

Field of education:
Mechanical engineering

Professional qualification:
CNC operator

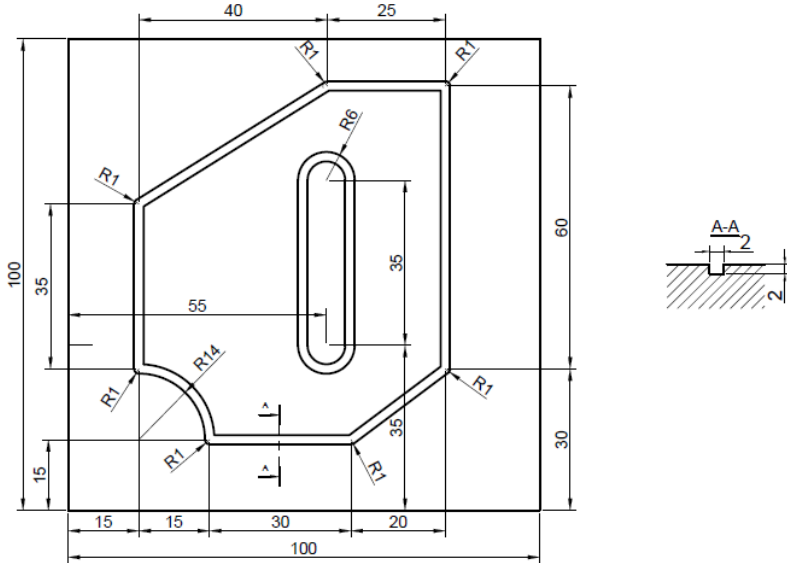
Exercise:
Programming of CNC machine

Variant:
Task 21 – Support plate 2.1.

Instructions for exercise:

According to the given workshop drawing make the following tasks:

- Draw the appearance of the 3D model in Fusion 360.



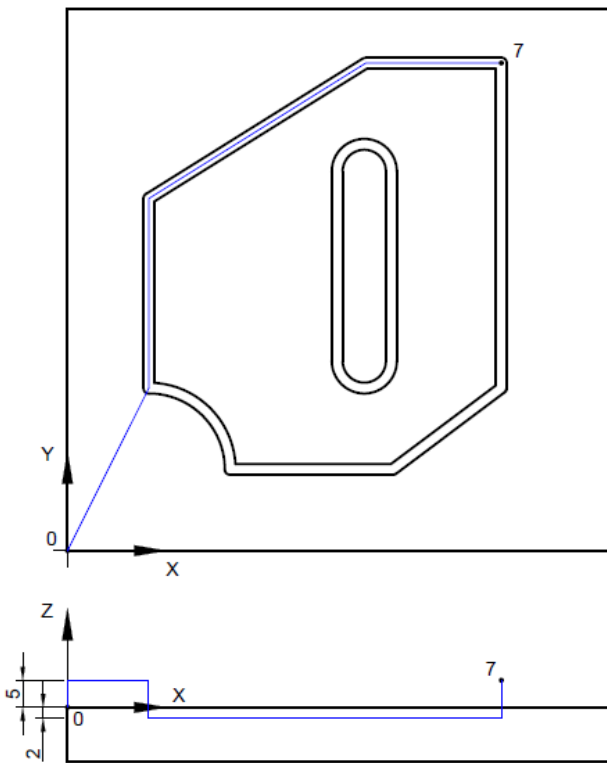
The technical drawing shows a load-bearing plate with the following dimensions and features:

- Overall width: 100
- Overall height: 90 (divided into 60 and 30)
- Top edge: 40 from left to start of first fillet, 25 from end of first fillet to right edge.
- Left edge: 35 from top to start of second fillet, 15 from end of second fillet to bottom edge.
- Right edge: 60 from top to start of third fillet, 30 from end of third fillet to bottom edge.
- Bottom edge: 15 from left to start of fourth fillet, 30 from end of fourth fillet to start of fifth fillet, 20 from end of fifth fillet to right edge.
- Internal features: A central slot with a width of 55 and a height of 35. A fillet with radius R6 is at the top of the slot.
- Fillet radii: R1 at the top-left and top-right corners; R14 at the bottom-left and bottom-right corners; R1 at the bottom-left and bottom-right corners of the main plate.

Section view AA-2 shows a cross-section of the plate with a thickness of 2 units.

