

**Chipping – Course: Technique for Manual Working of Materials.
Instruction Examples for Practical Vocational Training**

Table of Contents

<u>Chipping – Course: Technique for Manual Working of Materials. Instruction Examples for Practical Vocational Training</u>	1
<u>Introduction</u>	1
<u>Instruction example 10.1. Training workpieces for cutting–off chiselling</u>	1
<u>Instruction example 10.2. Case for safety goggles</u>	4
<u>Instruction example 10.3. Dog vice for sheet metal</u>	7
<u>Instruction example 10.4. Drilling support</u>	10
<u>Instruction example 10.5. Marking gauge</u>	13

Chipping – Course: Technique for Manual Working of Materials. Instruction Examples for Practical Vocational Training

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Introduction

The present documentation comprises five selected instruction examples by means of which cutting–off and chipping chiselling can be exercised.

Apart from the introductory cutting–off exercise, workpieces are manufactured which can fulfill a special purpose in the workshop:

It is useful to fasten the case for the safety goggles beside drilling and grinding machines, the dog vice for sheet metal and the marking gauge complete the tool outfit of the trainee at his workplace, the drilling support can be used as supplement to the drilling machine accessories.

To facilitate the preparation and execution of the work the materials, hand tools, measuring and testing tools as well as accessories required for each instruction example are given.

Moreover, the previous knowledge is mentioned which is required for the individual exercises.

On the basis of the working drawing enclosed and the appertaining sequences of operations the workpieces can be manufactured.

Explanations as to material indication:

Marking of the steel is done with the value of tensile strength in the unit of "Megapascal" (MPa).

Instruction example 10.1. Training workpieces for cutting–off chiselling

To practise cutting–off chiselling on different cross–sections without measures given.

Material

– Round steel (380 MPa)

Diameter: 6 to 10 mm

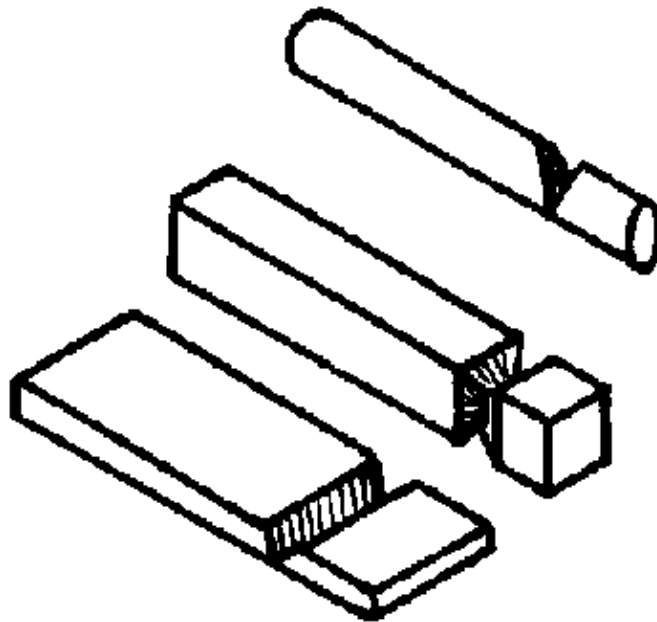
– Square steel (380 MPa)

Thickness: 6 to 10 mm

– Flat steel (380 MPa)

Thickness: 4 mm

Width: 20 to 35 mm



Hand tools

Flat chisel, engineers' hammer

Measuring and testing tools

Eye

Accessories

Steel plate or anvil with spacers (sheet plates), protective wall or protective grating

Required previous knowledge

none

Sequence of operations

Comments

1. Arrange workplace, prepare working material

– Check for completeness

2. Cutting–off the round steel – chiselling in a single pass

– Part (1)
Protect the workpiece against rolling away!

