# Chapter I

# Introduction

## Generalization[1,2]

Metals in casting production have a wide range of chemical compositions, and each of which requires its own appropriate melting temperature. However, castings of most metal usually have common casting defects. Most factories have incurred substantial revenue loss from casting defect and rejected product. The cavities defect from gas in process is one of the problems commonly found in foundry. Measures to control sand additives in sand molding process are the key factor to solve the gas cavities defect. Therefore, the cause of gas cavities defect in steel casting is an important issue to study.

## Objectives

The objectives of this study were:

1. To study and apply the metallurgical knowledge to the foundry process using an actual case study.

2. To study the correlation between sand properties and gas cavity defect, so that pinhole and blowhole can be reduced by controlling sand properties.

## Scope

The goal of this work is to investigate the effect of sand properties on casting defects, focusing on pinholes and blowholes in steel casting. Two major properties of sand, i.e. permeability and % loss on ignition, were chosen to correlate with the occurrence of casting defect. The defects are measured by stereological technique and the correlations are investigated by statistical technique (Analysis of variance, ANOVA). Grain finess number, clay content, starch content and moisture content are chosen as variables for permeability and % loss on ignition. The levels of variation are 4.5 and 6.5 % of clay, 0.5 and 1 % of starch, 2.5 and 4 % of moisture and two levels of grain finess number, which are known after sand testing. Two levels of pouring temperatures of about 1550 °C and 1620 °C are selected to investigate the differences of low and high pouring temperatures on the pinhole and blowhole occurrence. By design of experimentation (DOE), the two levels were chosen to make linear relations. In addition, compressive strength testing was done for completion of sand properties data.

## Expected Benefits

1. The study will benefit the foundry industry since it is expected that the amount of defects will be reduced if the root the causes of defects are determined.

2. Student can get an experience in studying of pinhole and blowhole reduction.