



DUCTILE IRON DATA

for Design Engineers

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PREFACE

Ductile Iron Data for Design Engineers revised edition. The title describes both the contents and the objective of this book. It is a comprehensive summary of data describing the engineering properties of Ductile Iron. The youngest but most successful member of a truly ancient family, Ductile Iron has suffered from an abundance of myths and a lack of information.

“Cast iron is brittle.” is an outdated but widely held truism which mistakenly implies that all cast irons are the same, and none are ductile. In fact, Ductile Iron is far more than a cast iron which is ductile. It offers the design engineer a unique combination of a wide range of high strength, wear resistance, fatigue resistance, toughness and ductility in addition to the well-known advantages of cast iron – castability, machinability, damping properties, and economy of production. Unfortunately, these positive attributes of Ductile Iron are not as widely known as the mistaken impression of brittleness is well known.

The purpose of this book, therefore, is quite simple: to replace the myths with data, and let the designer decide how he can take advantage of the unique combination of properties offered by Ductile Iron.

This book is being offered to design engineers through the Ductile Iron Marketing Group (DIMG), a non-profit organization whose goal is the promotion of the generic use of Ductile Iron castings through market surveys and promotional and educational activities. It has been published by Rio Tinto Iron & Titanium Inc. (formerly QIT - Fer et Titane Inc.), a member and co-founder with Miller and Company of the DIMG. The other member of the group is the Ductile Iron Society (DIS). Dr. Richard Warda, formerly with QIT and CANMET originally wrote the book.

Significant editorial assistance and additional materials were provided by Mr. L. Jenkins, Technical Director, DIS; Dr. G. Ruff, CMI Tech. Center; John Keough & Bela V. Kovacs, Atmosphere Furnace Company; Mrs. F. Dubé, Rio Tinto Iron & Titanium Inc.

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SECTION I

FORWARD

FORWARD

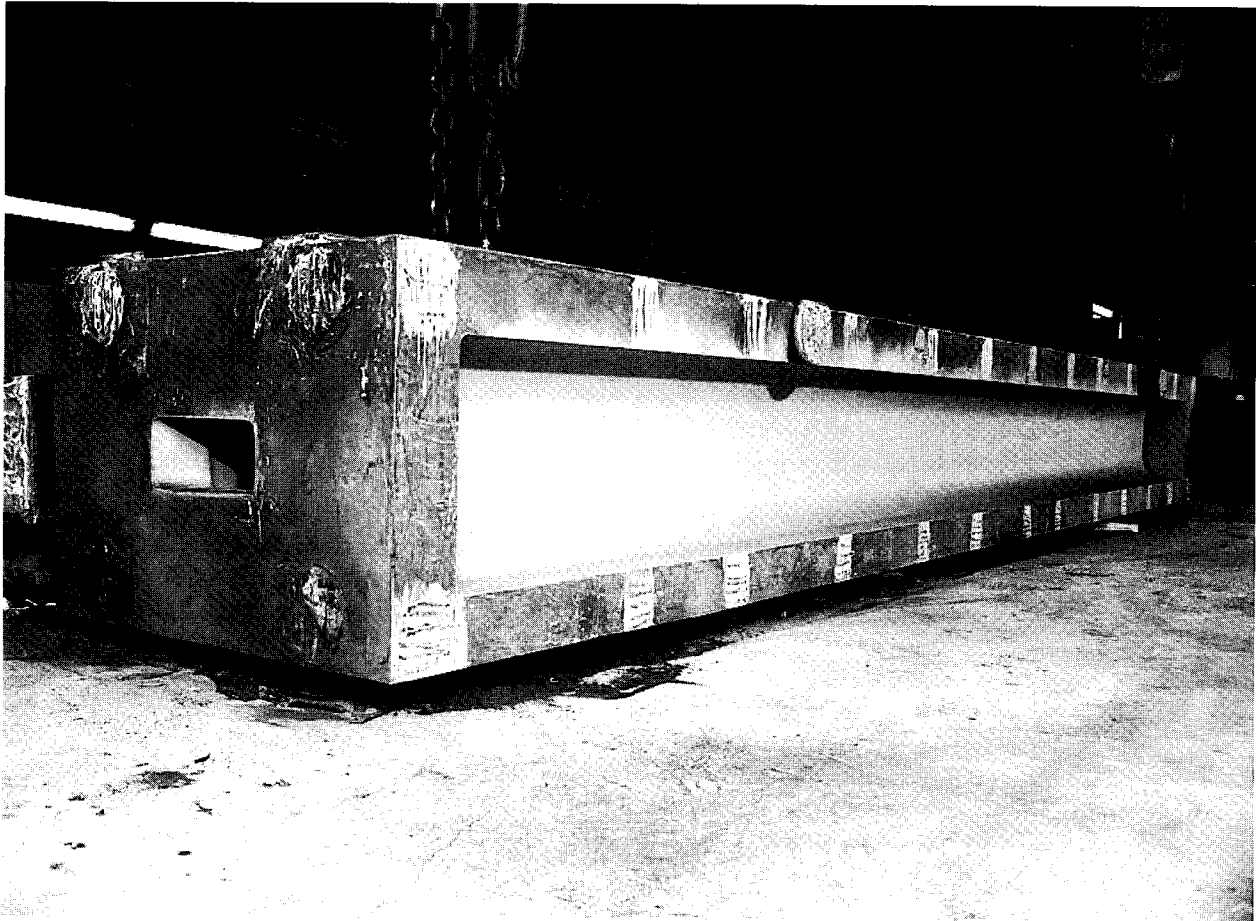
Over forty years ago the birth of a new engineering material, Ductile Iron, was announced at the 1948 American Foundrymen's Society Annual Conference. Looking back on the first four decades of Ductile Iron reveals the classical pattern of the research, development and commercialization of a new material. In the early years INCO, the patent holder, introduced Ductile Iron to designers and engineers by distributing technical literature and conducting seminars. As knowledge of the properties and economies of Ductile Iron spread, its usage increased dramatically throughout the fifties and early sixties. After the termination of INCO's promotion of Ductile Iron in 1966, Ductile Iron market growth continued to outperform other ferrous castings but, as the engineers and designers who benefitted from the early promotional efforts of INCO retired and were replaced by a new generation, the knowledge gap about Ductile Iron began to widen.