3. Cutting–off the square steel – notching at all sides with the flat chisel, then beating through or breaking

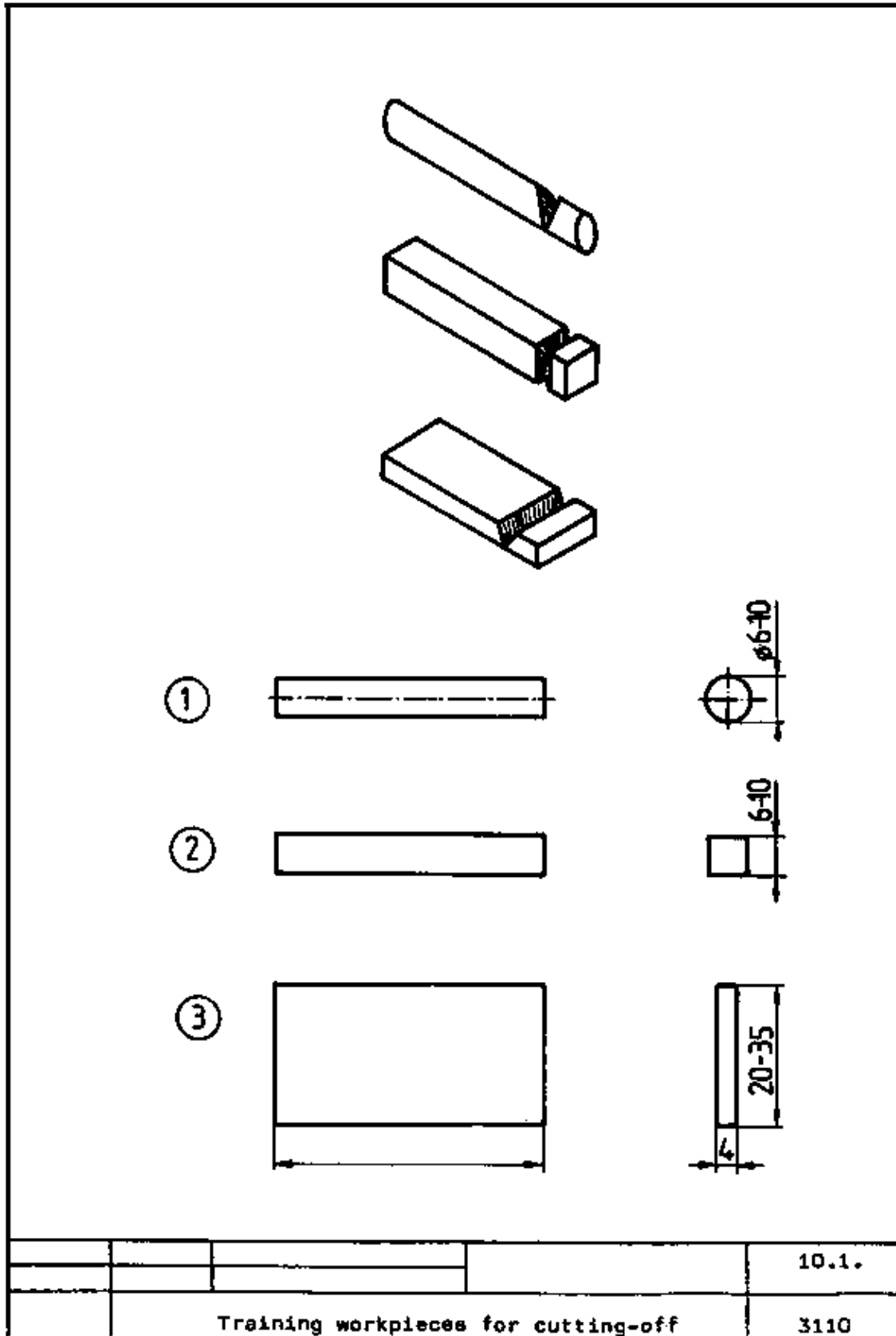
– Part (2)

4. Cutting-off the flat steel – beating through from one side with overlapping chisel neck

– Part (3)
– on a support not hardened (spacer)

