

## CASE STUDY



A 2013 Award of Distinction winner in the Hardware & Appliances category.

### Rack, Pinion, and Bushing Assembly

**Process:**  
Conventional powder metallurgy

**Density:**  
6.7 g/cm<sup>3</sup>

**Tensile Strength:**  
75,000 psi

**Particle Hardness:**  
52 HRC min.

**Apparent Hardness:**  
20 HRC min.

#### End Use and Function

This is an assembly consisting of rack, pinion, and bushing used in a patented pergola louver system that allows the pergola to convert to a water-tight shelter.

#### Fabrication

The sinter-hardened steel rack and five-level pinion and the copper steel bushing are pressed to net shape with one cross-drilled hole being the only secondary operation performed. The assembly was designed to be sinter bonded for strength. The parts have a typical density of 6.7 g/cm<sup>3</sup>, 75,000 psi ultimate tensile strength, 135,000 psi transverse rupture strength, and 20 HRC min. apparent hardness and 52 HRC min. particle hardness.

#### Results

Because of the large number of assemblies required in each louver system, the PM process gave the customer the only cost-effective option, delivering an estimated 75% savings over the machined alternative.



PickPM is a resource created by the Metal Powder Industries Federation, a trade association for the metal powder industry, for the benefit of the metal powder industry. To learn more about powder metallurgy, or to find a part fabricator, visit us at [PickPM.com](http://PickPM.com)