



CNC **CONTROL** **SETUP** for **Milling and Turning**

MASTERING CNC CONTROL SYSTEMS

Thu Vien DHKTCN-TN



KNV.14001961

Peter Smid

CNC Control Setup for Milling and Turning

Other books by Peter Smid:

CNC PROGRAMMING HANDBOOK

Comprehensive Guide to Practical CNC Programming

Third Edition - ISBN 9780831133474

CNC PROGRAMMING TECHNIQUES

An Insider's Guide to Effective Methods and Applications

ISBN 9780831131852

FANUC CNC CUSTOM MACROS

Practical Resources for Fanuc Custom Macro B Users

ISBN 9780831131579

CNC Control Setup for Milling and Turning

Mastering CNC Control Systems

Peter Smid

Industrial Press, Inc.
989 Avenue of the Americas
New York, NY 10018, USA
<http://www.industrialpress.com>

Library of Congress Cataloging-in-Publication Data

Smid, Peter.

CNC control setup for milling and turning : mastering CNC control systems / Peter Smid.

p. cm.

Includes index

ISBN 978-0-8311-3350-4 (hard cover)

1. Milling-machines--Numerical control. 2. Turning (Lathe work)--Numerical control. 3. Machining--Automation. I. Title.

TJ1225.S557 2010

671.3'5--dc22

2010007023

Industrial Press, Inc.
989 Avenue of the Americas
New York, NY 10018, USA

Copyright © 2010

Printed in the United States of America

All Rights Reserved.

This book or parts thereof may not be reproduced, stored in a retrieval system, or transmitted in any form without the permission of the publishers.

Cover Design: Janet Romano
Editorial Director: John Carleo
Marketing & Sales Director: Patrick V. Hansard

4 5 6 7 8 9 10

About the Author

Peter Smid is a professional consultant, educator and speaker, with many years of practical, hands-on experience, in the industrial and educational fields. During his career, he has gathered an extensive experience with CNC and CAD/CAM applications on all levels. He consults to manufacturing industry and educational institutions on practical use of *Computerized Numerical Control* technology, part programming, *Autocad*®, *Mastercam*® and other CAD/CAM software, as well as advanced machining, tooling, setup, and many other related fields. His comprehensive industrial background in CNC programming, machining and company-oriented training has assisted several hundred companies to benefit from his wide-ranging knowledge.

Mr. Smid's long time association with advanced manufacturing companies and CNC machinery vendors, as well as his affiliation with a number of Community and Technical College industrial technology programs and machine shop skills training, have enabled him to broaden his professional and consulting skills in the areas of CNC and CAD/CAM training, computer applications and needs analysis, software evaluation, system benchmarking, programming, hardware selection, software customizing, and operations management.

Over the years, Mr. Smid has developed and delivered hundreds of customized educational programs to thousands of instructors and students at colleges and universities across United States, Canada and Europe, as well as to a large number of manufacturing companies and private sector organizations and individuals.

He has actively participated in many industrial trade shows, conferences, workshops and various seminars, including submission of papers, delivering presentations and a number of speaking engagements to professional organizations. He is also the author of articles and many in-house publications on the subject of CNC and CAD/CAM. For six years he had a monthly column in the ShopTalk Magazine related to CNC programming. During his many years as a highly respected professional in the CNC industrial and educational field, he has developed tens of thousands of pages of high quality training materials.

Peter Smid is also the author of three other best selling CNC books published by Industrial Press, Inc.:

CNC PROGRAMMING HANDBOOK

Comprehensive Guide to Practical CNC Programming

Third Edition - ISBN 9780831133474

CNC PROGRAMMING TECHNIQUES

An Insider's Guide to Effective Methods and Applications

ISBN 9780831131852

FANUC CNC CUSTOM MACROS

Practical Resources for Fanuc Custom Macro B Users

ISBN 9780831131579

All books are also available as e-books

The author welcomes comments, suggestions and other input from educators, students and industrial users.

You can contact him at info@industrialpress.com

Acknowledgments

I have made a number of references to several manufacturers and software developers in the book.
It is only fair to acknowledge their names:

- FANUC and CUSTOM MACRO or USER MACRO or MACRO B are registered trademarks of Fanuc Ltd, Japan
- Mastercam is a registered trademark of CNC Software Inc., Tolland, CT, USA
- Edgecam is a registered trademark of Pathtrace, Inc., UK
- NCPlot is a registered trademark of NCPlot LLC, Muskegon, MI, USA
- AutoCad is a registered trademark of Autodesk, Inc., San Rafael, CA, USA
- Kennametal is a registered trademark of Kennametal, Inc., Latrobe, PA, USA
- WINDOWS is a registered trademarks of Microsoft, Inc., Redmond, WA, USA

There are other companies mentioned in this handbook ...

- Caterpillar
- Fadal, Fagor
- Haas, Heidenhain
- Iscar
- Kitamura
- Makino, Matsuura, Mazak, Mitsubishi, Mori-Seiki
- Okuma, Osaka KiKo (OKK)
- Sandvik, Seco, Siemens, Sumitomo
- Valenite
- Widia
- Yasnac, Yamazaki
- ... and some others that may have escaped me

Table of Contents

Chapter 1
CONCEPTS OF CNC MACHINING 1

CNC PROCESS 1

Drawing Evaluation 1

Material Identification 1

Part Holding 2

Tooling Selection 2

Cutting Conditions 2

Program Writing 2

Program Verification 2

Program Documentation 3

Program Transfer 3

WORK COMPLETION 3

Program Evaluation 3

Material Check 3

Tooling Preparation 3

Tooling Setup 3

Fixture Setup 4

Program Loading 4

Setting Offsets 4

First Part Run 4

Program Optimization 4

Production Run 4

Part Inspection 4

Safety Issues 4

Chapter 2
CNC MACHINE SPECIFICATIONS 5

MACHINE SPECIFICATIONS 5

Useful Information 5

VERTICAL MACHINING CENTER 5

Typical Specifications - VMC 6

HORIZONTAL MACHINING CENTER 6

Typical Specifications - HMC 6

LATHES AND TURNING CENTERS 7

Typical Specifications 7

FANUC SYSTEM SPECIFICATIONS 7

Controlled Axes 7

Operation Functions 8

Interpolation Functions 8

Feedrate Functions 8

Spindle Functions 8

Tool Functions 9

Program Input 9

Editing Functions 9

Setting and Display Functions 9