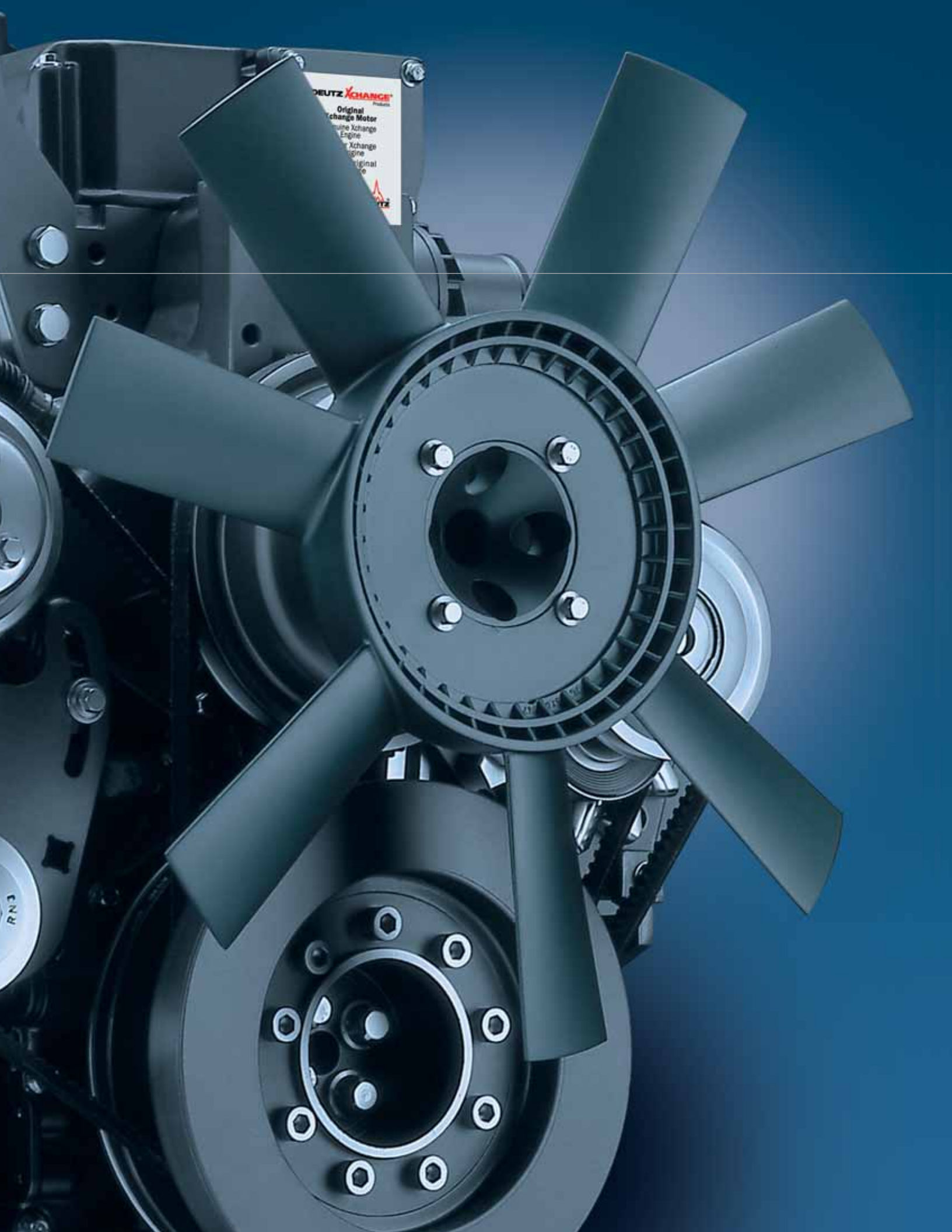


DEUTZ XCHANGE[®]

Like new, only better.



