Royal Adhesives and Sealants

Hardman® Structural Adhesives
Hardman Rubber Co. Founded in 1879
- Rubber cements, molded rubber sundries, DPR
- Developed epoxy brush adhesives in 1950’s
- Developed electrical encapsulants in 1960’s

60,000 Square Feet Manufacturing Center in Belleville, NJ

4,000+ Square Feet R&D Center in Belleville, NJ

80 Years Combined Experience Formulating Epoxy and Urethane Adhesives
Structural Adhesives

- EPOWELD® Two-Part Epoxy Adhesives
- MONOPOXY® One-Part Epoxy Adhesives
- KALEX® Two-Part Urethane Adhesives

Custom Formulations
- R&D has ability to develop customized formulations in a timely manner through TSR system

Variety of Packaging and Applications Solutions
## Competitor Comparisons

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<thead>
<tr>
<th>Two-Component Epoxy</th>
<th>Product Range</th>
<th>Base Material</th>
<th>Viscosity</th>
<th>Work Life (Minutes)</th>
<th>Peel @ 75F (PLI)</th>
<th>Lap Shear @ 75F (PSI)</th>
<th>Hardness (Shore D)</th>
<th>Packaging</th>
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<tbody>
<tr>
<td></td>
<td>Loctite Hysol Brand</td>
<td>Epoxy</td>
<td>Low Medium High Paste</td>
<td>5-120</td>
<td>5-50</td>
<td>1000-6000</td>
<td>75-90</td>
<td>50ML, 200ML, 400ML Dual Cartridge</td>
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<tr>
<td></td>
<td>Huntsman Araldite 2000 Brand</td>
<td>Epoxy</td>
<td>Low Medium High Paste</td>
<td>1-75</td>
<td>30-60</td>
<td>1700-3000</td>
<td>75-90</td>
<td>50ML, 200ML, Dual Cartridge</td>
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<tr>
<td></td>
<td>3M Scotch-Weld Brand</td>
<td>Epoxy</td>
<td>Low Medium High Paste</td>
<td>4-120</td>
<td>2-60 (PIW)</td>
<td>1400-4900</td>
<td>35-90</td>
<td>50ML, 200ML, 400ML Dual Cartridge</td>
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<tr>
<td></td>
<td>Hardman Brand</td>
<td>Epoxy</td>
<td>Low Medium High Paste</td>
<td>3-198</td>
<td>1-70</td>
<td>675-4500</td>
<td>40-95</td>
<td>Double Bubble</td>
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</table>

<table>
<thead>
<tr>
<th>Two-Component Urethane</th>
<th>Product Range</th>
<th>Base Material</th>
<th>Viscosity</th>
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<th>Peel @ 75F (PLI)</th>
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<tbody>
<tr>
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<td>Loctite Hysol Brand</td>
<td>Urethane</td>
<td>Low Medium</td>
<td>4-10</td>
<td>5-30</td>
<td>800-3000</td>
<td>45-68</td>
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<tr>
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<td>Huntsman Araldite 2000 Brand</td>
<td>Urethane</td>
<td>Low Medium</td>
<td>3-15</td>
<td>5-40</td>
<td>300-3000</td>
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<td>15-25 (PIW)</td>
<td>1250-2000</td>
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<td>250ML Universal Cartridge</td>
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</table>
**DOUBLE/BUBBLE® Packets**

DOUBLE/BUBBLE packets are convenient, one-shot use, high-performance adhesives that allows for quick, one-the-spot repairs anywhere, anytime. Each adhesive component is pre-measured in a single foil packet for ease of use.

**Universal Cartridges**

Universal cartridges are innovative, two-component systems that fit into a variety of mechanical, pneumatic, and electric 1/10th gallon caulking guns. Each adhesive component is separated with one adhesive component in the front of the cartridge and the other in the back.

**Side-by-Side Cartridges**

Side-by-side cartridges are ideal for small volume applications where mix ratios and viscosities can vary widely. Each adhesive component is isolated “side-by-side” to prevent cross-contamination and accidental cure until the adhesive applied.

* Adhesives also available in bulk 5-gallon pails, 55 gallon drums
DOUBLE/BUBBLE Packets

- High Performance Adhesives
- Single-Use Packet
- Quick and Convenient
- Wide Variety of Applications
- Private Label Almost Any Adhesive

Quick • Convenient • Ready-to-Use
Specialty DOUBLE/BUBBLE Packets

- **Golf DOUBLE/BUBBLE**
  - Shafting of golf clubs
    - EPOWELD 3243 Ivory
    - EPOWELD 3243 Black
    - EPOWELD 16822 Black

- **Striking DOUBLE/BUBBLE**
  - Hammers and axes
  - 28 gram (1 oz.) packet
Available in a variety of value-added packaging
Universal Cartridge Systems

- **Features**
  - 1/10 gallon, 250 ml
  - 1:1, 2:1, and 10:1 systems
  - Applied via traditional or powered caulk gun

- **Functional Benefits**
  - Superior ratio control
  - Reduced waste and mess
  - Re-closable and reusable

- **Competitive Benefits**
  - Fit in tools that your potential customers already own
  - Ease of application
  - Remove a significant barrier to entry to new markets
  - More user-friendly or cost-effective than currently available solutions
A Look Inside the Universal Cartridge

TAH - U.S. Patent No. 5,310,091

1:1 ratio
Universal Cartridges:
Caulking Gun Options

- **Manual**
  - Several levels of quality and mechanical advantage
  - Cost: $2 - $20

- **Pneumatic**
  - Air source required
  - Cost: $75 - $120

- **Cordless Electric**
  - Special Features: Speed control and shot size
  - Cost: $100 - $200
Side-by-Side Cartridge Systems

- On-demand Mixing and Dispensing of Two-component Reactive Materials
- Accurate, Efficient Metering and Mixing
- Variety of Volume Mix Ratios
  - 1:1 to 25:1
- Variety of Sizes
  - 4 ml to 1500 ml
- Wide Range of Viscosities
- Improved Shelf-life for Highly Reactive or Moisture-sensitive Materials
- Minimizes Waste
- Easy to Use
- Uniform Material Application

* Photo courtesy of APS
Hardman Structural Adhesives

- Full Range of Epoxy and Urethane Adhesives
- Full Range of Packaging and Applications Options
- Custom Formulation Capability
  - Application specific
- Private Label Programs
Additional Markets Served

- **Assembly Systems**
  - Automotive adhesives, sealants, encapsulants, potting compounds
  - Filter adhesives and casting compounds
  - Brush adhesives

- **Electrical/Electronic Systems**
  - Potting compounds
  - Encapsulants
  - Adhesives