European Remanufacturing of Heavy Duty and Off-Road Vehicle Components (including Tyres)

A Hidden Giant?

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Past Chairman & now
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Trucks, Trailers and Buses are real Heavy Duty Vehicles!

- Total weight 3.6 t to 40 t
- Between 5 and 8 axles
- Transmissions between 9 and 16 gears
- Air brakes
- Electrical equipment 24 Volt
- Engine from 150 KW to 400 KW
- Tyres 17-24 inches Rim Diameter
Agriculture vehicles, Tractors, Combined etc. are not a small Market

- Special heavy duty vehicles
- Total weight up to 5 t
- Engines up to 250 KW – 9 liters
- Hydraulic brakes
- Transmission up to 25 gears
- Tyres diameters up to 215 cm
- Electrical supply 12 Volt and 24 Volt
Off Road, Construction, Earth Moving, Mining Vehicles etc are Machines

- Heavy duty vehicles - Loaders etc
- Total weight up to 30 t and more
- Engines up to 250 KW – 12 liters
- Hydraulic multi disc brakes
- Hydrostatic Transmission
- Electrical supply 24 Volt
# Heavy Duty Vehicle in Use in Europe (West & Central)

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trucks from 3.6 t to 40 t</td>
<td>5,500,000</td>
</tr>
<tr>
<td>Trailers (for above trucks)</td>
<td>1,500,000</td>
</tr>
<tr>
<td>Buses</td>
<td>650,000</td>
</tr>
<tr>
<td>Agriculture tractors</td>
<td>9,500,000</td>
</tr>
<tr>
<td>Off Road, construction, etc</td>
<td>2,100,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19,250,000</strong></td>
</tr>
<tr>
<td>Light Commercial (3.5 t)</td>
<td>27,000,000</td>
</tr>
</tbody>
</table>
For HD Vehicles more product lines are remanufactured!

- **Standard components which are remanufactured for cars/light vehicles are:**
  - Starters and alternators, power steering pumps, Fuel injection, electronic control modules, Brake calipers, transmissions, engines and turbochargers

- **But for Heavy Duty additional components are remanufactured such as:**
  - Hydraulic Pumps and Cylinders
  - Water &Oil pumps and oil coolers
  - Air compressors and air actuators
  - Radiators & Retarders & Particle Filters
    - Differentials and hydraulics
    - Tyres and Dampers etc
HD Vehicles Components Values and Dimensions are much higher!

A few examples which clearly demonstrate how much bigger HD components are:

- Brake caliper of a VW Golf: 2.5 kg
- Brake caliper of a Commercial Truck: 40 kg
- Engine of a VW Golf: 1.8 l
- Engine of a Heavy Duty Truck: 12 l
- Weight of a VW Golf Transmission: 40 kg
- Weight of Truck Transmissions: 200 kg
**European Remanufacturing**

**HD Diesel Engines**

<table>
<thead>
<tr>
<th>OE Manufacturers</th>
<th>Daimler, Volvo, FPT, Scania, Renault, Iveco. Cummins, Caterpillar, Deutz etc</th>
</tr>
</thead>
</table>

**Vehicle Brand**

<table>
<thead>
<tr>
<th>Trucks</th>
<th>Mercedes, Volvo, Daf, Scania, Iveco etc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tractors/Off Road</td>
<td>John Deere, Caterpillar etc</td>
</tr>
</tbody>
</table>

**Replacement Market**

<table>
<thead>
<tr>
<th>Remanufactured</th>
<th>ca. 80,000 p.a.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repaired</td>
<td>?</td>
</tr>
</tbody>
</table>

**Reiman Market Share**

| OE Reman : | 75 % |
| Independent Reman : | 25 % |
European Remanufacturing
HD Startermotors & Alternators

**OE Manufacturers**
- Mitsubishi
- Bosch
- Prestolite, etc.

**Vehicle Brand**
- Mercedes, Volvo, DAF, Scania, Iveco, MAN, Renault, John Deere etc.

**Replacement Market**
- New machines: 30 %
- Reman machines: 70 %

**Reman Market Shares**
- OE Reman: 60 %
- Independent: 40 %
European Remanufacturing
HD Truck Power Steering

| OE Manufacturers | ZF  
|                 | ZF/Thyssen  
|                 | TRW  
| Vehicle Brand   | Trucks: Mercedes, Volvo, DAF, Scania, Iveco, Renault, Volvo & MAN  
| Replacement Market | New units ca. 30 %  
|                  | Reman & Repair ca. 70 %  
| Reman Market Share | OE Reman : 60 %  
|                  | Independent Reman : 40 %  

