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## The Plaster Mold Process

**What is it?** Briefly stated this is a method of producing castings, usually in aluminum or zinc, by pouring liquid metal into plaster (gypsum) molds.

**Why Use It?** Because the above process results in "precision" castings with consistent dimensional accuracy and smooth surface finish using "low cost" tooling.

**How to Use It.** To buy time during prototype and preproduction. As insurance against failure.

**When to Use It.** Usually in the following circumstances:

1. Castings requiring "close tolerance".
2. Engineering – design and model building prototypes "Product Liability" evaluation.
3. To simulate die castings for pilot and preproduction during manufacture of long lead production tooling.
4. For complex and special shapes.
5. For low volume usage when quantities do not justify die casting tools.
6. To reduce costs and machine shop time by eliminating secondary and complex machining operations.
7. Castings requiring smooth appearance with fine detail in aesthetic applications.
8. For castings requiring high metallurgical integrity verified by Radiographic and Fluorescent penetrant inspection.

## Specifications - Design & Application

**Size** No limitation but best range within 2" cube to 36" cube.

**Finish** Can hold 63 micro inch but normally 90 micro inch.

**Shape** Considerable design freedom for unusual and complex shapes.

### **Wall thickness**

|            |           |
|------------|-----------|
| Thin wall  | .03 - .06 |
| Average    | .08 - .12 |
| Thick Wall | .18 - .50 |

### **Tolerances**

|                  |                  |
|------------------|------------------|
| 0" - 2" ± .010   | 2" - 3" ± .015   |
| 3" - 6" ± .020   | 6" - 12" ± .025  |
| 12" - 18" ± .030 | 18" - 30" ± .040 |

Closer tolerances can be held on specific dimensions.

**Limitations** The process is limited to non-ferrous metals with pouring temperatures below 2,000°F – this includes all aluminum and zinc casting alloys.

**Holes** Not economical to cast small holes ¼" or less unless odd shape or in inaccessible areas.

**Alloys** All aluminum and zinc casting alloys to the appropriate commercial and military specifications.

**Quality** Radiographic to MIL-C-6021 Class 2A Grade C-local areas to Grade B. – discussion necessary.

**Mechanical Properties** Tensile – Yield – Elongation – as per the appropriate commercial and military specifications. – discussion necessary.

### **Tooling – Pattern Equipment**

- a. Wood – To expedite for up to 20 pieces
- b. Epoxy Resin – usually for up to 500 pieces.
- c. Metal- Aluminum or brass – used to obtain best tolerances and quality.
- d. Flexible – Rubber – for special applications usually "Cast-to Size" molds for plastics industry

**Cost** Rule of Thumb for complex shapes in 15" cube range.  
Tooling – 10% of die cast tools.  
Piece price – 10 times die cast parts.

**Delivery** 1-2 weeks for simple parts.  
6-8 weeks for complex parts.

### **Typical Applications**

1. Castings for business machines, medical equipment, computers, electronics, aircraft, engineering.
2. **Molds for Plastics Industry** Rotational molds – vacuum form – expanded polystyrene molds – Kirksite injection molds – tire molds – blow molds.