5. Final check

– Visual check of the cut face



Instruction example 10.2. Case for safety goggles

To practise cutting-off and chipping chiselling of sheet steel

Material

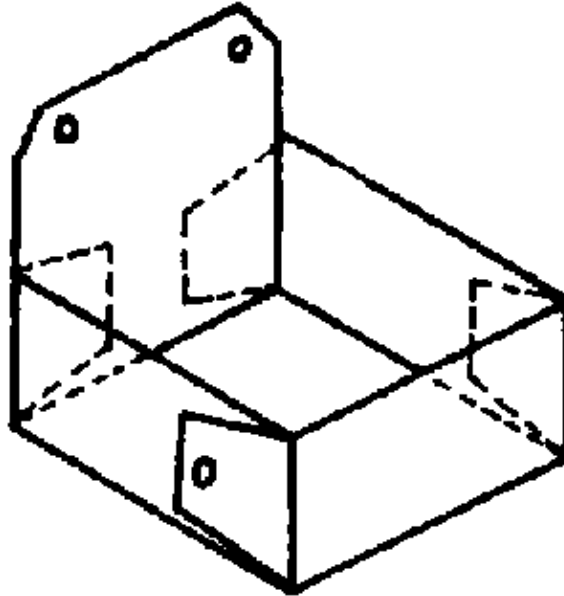
– Sheet steel (380 MPa)

Thickness: abt. 1.5 mm

Width: 320 mm

Length: 360 mm

– 4 x button-head rivet of 4 mm dia.



Hand tools

Brass scribe, steel scribe or surface gauge, flat chisel, engineers' hammer, centre punch, drills with flat point and centre point of 4.1 mm dia. and 8 mm dia., smooth file 250 mm (flat)

Measuring and testing tools

Steel rule

Accessories

Steel plate or anvil and spacer, protective wall or protective grating

Required previous knowledge

Reading of drawings, scribing, prick-punching, measuring, filing, drilling

Sequence of operations

Comments

1. Arrange workplace, prepare working material

– Check for completeness

2. Checking of initial dimensions of the sheet metal, if necessary, reworking

– (shearing, filing)

3. Scribing of the edges to be parted and bent as per drawing, scribing and punching of the holes

– Attention!
When using a steel scribe, scribe lightly on the inside of the bending edge – otherwise danger of breaking when bending!

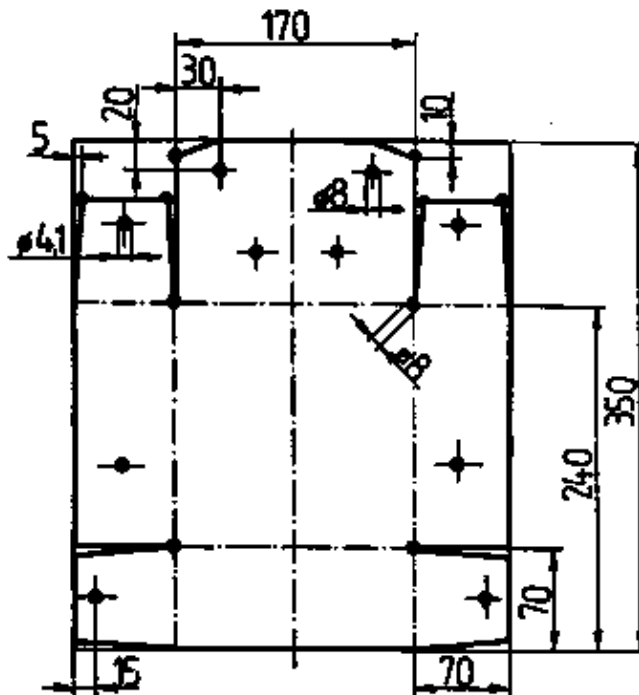
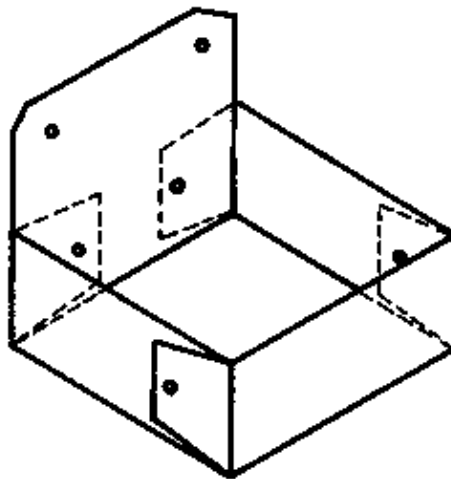
4. Drilling of the holes with the drill with flat point and centre point – corner holes of 8 mm dia., rivet holes of 4.1 dia., deburring of the holes – Protect workpiece against pulling up and twisting!