The engine company.  **DEUTZ[®]**



DEUTZ XCHANGE
Original
Xchange Motor
Xchange
Engine
Xchange
Engine
Original

RN3

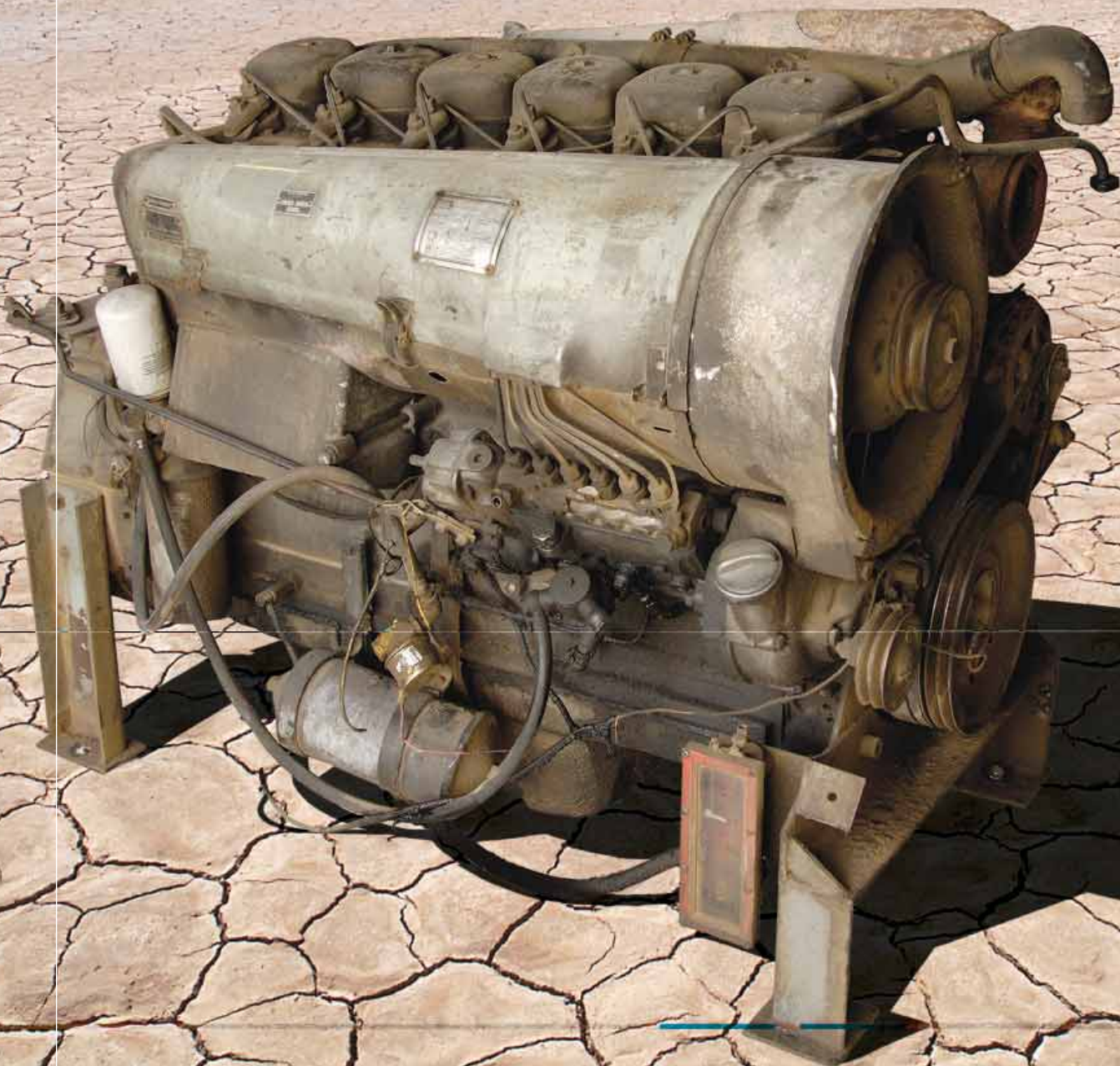
Redefining Reman.

In the world of science, the subject of cloning has become a perennial and controversial field of interest, fueled primarily by the prospect of restoring renewed life and health to a dead or damaged cell, no matter the type of injury or disease.

In the world of modern engine recovery, look-alikes are no less popular... or controversial. Engine rebuilders are a dime a dozen, and today's industrial marketplace is fairly saturated with rebuilt and refurbished diesel components advertised under the guise of a remanufactured product.

Some persons may be inclined to categorize a genuine DEUTZ Xchange engine alongside other typical rebuilt products, assuming both to be equivalent options for replacing a failed engine or component. But a second opinion is in order. And the differences are as opposite as comparing apples to oranges.

A remanufactured DEUTZ BF6L913 is a more cost-efficient, emissions-compliant engine replacement option than its TIER 3 counterpart.



