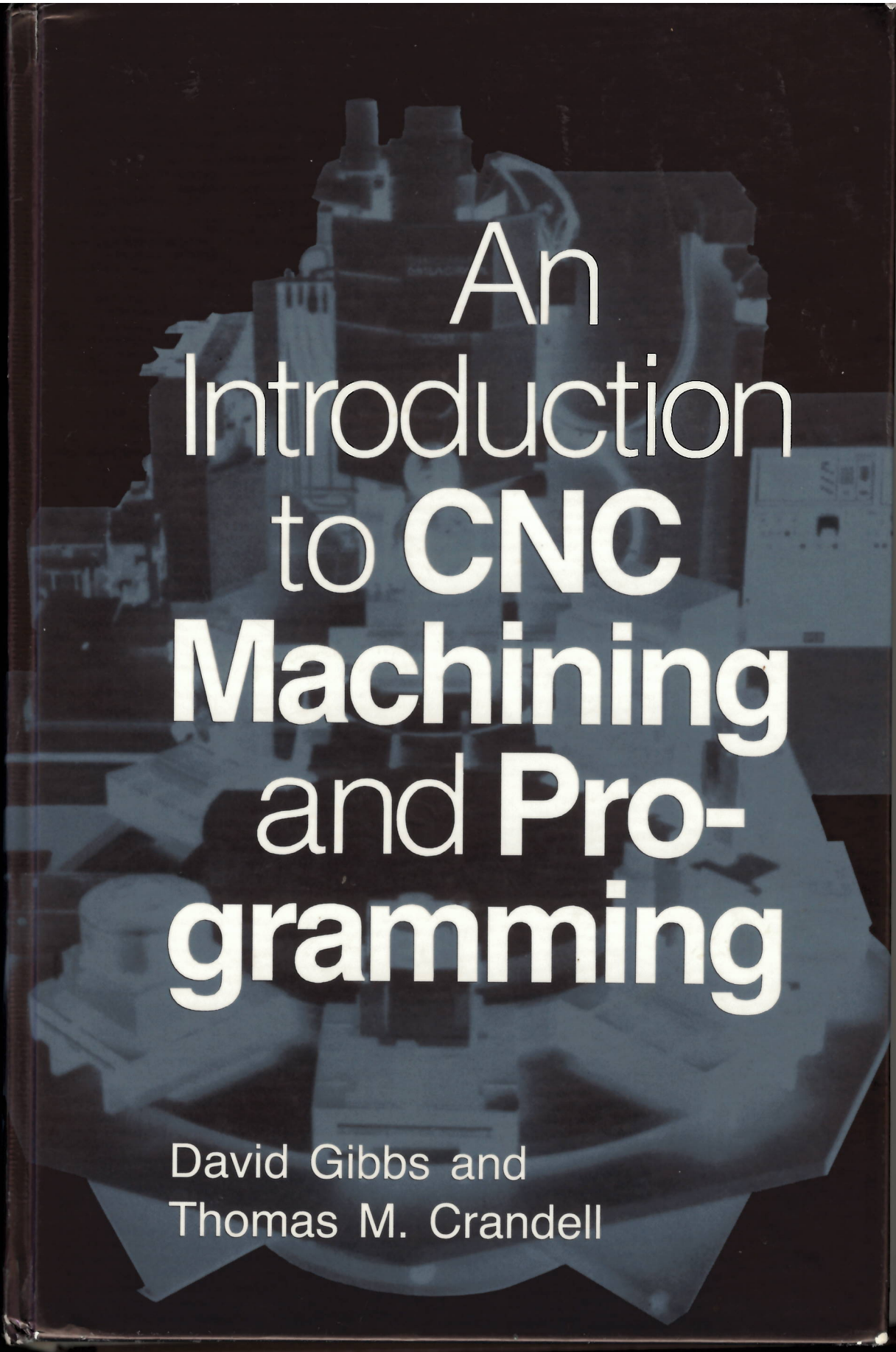

An Introduction to CNC Machining and Programming

David Gibbs and
Thomas M. Crandell

An Introduction T

CNC Machin and Programmin

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DEDICATION

I would like to dedicate my work on this textbook in loving memory of my grandfather, Edgar L. Crandell. I also dedicate my work to my parents Gale and Beverly Crandell. It was these three individuals who taught me to work hard to complete a task and to do it to the best of my ability. I thank them for their time and patience during my upbringing.

My thanks goes to the following: My family—Linda, Chad, and Todd—for time spent away from them; Ferris State University for equipment support; and Ferris Faculty and Staff that provided assistance.

Thomas M. Crandell

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CONTEN

PREFAC

An Introduction to CNC Machining and Pr
the essentially practical activity of preparing
control (CNC) part programs for turning, r
value to students in a wide range of course
and calculations of all forms, tooling for CN
in a major or related course in a college, uni

The preparation and proving of CNC par
chinery and computer installations in order
experience. Using such equipment, and und
languages and techniques, requires instructi
a competent instructor. Students undertaking
programming will therefore find it necessary
college or training center. The student must
basic machining techniques, and should ide
turning, milling, and drilling operations. In
mental requirements have been borne in mi

CNC part programming is an absorbing a
one of the few areas of study where studen
too quickly! Thus a primary objective of t
course time can be used to the best advanta
devote as much time as possible to preparing
equipment. Accordingly, an attempt has be
formation to provide the student with much o
to support the more practical elements of stu
on formal lectures and unnecessary note ta
student with the opportunity to study specif

This text is essentially practical in nature a
material for course work. It contains a seri
student with a practical understanding of C
gramming by various means. Throughout t
detailed drawings of components in inch and
included to complement the text, may also
in the early stages of a course. An additio
degrees of complexity and intended for later
ability.

It is the author's experience that many r

for retraining, also many younger students, are hampered in their programming work by never being taught how to apply their calculation skills in algebra, geometry, and trigonometry. It is generally outside the scope of a course of study devoted to part programming to spend much time rectifying this state of affairs, and yet it cannot be ignored. To assist both instructors and students there is a chapter devoted entirely to the type of calculations that will be encountered when preparing part programs manually; it is hoped that the completion of this material, supported by on-the-spot tutoring by faculty, will be of value.

This text will be of on going value to students, faculty, and industrial programmers alike.

D.A.W. Gibbs
Workingham

Thomas M. Crandell
Ferris State University

1

AN INTRODUCTION TO
OF COMPUTER NUMER

DEFINITION OF NUMERIC

Numerical control (NC) is the term used to
movements and various other functions by ins
numbers and initiated via an electronic contr

Computerized numerical control (CNC) is
system utilizes an internal computer. The inte
lowing: storage of additional programs, progr
from memory, machine and control diagnos
metric–incremental/absolute switchability.

The two systems are shown diagrammatical
may be free-standing or built into the main s
erating panel of an integrated control unit is

THE APPLICATION OF COMPUTER

Computer numerical control is applied to a v
cesses such as metal cutting, woodworking, w
forming, sheet metal punching, water jet cut
ing and laser cutting. The text that follows
common machine-shop engineering processe
drilling, where it has been particularly succe

THE ADVANTAGES OF COMPUTE

Computer numerical control is economical for
single-item production. Many factors contrib
most important of these being as follows:

(a) high productivity rates
(b) uniformity of the product
(c) reduced component rejection

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