5. Chiselling out of the outlines of the case – at one side with overlapping chisel neck along the scribed line

6. Deburring of the edges

7. Checking of the edges – Cleanliness, accuracy to size

Finishing: Bending of the side parts by means of a bending machine and on the vice, riveting of the side parts with button-head rivets of 4 mm dia.



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			Case for safety goggles	3110

Case for safety goggles

Instruction example 10.3. Dog vice for sheet metal

To practise cutting-off chiselling after drilling out

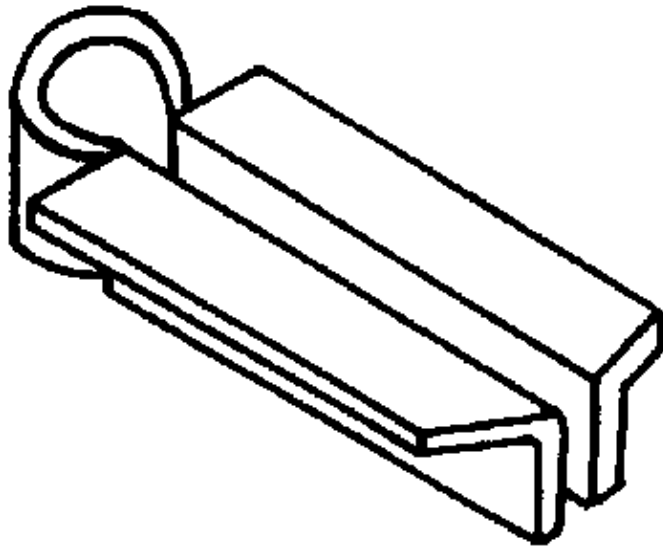
Material

– Angle steel (380 MPa)

(equal angle or unequal angle)

25 x 25 x 4

Length: not less than 680



Hand tools

Steel scribe, double–point punch (5.2.), engineers' hammer, drill of 5 mm dia., flat chisel, bastard file 200 mm (flat)

Measuring and testing tools

Steel rule, protractor

Accessories

Vice, steel plate or anvil, round material 20 dia., protective wall or protective grating, soluble oil, machine vice

Required previous knowledge

Reading of drawings, scribing, prick–punching, measuring, drilling, filing

Sequence of operations

Comments

- | | |
|--|--|
| 1. Arrange workplace, prepare working material | – Check for completeness |
| 2. Scribing of the bevels at the ends of the angle steel in an angle of 45° | – Stage (1)
Set check punch marks |
| 3. Scribing of the centre of the angle steel and of the section as per drawing on the outside | – Stage (2)
Set check punch marks |
| 4. Scribing of the line to be drilled out (bore line) 3 mm away from the scribed line and punching with double–point punch | – The dimensions on the drawing apply when a 5.2 mm double–point punch is used |

