

Diesel ReCon a subsidiary of Cummins



Diesel ReCon, based in Cumbernauld, is a wholly-owned subsidiary of Cummins, and re-manufactures Cummins-brand diesel engines for trucks, trains, other large vehicles and industrial equipment. The company employs over 100 people and had a turnover of \$24m in 2013. The company is experiencing a period of growth with the turnover target for 2014 of \$32m. The company's remanufactured engines are shipped to a distributor in Belgium, and from there, the engines are sent to customers across Europe, the Middle East and Africa.

The company remanufactures 80 units per month, on average, and has a small amount of activity manufacturing new cylinder heads for spares. Cummins has been involved in re-manufacturing diesel engines for 85 years—nearly as long as the company has been active in manufacturing them.

The company predominantly operates in the aftermarket segment of the engine value chain, but has some activity in component manufacture (new cylinder heads). Other parts of the Cummins business are involved in new engine manufacture and retailing.

The remanufacturing process



1. Engine core is drained of fluids and disassembled into components. Some parts will be placed into a furnace to burn off any remaining oil and carbon.



2. Some components are shipped off to other Cummins facilities for remanufacturing. Those components staying in house for remanufacturing will be grit blasted and washed.

3. The 5 highest value components that will be recovered for remanufacturing are: the crankshaft, camshaft, conrods, cylinder heads and crank case.



4. Components will undergo inspection, local repair and finishing to restore them to OEM specifications. Diesel ReCon have access to all of the original design specifications.

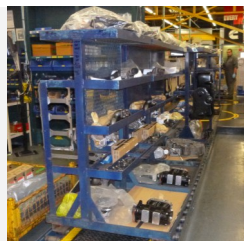


5. Over- or undersized parts may be used to compensate for wear. The materials used in these modifications may be better than the original, improving functionality.



6. Common remanufacturing tasks include: replacing stripped threads, detecting cracks, and re-machining components to meet tolerances for straightness and flatness.

7. After all of the individual components have been re-manufactured, the engines are re-assembled on an assembly line ready for testing.



8. Finished engines undergo a leak test for fuel and water and a flow rate test for oil. The power output, smoke and emissions, water temperature and oil pressure are also tested.



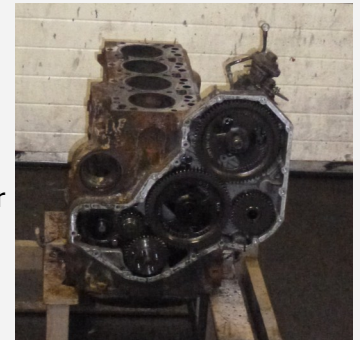
Why remanufacture diesel engines?

- **Product suitability**—diesel engines are suitable for remanufacturing as they are high value and complex products with significant energy, material and labour embedded in each engine.
- **Customer retention**—offering a remanufacturing services is an important activity for retaining customers in the Cummins network. Cummins also offer installation and servicing activities to ensure that the company can meet all of its customers' needs and avoid them seeking alternative suppliers.
- **Waste reduction**—remanufacturing reuses a significant fraction of the original components, avoiding the costs and environmental impacts of disposal.
- **Availability**—engines are normally remanufactured to stock so a remanufactured engine may be a better option than repairing a damaged engine. This could be extremely important for a customer who may be losing money for every day of down time.
- **Supply chain integration**—as a subsidiary of Cummins, the OEM, Diesel ReCon has access to all of the original design specifications. This makes it possible to produce and guarantee remanufactured products that meet the OEM specification.



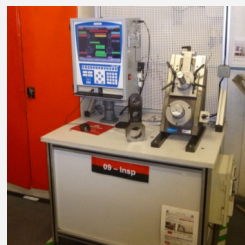
Engine core

- Diesel ReCon stores about 300-400 engines on site as core.
- Core is generally acquired on an exchange basis.
- Customers who supply a full and undamaged engine receive the full core refund; if parts are missing the refund will be reduced and if the engine is both incomplete and faulty, then the customer will receive a further reduced rate for the engine.
- Cummins has a facility in the US, which is responsible for global core management. The facility will stockpile core, either for future remanufacturing or to keep the core off the market and away from competitors.
- For some regions of the world, core return rates are low. This is problematic as without the core, material costs for remanufacturing the engines will increase.



Inspection and calibration

- Diesel ReCon uses gauges to test whether component dimensions lie within the specification tolerances.
- Gauges are routinely calibrated at the company's gauge lab, which can also be used to confirm that part suppliers are supplying in-spec components.
- Inspection rigs can accurately measure the dimensions of each individual component and identify what further processing is required for it to meet the specification.



A global company

- Diesel ReCon interacts with several other Cummins facilities around the world.
- The Belgian distribution centre decides what Diesel ReCon should remanufacture for its stock.
- Both learning and production capacity can be shared between the facility in Cumbernauld and the remanufacturing facility in Mexico.
- Currently, some components are sent for remanufacturing in Spain, Mexico, India, Memphis and Huddersfield.





"People do not always understand that remanufacturing can be more complex than manufacturing new."

Colin Pettigrew—Product engineering manager, Diesel ReCon

Despite a long history of remanufacturing, Diesel ReCon still faces a number of business challenges:

- **Component part supply**—replacement component parts may be difficult or expensive to source as the parts may be obsolete or produced in low volumes. Similarly, oversize parts may be more expensive due to low production volumes.
- **Technology evolution**—UK rail industry customers have stated that they will not be purchasing any new diesel engines due to the trend for electrification of railway lines. This means that existing engines need to remain serviceable for many more years. However, working in emissions reduction and hybrid technology could also present an opportunity for the company.

Future plans and opportunities

Diesel ReCon currently remanufactures about 150 product ranges and is looking to continue to expand this in the future. The remanufacturing plant in Mexico currently has thousands of products available and 40% of the facilities sales arise from product lines where there are less than 5 sales per year. The Cumbernault facility is looking to transition more towards this business model.

Diesel ReCon is also looking to expand its activities into component remanufacturing. Rather than sending components off to be remanufactured elsewhere, remanufacturing components in house would provide greater control and a shorter lead time.

In addition to a strategy for growth, Diesel ReCon will continue to invest in its plant and improve its remanufacturing processes. The company would like to upgrade its test cell equipment to the equivalent OEM model, however, this will be an investment of several million pounds. The company is currently in the process of re-designing its engine assembly line to improve efficiency.

A new area of development for the wider Cummins organisation is consideration of remanufacturing in the design stage. A new initiative, led by a team in America, will be developing engineering standards for new products. As part of the standard, consideration of remanufacturing will have to be made, including making allowances for inserts, avoiding sealed units, considering the suitability of coatings for remanufacture, considering what cleaning processes can be used and considering the specified part tolerances to allow for further remanufacturing. Further opportunities for the company includes: buses, industrial applications, construction applications, power generation and engine components.

We would like to thank Colin Pettigrew at Diesel ReCon for his assistance in preparing this case study.

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