Welcome to a slide presentation of some of our research findings over the past 25 years on the remanufacturing industry. Visitors to this site who are remanufacturers may find little new in what they see. If, however, you are a visitor for whom remanufacturing is unfamiliar territory, we hope you will gain some insight into this important and little understood sector of our economy.

If you have questions, feel free to contact either of us.

Bill Hauser
Bob Lund.
In remanufacturing, products that are known to be worn, defective, or discarded are brought to a manufacturing environment, where they are disassembled. All components are cleaned and checked. Those that can be reused are brought up to specification. Those that cannot be reused are replaced. When the product is reassembled and tested, it is ready for a second life, performing as new.

In many cases, improvements in a product may be made to increase its reliability, improve ease of maintenance, or add more sophisticated controls. In other cases, especially in electronics, remanufacture includes reconfiguration and reprogramming to match new customer applications.
This diagram describes the flow of materials through the cycle of manufacture, repair, reuse, remanufacture, and recycling of durable products.

Among the alternatives of repair, reuse, remanufacture, or recycling, the larger the loop, the greater are the costs to society and the less “conservative” is the option.
This chart illustrates conservation of value in a product that is remanufactured versus one that is recycled. The relative costs of material, labor, energy, and the contribution of plant and equipment to a product in its manufacture are shown on the left. Remanufacturing preserves much of this value while adding a second life to the product. In contrast, recycling shreds the product in an attempt to recover only the material value. Little or none of the other residual values in the product are retained.

Percentages show in this chart are illustrative only. Actual percentages vary with product type.
As was illustrated by the preceding two slides, remanufacturing conserves materials, energy, and manufacturing plant and equipment. As a domestic industry, it provides employment to American workers, and, for those lacking in industrial skills, it provides both introductory training and advancement “ladders” as skills develop.

By providing like-new products at prices that typically range from 45% to 65% of comparable new products, remanufacturers can attract new buyers into a market where new product prices have been prohibitively high for them. The overall size of the market is increased.

In the process of disassembling products, remanufacturers are able to segregate toxic or hazardous materials and safely dispose of them.

Remanufacturing is profitable, private industry. The firms pay property and income taxes. Their employees pay income taxes.
These are the general criteria that must be met if a product is to be successfully remanufactured and sold.

It must be technically possible to disassemble and rebuild the product. Attempts are frequently made by original equipment manufacturers (O.E.M.s) to thwart attempts at remanufacture. As in most manufacture, parts must be standard, so replacement parts can be made, bought, or obtained from other discarded units ("cores"). Savings in product cost realized through core reuse must be significantly greater than the cost to acquire the core.

Products in an area where there is rapid technological change (such as personal computers) are poor candidates for remanufacture.

A real or potential market for the remanufactured product must exist. Most remanufactured products find markets in commercial and industrial sectors. In the automotive sector the repair or service technician often represents the customer in the purchase.
As of May 2012, the database of manufacturers was transferred to the Rochester Institute of Technology’s Center for Remanufacturing and Resource Recover. The database now contains over 7,000 American and Canadian firms that have been verified to mean the definition of remanufacturers. They represent 121 product sectors. For a complete description of the database, see R. T. Lund's “The Database of Remanufacturers” that can be viewed and download from elsewhere on this website.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Product Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive &amp; Other Transport</td>
<td>16</td>
</tr>
<tr>
<td>Compressors, Turbines, Valves</td>
<td>5</td>
</tr>
<tr>
<td>Electrical/Electronic Apparatus</td>
<td>29</td>
</tr>
<tr>
<td>Machinery &amp; Related Equipment</td>
<td>29</td>
</tr>
<tr>
<td>Laboratory, Medical, &amp; Surgical</td>
<td>12</td>
</tr>
<tr>
<td>Office Furniture / Equipment</td>
<td>3</td>
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<tr>
<td>Tires</td>
<td>1</td>
</tr>
<tr>
<td>Toner &amp; Ink Cartridges</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>121</strong></td>
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Bob Lund has been studying the remanufacturing industry since 1978. Bill Hauser has worked with him since 1997. These are five reports on the remanufacturing industry published by Lund individually or by Lund and Hauser together.

*Hidden Giant* was the first attempt to define the size and scope of the remanufacturing industry. (This report is no longer available.)

*Enterprise for the Inner City* describes research into the possibility of introducing medical equipment remanufacture into the economically disadvantaged inner city of Boston.

*Anatomy of a Giant* examines the inner workings of companies across the breadth of the remanufacturing industry. A two and one-half year survey effort, it involved the cooperation of hundreds of executives of large and small companies.

*Remanufacturing: Operating Practices and Strategies* examines how remanufacturing firms function as businesses, both at the operating level and at the strategic level. We examine the differences and similarities within the variety of business models in the industry.

*The Database of Remanufacturers* describes the various features of the database, which has evolved over a thirty-year period into a highly effective tool to keep track of firms in the industry.
This chart emphasizes the relative sizes of the 1000 firms that were in our 1996 survey. Over 80% of the firms fell into the 20-employee or less category.
Evidence from our recent work indicates that firms in the industry continue to grow, even during a time of recession in the economy.

Original equipment manufacturers are becoming increasingly aware of the profit opportunities afforded by remanufacturing. In addition to the profit potential, remanufacturing provides feedback on product failure modes and durability, and it permits the firms to maintain brand reputation.

There is efficiency of scale in the industry, so we see larger firms emerging, buying up smaller firms or becoming wholesale suppliers to these smaller firms, who become retail resellers.

The industry is healthy – a vital contributor to the American economy.

The wide dispersion, diversity of products, and small size of the players in this industry have made the industry virtually invisible to the public, and to policy makers who might provide encouragement to this industry.