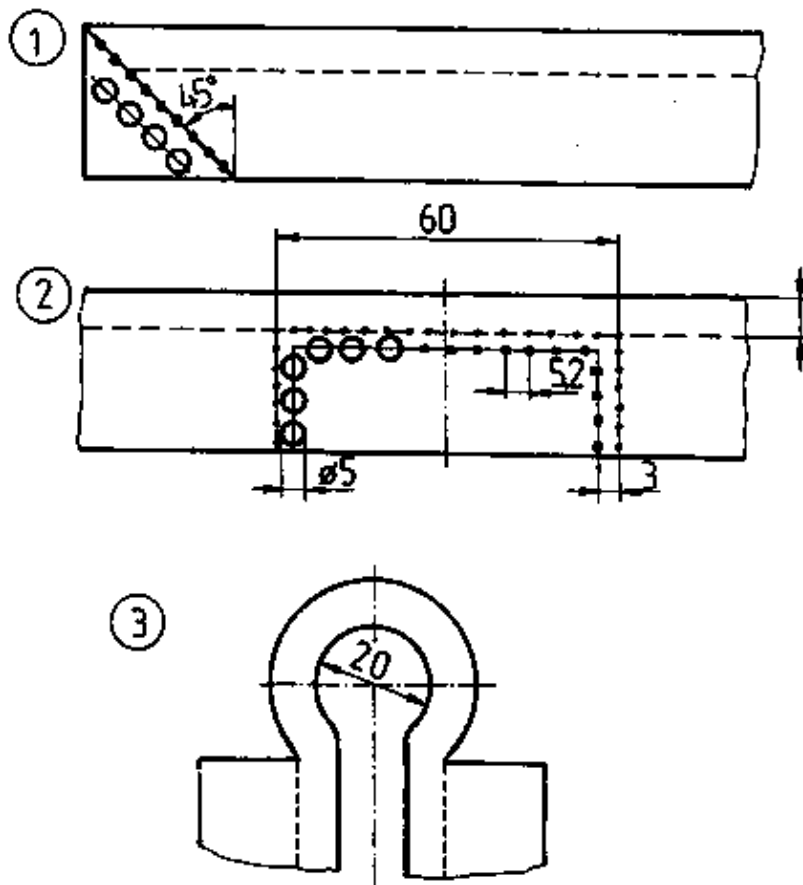
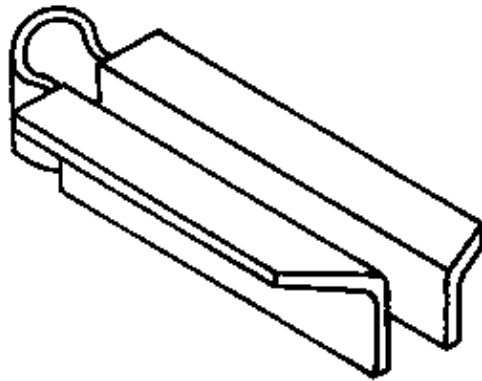
5. Drilling out with drill of 5 mm dia.

– Attention!
Drill must not run off centre!

6. Chiselling along the drilled out line and breaking out of the section

7. Checking of the parted edges

Finishing: Filing of the parted edges, bending of the eye over the round material of 20 dia. according to given data Stage (3)



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Dog vice for sheet metal

Dog vice for sheet metal

Instruction example 10.4. Drilling support

To practise chipping chiselling of faces and grooves on cast iron.

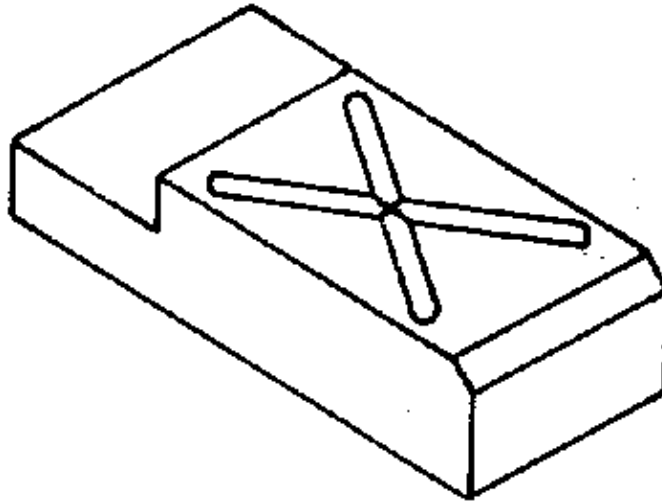
Material

Cast iron

Thickness: abt. 16 mm

Width: 100 mm

Length: 140 mm



Hand tools

Steel scriber, punch, hammer, cape chisel 5 mm, flat chisel, half-round grooving chisel 4 mm

