent reliability.

Long life bearing and gearing solutions.

BIRRANA™ WHEEL GROUP INNOVATIONS

IMPROVED PERFORMANCE THROUGH INNOVATIVE ENGINEERING

The Birrana™ brand stands for unparalleled expertise in the design, manufacture and rebuild of brakes, final drives, differentials, axles and suspension systems for Caterpillar and Komatsu mobile mining equipment. Birrana™ mobile mining innovations are now available globally.

Our core business is remanufacturing and improving wheel groups for Caterpillar and Komatsu mobile mining equipment. In order to achieve these improvements, our team utilizes Birrana™ technology, including;

The Birrana™ Control Fit wheel bearing set up, which includes:

- Flexible spacer
- Hardened spacer
- Proprietary:
 - Bearing design and specification
 - Bearing fits
 - Preload adjustment

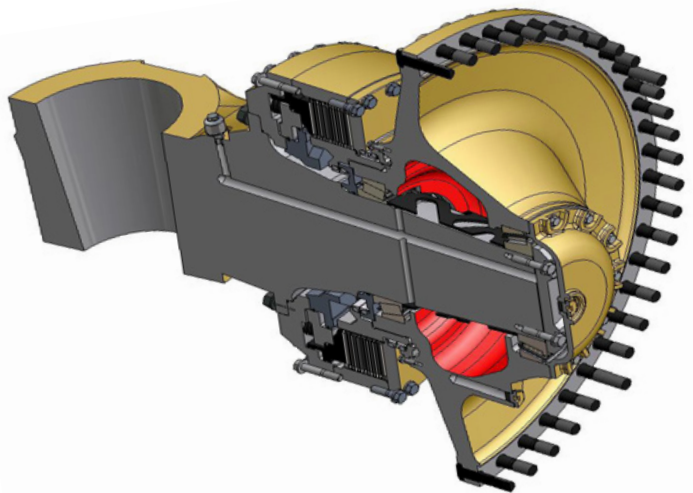
While proprietary Birrana™ contamination control includes:

- Isolation seal
- Contamination guards and contamination control to reduce wheel bearing contamination.

Other offerings include:

- Gear design and manufacture

At H-E Parts, we are committed to continuous improvement in our Birrana™ wheel group innovations through a dedication to improving performance, reducing cost per hour and on time deliveries to minimize downtime for our customers.



BIRRANA™ INNOVATIONS



BIRRANA™ OIL SAMPLE PLUGS

The BEST™ plug is a small and easy to install component for wheel groups and differentials which offers customers a reliable, safe and convenient option when checking for contamination. When checking the magnetic plug condition for a component, it automatically seals the compartment on the removal of the plug, ensuring no oil contamination occurs. This means that a magnetic plug check can be done without any personal danger or risk to the environment.

The Birrana™ BEST plug works to:

- Improve safety
- Eliminate oil spills
- Control draining
- Reduce downtime
- Encourage regular checking of all component magnetic plugs

BIRRANA™ INNOVATIONS

BRAKE WEAR GAUGE

The Birrana™ brake wear gauge is used to measure brake wear by informing the user as to how much of the brake life remains. The Birrana™ brake wear gauge is installed during a brake rebuild and stays in the wheel group to make testing convenient and safe. One direct measurement is all that is required to determine brake pack wear. Brake bleeding, which is considered an arduous and lengthy task, is no longer required following measurements as the hydraulic circuit does not need to be interrupted in order to use the tool to measure brake wear.

Additional benefits to the Birrana™ brake wear gauge are:

- The elimination of oil spills that can lead to safety issues
- Improve brake life monitoring and change out planning
- Improved accuracy and repeatability of brake wear measurements
- Allows maintenance plans to be made with confidence
- Prevents any safety issues from poorly bled brakes due to measuring brake wear
- Prevents repeated hydraulic bleeding and truck down time after brake wear is measured

EASY TO INSTALL AND USE

To measure brake wear using the Birrana™ brake wear gauge, simply remove the protective cap, push the indicator inwards, and immediately see how much brake life remains. As the brake wear gauge is already installed, the testing process is quick and accurate. Once the truck is parked, one person can perform the measurement procedure for all four brakes in around 10 minutes.



