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**G-CLAMP BY SAND CASTING**

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## ABSTRACT

We can use several different methods to shape materials into useful products. Making parts by casting molten metal into a mold and letting it solidify is a logical choice. Indeed, casting is among the oldest methods of manufacturing and was first used in about 4000 B.C to make ornaments, copper arrowheads, and various other objects.

In the broad sense, casting is a process that is applied not only to metals but also to nonmetallic materials. Plastics, ceramics, and glasses are also cast into shapes.

Basically, metal-casting processes involve the introduction of molten metal into a mold cavity where, upon solidification, the metal takes the shape of the cavity. The casting process is thus capable of producing intricate shapes in a single piece, including those with internal cavities. Very large or hollow parts can be produced economically by casting techniques. Typical cast products are engine blocks, crankshafts, pistons, valves, railroad wheels, and ornamental artifacts.

Although casting processes allow a great deal of versatility in part size and shape, they most often are selected over other manufacturing methods because they:

- can produce complex shapes with internal cavities or hollow sections.
- can produce very large parts
- can utilize work piece materials that are difficult to process by other means.
- are economical to use

Almost all metals can be cast in (or nearly) the final shape desired, often with only minor finishing required. This capability places casting among important net-shape manufacturing technologies. (Among other similar process is net-shape forging,

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## **1.1 INTRODUCTION**

The traditional method of casting metals is in sand molds and has been used for millennia. Simply stated, sand casting consists of placing a pattern (having the shape of the desired casting) in sand to make an imprint, incorporating a gating system, filling the resulting cavity with molten metal, allowing the metal to cool until it solidifies, breaking away the sand mold, and removing the casting. Although the origins of sand casting date to ancient, it is still the most prevalent form of casting. In the United States alone, about 15 million tons of metal are cast by this method each year. Typical parts made by sand casting are machine-tool bases, engine blocks, cylinder heads, and pump housings.

## **1.2 OBJECTIVE OF THE PROJECT**

### 1.2.1 Understand the role of modeling

Modeling is tools for helping engineers do a better job. As an engineering tool, modeling provides engineers with a way to understand the process dynamics and evaluate the quantitative effects of various process variables on the quality of the resulting products. Furthermore, casting modeling allows process engineers to make virtual castings and to optimize their casting process in terms of quality and yield without actually making castings. These capabilities make modeling more powerful than any other tools previously available to process engineers.

Because of its powerful capabilities, modeling is increasingly accepted as a technology which can improve quality and decrease cost in foundries and molten metal