Measuring and testing tools

Steel rule, depth gauge

Accessories

C-clamp, steel plate, protective wall or protective grating

Required previous knowledge

Reading of drawings, scribing, prick-punching, measuring, testing

Sequence of operations

Comments

- | | |
|---|------------------------------|
| 1. Arrange workplace, prepare working material | – Check for completeness |
| 2. Checking of initial dimensions | – Set check punch marks |
| 3. Scribing of the step edge (35 x 100) and of the centre lines of the grooves on this face | |
| 4. Chiselling of the grooves with the cape chisel from both sides, chiselling off of the remained webs by the flat chisel | – approx. 3 chip thicknesses |
| 5. Scribing of the chamfer 5 x 45 and chiselling off with the flat chisel | – approx. 2 chip thicknesses |

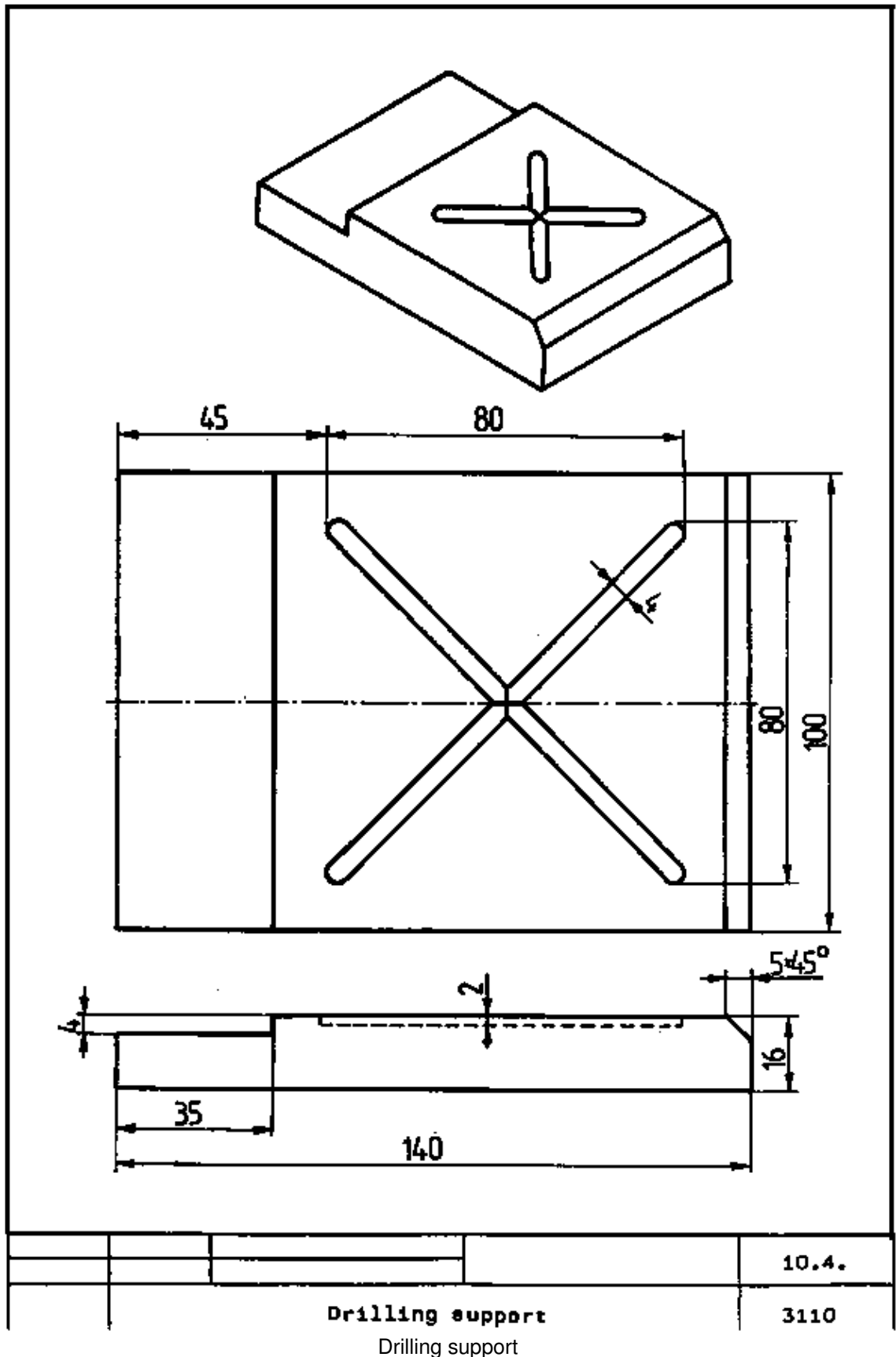
6. Scribing of the groove cross (centre lines)

