PREFACE TO THE FIRST EDITION

Foundry is the most basic input industry and stringent demands of quality and quantity are being placed on it with rapid industrialisation and growth in other fields of production. Up-to-date knowledge of materials and processes for casting is necessary in order to be able to produce sound castings economically.

This book has been prepared to meet the growing needs of undergraduate students of production, metallurgical and mechanical engineering, persons preparing for professional examinations like those of the Institute of Metals, Institution of Engineers (India), City & Guilds Examination, Institute of Indian Foundrymen, etc. in which foundry technology usually forms a complete paper. It is hoped that the book will also serve as a useful guide and reference book for personnel already in the profession who may need to refresh their knowledge of the subject. It is believed further that the treatment in this book is in harmony with the current trend towards a more practical approach to engineering education.

I am indebted to various organisations (acknowledged in the text) for kindly making available illustrations, diagrams and data. Thanks are due to the Indian Standards Institution for permission to include extracts from some of its standards. Tables 2.3.1, 9.2, 6.1, 6.2, and 6.5 of this book have been reproduced with permission of the ISI from five Indian Standards, namely IS: 1513-1971; 3343-1965; 1987-1974; 224-1973; and 1751-1968 respectively. Thanks are also due to Mr. B.N. Mahbo of NIFFT for carefully preparing the script, and Mr. S.K. Dasgupta and Mr. R. Horo, also of the NIFFT, for preparing diagrams.

As the subject is of a very extensive nature, and new developments and innovations are taking place rapidly, there will always be scope for further improvement. Constructive suggestions in this regard are welcome from readers and will be given due attention when the next edition of the book is brought out.

P.L. JAIN
INTRODUCTION

Foundry engineering deals with the processes of making castings in moulds formed in either sand or some other material. The art of the foundry is ancient, dating back to the dawn of civilization. Even in pre-historic times, as far back as 5000 B.C., metallic objects in the form of knives, coins, arrows, and household articles were in use, as observed from the excavations of Mohenjodaro and Harappa. One of man's first operations with metal was melting the ore and pouring it into suitable moulds. The casting process is said to have been practised in early historic times by the craftsmen of Greek and Roman civilisations. Since then, the role of metals has acquired unique significance. Copper and bronze were common in ancient times, but evidence indicates that iron also had been discovered and developed in the period around 2000 B.C., though its use was greatly restricted.

The earliest use of the metals was mostly for the purpose of knives, arrow points, coins, and tools. The moulds were made in stone or sand. Around 300 B.C. started the era of religious upheavals, and metals began to be used for statues of gods and goddesses. Bronze was still the most popular metal. It was at this time that lost wax process made its impact. Subsequently, a still greater application of metals figured in armoury, guns, and war material. The superior quality of metals and the absence of any impurities in them emphasise the ability and precise quality control of the refining process even in those days.

The greatest breakthrough in the application of metals for gunnery and other arms took place possibly at the time when Alexander was contemplating victory over the entire Eurasian continent. Since then, the whole art of metal founding has emerged as an exact science. Today, we have a variety of moulding processes and melting equipment and a host of metals and their alloys. And though the techniques and methods of production have changed considerably, the basic principles still remain almost the same.

Castings have several characteristics that clearly define their role in modern equipment used for transportation, communication, power, agriculture, construction, and in industry. Cast metals are required in various shapes and sizes and in large quantities for making machines and tools, which in turn work to provide all the necessities and comforts of life.

Other metal-shaping processes, such as hot working, forging, machining, welding, and stamping, are of course necessary to fulfil a tremendous range of needs. However, certain advantages inherent in castings—design and metallurgical advantages—and in the casting process itself, endow them with superiority over other methods.
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