H-E PARTS PART NUMBER	TO SUIT	SLEEVE COLOUR
A11250 A8720	Brake Wear Gauge 793EL Front Brake Wear Gauge 777D Rear	Black
A8727	Brake Wear Gauge 789 Rear	Gold
A8728	Brake Wear Gauge 785R/793F Brake Wear Gauge 793 EL Rear	Blue
A8729 A10365	Brake Wear Gauge 777R/789F Brake Wear Gauge 793EL Rear	Purple
A8730	Brake Wear Gauge 785 Front	Red
A11200 A8093	Brake Wear Gauge 777F Rear Brake Wear Gauge 793 Rear	Clear
A11870	Brake Wear Gauge 777F - Bleeder	Clear



BIRRANA™ CONTROL FIT WHEEL BEARING SET UP

1 CONTAMINATION GUARD

Designed for rear wheel groups, this assembly consists of a series of 'super magnets' positioned inside the end of the wheel hub and two metal plates that are attached to the anchor gear and wheel hub. The super magnets collect wear debris out of the oil and the plates form a labyrinth arrangement. The labyrinth arrangement allows oil to pass but keeps any wear particles generated in the planetaries away from the wheel bearings.

2 BIRRANA™ HARDENED SPACER

The hardened spacer is splined to the spindle to prevent movement and provides a hard surface behind the outer bearing cone in the rear wheel groups. The hardened spacer has an anti-fretting surface treatment and minimizes wear or fretting on the anchor gear. This reduces the likelihood of wear particle contamination and maintains bearing pre-load while improving the overall wheel bearing life.

3 BIRRANA™ PROPRIETARY BEARING DESIGN AND SPECIFICATION

Birrana™ wheel bearings are made from premium clean steel for long fatigue life. Superior surface finishes are employed where required to reduce the incidence of thin film lubrication and increase bearing life. Additionally, in critical applications, special heat treatments are specified to provide significant debris resistance, while modified profiles on rollers and races prevent premature bearing failure by reducing stress concentrations under load.

H-E Parts bearings are also designed using:

- Textured rollers that further improve oil film thickness
- Surface treatments that provide debris resistance
- Crowning that distributes load more evenly

4 WHEEL BEARING PRE-LOAD

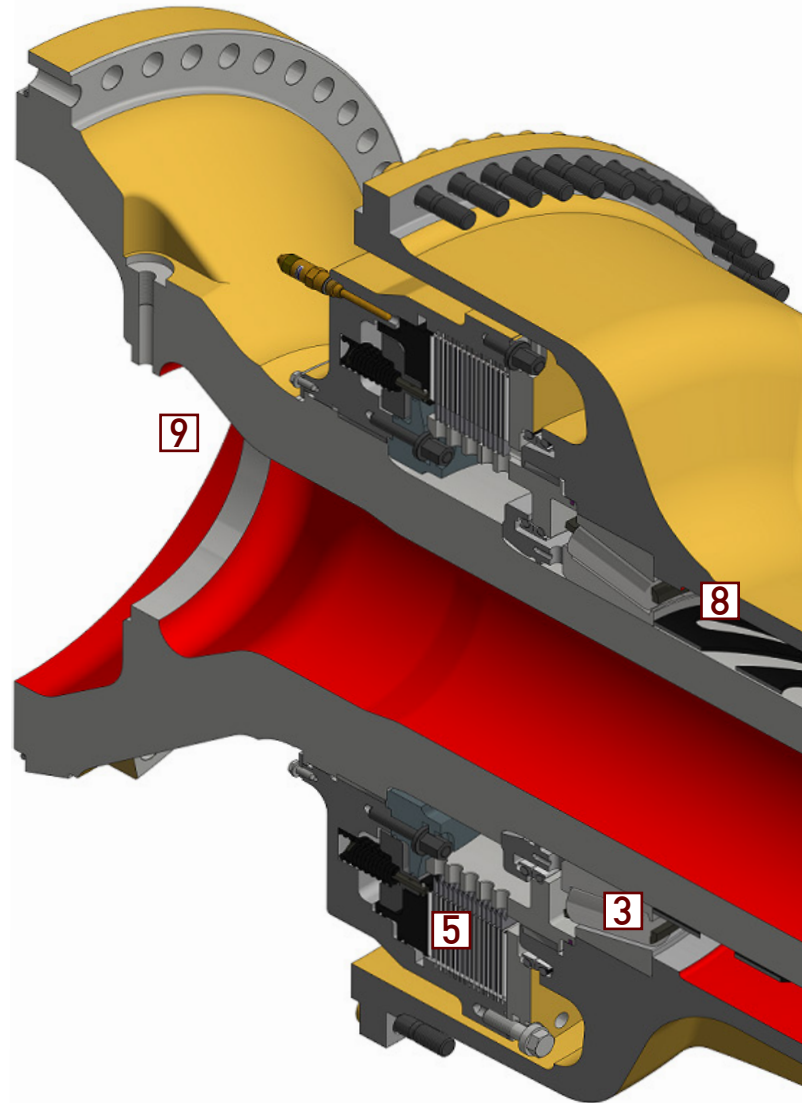
Incorrect bearing pre-load setting is a common cause of premature wheel bearing failure. Birrana™ has a proprietary wheel bearing pre-load setting process that is accurate, reliable and repeatable. It is not affected by inconsistencies in bolt torques, bearing fits or housing dimensions.