7. First chisel completely one groove with the grooving chisel, then, proceeding from the middle, chisel the second groove towards both sides

– approx. 1 chip thickness

8. Final check

– Straightness of the grooves, uniformity of the plane areas



Instruction example 10.5. Marking gauge

To practise cutting-off chiselling of slots and chipping chiselling of narrow areas

Material

– Flat steel (380 MPa)

Thickness: 4 to 5 mm

Width: 24 mm

Length: 180 mm

– Flat steel (380 MPa)

Thickness: 10 mm

Width: 35 mm

Length: 50 mm

– Angle steel (380 MPa)

40 x 40 x 4

Length: 35 mm

– High straight–knurled screw

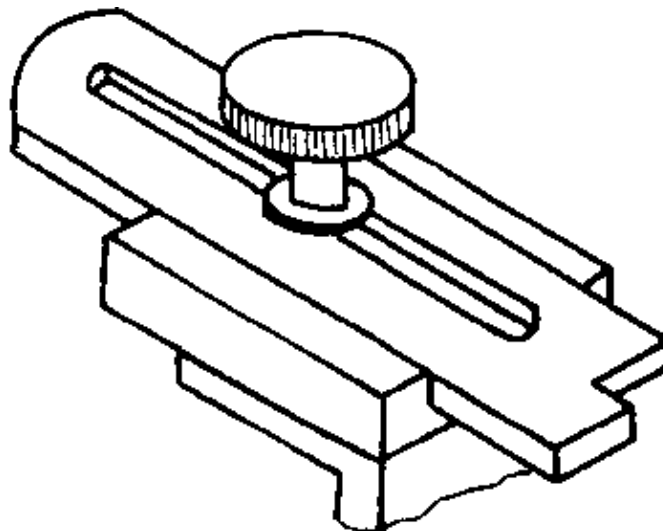
M 6 x 18

– Fillister head screw

M 3 x 10

– Wide washer

Hole diameter: 6,2 mm



Hand tools

Steel scribe or surface gauge, marking and centre punch, hand hacksaw, engineers' hammer, drills 2.5 mm dia.; 3.1 mm dia.; 5 mm dia.; 6 mm dia.; 6.2 mm dia.; nut taps M 3 and M 6, bastard and smooth files 250 mm (flat), mortise chisel, cape chisel, flat chisel

