

## CASE STUDY

### Fall-Arrest System Pulley

**Process:**

Metal Injection Molding (MIM)

**Material:**

MIM-17-4 PH stainless steel

**Density:**

7.67 g/cm<sup>3</sup>

**Hardness:**

35-40 HRC

**Weight:**

62 g



2026 Grand Prize winner in the Hand Tools/Recreation category for MIM components

**End Use and Function**

The pulley regulates rope movement and provides automatic braking and locking during a fall. Rapid descent or sudden loading triggers immediate engagement for height-related construction, maintenance, and rescue applications.

**Fabrication**

The pulley is produced in a two-cavity hot-runner mold with multiple slides that form the spike geometry and mounting features. Carefully positioned gates and vents promote complete filling, while special sintering setters and controlled heating maintain roundness and prevent thin-wall distortion. Heat treatment establishes the required hardness.

**Results**

MIM delivers accurate, repeatable geometry, a high-quality surface finish, reduced porosity, and minimal machining. The resulting pulley provides reliable braking control and durability while improving material utilization and reducing cost compared with machined or cast alternatives.



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