Wheel bearings can only achieve their full potential life if pre-load is set correctly and maintained for the life of the bearing. Excessive pre-load and loss of pre-load are known causes of early bearing failure.

5 CARBON FRICTION DISCS

H-E Parts supply high-performance carbon friction discs with outstanding heat dissipation and resistance. These high-performance components have been engineered for extreme applications and provide longer service life and better heat resistance. The carbon plates give customers the opportunity to better match brake life to wheel-end life.

All brake friction discs are soaked in recirculating, filtered oil for 8 hours prior to brake assembly. Brake units are pressure tested using proprietary tooling to ensure the customer has no issues once received.



BIRRANA™ CONTAMINATION CONTROL

6 THICKER FRET RESISTANT RETAINER PLATE

Birrana™ retainer plates are available for select front and rear wheel groups. They are thicker than the OEM plates with countersunk bolt holes. Plates for front wheel groups also have a larger outer diameter which increases the contact area for the outer bearing cone.

Birrana™ retainer plates:

- Are hard with anti-fretting surface treatment
- Reduce wear or fretting on the retainer plate
- Ensure bearing preload is maintained
- Ensure wheel bearing life is improved

7 GEAR DESIGN AND MANUFACTURE

Gears and cutters are designed with crowning and tooth tip and root profile modifications as required to improve tooth bending strength, eliminate interference, and optimize tooth contact under load. H-E Parts proprietary designed software developed in-house is used for determining gear geometry and calculating gear rating/capacity to ensure the gears are manufactured to the highest required specifications.

Gear ratings are based on real-world field performance and bending and rolling/sliding contact fatigue test data for real world materials. Finite Element Analysis is used to model the stresses in all components to ensure acceptable fatigue life.

