PSF27 is a chromium, molybdenum, and vanadium alloyed cold work tool steel (AISI D2 analysis +) produced using the Spray Forming Process. The Spray Forming Process allows for rapid solidification resulting in materials with a very fine grain and homogeneous structure. This structure results in improved toughness, wear resistance, crack resistance, and higher hardness. It also yields more predictable heat treatment results.

### Typical Chemical Composition

<table>
<thead>
<tr>
<th>Element</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon</td>
<td>1.55%</td>
</tr>
<tr>
<td>Silicon</td>
<td>0.40%</td>
</tr>
<tr>
<td>Manganese</td>
<td>0.40%</td>
</tr>
<tr>
<td>Vanadium</td>
<td>1.00%</td>
</tr>
<tr>
<td>Chromium</td>
<td>12.00%</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>0.75%</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>0.07%</td>
</tr>
</tbody>
</table>

### Common Applications

- Blanking Dies
- Forming Rolls
- Punches
- Knives
- Thread Roll Dies
- Crush cutting Tools
- Shredders

### Physical Properties

- **Modulus of Elasticity**: $30 \text{ psi} \times 10^6 = 207 \text{ GPa}$
- **Density**: $0.2833 \text{ lb/in}^3 = 7861 \text{ kg/M}^3$
- **Annealed Hardness**: 215-255 Brinell (BHN)
- **Machinability**: 50-60% of 1% carbon Steel
- **Thermal Conductivity**: 15 BTU/hr/ft/°F (200F)

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1-800-365-1116  [www.sbsm.com](http://www.sbsm.com)
Heat Treatment

Preheat: 1200/1300°F, equalize.

High Heat (Austenitizing): 1870/1900°F, hold 30 minutes at temperature.

Quench: Air or positive pressure vacuum. Cool to 150 °F.

Temper: 400°F/975°F - hold 2 hours at temperature, air cool to room temperature between tempers. Temper twice. Recommended tempering temperature 930-975°F.

Annealing:
Heat to 1600°F, hold for two hours at temperature, then cool slowly(25°F/hr) to 1000°F, then air cool.
Or
Heat to 1600°F, hold two hours at temperature, cool to 1425°F, hold six hours then air cool.

Stress Relieving:

Annealed Material: Heat to 1200°F, hold for two hours at temperature, cool in still air to room temperature.
Hardened Material: Heat to 25/50°F below tempering temperature, hold two hours then cool in still air to room temperature

Size Change During Hardening-

<table>
<thead>
<tr>
<th>Hardening Temp °F</th>
<th>Tempering Temp °F</th>
<th>HRC</th>
<th>Longitudinal Size Change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900 1040</td>
<td>500 260</td>
<td>60.5</td>
<td>+.03</td>
</tr>
<tr>
<td>1900 1040</td>
<td>950 510</td>
<td>62</td>
<td>+.04</td>
</tr>
</tbody>
</table>