Strongwell combines superior raw materials, composite design, and the pultrusion process to manufacture EXTREN®, the highest quality pultruded fiberglass structural shapes available. Listed below are some useful comparisons when considering EXTREN® vs. traditional building materials.

### EXTREN® vs. Steel
- **Corrosion Resistance**: High, Low
- **Strength-to-Weight**: High, Medium
- **Maintenance**: Low, High
- **Conductivity**: Very Low, High

### EXTREN® vs. Aluminum
- **Corrosion Resistance**: High, Medium
- **Impact Resistance**: High, Low
- **EMI/RFI Transparency**: High, Low
- **Conductivity**: Very Low, High

### EXTREN® vs. Wood
- **Corrosion Resistance**: High, Low
- **Insect Resistance**: High, Low
- **Water Absorption**: Low, High
- **Flame Retardance**: Varies by Series, Low

For more specific comparisons, see the table on the next page.

To gain more in-depth data, visit www.strongwell.com/designmanual for access to the Strongwell Design Manual.

**Is EXTREN® the best material choice to meet the requirements of your application?**

See next page to compare the features of EXTREN® and traditional structural materials on a point-for-point basis!
<table>
<thead>
<tr>
<th>COMPARE</th>
<th>EXTREN® FIBERGLASS STRUCTURAL SHAPES</th>
<th>STEEL A-36 CARBON</th>
<th>ALUMINUM EXTRUDED SHAPES</th>
<th>STRUCTURAL TIMBER DOUGLAS FIR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STRENGTH-TO-WEIGHT</strong></td>
<td>Up to 75% lighter than steel and 30% lighter than aluminum. Ultimate Flexural Strength = ( (Fu) \ \frac{lw}{cw} = 30 \text{ ksi} ) Tensile Strength = ( \frac{lw}{cw} = 30 \text{ ksi} )</td>
<td>Up to 400% heavier than FRP. Homogeneous material. Tensile Strength = 60 ( \text{ ksi} ) Yield Strength = 36 ( \text{ ksi} )</td>
<td>Up to 70% heavier than FRP. Flexural Strength = ( (Fu) \ 35 \text{ ksi} ) Homogeneous material.</td>
<td>Specific Gravity = 0.51* (oven dried) Extreme fiber bending = up to 2800 PSI* Compression parallel to grain = up to 1800 PSI*</td>
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<tr>
<td><strong>INSTALLATION</strong></td>
<td>Can be field fabricated using simple carpenter tools and is easily lifted into place during installation with less equipment or specialized labor vs. steel.</td>
<td>Often requires specialty lifting equipment to move and place. Also requires specialized labor for fabricating and welding.</td>
<td>Good machinability, but requires welding, brazing, soldering, or mechanical joining in the field.</td>
<td>Easy to field fabricate and assemble with simple carpenter tools.</td>
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<tr>
<td><strong>INSTALLED COST</strong></td>
<td>Because installation of Strongwell FRP is much simpler and quicker than steel, structures built using Strongwell’s pultruded products can cost as much as 15% less than carbon steel, 30% less than galvanized steel, and as much as 50% less than stainless steel.</td>
<td>+/- 15% higher installed cost than FRP due to need for specialized labor, heavy equipment, and permitting.</td>
<td>Higher material costs than steel, and still often requires specialized labor, heavy equipment, and permitting.</td>
<td>Least expensive installation, but poor longevity in demanding locations, requiring more frequent maintenance and/or replacement.</td>
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<tr>
<td><strong>MAINTENANCE &amp; CORROSION RESISTANCE</strong></td>
<td>Unaffected by moisture or immersion in water when sealed. Will not rust like metal and will not rot like wood.</td>
<td>Subject to oxidation, rust, and corrosion. Requires regular painting or galvanizing for many applications.</td>
<td>Can cause galvanic corrosion. Unless anodized or coated, often requires periodic maintenance to ensure corrosion resistance.</td>
<td>Susceptible to warp, rot, and decay. Hazardous or high-maintenance coatings or preservatives often required for longevity.</td>
</tr>
<tr>
<td><strong>CONDUCTIVITY</strong></td>
<td>Extremely low electrical and thermal conductivity properties and high dielectric capability. Thermal Conductivity = ( 4 \ (\text{BTU/sf} / \text{HR} / \text{F} / \text{in}) )</td>
<td>Conducts electricity. Potential Shock Hazard. Thermal Conductivity = ( 260 - 460 \ (\text{BTU/sf} / \text{HR} / \text{F} / \text{in}) )</td>
<td>Conducts electricity. Potential Shock Hazard. Thermal Conductivity = ( 150 \ (\text{BTU/sf} / \text{HR} / \text{F} / \text{in}) ) Thermal Coefficient of Expansion = ( 11 - 13 \ (\text{in/ln/}^\circ \text{F})10^6 )</td>
<td>Poor conductor when wet. Can be conductive when it is wet.</td>
</tr>
</tbody>
</table>

*Surface dry at 19% max moisture content Design Values for Wood Construction, National Design Specification for Wood Construction.*