Xchange: Superior for What It's Not

Engine rebuilders know that reviving downed equipment is your top priority when serious damage occurs. Some, however, will prey on the uninformed by peddling inferior products with a price tag to match. And little else. So, when it comes to choosing between having your engine rebuilt or otherwise replaced, the decision can be tricky. In your comparison shopping, it's compelling to consider what a genuine DEUTZ Xchange engine isn't:

Not Rebuilt

By standard definition, most engine rebuilders will only recondition an engine by cleaning, inspecting and replacing severely worn or broken parts. The engine's serviceable components are often reused within the bounds of the manufacturer's acceptable wear limits. While convenient at the time of purchase, the quality of a rebuilt engine is hardly consistent and most may be covered with only a limited guarantee of workmanship or performance. Definitely a higher price to pay than it's worth.

Not Used

In a pinch, it may seem a simple solution to extract a replacement part – or even an entire engine – directly from used machinery, typically scrap equipment. While obviously easier on one's pocketbook, such a quick fix can hardly guarantee that the junked component is equivalent to your damaged engine – or that the scrapped part doesn't conceal its own hidden damage. Used or salvage yard components commonly have high mileage and a poor maintenance history. And with no provisions for disassembly, recalibration, inspection or warranty, scrap yard finds are little more than another failure waiting to happen.

Not EPA Restricted

EPA regulations prohibit an engine from being replaced with a prior emissions-level product. As emissions standards have become stricter, modern engine control systems have migrated from older mechanical to fully electronic technologies, presenting consumers with the increased costs – and lead time – of purchasing and configuring a new engine into their existing equipment. The best solution for compliant engine replacement is to install a remanufactured engine of the equivalent emissions level, which makes choosing your DEUTZ Xchange engine a win-win decision. In fact, a remanufactured DEUTZ BF6L913 is a more cost-efficient, emissions-compliant engine replacement option than its TIER 3 counterpart. How's that for peace of mind?

Not Equaled

Genuine DEUTZ Xchange engines are fully remanufactured. This means that each engine undergoes a state-of-the-art, 300-point reconditioning process according to its original blueprint specifications. This also means that each Xchange engine is measured against the highest of German-engineered quality standards, minimizing recurrence of engine failure and equipment downtime. DEUTZ offers an industry leading, national, three-year limited warranty on all genuine Xchange engines – Standard, including a No-Hassle Core Return Policy. And only 100% genuine DEUTZ replacement parts are installed. Imitators: nice try.

DEUTZ Xchange production facility



LOCATION: Pendergrass, Georgia, USA

FLOORSPACE: 50,000 sq. ft

MODELS SERVED: 1011/2011 Series

DEUTZ 912/913 Series

DEUTZ 1012/1013 Series

DEUTZ 2012/2013 Series

DEUTZ 1015/2015 Series

DEUTZ Xchange production facility

TOUR: Pendergrass, Georgia, USA

The Xchange Heritage

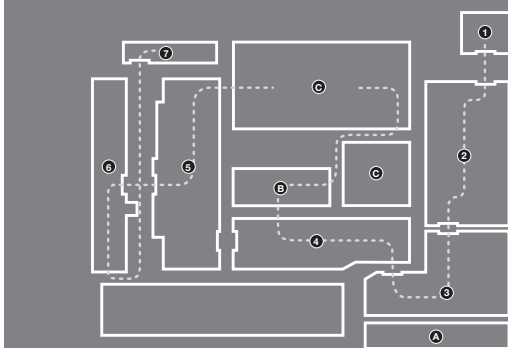
DEUTZ began its proud legacy as pioneer in diesel remanufacturing in 1948 with its first engine remanufacturing plant at Übersee in Upper Bavaria, Germany. A former BMW aircraft engine repair plant, the facility quickly gained a fine reputation for its world-class technical expertise in German engineering.

More than 60 years later, this tradition continues stronger than ever. DEUTZ Corporation, the largest subsidiary of DEUTZ AG, has expanded this legacy to The Americas with the launch of the DEUTZ Xchange production facility in 2008. This advanced, \$3.5 million, 50,000 sq. ft. facility, located in Pendergrass, Georgia, USA, serves as the administration hub for DEUTZ Xchange engines, parts and service throughout The Americas.

At the facility's core production base are the DEUTZ 1011/2011 and 912/913 engines, the highest-volume DEUTZ model series sold in North America. The plant's roster also includes DEUTZ 1012/1013 and 1015/2015 engines, as well as 2012 and 2013 models.

Designed with an eye on future growth, this Xchange production plant boasts the remanufacturing capability of nearly every component in the targeted engine series, with the exception of turbochargers. A pretty impressive feat, in our humble opinion.

