CRITICAL SUPPORT — This wheel shaft holds adjustable guide wheels onto a railroad frog grinder.

ROBUST PART — Each part is loaded with the full weight of the grinder and subject to shock loads.

FASTER BUILD — The Metal X replaced a hard-to-machine part with an easy-to-manufacture assembly.

MASSIVE SAVINGS — Stanley Infrastructure achieved up to 25x cost savings and 50x time savings.

The Part

PRINTED FLANGE
Without the shaft and key, the Metal X easily printed the wheel flange without supports.

OFF-THE-SHELF KEY
A key rotationally constrains the printed flange onto the purchased shaft.

OFF-THE-SHELF SHAFT
Purchasing an off-the-shelf shaft and machining in retaining ring grooves saves time, material cost, and machining cost.

Efficient Fabrication
Stanley Infrastructure used to machine wheel shafts out of a single block of steel. Because of the diameter of the flange and the length of the shaft, this meant that ~90% of the stock material was wasted in each part. With the help of Markforged engineers, Stanley Infrastructure redesigned the wheel shaft to be a three-part assembly. By purchasing an off-the-shelf shaft and key, they were able to easily print the more complex flange on the Metal X. The new assembly passed both durability and abuse drop testing.

<table>
<thead>
<tr>
<th>PRODUCTION VOLUME</th>
<th>COST SAVINGS</th>
<th>TIME SAVINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical Annual Volume</td>
<td>25% - 45%</td>
<td>48%</td>
</tr>
<tr>
<td>Single Component Fabrication</td>
<td>96%</td>
<td>98%</td>
</tr>
</tbody>
</table>

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