There’s nothing else like it for bushings

- Lasts longer
- Carries heavier loads
- Needs less maintenance
- Protects against unplanned down time

**ToughMet Alloy Resists:**
- Abrasive wear (scratching)
- Adhesive wear (galling)
- Corrosion
- Deformation

**ToughMet® Alloy Outlasts Steel & Aluminum Bronze**

- Steel galls to steel pin: metal removal.
- Aluminum Bronze wears against HRC60 pin.

Oscillating motion over 45 deg. Theoretical bearing stress 2000 psi. (Actual is higher.)

**ToughMet bearings last 2x as long as the bronze with no added friction.**

**Typical mechanical properties of ToughMet Alloy and other materials:**

<table>
<thead>
<tr>
<th>Material</th>
<th>UNS Number</th>
<th>Chemical Composition %</th>
<th>Yield Strength</th>
<th>Tensile Strength</th>
<th>Elongation (%)</th>
<th>Hardness</th>
<th>Modulus of Elasticity</th>
<th>Fatigue Strength (10^3 cycles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ToughMet® 3</td>
<td>C96900</td>
<td>15 Ni, 8 Sn, Balance Cu</td>
<td>105 (ksi) 735 (MPa)</td>
<td>110 (ksi) 770 (MPa)</td>
<td>2 - 6</td>
<td>HRC 30-34</td>
<td>18.5 (10^3ksi) 128 (10^3MPa)</td>
<td>40 (ksi) 275 (MPa)</td>
</tr>
<tr>
<td>Manganese Bronze</td>
<td>C86300</td>
<td>22-28 Zn, 2-4 Fe, 5-8 Al, 2.5-5 Mn, 1 Ni, 60-66 Cu</td>
<td>60 (ksi) 415 (MPa)</td>
<td>110 (ksi) 760 (MPa)</td>
<td>12</td>
<td>HRB 90</td>
<td>14.2 (10^3ksi) 98 (10^3MPa)</td>
<td>25 (ksi) 170 (MPa)</td>
</tr>
<tr>
<td>Aluminum Bronze</td>
<td>C95400</td>
<td>3-5 Fe, 10-11.5 Al, 1.5 Ni, 5 Mn, 83 Min Cu</td>
<td>30 (ksi) 205 (MPa)</td>
<td>75 (ksi) 515 (MPa)</td>
<td>12</td>
<td>BHN 150</td>
<td>15.5 (10^3ksi) 105 (10^3MPa)</td>
<td>28 (ksi) 195 (MPa)</td>
</tr>
<tr>
<td>Leaded Tin Bronze</td>
<td>C93200</td>
<td>6.3-7.5 Sn, 6-8 Pb, 1-4 Zn, 81-85 Cu</td>
<td>14 (ksi) 95 (MPa)</td>
<td>30 (ksi) 205 (MPa)</td>
<td>10</td>
<td>BHN 65</td>
<td>14.5 (10^3ksi) 100 (10^3MPa)</td>
<td>10 (ksi) 70 (MPa)</td>
</tr>
</tbody>
</table>
COMPANY PROFILE
Sunrise Aggregates of Danville, Michigan, produces about one million yards of gravel and sand a year for Michigan Department of Transportation highway projects. The company risks significant fines if it does not deliver gravel and sand on time. During peak season, Sunrise Aggregates runs its excavators at high speeds 100 hours a week, digging through clay and gravel – often underwater.

APPLICATION
Catapillar 350L excavators

CHALLENGE
OEM pins and bucket bushings wear out at approximately 3,500 hours, much faster than other joints which last about 8,000 hours. Manual lubrication is required every three hours when digging in water.

SOLUTION
Sunrise replaced steel bushings with ToughMet alloy on two CAT 350L excavators. The ToughMet bushings were checked at 8,100 hours. There was little wear and no change in performance, even with some skipped lubrication cycles. The ToughMet bushings were put back in service on the excavators, lasting more than 12,000 hours.

Using ToughMet bushings rather than steel more than tripled bushing and pin life.

Field test results – excavator bucket bushings

For more information on ToughMet alloys for excavator bucket bushings & other heavy equipment applications visit:
http://www.ToughMet.com