Non-Text Problem:

You are using an Acme power-screw (not pictured) to lift a load bearing frame, pictured in figure 1. You estimate that the jack will experience 2000 lbs of load. Given the properties of the power screw in table 1, answer the following:

1. If there is an eight inch handle on the jack, how much force is required to lift the frame.

2. Is the jack safe? Check the following:
   (a) Combined axial and torsional stress (use von Mises).
   (b) Bearing stress
   (c) Stripping of threads
   (d) Self-locking

3. If the frame is connected by bolts and welds, as shown in figure 1, what do the bolt diameters and weld width have to be in order to prevent failure, with a factor of safety of 1.5. Assume that the jack acts in the center of the chassis. The bolts are SAE grade 5 and the weld is with a E6012 electrode.

<table>
<thead>
<tr>
<th>$S_y$</th>
<th>d</th>
<th>$d_w$</th>
<th>f</th>
<th>$f_c$</th>
<th>$L_n$</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 ksi</td>
<td>0.75 in</td>
<td>1.5 in</td>
<td>0.10</td>
<td>0.05</td>
<td>0.75 in</td>
</tr>
</tbody>
</table>

Table 1: Properties of power screw

Figure 1: Frame connections