

**Working on Long-hole Cutting Machines – Course: Mechanical
woodworking techniques. Instruction examples for practical vocational
training**

Table of Contents

Working on Long-hole Cutting Machines – Course: Mechanical woodworking techniques.

<u>Instruction examples for practical vocational training</u>	1
<u>Preliminary Remarks</u>	1
<u>Instruction Example 09.1.: Stool Plate</u>	1
<u>Instruction Example 09.2.: Stool Frame</u>	3
<u>Instruction Example 09.3.: Frames</u>	6
<u>Instruction Example 09.4.: Frames</u>	9
<u>Instruction Example 09.5.: Frame Part with Mortise Dead Lock</u>	12

Working on Long-hole Cutting Machines – Course: Mechanical woodworking techniques. Instruction examples for practical vocational training

**Institut für berufliche Entwicklung e.V.
Berlin**

Original title:
Lehrbeispiele für die berufspraktische Ausbildung
“Arbeiten an Langlochfräsmaschinen”

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First Edition © IBE

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Parkstraße 23
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Order No.: 93–33–3409/2

Preliminary Remarks

The present material includes 5 Instruction Examples where the drilling of round-hole bores and the drilling and cutting of long holes with long-hole cutters will be practised on different pieces of work.

In order to ease the preparation and realization of the exercises for each instruction example the necessary material, machines and tools, measuring and testing devices and auxiliaries are named. The necessary basic knowledge for the preparation and the realization of the instruction examples are mentioned, too.

With the help of working sketches and working descriptions the exercises can be carried out independently.

As instruction examples there were selected pieces of exercise which give applicable objects after their manufacturing:

A stool plate and a stool frame as single parts of a workshop stool, two frames for different purposes, a frame part with an insert lock for a door.

The long measures are standard and can be adapted to the local conditions by the trainee.

Instruction Example 09.1.: Stool Plate

Drilling of long-hole bores for long wood dowel pins to manufacture wide doweled joints.

Material

– 3 boards with milled narrow faces (1)

length: 500 mm

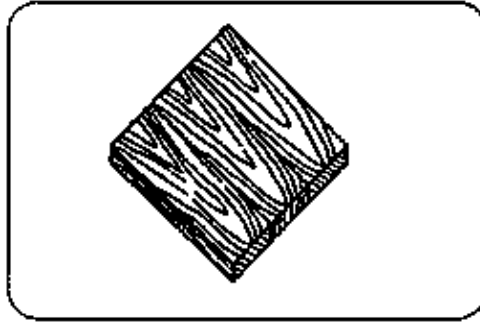
width: 170 mm

thickness: 24 mm

– 6 long wood dowel pins (2)

diameter: 8 mm

length: 55 mm



Machines and tools

long-hole cutter, twist drill with a centre point \varnothing 8 mm, pencil, scribe, awl, wooden hammer