DEUTZ Xchange Tour— Pendergrass, Georgia, USA

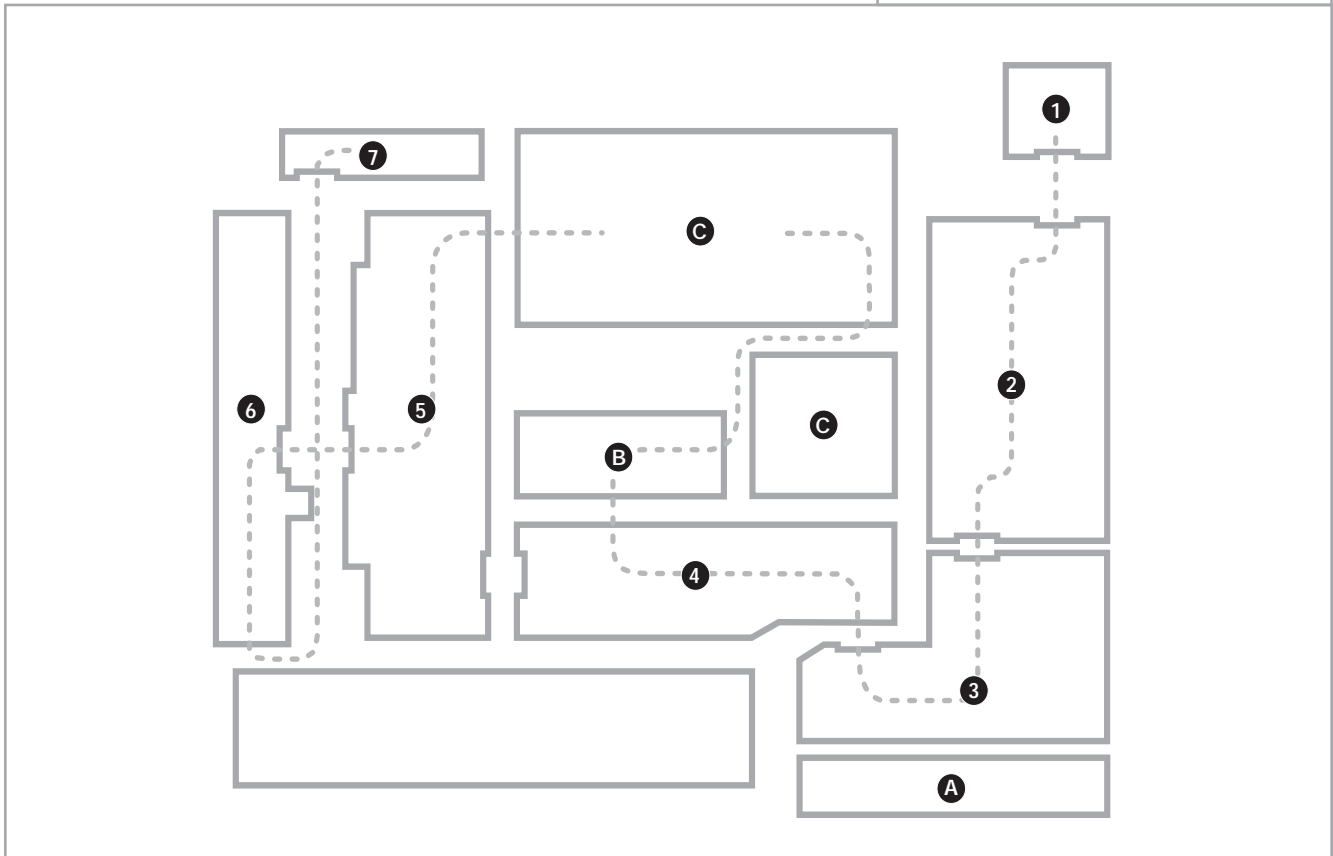


AREA 2: Engine receiving and inspection

A Guided Tour (de force)

Haas® CNC machine tooling... Magnaflux® Magnetic Particle Inspection... Taylor® Dynamometer testing... 40 man-hours... 300 processes... and a little elbow grease. They're just a fraction of the craftsmanship that embodies the rebirth of every Xchange engine exiting our assembly lines.

