

R E V I E W

Design Strength of Spheroidal Graphite Cast Iron, by I. V. Kudryavtsev, N. M. Savvina, N. B. Baranova and N. A. Balabanov. Mashgiz, 1957.

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This book deals with the mechanical properties of spheroidal graphite cast iron, known also as high-strength iron, as affected by its composition and structure. Static, impact, fatigue properties are covered.

Special attention is paid to fatigue properties, including the type, the stress state, the scale factor, effects of stress concentrations and corrosion fatigue. Considerable space is devoted to various matters associated with an increase of endurance limits by mechanical and thermal surface treatments.

The results of studies on the effect of temperature under short-term loading conditions on the mechanical properties of these irons are reported, and also of a study of elastic properties and incomplete elasticity (damping).

An undoubted merit of the book is that it is based mainly on the use of results obtained by the authors in investigations, in which special attention was paid to the selection of material, the technique of preparing and testing the specimens. All this increases the value and reliability of the results obtained in a broad study of the mechanical properties of these irons.

The book also uses both domestic and foreign information about the mechanical and physical properties of high strength cast irons.

In all important cases, the irons were comparison-tested against iron containing flake graphite and medium-carbon structural steels, which of course increases the book's practical value by making it possible to appraise high-strength iron as a substitute for these materials.

The last chapter, dealing with the use of high-strength iron for diesel crankshafts is very interesting. With the proper technology, cheaper high-strength iron crankshafts are just as strong as those of steel 45 (0.45% carbon).

Finally, these extensive and intensive studies are of practical value, in view of the various interesting observations and deductions made by the authors regarding the effect of structure on the mechanical properties of different irons.

The book is written simply and clearly and the many graphs greatly facilitate assimilation of its contents.

A few concluding notes:

- 1) The term 'ability to extinguish vibrations' (p. 143) is unfortunate; it should be 'dissipation of vibrational energy' or 'damping of vibrations'.
- 2) In determinations of residual stresses in high-strength iron after surface hardening (p. 72) a more exact method should have been used with successive removal of layers and measurement of the resulting strain. Strain gages are best for this purpose and yield more accurate information about residual stress magnitude and distribution.
- 3) In all probability, the effective stress concentration coefficients found in fatigue tests are lower for cast irons because of a lower volume of metal in the notched zone than in the corresponding portion of an un-notched specimen. This is possibly the reason for the unusual value of 0.9 for this coefficient, found by the authors in torsional fatigue (p. 36). An annular notch would have only a small effect on the endurance strength in such tests if failure is due to normal stresses.
- 4) There is very little information in the book about important and useful high-temperature properties of high-strength irons like creep and rupture strength, and resistance to 'growth'. On these matters, very comprehensive and valuable foreign literature should have been consulted.

5) For a more complete assessment of the fatigue strength of these irons, their reaction to cyclic overstressing should be studied.

These few observations do not detract in any way from the great practical value of the book which will undoubtedly contribute towards a wider use of high strength cast iron.

The Section FROM FOREIGN JOURNALS has been omitted as of no value whatsoever to Western readers who are infinitely better and more promptly served by such abstracting services as ASM Review of Metal Literature; Abstracts of Current Literature; Metallurgical Abstracts; Centralblatt der Hütten und Walzwerke, Zeitschriftenschau; etc. Publisher's Note.

D I S S E R T A T I O N S

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