FJW Consulting
European Remanufacturing
HD Air actuated Calipers

OE Manufacturers
- Knorr Bremse
- Wabco
- Meritor
- Haldex

Vehicle Brand
- Trucks: Mercedes, Volvo, Daf, Scania, Iveco etc
- Axles: BPW, SAF, ZF etc
- Trailers: Krone, Schmitz Cargo etc

Replacement Market
- New calipers: 75%
- Reman calipers: 25%

Reman Market Shares
- OE Reman: 20%
- Independent: 80%
For Trucks from 7.5 tons to over 40 tons, with tyres from 17” to 24” rim diameter and weights of 30 kg to 120 kg

For Construction Equipment from 20 tons to 60 tons of overall weight and tyres from 25” to 33” rim diameter and weights of 120 kg to 750 kg

For Earth Moving & Mining equipment from 100 tons to 600 tons of overall weight and tyres from 35” to 63” rim diameter and weights of 700 kg to 6000 kg

Retreading HD Tyres is also Remanufacturing!!!
Remanufacturing HD Tyres
The Process is safe!

- Careful inspection of old Tyre casings (only sound cases/carcasses are reused)
- Worn tread is buffed (removed) away
- Small defects are repaired
- Uncured (soft) rubber is applied on the casing and put for vulcanizing either in a molding machine
- Or pre-vulcanized treads are put on the casings for vulcanizing in a vacuum autoclave
• The European market for replacement of HD Tyres amounts to ca. 10 million units

• The market share of retreaded/remanufactured HD Tyres is ca. 3.8 million or 38%

• Car Tyres which have a low value are not attractive for retreading

• The Value of Off-Road Tyres for Mining, Construction etc. is high and attractive for remanufacturing

• Also Aviation Tyres are retreaded and have a high market share vs. new! Aviation tyres can be retreaded up to 5 times!!!
Automotive (Car) Remanufacturing is very big!
But how big is European Heavy Duty Remanufacturing?

• The European Automotive (car) Reman business is estimated to be ca. Euro 5.7 billions

• And the number of cars in use is much higher than Heavy Duty vehicles (220 million vs. 20 million)

• But the wear of HD components is much higher and HD vehicles have more remanufactured components

• and HD components are 4 to 5 times more expensive.

• So what is the final value of HD Remanufacturing???
**European Heavy Duty is definitely a Giant!**

<table>
<thead>
<tr>
<th></th>
<th>Annual Volume (Units)</th>
<th>Annual Sales (Euro)</th>
<th>Annual CO 2 savings tons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Automotive (Cars &amp; Vans)</strong></td>
<td>22.313.000</td>
<td>5.700.000.000</td>
<td>270.000</td>
</tr>
<tr>
<td><strong>Heavy Duty components</strong></td>
<td>3.590.000</td>
<td>3.717.000.000</td>
<td>279.000</td>
</tr>
<tr>
<td><strong>Heavy Duty Tyres</strong></td>
<td>3.800.000</td>
<td>1.140.000.000</td>
<td>285.000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>29.6 Millions</td>
<td>10.5 Billions</td>
<td>834.000</td>
</tr>
</tbody>
</table>
European HD Remanufacturing, what are the Trends?

- Not as for the car business, for Heavy Duty after market sales tend to be controlled by OE players
- But independent Remanufacturers are ready to fight for their part of the market
- The life expectancy of components is improving which works against Remanufacturing
- The components tend to become technically more complex which is in favor of the true specialists
European HD Remanufacturing, what are the Trends?

- But the profit margins for HD & complex components are much better.
- Remanufacturing is in general a growing business (though undermined by new copied units).
- The recognition as a green industry and the acceptance to service economically vehicles offers the reman industry excellent current and future business opportunities.
And finally out of the box:

How many Reman Giants do you know?

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive and HD &amp; Off Road</td>
<td>35%</td>
</tr>
<tr>
<td>Aerospace</td>
<td>30%</td>
</tr>
<tr>
<td>Machinery</td>
<td>13%</td>
</tr>
<tr>
<td>IT products</td>
<td>6%</td>
</tr>
<tr>
<td>Medical devices</td>
<td>4%</td>
</tr>
<tr>
<td>Others</td>
<td>12%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>
Remanufacturing of Heavy Duty Vehicle Components

A Hidden Giant!

Editor: Fernand J. Weiland
European HD Remanufacturing

Thank you