Measure: M 1:1	Date:	Surname and name:	Strukovna škola ĐURĐEVAC
Position -	Assembly drawing (number): -		Material : -
Number of drawings: -		Name: Load-bearing Plate 2	

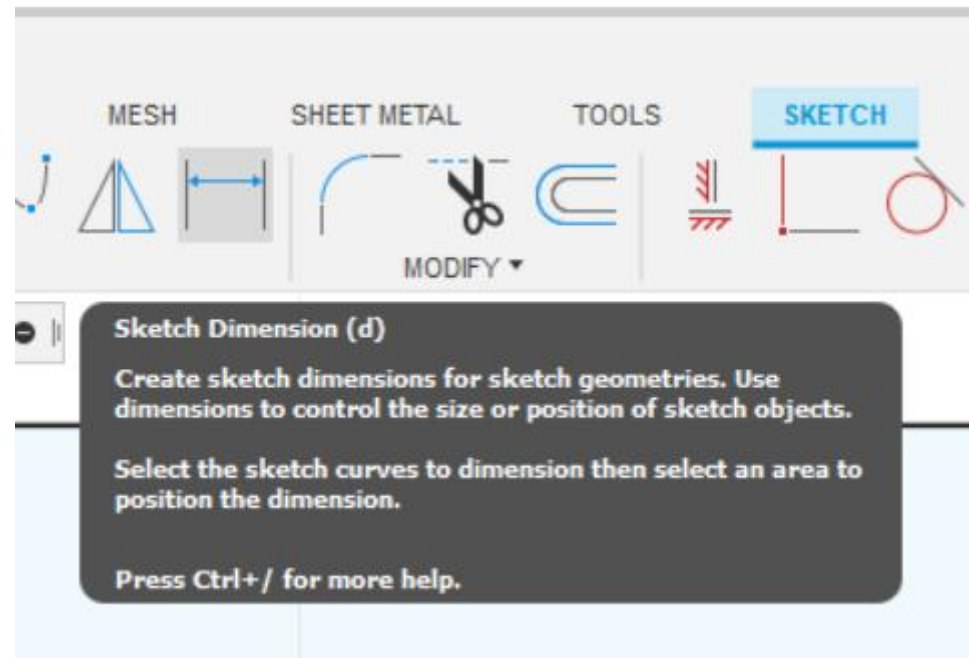
- According to the given path and the given start or end point (blue line), determine the other necessary points.



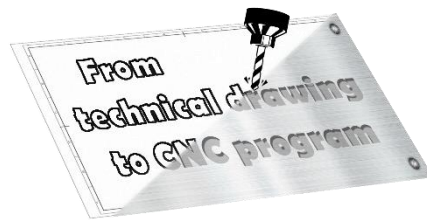
The image shows a technical drawing of a part with a path and coordinate systems. The top part is a 2D view of a part with a central slot and a curved bottom-left corner. A blue line indicates a path starting from the origin (0,0) and moving towards the part. The bottom part is a 3D view of the part, showing a rectangular block with a slot. The Z-axis is vertical, and the X-axis is horizontal. A blue line indicates a path starting from the origin (0,0) and moving along the X-axis. Dimensions are given: 5 for the height of the part and 2 for the width of the slot. The path is labeled with '0' at the start and '7' at the end.

Task 1	Measure: M 1:1
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- To make it easier to determine the coordinates, use Sketch Dimension option in the drawn sketch for precise G-code writing.



- Consider the position of your coordinate system.
- Write a G-code.
- Tighten the workpiece on the machine.
- Set the coordinate system on the machine (reset all coordinates to 0).
- Load the program into the machine control unit.
- Move the machine via the control unit to perform operations.



Brief description of commands in G-code:

- G0 - fast pace, straight movement, when we are not in contact with the object of processing

The command for programming the high-speed movement is modal, and the form of programming is:

G0 X ... Y ... Z ... - in a rectangular coordinate system,

where X, Y, Z are the coordinates of the point which the tool should reach.

- G1 - working stroke, straight movement, when processing the object

It is used for processing, i.e. we enter the material with a tool. The tool moves in a straight line with an offset which is specified before or in the block with the G1 command. The command is modal. Form of programming in a rectangular coordinate system is:

G1 X ... Y ... Z ...

where X, Y, Z are the coordinates of the point to which the tool should reach.

- G2 - circular clockwise movement
- G3 - circular motion counterclockwise
- In addition to linear interpolation, the control unit also allows circular interpolation. The first piece of information is the point where the tool is currently located, and that is the starting point of circular arc. The other two data are a logical combination of the following data:

X, Y, Z - coordinates of the end point of the circular arc,

R - radius of a circular arc, or

I, J, K - coordinates of the center of the circular arc