

**PRINCIPLES OF INTERCHANGEABLE
MANUFACTURING; A TREATISE ON THE BASIC
PRINCIPLES INVOLVED IN SUCCESSFUL
INTERCHANGEABLE MANUFACTURING
PRACTICE, COVERING DESIGN,
TOLERANCES, DRAWINGS, MANUFACTURING
EQUIPMENT, GAGING AND INSPECTION**

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Principles of interchangeable manufacturing; a treatise on the basic principles involved in successful interchangeable manufacturing practice, covering design, tolerances, drawings, manufacturing equipment, gaging and inspection by Earle Buckingham

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EARLE BUCKINGHAM

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GAGING AND INSPECTION

BY

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PREFACE

WHILE many articles dealing with various phases of interchangeable manufacturing have appeared from time to time in the technical press, no complete and comprehensive treatise dealing with this subject as a whole has heretofore been available to those interested in interchangeable manufacturing in the machine building and metal working fields.

The development of interchangeable manufacturing is closely interwoven with many distinctly American manufacturing methods and processes. Every large American industry has contributed its share to the progress made in interchangeable manufacturing. Different plants working along independent lines have often achieved the same results by widely different methods. The author has attempted to define and emphasize the underlying basic principles, using specific methods only when necessary to illustrate the application of these principles in actual manufacturing processes. He has gathered the information upon which this treatise is based from many manufacturing plants, both large and small, in this country and in Canada. He has seen every method discussed in successful operation, some in one plant, some in another — but not all in any one.

For more than ten years the author has been in constant touch with many of the detailed manufacturing problems that arise in the production of interchangeable mechanisms in large quantities. During the World War his work took him for four years into many manufacturing plants in connection with ordnance work, first for private corporations and later for the Ordnance Department. When engaged in this work it became apparent to him that the absence of common methods of interpretation of drawings, tolerances, and specifications, the lack of uniform gaging methods and misunderstanding of many of

the factors of interchangeable manufacturing, presented an urgent need for a complete treatise on this subject.

In arranging the material available on the subject of interchangeable manufacturing, the author has first taken up the general principles involved in the industrial application of this method of production, and has then devoted a separate chapter to the definition of the terms used, so that there will be no misunderstanding as to the meaning of the terms used later in the book. The influence of interchangeable manufacturing processes on machine design and the purposes of models are then dealt with, followed by a complete and minute discussion on the dimensioning of drawings intended for use in interchangeable manufacturing. This is followed by a discussion of the principal elements that govern mechanical production, the equipment required for interchangeable manufacturing (including machines, jigs and fixtures); the gaging equipment necessary; and the principles of inspection and testing. Special chapters are also devoted to the manufacture for selective assembly, and methods used in small quantity production on an interchangeable basis. An entire chapter deals with the service factor in interchangeable manufacturing, because in the final analysis no manufactured machine or device is ever purchased for itself alone, but is acquired for the service which it is supposed to render.

The Pratt & Whitney Co., Hartford, Conn., with whose cooperation this treatise is written, submits it to the public as a part of the company's contribution to the art of interchangeable manufacturing with the hope that it will assist manufacturers and mechanics to employ effectively the principles of interchangeable manufacturing and to reap the benefits that a rational application of these principles make possible. The author also wishes to acknowledge at this time the assistance that has been given him by many other manufacturing plants that he has visited. To name them all would mean a long list of prominent plants manufacturing machine tools, automobiles, tractors, ordnance, typewriters, watches, phonographs, instruments, etc.

EARLE BUCKINGHAM

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