During the past decade the development and commercialization of austempered Ductile Iron (ADI) has added a new star to the Ductile Iron family. Combining the strength, ductility, fracture toughness and wear resistance of a steel with the castability and production economies of a conventional Ductile Iron, ADI offers the designer an exceptional opportunity to create superior components at reduced cost. Only one factor has detracted from this story of forty years of Ductile Iron technology – the promotion of this material to designers has been a poor second to its technical development. In fact, the lack of knowledge and understanding among some potential users about the properties and uses of Ductile Iron is astounding.

In 1985 QIT-Fer et Titane and Miller & Company, two suppliers to the Ductile Iron foundry industry, recognized that a lack of engineering data was inhibiting the sales of Ductile Iron castings. To remedy this lack of information, QIT and Miller & Company formed the Ductile Iron Group (DIG). For the past five years, the DIG, which also includes the Ductile Iron Society, have conducted market surveys to identify the informational needs of designers and engineers and have addressed these needs through the publication of technical literature and the presentation of technical lectures and seminars.

“Ductile Iron Data for Design Engineers” (revised edition), produced by Rio Tinto Iron & Titanium for distribution by the Ductile Iron Marketing Group, will help to overcome the lack of information which has persisted, even after forty years of Ductile Iron production. By informing designers and engineers about the impressive mechanical properties and economic advantages of Ductile Iron and ADI, this book should be of significant benefit to both users and producers of this remarkable material.

Keith D. Millis (deceased)
Formerly Executive Director
Ductile Iron Society
& Co founder of Ductile Iron



Courtesy of Siempelkamp Guss, Germany

World's largest Ductile Iron casting produced to date: crosshead for pipe press. Net casting weight 230 tonnes. Length: 14m, height: 2m and width: 2.5m.

This casting contains 80 tonnes of Sorelmetal in order to obtain the excellent properties required in the heaviest sections.