Measuring and testing means

folding rule, steel square

Auxiliaries

working desk

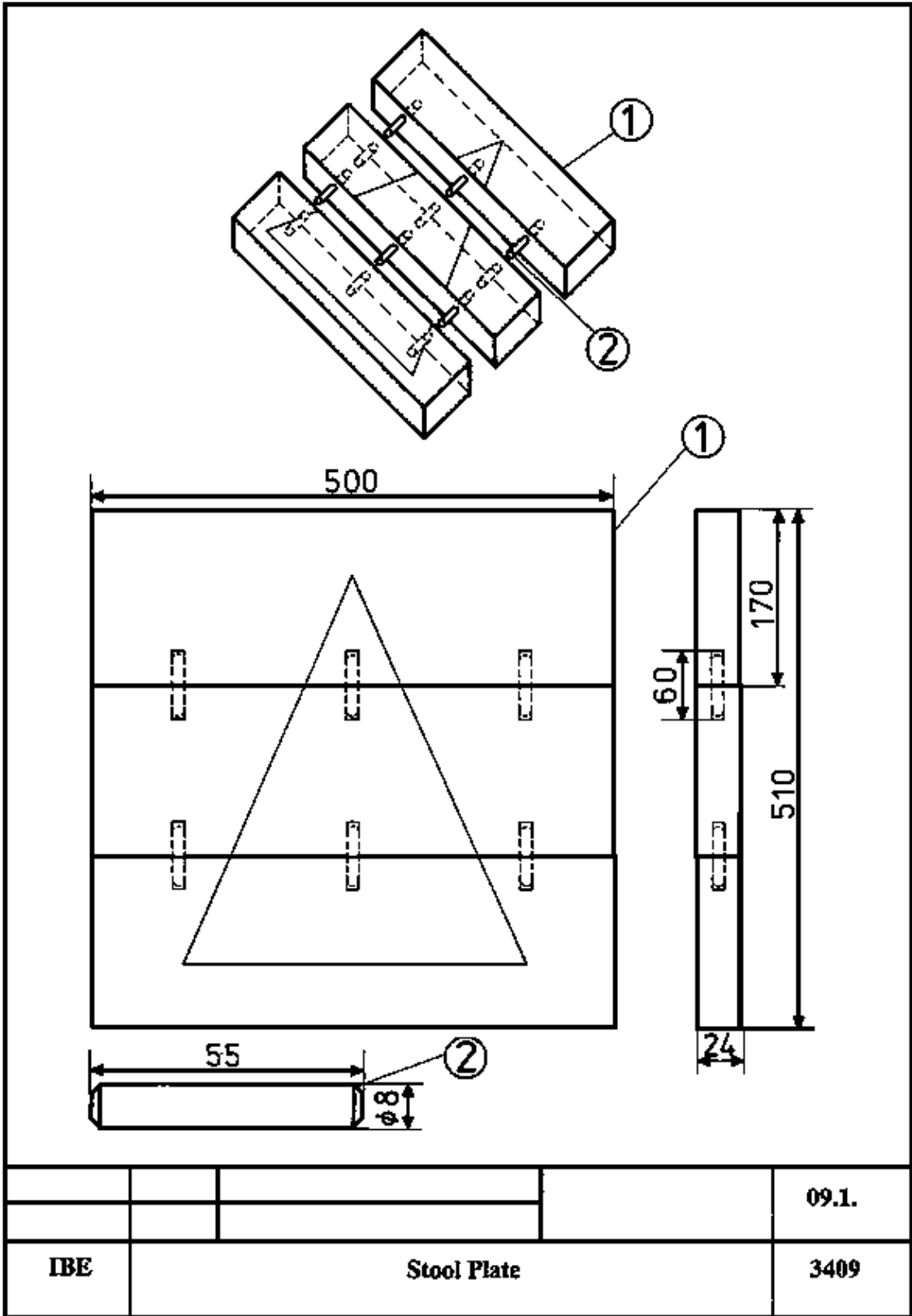
Necessary basic knowledge

measuring and marking, working on circular sawing machines and smooth planing milling machines

Sequence of operations	Comments
1. Marking the bore centres on the narrow faces.	Punching the bore centre with the awl for placing the centre point of the drill.
2. Clamping the drill bit.	Insert the drill shank into the drill chuck to the stop.
3. Adjusting the necessary bore depth.	The fixing of the bore depth is carried out with the adjustable stop on the machine.
4. Clamping the piece of work.	Placing the piece of work on the stop bar the working table and fastening it.
5. Adjusting the table height to the bore centre.	The adjusting of the table height is carried out with the hand wheel.
6. Switching on the machine.	
7. Drilling the dowel holes.	The bore shaft with drill chuck and drill bit is moved to the fixed bore depth by the lever.
8. Switching off the machine.	
9. Checking the dimensional accuracy.	Checking the bore edges, inaccurate bore edges result from – a too high tool feed – a dull drilling tool.

Finishing:

Sticking in the dowel pins, glueing the joints, smooth planing of the wide faces and milling to thickness.



Stool Plate

Instruction Example 09.2.: Stool Frame

Drilling of round-hole bores for long wood dowel pins to manufacture doweled edge joints.

Material

– 4 edges with milled wide and narrow faces (1)

length: 350 mm

width: 80 mm

thickness: 24 mm

– 4 square bars with all faces milled (2)

length: 480 mm

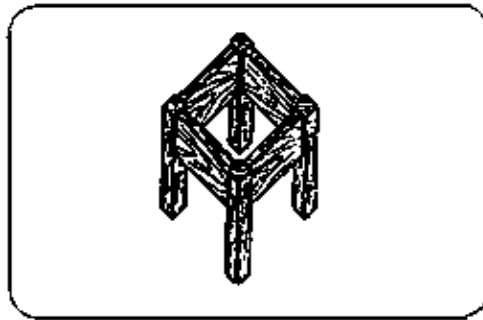
width: 40 mm

thickness: 40 mm

– 16 long wood dowel pins (3)

diameter: 8 mm

length: 55 mm



Machines and tools

long-hole cutter, twist drill with a centre point \varnothing 8 mm, scriber, pencil, awl, wooden hammer