DEUTZ Xchange production facility



AREA 5: Parts Assessment and Inventory

DEUTZ Xchange production facility

TOUR: Pendergrass, Georgia, USA

A. Quality Control Lab

1. Engine Receiving & Inspection

B. 1011/2011 Governor Rebuilding Cooling Blower Rebuilding Injection Pump/Injector Testing

2. Engine Disassembly Cleaning & Parts Segregation Repair

C. Parts Inspection, Assessment and Inventory

3. CNC Crankcase Machining CNC Cylinder Head Machining Cylinder Honing Cylinder Head Repair

4. Connecting Rod Boring & Re-bushing Crankshaft Grinding Magnetic Particle Inspection Crankshaft Washing, Polishing & Balancing

5. Assembly

6. Dynamometer Testing Engine Washing, Painting & Dressing

7. Final Inspection & Packing



AREA C: Parts Assessment and Inventory



AREA 5: Twin-spindle DC Electric torque driver

DEUTZ Xchange production facility

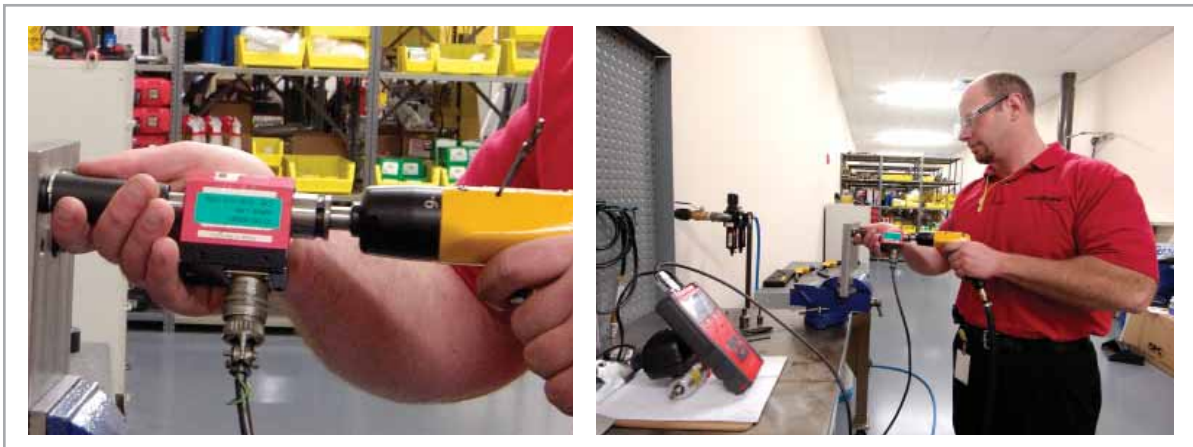
TOUR: Pendergrass, Georgia, USA

Xacting Standards

A craftsman can only be as skilled as his tools are precise. While the roots of industrial machining lie in the craft of manual workmanship, the evolution of modern technology has dictated progressive advances in the speed, accuracy and performance of mechanical operations.

To ensure that every Xchange engine manufactured meets DEUTZ new-engine production standards, manual and pneumatic socket wrenches are displaced by the Cleco® Tightening Manager System, DC Electric Tool Systems' state-of-the-art, ISO 9001 Certified, computer-controlled assembly tool system.

This fastening technology – the gold standard used in the automobile and aircraft industries – is the only of its kind among assembly tool systems. A single user interface, controlled on-site by the DEUTZ Xchange Quality Control Lab, manages and monitors exact torque tolerances for every engine fastener point, ensuring perfect couplings and maximizing assembly productivity.



AREA A: Quality Control Lab

Disassembly & Cleaning

The first stage of the Xchange remanufacturing process targets receipt and inspection of usable engine cores. Each core is accepted, inspected for soundness and electronically documented. The engine's original build documentation is downloaded from factory archives, and each individual core is conducted through its own disassembly process so that all related parts are kept together for accurate identification.

Cleaning processes include:

- Hot-Water Jet Wash
- High-Temperature Parts Wash
- Dry Metallic Abrasive Shot Blasting
- Silica Sand Blasting
- Baking Soda Blasting
- Metal Parts Tumbling
- Ultrasonic Wash



AREA 2: High Temperature parts wash

The second and "dirtiest" stage involves disassembling and cleaning each usable engine core. All parts are thoroughly de-painted, bathed, inspected, and identified with a unique Xchange part number.



AREA 2: All parts are disassembled and cleaned rigorously

DEUTZ Xchange production facility

TOUR: Pendergrass, Georgia, USA

Crankcase & Cylinder Head Refinishing

After washing, each engine's crankcase and cylinder heads are assessed and identified with a unique Xchange part number. On the average, 70% of these serviceable components are found reusable.

