

Casting Technology

Introduction

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Evaluation

- Midterm (%40)
- Homework (%20)
- Final (%40)

Sources: ASM Vol 15. Foundry Technology,
John Campbell's 'Complete Casting Handbook'
Peter Beeley's 'Foundry Technology'
Doru Stefanescu's 'Engineering of Casting Solidification'

The story of metal casting is as glamorous as it is ancient, beginning with the dawn of human civilization and interwoven with legends of fantastic weapons and exquisite artworks made of precious metals. It was and is involved in the two main activities of humans since they began walking the earth: producing and defending wealth. Civilization as we know it would not have been possible without metal casting. Metal casting must have emerged from the darkness of antiquity first as magic, later to evolve as an art, then as a technology, and finally as a complex, interdisciplinary science.

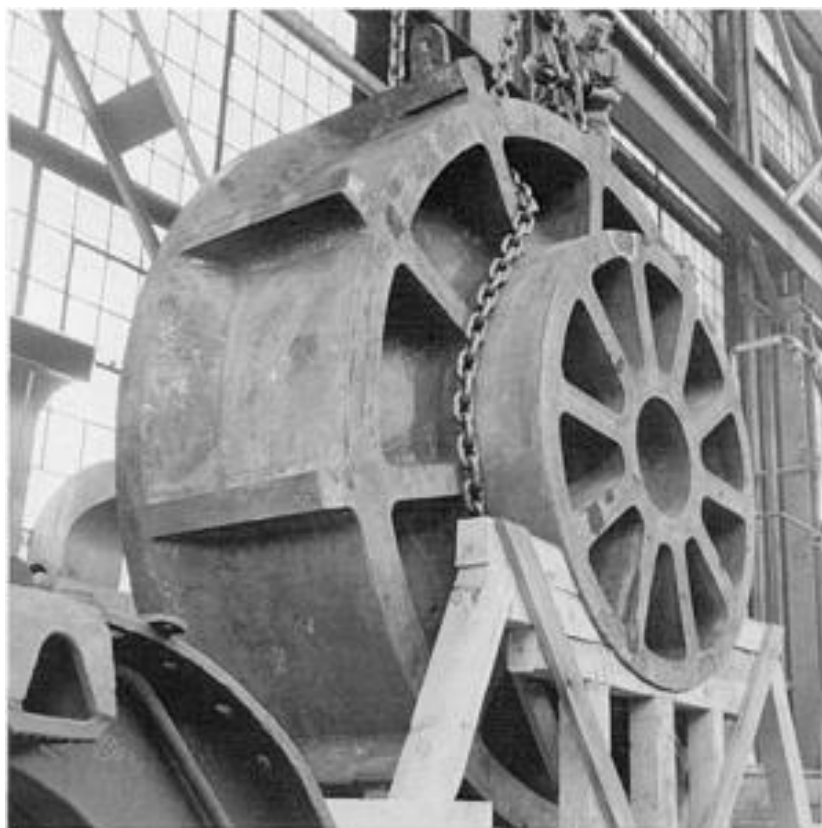
METAL CASTING is unique among metal forming processes for a variety of reasons. Perhaps the most obvious is the array of moulding and casting processes available that are capable of producing complex components in any metal, ranging in weight from less than an ounce to single parts weighing several hundred tons. Foundry processes are available and in use that are economically viable for producing a single prototype part, while others achieve their economies in creating millions of the same part. Virtually any metal that can be melted can be cast.



Deer statuette / Geyik heykelciğı
Arsenical copper / Arsenikli bakır,
H / Y 45.5, Alaca Höyük-Çorum 25th c. BCE / MÖ 25. yy,
Anadolu Medeniyetleri Müzesi-Ankara



Bull statuette / Boğa heykelciğı
Arsenical copper / Arsenikli bakır,
H / Y 48, Alaca Höyük-Çorum 25th c. BCE / MÖ 25. yy
Anadolu Medeniyetleri Müzesi-Ankara



(a)



(b)



Casting Techniques

- **Expendable mould techniques**
- **Permanent mould techniques**

Expendable mould techniques

- **Permanent pattern techniques**
 - Sand mould casting (Green, Dry, Resin)
 - Shell mould casting
 - Vacuum (V) Process
 - Plaster mould casting
 - Ceramic mould casting
- **Expendable pattern techniques**
 - Investment casting (Lost wax casting)
 - Ceramic shell, - Block Mould (Flask)
 - Lost foam casting (Full mould casting)

Permanent mould techniques

- Metal (permanent) mould casting (Gravity die casting)
- High pressure die casting (Die casting)
 - Hot chamber, - Cold chamber
- Low pressure die casting
- Semi-Solid Metal Forming
- Squeeze casting
- Centrifugal casting
 - True, - Semi, - Centrifugal assisted
- Continuous casting
 - Non-ferrous metals, - Steel

Five main principles for successful casting

1. Choose the suitable technique and prepare its moulds and cores in proper conditions.
2. Prepare the desired alloy. Choose the suitable melting unit and apply required liquid metal treatments. (Such as inoculating, degassing, modification, fluxing)
3. Pouring the liquid metal into the mould in appropriate viscosity and speed. (Provide laminar flow)
4. Control the nucleation, solidification and structure of casting.
5. Provide optimal liquid metal feeding to compensate shrinkage.

Elements of a simple mould

