Improved Adhesive for Cryogenic Applications Cures at Room Temperature

The problem:
To formulate an adhesive that will cure at room temperature and provide an effective adhesive bond over the range from room temperature down to the temperature of liquid hydrogen (-423° F).

The solution:
An adhesive consisting of 1 part of 200-mesh powdered nylon filler to 2 parts of an epoxy-polyamine resin.

The added nylon filler markedly improves the adhesive strength (tensile shear) and adhesive toughness (T-peel strength) of the epoxy-polyamine resin. The filled adhesive can be cured at room temperature, whereas the unfilled resin requires a 250° F curing cycle. When applied to 7075-T6 bare aluminum, the bond strengths of the filled and unfilled adhesives cured under contact pressure at room temperature are as follows:

<table>
<thead>
<tr>
<th>Adhesive</th>
<th>Tensile Shear (Psi)</th>
<th>T-Peel (Lb/in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rm Temp. -320°F -423°F</td>
<td>Rm Temp. -320°F -423°F</td>
</tr>
<tr>
<td>Unfilled Epoxy-Polyamine</td>
<td>2334 1514 1552</td>
<td>0 0 0</td>
</tr>
<tr>
<td>Nylon-Filled Epoxy-Polyamine</td>
<td>3127 2710 2552</td>
<td>3.9 3.5 3.0</td>
</tr>
</tbody>
</table>

Note:
Inquiries concerning this innovation may be directed to:
Technology Utilization Officer
Western Operations Office
150 Pico Boulevard
Santa Monica, California, 90406
Reference: B66-10185

Patent status:
No patent action is contemplated by NASA.

Source: M. B. Smith and Harry J. Klinger of Telecomputing Corporation under contract to Western Operations Office (WOO-132)