Crankcases are resurfaced using a Haas® CNC vertical mill. DEUTZ 1011F series crankcases, for example, are bored to oversize dimensions to accommodate new slip-fit piston liners. Warped or damaged threads are HeliCoil rethreaded as required.

Cast-iron cylinder heads are remanufactured to new-part tolerances for valves, valve guides, valve springs, and valve depth on DEUTZ 1011 and 2011 models, while air-cooled 912 series cylinder heads generally require valve seat resurfacing and dome re-cutting on a CNC lathe to restore the head to original factory dimensions.

Every Xchange engine receives only 100% genuine DEUTZ pistons.



AREA 3: Crankcase honing & cylinder head repair

Crankshaft & Camshaft Refinishing

Crankshafts and camshafts are sorted and undergo magnetic particle inspection, a nondestructive inspection method which facilitates the detection of surface and subsurface flaws, as well as an equally nondestructive Rockwell test to determine and assess surface hardness.

Crankshafts may be polished and/or ground depending upon their condition, and camshafts may be polished or re-ground. Crankshafts may also be re-balanced based on their configuration.

Refinished crankshafts are rewashed, inspected, and marked with corresponding DEUTZ bearing size codes. The appropriate bearings are then matched with the crankshaft and the completed crank kit is placed into parts inventory.

Connecting Rod Machining

Connecting rods are sorted, visually inspected, rewashed and placed into parts inventory as a new part. Rods are machined in batches, through processes including magnetic particle inspection, straightness analysis, and pin bushing replacement.

Finished rods are weighted – a critical preventive against the occurrence of engine vibration – and sorted into parts inventory by weight class to ensure that all rods for a specific engine are calibrated within their prescribed weight tolerance range.



AREA 4: Crankshaft refinishing

DEUTZ Xchange production facility

TOUR: Pendergrass, Georgia, USA

Parts Assessment

The parts assessment process is one of the most difficult in the Xchange engine remanufacturing operation. Each remanufactured component of every reclaimed engine must be properly cataloged by part number. The operational age of many reclaimed engines received makes this critical task a laborious one, as many of these units have been previously rebuilt or modified several times.

Each remanufactured part is assessed for suitability on an Xchange engine. All signs of wear, corrosion or cracks are identified to prevent defective parts from entering approved parts inventory.

Parts Inventory

Finished parts are inventoried by bin location per individual identification number. Production orders for pre-assembled components, such as cylinder heads, crankshafts, blowers, and governors, are executed by a bill of materials for fulfillment.

Production orders for complete engines are concurrently sourced from parts inventory and pre-assembled component stock.



AREA C: Assembly



AREA C: Parts Assessment and Inventory

Engine Assembly

Each Xchange engine is built to order as a new engine, in assembly line production sequence. Detailed assembly instructions are displayed on LCD screens located at each assembly station and are unique to the part number of each component being built.

Each engine receives new fasteners for most components. All fasteners are tightened only with fixed-torque drivers preset to exact torque tolerances for every engine fastener point, with each tightening tool electronically matched to its corresponding fastener.

Critical fasteners, such as main & rod cap bolts and head bolts, are tightened with a twin-spindle DC Electric torque driver to ensure accurate and repeatable angle rotations.

Engine Testing

Assembled Xchange engines are individually tested by computer-controlled Eddy Current Dynamometer. Test cycles and times are regulated per ISO 3046 standards in accordance with DEUTZ new-engine test procedures and data results are recorded and archived for each engine.

Each engine is tested using the same preservative break-in lubricant as used in new and Xchange engines produced in Germany.