Measuring and testing means

folding rule, steel square

Auxiliaries

working desk

Necessary basic knowledge

measuring and marking, working on circular sawing machines, smooth planing milling and thickness milling machines

Sequence of operations	Comments
1. Marking and punching the bore centres on the stool legs and the edges.	Mark the measures precisely – otherwise off-centre running of the bore possible.
2. Clamping the twist drill.	Clamp the shank fast and secure.
3. Fixing the bore depth.	Setting the stop.
4. Clamping the piece of work on the working table.	Placing the piece of work on the stop and clamping with the eccentric lever.
5. Fixing the table height to the bore centre.	

6. Drilling the dowel pin holes into the legs and the edges according to the marking.

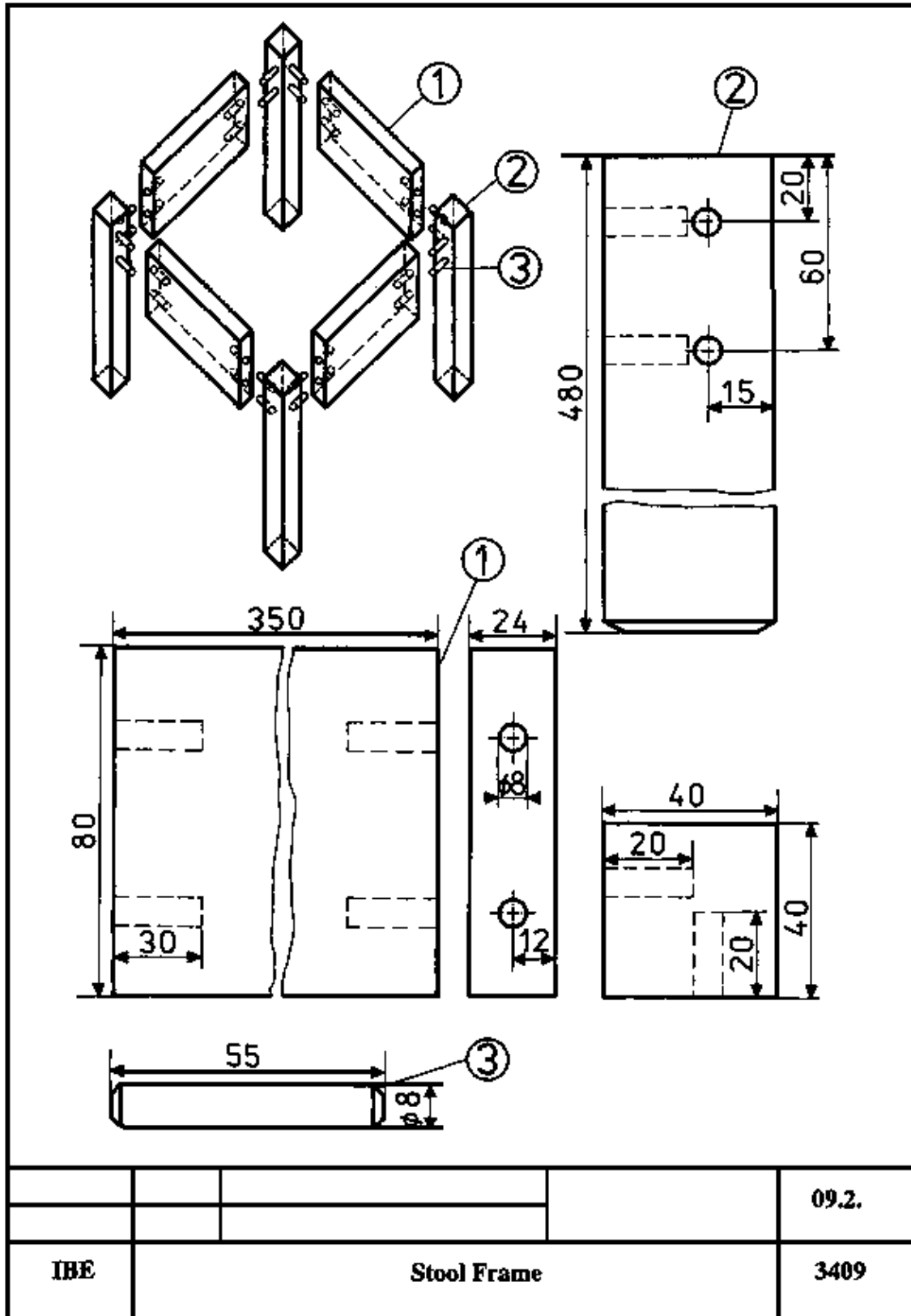
Drilling at the marking should be carried out precisely to ensure true-to-size.

