Pentz Cast Solutions: Molding Process Comparisons

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| **Aluminum Casting: Molding Process Comparisons** |
| **Process** | **Benefits/Limitations****(See Terms & Concepts for more detailed descriptions)**  | **Typical Part Weight** | **Typical Surface Finish (RMS)** | **Min. Draft Req.**  | **Typical Linear Tolerances (as cast)** | **Typical****Tooling Cost** | **Typical****Volume** |
| **Automated****Precision** **Green Sand Molding** | **Superior performance at any volume. Extremely efficient, flexible, and cost effective. Utilizes automated system for building and handling the green sand molds used to cast parts.** Pentz has a PLC-controlled state-of the-art Sinto FBO II automated molding system capable of: - 16x20 mold sizes - 5-minute tool changes - 40 second mold cycle | **1 oz/ to****30 lbs.** | **Industry 250-1000****Pentz****200-400** | **1 °- 3°** | Industry Norm ±.030” .up to 6”. Over 6” add an additional ±.003’/in.**Pentz Typical ±.020 up to 6”. Over 6” additional ±.002”/in.** | **Without Cores****$5,000 - $8,000****With Cores****$8,000 - $10,000** | **1-1 Million /year****Automated, efficient, and effective at any volume** |
| **Precision Manual Green Sand Molding** | **The most versatile casting Process. Produces castings with high strength and complex shapes in all sizes with excellent finish.** Utilizes manually formed green sand molds to make castings. Economical solution for many castings applications. | **1 oz. to 3,000 pounds** | **Industry** **250-1000****Pentz****125-400** | **½°- 3°** | Industry Norm ±.030” .up to 6”. Over 6” add an additional ±.003’/in.**Pentz Typical ±.020 up to 6”. Over 6” additional ±.002”/in.** | **Without Cores $1,000-$5,000****With Cores****$4,000 - $10,000** | **1-100,000/year****Any Volume** |
| **Precision Dry Sand Molding (AKA-No Bake, Airset, Cold Box CO2, etc.)** | **Excellent for producing parts that require high strength and pressure tight/vacuum tight sealing characteristics**. Utilizes chemically bonded dry sand to form molds used to cast parts. | **1 oz. to 3,000 pounds** | **Industry** **250-750****Pentz****200-500** | **½°- 3°** | Industry Norm ±.030” .up to 6”. Over 6” add an additional ±.003’/in.**Pentz Typical ±.020 up to 6”. Over 6” additional ±.002”/in.** |  | **1-10,000/year****Any Volume** |
| **Permanent Mold** | **Produces very high-density castings that are pressure tight and have excellent structural characteristics.** Parts are cast repeatable form the same cast iron mold. A mold typically lasts 20,000 castings. | **1 oz. to 100 lbs.** | **Industry****150-750****Pentz100-500** | **1° to 10°** | Industry Norm ±.015” .up to 3.875”. Add ±.020” up to 15”**Pentz Typical ±.012”. Add additional ±.017” up to 15”** | **Without Cores $15,000-$60,000****With Cores****$20000 -$70,000** | **2,000 / year minimum****Medium to High Volume** |
| **Die Casting** | **Casting forms in steel dies. Well suited for high volume nonstructural components**. | **<1 oz.****To****35 lbs.** | **Industry****32-63** | **1 °- 3°** | Industry Norm ±.004” .up to 1”. Over 1” add an additional .0015”/in. up to 12” | **$15,000-$80.000** | **5,000 minimum****High Volume** |
| **Investment Casting (Lost Wax)** | **Casting formed in a ceramic mold. Generally used for small, intricate parts requiring very high dimensional stability** | **No minimum to 20 lbs.** | **Industry****10-85** | **No Minimum** | Industry Norm ±.005” .up to 1”. Over 1” add an additional ±.005’/in. | **$5,000 - $40,000** | **Under 1000****Low Volume** |
| **CNC Machined “Hog Out”** | **Cut aluminum from billet material using CNC** program. Typically used for one-off low volume prototypes.  | **1 oz. to 100 lbs.** | **Industry****20-60** | **No Minimum** | **Industry Norm ±.001”** | **$2,000-$10,000** (Includes program & fixture costs) |  **Low Volume** |
| Note: The above industry comparison depends on the casting supplier, metals, too design, and casting design. Actual part and tooling costs vary significantly based on size, complexity, and tolerance required.Call 425-788-6490 to contact a sales engineer |
| **www.pentzcastsolutions.com** |