AREA 5: Engine assembly



AREA 6: Dynamometer Testing



AREA 6: Paint Booth

DEUTZ Xchange production facility

TOUR: Pendergrass, Georgia, USA

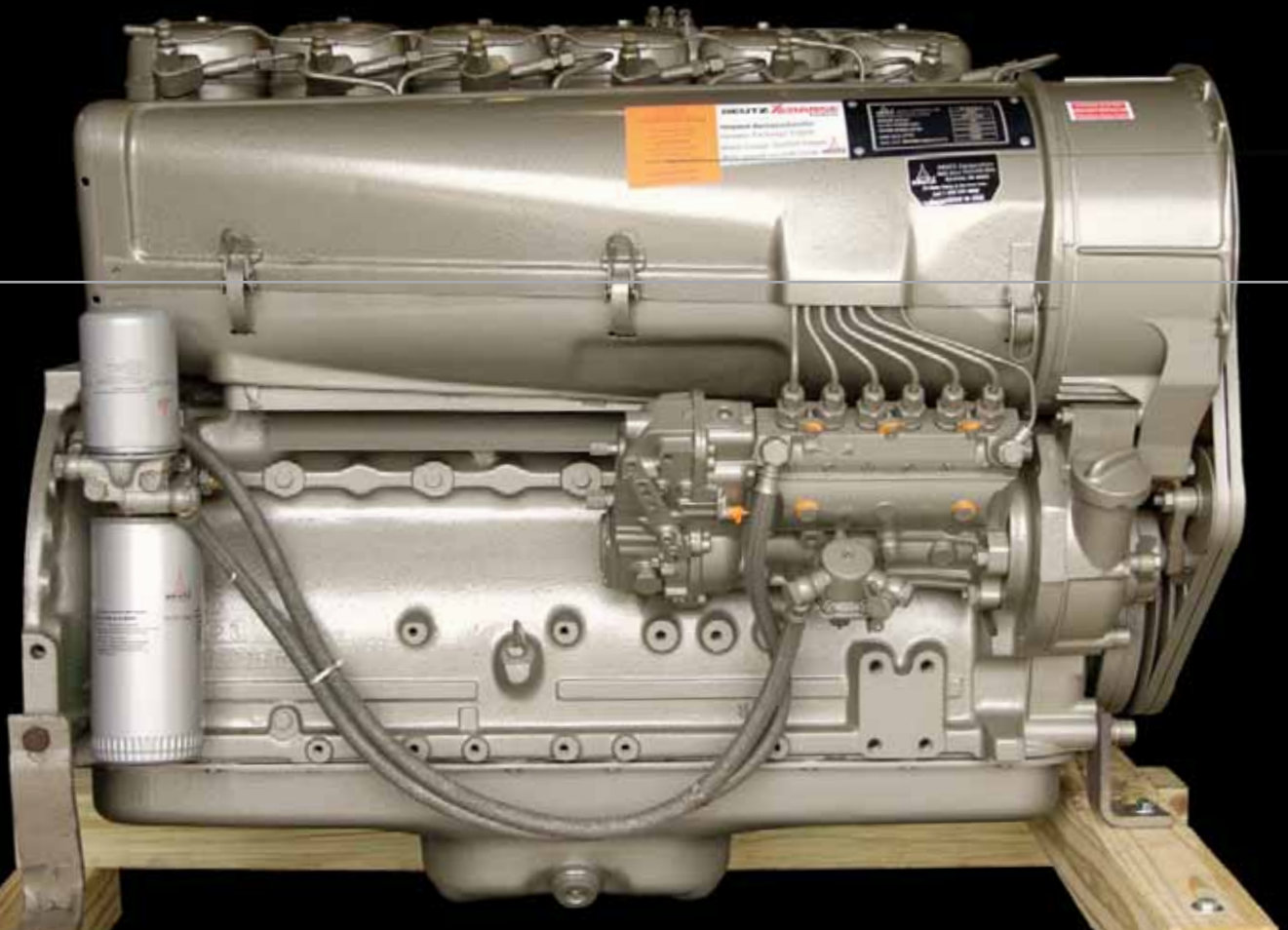
Engine Painting and Dressing

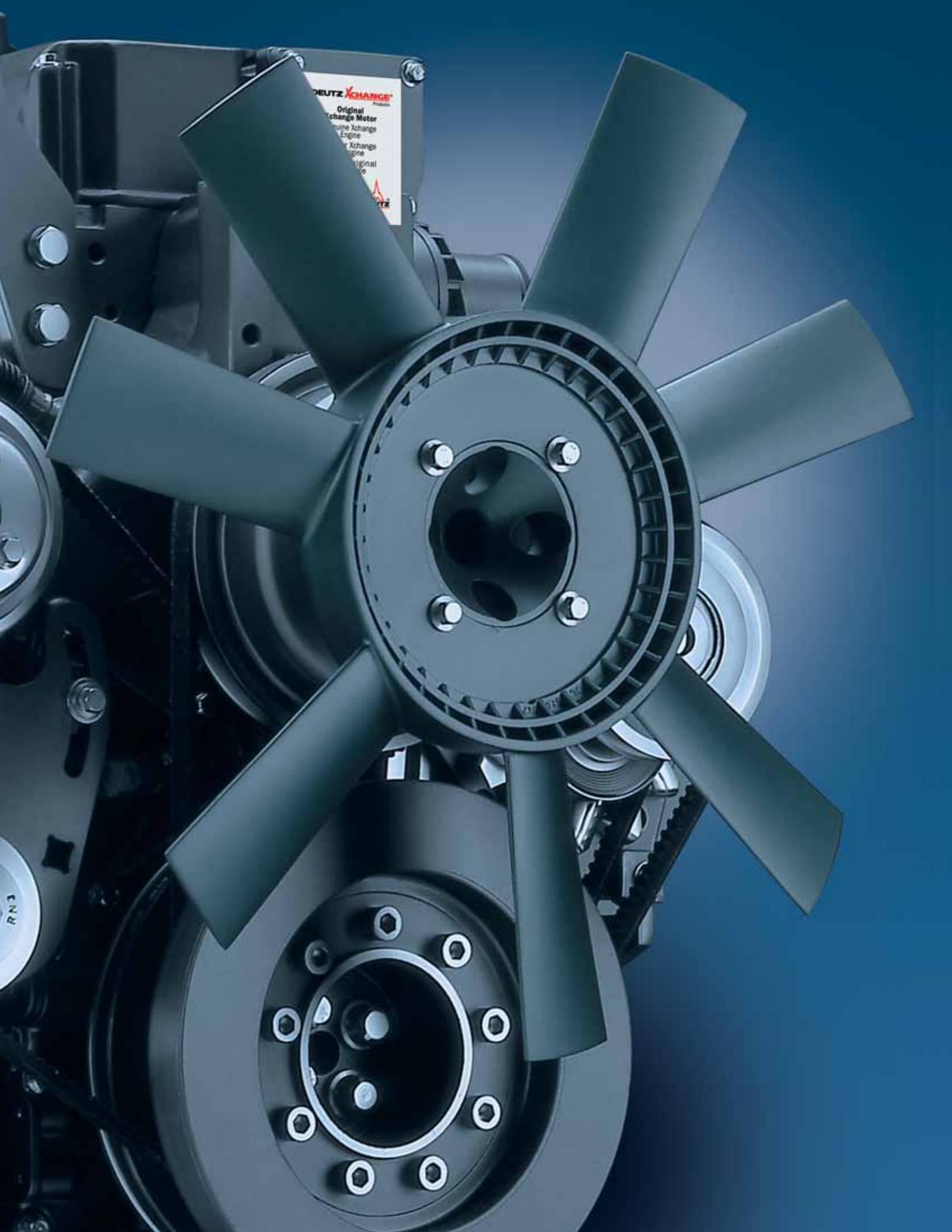
After testing, finished Xchange engines are routed to final dress or directly to the painting sequence. After final dress, engines are steam washed to remove surface traces of assembly lubricant or residual testing fuel.

The Xchange painting enclosure maintains an air temperature of 125°F to simultaneously preheat and dry each engine before paint application. After painting and a short cure time, engines are placed directly onto shipping skids. Labels and loose parts are secured, and each engine is transferred to the finished inventory or shipping areas.



Before
After





DEUTZ XCHANGE

Original
Xchange Motor
Xchange Engine
Xchange Engine
Original

RN3



Engine Core Acceptance Criteria

Guidelines

- No visible holes or cracks may be present in the block or any other major components
- Cores must not sustain any damage due to non-operational causes such as fire, rust or mishandling
- 360° crankshaft rotation must be possible

Full (100%) core return credit will be issued when:

- No externally visible cracks or breaks are present on cylinder block and head
- Crankshaft is structurally sound, has not seized (rotating 360° under standard torque) and can be machined if necessary
- Core is delivered in "as removed" condition (i.e., assembled, no basket engines), with no missing or damaged parts

Partial (50%) core return credit will be issued when:

- Major engine components are missing, but with no externally visible cracks or breaks on cylinder block and head

Partial (25%) core credit will be allowed when:

- Block or cylinder head has been cracked or broken
- Crankshaft has been broken or seized Engine is delivered in disassembled condition

Return Shipping Procedures

- Contact DEUTZ Corporation's 3rd party logistic provider, TSG, to arrange pickup:

TSG Inc.

460 Briscoe Boulevard, Suite #303
Lawrenceville, GA 30045
Phone 1-800-445-6043, ext. 707 (dispatch) or 770-995-3036 or
contact Mr. Jay Carr direct at (678) 259-0117



DEUTZ Corporation Xchange Plant Pendergrass:

1409 Valentine Industrial Parkway, Suite 100

Pendergrass, Georgia 30567, U.S.A.

Tel: (770) 564-7335 Fax: (706) 693-4374

Email: DCXsales@deutzusa.com

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