Measuring and testing tools

Steel rule, vernier caliper

Accessories

Vice, C-clamps, machine vice, steel plate or anvil

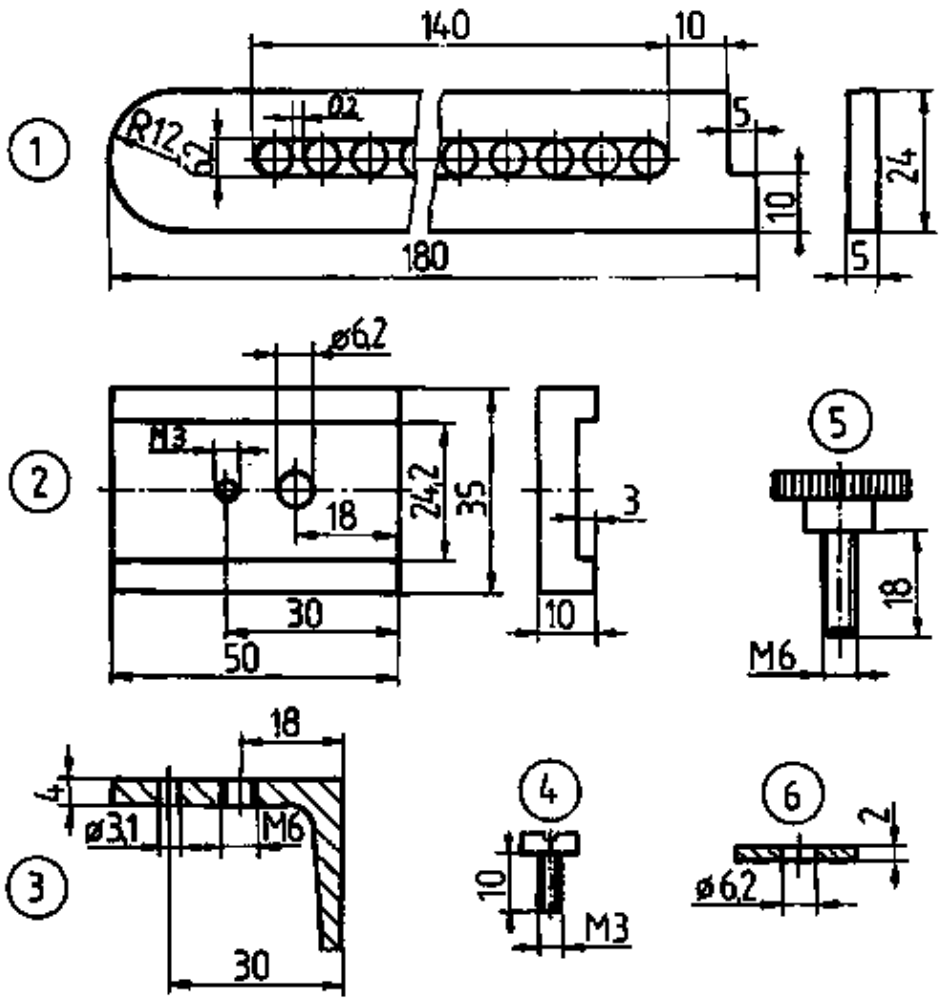
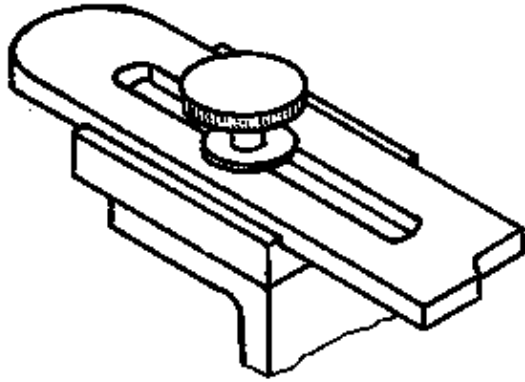
Required previous knowledge

Reading of drawings, scribing, prick-punching, measuring, testing, drilling, countersinking/counterboring, sawing, filing, thread cutting

Sequence of operations

Comments

- | | |
|---|--|
| 1. Arrange workplace, prepare working material | – Check for completeness |
| 2. Scribing of the component (1) and working of the outline to size | – Sawing, filing |
| 3. Punching of the hole centres in the slot, drilling and chiselling out of the slot by the mortise chisel | – Hole 6 mm dia.
– Distance between the hole edges 0.2 mm |
| 4. Control of the slot, subsequently finishing by filing | |
| 5. Scribing of the component (2) and working to size of the outer edges | – filing |
| 6. Scribing of the flat groove (24.2), sawing of the groove edges, chiselling of grooves by the cape chisel, chiselling off of the remained webs by the flat chisel | – Pay attention to firm fixing! |
| 7. Checking of the flat groove, subsequently finishing by filing | |
| 8. Working to size of the component (3); Fastening with part (2) and drilling jointly; Boring separately and threading | – sawing, filing
– hole 2.5 dia. and 5.0 dia.
– boring 3.1 dia. and 6.2 dia.
according to the drawing |
| 9. Mounting by means of parts (4), (5), (6) | |
| 10. Final check | – Accuracy to size, appearance,
good slideability of the slide |



			10.5.
		Marking gauge	3110

Marking gauge