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Courses » Computer numerical control (CNC) of machine tools and processes

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Unit 2 - Week1- Computer Numerical Control Machines : Introduction and Classification

Course outline

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Week1- Computer Numerical Control Machines : Introduction and Classification

- Lecture1: Introduction to computer control – role of computers in automation
- Lecture2 : Introduction Cotd.– binary logic and logic gates
- Lecture3 : Classification of Computer numerical control (CNC) – Point to point and continuous control
- Lecture4 : Classification Cotd. : Closed loop and open loop control
- Lecture5 : Tutorial involving simple calculations on different aspects of CNC controls
- Lecture6 : Questions, MCQ

Assignment-1

The due date for submitting this assignment has passed. **Due on 2016-09-16, 22:00 IST.**

Submitted assignment

- 1) There is a stepper motor rotating at 20 rpm and is connected with a table through gear box, **1 point** lead screw-nut connection as shown in Fig. 1. The table has single axis of motion and is developing a speed of 20 mm/min along that axis due to motor rotation. The stepper motor covers one rotation in 200 steps and moves one step per pulse of the pulse generator. The Basic length unit (BLU) of the drive is (motion of table per pulse of pulse generator)

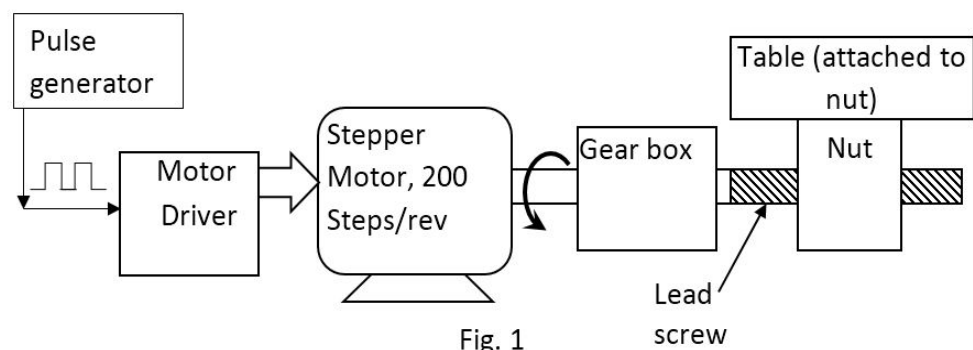


Fig. 1

- 0.01 mm
- 0.05 mm
- 0.1 mm
- 0.005 mm
- None of the others

No, the answer is incorrect.

Score: 0

Accepted Answers:
0.005 mm

- 2) Point-to-point(P-T-P) control is applicable in case of

- CNC drilling machine
- CNC milling machine
- CNC lathe

1 point

Discussions on Motors, Encoders, Decoders and Programming Practice

- Quiz : Assignment-1
- Solution to Assignment-1

Week2: Technologies and devices employed in CNC machines

Week 3: Computer aided offline programming practice, Linear and curvilinear interpolator, Tutorial

Week 4: 3-D Machining, Curved Surface Geometry and Cutter Path generation, Tutorial

Lecture notes: pdf of all ppts shown

- none of the others

No, the answer is incorrect.

Score: 0

Accepted Answers:

CNC drilling machine

3) In a machine shop, there are 5 machines A, B, C, D and E. These machines send out binary **1 point** signals a, b, c, d and e. A signal is 1 if concerned machine is working alright and value 0 if concerned machine malfunctions. The maintenance section wants you to send a signal 1 to them whenever one or more machines is/are malfunctioning. This signal is the output of the logic circuit as below (+ means OR, . means AND, ' means complement)

- a+b+c+d+e
- a.b.c.d.e
- a'.b'.c'.d'.e'
- a'+b'+c'+d'+e'
- None of the others

No, the answer is incorrect.