7. Checking the dimensional accuracy.

Checking the dimensional accuracy of the bore distances and the bore depth.

Finishing:

Grinding the wide and narrow faces of the legs and edges. Glueing the leg frame together. Fastening the stool plate manufactured in the Instruction Example 09.1.



Stool Frame

Instruction Example 09.3.: Frames

Drilling of round-hole bores for long wood dowel pins to manufacture a doweled frame corner joint

Material

– 2 strips with milled wide and narrow faces (1)

length: 400 mm

width: 80 mm

thickness: 24 mm

– 2 strips, milled (2)

length: 800 mm

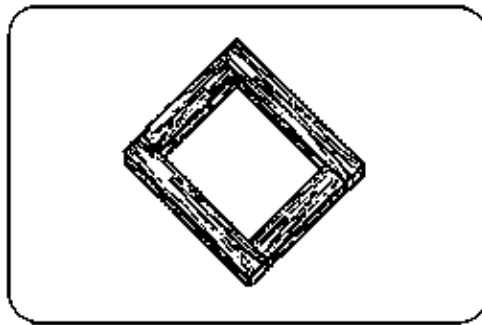
width: 80 mm

thickness: 24 mm

– 8 long wood dowel pins (3)

diameter: 8 mm

length: 55 mm



Machines and tools

long-hole cutter, twist drill with a centre point \varnothing 8 mm, scribe, pencil, awl, wooden hammer

Measuring and testing means

folding rule, steel square

Auxiliaries

working desk

Necessary basic knowledge

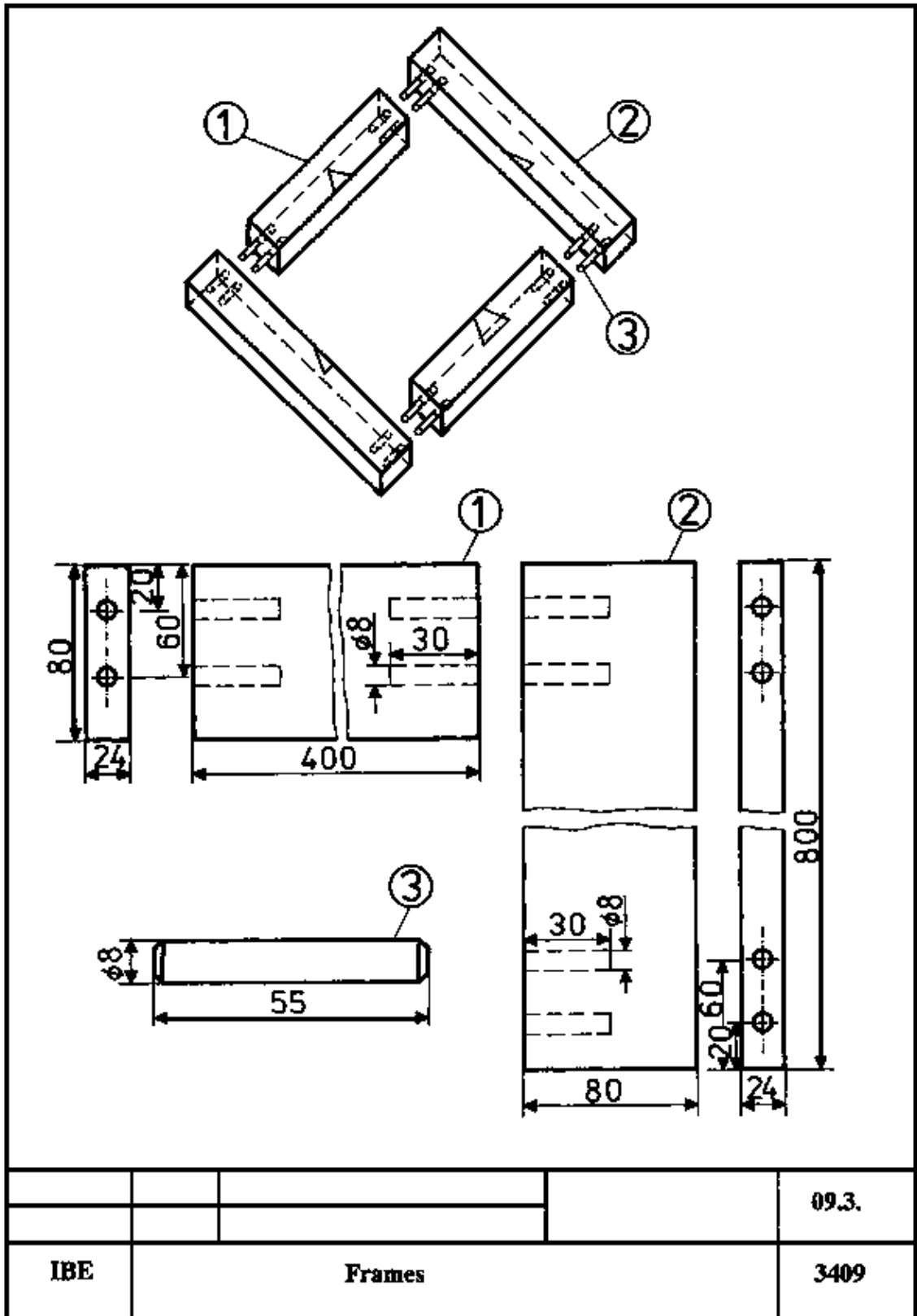
Measuring and marking, working on circular sawing machines, smooth planing milling and thickness milling machines.

