

CNC PROGRAMMING

Code: 322079

Main Scientific Area: Mechanics and industrial processes

Lecturer: Fernando Daniel Ferreira Machado

Language of Instruction: Portuguese

Regime: S2

Contact Hours: 60h Total Workload: 105h

ECTS: 6,0

Objectives

This UC aims to introduce the main configurations of CNC equipment, tools used and ways to program and operate them.

Learning Outcomes

This UC aims to introduce the main configurations of CNC equipment, tools used and ways to program and operate them.

Course Contents

Introduction to programming (Lathes + Milling machine)The different programming methods - Framework, general characterization The different machine architectures and the associated axis system Fundamental concepts Reference points in programming - Associated techniques Type of coordinates - Absolute, Incremental and polar Structure of a program and syntax of a programming block Machining operations type (Lathe + Milling machine)Programming (Lathes + Milling machine)Instructions associated with working conditions - Type of coordinates, type of feeds, etc. Instructions associated with the setup - reference points, tools Rapid movements and Linear Interpolations Circular Interpolations Sub-programming techniques Tool compensation Machining Cycles - Roughing, Finishing, Boxing, Drilling and Threading Special instructions/Cycles Work preparation oriented to the CNCA information /documentation associated with work preparation (introduction)Definition of positioning, definition of operations, choice of tools and their cutting parameters Program verification and simulation The most common errors in programming Error detection and correction techniques Graphical simulation

Recommended Bibliography

CNC-Programming-Handbook-Third-Edition Modern Metal Cutting - a practical handbook Machine Tool Practices, 7th Edition, Richard Kibbe, John Neely, Roland Meyer, Warren White, Prentice Hall, 2001, ISBN 0-13-033447-2 Mechanics of Chip Formation, J.T. Black, Auburn University;ZASMHBAA0002117

Learning and Teaching Methods

Introduction to programming (Lathes + Milling machine)The different programming methods - Framework, general characterization The different machine architectures and the associated axis system Fundamental concepts Reference points in programming - Associated techniques Type of coordinates - Absolute, Incremental and polar

Structure of a program and syntax of a programming block Machining operations type (Lathe + Milling machine) Programming (Lathes + Milling machine) Instructions associated with working conditions - Type of coordinates, type of feeds, etc. Instructions associated with the setup - reference points, tools Rapid movements and Linear Interpolations Circular Interpolations Sub-programming techniques Tool compensation Machining Cycles - Roughing, Finishing, Boxing, Drilling and Threading Special instructions/Cycles Work preparation oriented to the CNCA information /documentation associated with work preparation (introduction) Definition of positioning, definition of operations, choice of tools and their cutting parameters Program verification and simulation The most common errors in programming Error detection and correction techniques Graphical simulation

Assessment Methods

This UC will be evaluated using two individual assessments throughout the semester and submitted in Moodle, to be mentioned: - Turning programming (40%) with a minimum grade of 8 out of 20 values. - Milling programming (40%) with a minimum grade of 8 out of 20 values; A BEHAVIORAL AND PARTICIPATION COMPONENT WHICH WILL ALSO BE EVALUATED IT WILL ALSO CORRESPOND TO 20% OF THE FINAL GRADE. If the student is unable to obtain approval in one of the previous components or both, the student may conduct an exam that will involve all three components of the ongoing assessments. The student can also always make improvements, always assuming this assessment as valid for the final grade and not the best of the two.