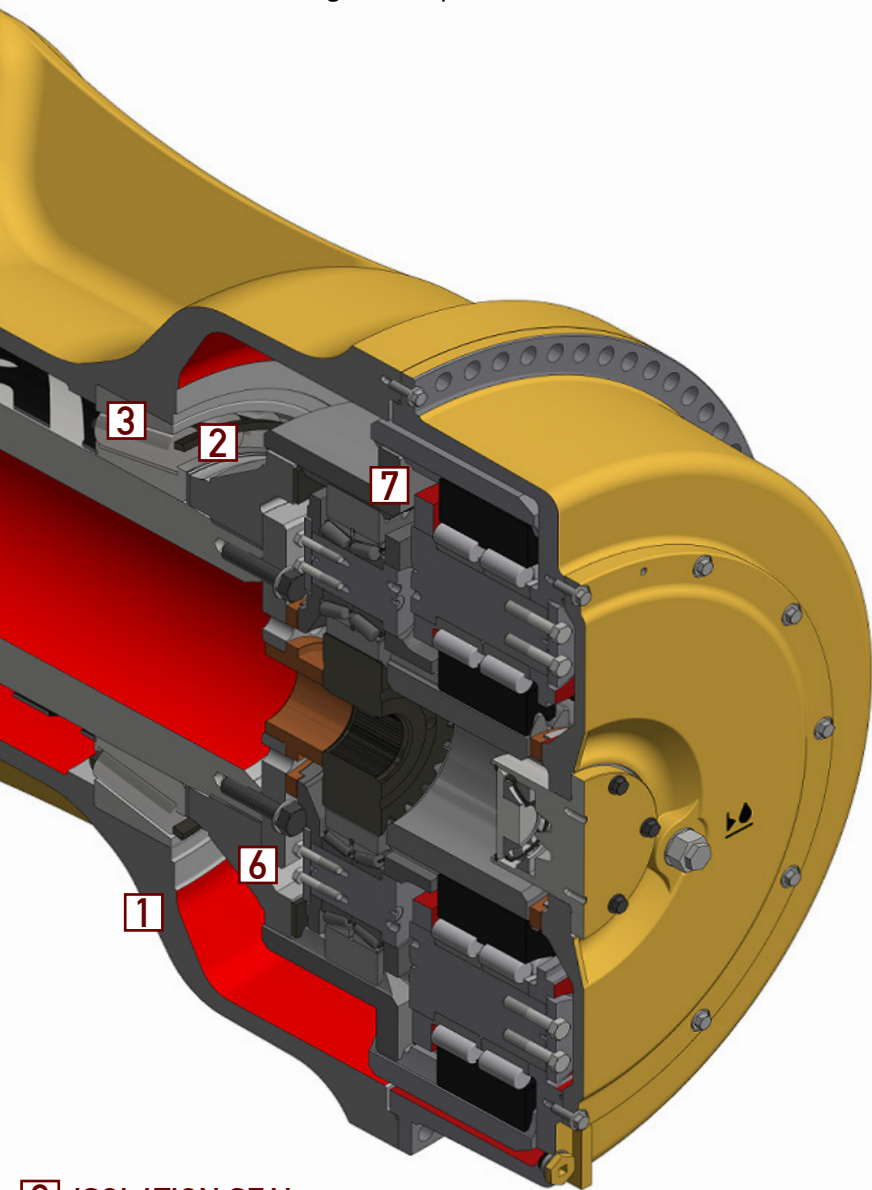
8 BIRRANA™ FLEXIBLE SPACER

The Birrana™ flexible spacer is available for both front and rear wheel groups. It fits over the spindle in between the wheel bearing cones and acts as a spring to provide a lateral clamp force on the bearing cones. This assists in preventing cone rotation on the spindle and reduces associated wear. Use of the Birrana™ flexible spacer means bearing pre-load is maintained and wheel bearing life is improved.

9 ISOLATION SEAL

When fitted to both wheel groups the isolation seals effectively divide the rear axle into three separate compartments. This separation eliminates cross contamination between the wheel groups and the differential. A failure in an axle compartment is confined to that compartment and will not damage the rest of the driveline components.

The separation allows oil samples and magnetic plug samples to be more meaningful as they reflect the condition of the sampled compartment only. Used in rear wheel groups, the isolation seal assembly is fitted to the inside of the spindle and has a rotating section that seals on the half shaft.



WHEEL GROUP REPAIRS

WHEEL GROUP REPAIRS

Repairing components rather than replacing with new can provide significant cost savings. H-E Parts offers complete refurbished wheel groups for front and rear wheel groups. Innovative upgrades and continuous improvements to the product performance have proven to lower cost per ton and keep equipment running longer. Repair processes are carefully designed to produce a reliable component which in some cases has superior properties to the original e.g. wear resistance or fatigue life. H-E Parts has expertise and experience in welding, heat treatment, metallurgy, spline cutting, and general machining.

COMPONENT RE-USE

H-E Parts, globally, conforms to strict guidelines on appropriate criteria for re-use of components to maximize useful life without sacrificing reliability. Gears and other critical components are routinely inspected for re-use on a nation-wide basis using appropriate means including magnetic particle inspection for cracks. H-E Parts technicians and engineers are skilled and experienced in failure investigation and analysis procedures.

WHEEL GROUP REMANUFACTURE

H-E Parts has specialist facilities globally for the complete re-manufacture of wheel groups. In most cases, our proprietary methods allow severely distressed components to be re-manufactured, often better than new. Complete control of the rebuild process, tight standards, high performance components and special innovations provide increased wheel group reliability.

Rear and front hub refurbishment – optional high strength flanges can be fitted to most hubs and many cracking and mechanical damage can be repaired. We can even replace the worn internal splines in some wheel hubs.

Rear and front spindle refurbishment – option of WAS or HVOF bearing journals and spline replacement, bolt hole replacement and crack repair.

Refurbished planet carriers – stronger replacement primary carrier spline. Refurbishing cuts cost and upgrades increase component performance.

All component repairs carry high level warranties, reflecting our commitment to our customers and our confidence in the performance of our products.



WHEEL GROUP SERVICE EXCHANGE

At H-E Parts, we work to achieve minimal downtime for our customers by stocking an extensive range of service exchange products, including sub assembly components, while offering a repair and return service which is backed by a large range of our own proprietary and standardized parts. This gives us the ability to provide a rapid turnaround, regardless of external market influences on spare parts at any given time. Our transport frames are designed to meet appropriate safety standards and components are packaged to preserve them so they are ready to fit.

Service exchange offers convenience and consistency of rebuild specifications and quality. We carry a wide range of service exchange stock in our branches.



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H-E PARTS, GLOBAL LOCATIONS, FOR GLOBAL SOLUTIONS.



H-E Parts International replacement parts are compatible with the makes and/or models of the third-party equipment described. H-E Parts International is not an authorized repair facility of these third parties and it does not have an affiliation with any manufacturers of these third-party products. All brands, original equipment manufacturer (OEM) part numbers or references are owned by the respective OEM entities or their affiliates. These terms are used by H-E Parts International for identification and cross reference purposes only and are not intended to indicate affiliation with, or approval by the OEM, of H-E Parts International or its products.

