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μαθήματα ΠΠ

Αριθμητικός Έλεγχος Εργαλειομηχανών

Ενότητα 12: Advanced CNC Features

Δημήτρης Μούρτζης, Επίκουρος Καθηγητής
Πολυτεχνική Σχολή

Τμήμα Μηχανολόγων & Αεροναυπηγών Μηχανικών



COMPUTER NUMERICAL CONTROL OF MACHINE TOOLS

Laboratory for Manufacturing Systems and Automation
Department of Mechanical Engineering and Aeronautics
University of Patras, Greece



Dr. Dimitris Mourtzis
Assistant Professor

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Objectives of section 12

- **Explain** the concept of **mirror imaging**
- **Decide** when the use of mirror imaging is appropriate
- Write simple programs in word address that **employ** mirror imaging
- **Explain** the concept of **polar rotation**
- **Decide** when the use of polar rotation is appropriate



Mirror Imaging

- **Mirror imaging** means changing the **sign (+ or -)** of an axis movement
- **Mirror imaging** is used in a program to **save repetitive programming** when the direction of movement is the only difference between part features
- **Mirror imaging** is normally used in conjunction **with subroutines** or **do loops**
- **Reduce programming time** when there is **symmetry**
- Depending on the **quadrant** of the mirror imaging some or all of the factors below will be affected :
 - Sign of the axis
 - Milling direction(up- or down- milling)
 - Arc rotation direction (clockwise or counterclockwise)



Polar Rotation

- Despite the differences in controllers, there is **certain information** that every MCU needs in order to carry out a **polar rotation**:
- The **X axis coordinate** of the center of rotation
- The **Y axis coordinate** of the center of rotation
- The **index angle**, or the ***angle as measured counterclockwise*** from the
 - + X axis to the start of the rotation



Polar Rotation

The amount of the rotation

- Following the initial rotation to the **index angle**, subsequent rotations may be specified *as some angular value other than the index angle*.
- The rotations will occur in a **counterclockwise direction**
- A **code to initiate** polar rotation
- A **code to cancel** polar rotation



Summary 1/2

- **Mirror imaging** means changing the **sign (+ or -)** of an axis movement
- **Mirror imaging** is used in a program to **save repetitive programming** when the direction of movement is the only difference between part features
- **Mirror imaging** is normally used in conjunction **with subroutines** or **do loops**
- **Polar rotation** is an **indexing** of the NC machine's Cartesian coordinate system to some **angle** other than its normal state
- **Polar rotation** may be used to perform operations that otherwise would require the use of a **rotary axis** or lengthy coordinate calculations
- **Polar rotations** may be used in conjunction with **do loops** or **subroutines**



Vocabulary Introduced in this section

- Mirror imaging
- Polar axis system
- Polar rotation
- Tread lead



End of Section



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