Score: 0

Accepted Answers:

a'+b'+c'+d'+e'

4) CNC machining has the following main advantage over conventional automated **1 point** machining practice

- Ability to employ higher cutting speeds, feeds and depths of cut
- Flexibility
- Feedback control
- None of the others

No, the answer is incorrect.

Score: 0

Accepted Answers:

Flexibility

5) In CNC drilling machine, the table executes point-to-point movement along X and Y axes. **1 point** The drill spindle moves by linear interpolation along Z axis. The machine can be classified as

- 2C,L
- 3L
- 2P,L
- None of the others

No, the answer is incorrect.

Score: 0

Accepted Answers:

2P,L

6) Stepper motors are employed as prime movers along the axes of movement of a CNC Point-**1 point** to-point (P-T-P) machine table capable of moving along X and Y axes. The P-T-P machine table is to be equipped with all the requisite items for proper CNC P-T-P open loop control. In that case,

- Encoders have to be used for all axes of movement of table
- An interpolator is a must for the table
- It is necessary to have some kind of position control along each axis
- None of the others

No, the answer is incorrect.

Score: 0

Accepted Answers:

It is necessary to have some kind of position control along each axis

7) An interpolator is definitely present in

1 point

- A CNC P-T-P control machine
- A CNC P-T-P control machine with feedback
- A CNC continuous control machine
- All CNC machines

No, the answer is incorrect.

Score: 0

Accepted Answers:

A CNC continuous control machine

8) In a continuous control machine employing motors as prime movers in the X and Y axes **1 point** of motion, the direction of cutter movement in X-Y plane is controlled systems by

- Using cams in pairs for X and Y axes
- Deriving motion of Y axis from X axis through a gear box which has 6 output speeds
- By maintaining different ratios of rotations per minute of motors used as prime movers in X and Y axes of motion
- None of the others

No, the answer is incorrect.

Score: 0

Accepted Answers:

By maintaining different ratios of rotations per minute of motors used as prime movers in X and Y axes of motion

9) A point-to-point (P-T-P) control CNC machine

1 point

- Always has an interpolator
- Never has position down counter for any axis of motion
- Never has DC motor as prime mover along any axis of motion
- Has none of the others applicable to it

No, the answer is incorrect.

Score: 0

Accepted Answers:

Has none of the others applicable to it

10) The X-axis drive of a CNC table is shown in Fig.2, in which PTP closed loop control is **1 point** employed. Pulses sent out by encoder are used as feedback pulses to decrement the position down counter (not shown in Fig.2). DC motor is run by analog voltage. If the manufacturer doubles the ratio of the X-axis gearbox (ratio of gearbox = output RPM of gearbox/ input RPM of gearbox)

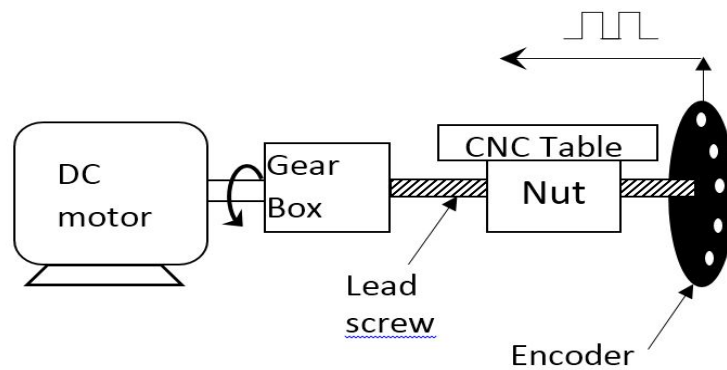


Fig. 2

- The X-axis BLU (Basic Length Unit) will double
- The X-axis BLU (Basic Length Unit) will remain same
- The X-axis BLU (Basic Length Unit) will become half
- None of the others

No, the answer is incorrect.

Score: 0

Accepted Answers:

The X-axis BLU (Basic Length Unit) will remain same

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