

Computer Numerical Control

Lecture 3

Part Programming for NC Systems

Dr Lina Momani

NC program

- A program for NC consists of a sequence of directions that causes an NC machine to accomplish a certain operation.
- The *NC program describes the sequence of actions of the controlled NC machine.*
- These actions include but are not limited to
 1. component movements, incl. direction, velocity and positioning;
 2. tool selection, tool change, tool offsets, and tool corner wear compensation;
 3. spindle rotation and spindle rotation speed, incl. possibility to change it to keep constant cutting speed for different diameters

Numerical Control Part Programming

R. A. Siders



Numerical Control Part Programming:

Numerical Control Part Programming James J. Childs,1973 Develops the subject to include detailed treatment of how to write both manual point to point and manual and computer assisted APT continuous path programs Presents each topic in a logical and clear manner Places heavy emphasis on concepts and terminology **CNC Programming Handbook** Peter Smid,2003 Comes with a CD ROM packed with a variety of problem solving projects **Introduction to Numerical Control** United States. Congress. Senate. Select Committee on Small Business. Subcommittee on Science and Technology,1971 **Numerical Control Part Programming** James J. Childs,1973 Computer-aided Part Programming for Numerical Control John D. McCarroll,1969 Introduction to Numerical Control, Hearing Before the Subcommittee on Science and Technology ... 92-1, June 24, and July 26, 1971 United States. Congress. Senate. Select Committee on Small Business,1971 *Introduction to Computer Numerical Control (CNC)* James Valentino,Joseph Goldenberg,2003 One of the greatest challenges facing the United States today is in the area of manufacturing To a large extent the computer has revolutionized this technology It has virtually transformed the process of product design analysis and manufacture Industries are finding that the new manufacturing technology demands well trained personnel Education is now being viewed as a continuous and long term investment The third edition of *Introduction to Computer Numerical Control CNC* has been expanded and improved The blueprint reading material has been separated as follows Chapter 5 Review of Basic Blueprint Reading for CNC Programmers and Chapter 6 Review of Basic Geometric Dimensioning and Tolerancing for CNC Programmers Chapter 18 now includes a presentation on creating and simulating a complete part program using Mastercam CNC software The third edition introduces the use of CNC software for writing verifying and simulating the milling word address programs in this text To this end a new Chapter 20 titled *Verifying Part Programs* has been added Included with this edition is a bound CD ROM disk containing powerful industrial quality CNC verification and simulation software The software displays real time solid model animation of the machining that results from a part program Additionally it has an inspection mode that enables students to section as well as verify the dimensions of the machined part The milling part programs in the text have been edited so they will work properly with the verification and simulation software Each chapter begins with a brief listing of objectives and ends with a chapter summary Illustrations and photographs are used liberally throughout to reinforce pictorially what is being discussed Students are frequently directed to boxed in key terms and concepts Flowcharts are used to teach CNC process planning and program planning The important topic of job setup is discussed in the many solved programming examples Fundamental word address G and M code programming is stressed Industrial standard practices and terms are emphasized in the solved programming examples Needless cross referencing has been eliminated Each program is listed with all explanations appearing on the same page Pattern recognition is emphasized The student is taught to recognize a certain group of programming commands as a

programming pattern For example pattern A commands start up the CNC machine whereas pattern B commands cause a tool change to take place An excellent assortment of review exercises is provided at the end of each chapter These exercises supply the student such important information as the operation to be performed tooling tool speed tool feed and job setup data The industry standard Fanuc controller is emphasized throughout the text Important mathematical principles are reviewed before programming is presented A special chapter on right triangle trigonometry provides the student with the critical mathematical information needed to understand programming The student is exposed to the big picture of CNC shop activities A special chapter explains the most important operations to be carried out in manufacturing a part Appendixes contain information useful to the CNC student They include a list of important safety precautions summaries of G and M codes for milling and turning operations recommended speeds and feeds for different materials with respect to drilling milling and turning operations and important and easy to use machining formulas A comprehensive glossary of key CNC terms is provided at the end of the book Verification and simulation software enables students to visualize the effects of a written part program Introduction to Computer Numerical Control CNC Third Edition can be used as an entry level text for many different types of training applications These include Undergraduate one semester or two semester CNC courses Manual component of a CNC programming course Industry training course Seminar on CNC programming Adult education course Reference text for self study This textbook is designed to be used in many types of educational institutions Four year engineering schools Four year technology schools Community colleges Trade schools Industrial training centers This work is the result of several years of experience in running CNC courses for both industrial personnel and the students at Queensborough Community College We found that many existing texts were either too general or too advanced for direct application As a result we drafted supplementary notes containing step by step information The notes were enhanced and tested extensively in the classroom Several colleagues both in industry as well as in education were called upon for their input A thorough market survey also influenced the final content It should be noted that all the programs presented have been thoroughly tested The student is advised to take the appropriate safety precautions when running them on a CNC machine

Federal Register, 1982-12-27 Export Administration Regulations United States. Bureau of Export Administration, United States. Office of Export Administration, 1985 Proceedings of ... Annual Meeting and Technical Conference, Numerical Control Society Numerical Control Society. Meeting and Technical Conference, 1983 **Numerical Control: Practice and Application** W. J. Patton, 1972 *An Introduction to CNC Machining and Programming* David Gibbs, 1991 Presents a balanced introduction to both machining and part programming Uses the reader's knowledge on conventional machines to explain the operation of CNC machining Includes sufficient information to provide the theoretical knowledge and practical aspects needed to comprehend CNC machining Contains a chapter on conversational and manual programming as well as computer aided part programming Offers hundreds of clear illustrations to fully clarify the text

Automation, Production Systems, and Computer-integrated Manufacturing Mikell P. Groover, 2008 This exploration of the technical and engineering aspects of automated production systems provides a comprehensive and balanced coverage of the subject It covers cutting edge technologies of production automation and material handling and how these technologies are used to construct modern manufacturing systems **Westinghouse Engineer** ,1967

McGraw-Hill encyclopedia of science & technology McGraw-Hill, 2002 **Western Machinery and Steel World ...** ,1964 **Teaching Numerical Control Part-programming Principles (machining)** Gustav Olling, 1974 Mechanical Engineers' Handbook: Instrumentation, systems, controls, and MEMS Myer Kutz, 2006 A single source for mechanical engineers offering all the critical information they require *Fundamentals of Engineering Graphics and Design* Louis Gary Lamit, Kathleen L. Kitto, 1997 *Computer Graphics* R. A. Siders, 1966 USA Use of computers in engineering design processes The evolution of computer graphics and technical aspects of specific equipment Financial aspects cost Impact on management Forecasting the future of computer graphics

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