Sequence of operations	Comments
1. Marking and punching the bore centres on the centers of the narrow faces and the cross grain edges.	It is enough to mark one corner joint. All bores will be performed true to size repeatedly by the fixed stops.
2. Clamping the twist drill.	
3. Fixing the bore depth.	
4. Clamping the piece of work on the working table.	Use inset wooden pieces if necessary.
5. Screwing the dog on the working table.	A dog is screwed on the working table with 2 machine screws where the pieces of work are placed.

- | | |
|--|---|
| 6. Fixing the centre distances of the bores with the two dogs. | The dogs make it possible to drill always at the same bore distance without marking the bore centres. |
| 7. Fixing the table height to the bore centre. | |
| 8. Drilling the dowel pin holes into the narrow faces and the cross grain edges. | Place the square side of the frame parts onto the working table. |
| 9. Checking in the dimensional accuracy. | Checking the true-to-sizeness of the bores. Fixing the frame together without glue for a check. |

Finishing:

Glueing the frames together. Grinding the faces and edges.



Frames

Instruction Example 09.4.: Frames

Milling of long holes for placing a mortise of a caulked frame corner joint.

Material

– 2 strips with milled wide and narrow faces (1)

length: 800 mm

width: 80 mm

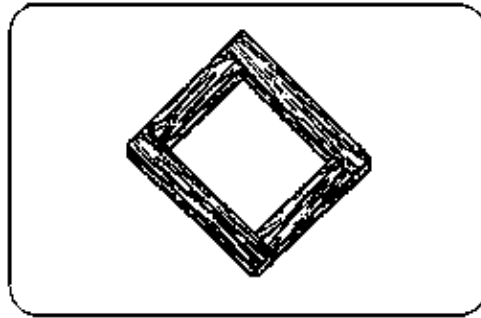
thickness: 24 mm

– 2 strips with a caulked or milled mortise (2)

length: 510 mm

width: 80 mm

thickness: 24 mm



Machines and tools

long-hole cutter, long-hole cutting tool \varnothing 8 mm, scriber, pencil

Measuring and testing means

folding rule, steel square

Auxiliaries

working desk

Necessary basic knowledge

Measuring and marking, caulking, working on circular sawing machines, smooth planing milling, thickness milling and universal milling machines.

Sequence of operations

Comments

1. Marking the length of the long hole on the narrow faces. Marking the outline of the long holes precisely.

2. Clamping the long-hole cutter in the bore chuck.

3. Fixing the bore hole depth.

4. Clamping the piece of work on the working table.

5. Adjusting the table height.

6. Between the markings of the long hole round holes are drilled closely side by side. Thereafter the remaining stretchers between the round holes are milled by the cross feed of the working table.

The straight cutting groove of the long-hole cutter throws the shavings out badly. The bore can tamp and the cutter can break. Therefore do not make deep round bores in one go. With the cross feed of the working table the length cutting edges mill away the remaining stretchers between the round

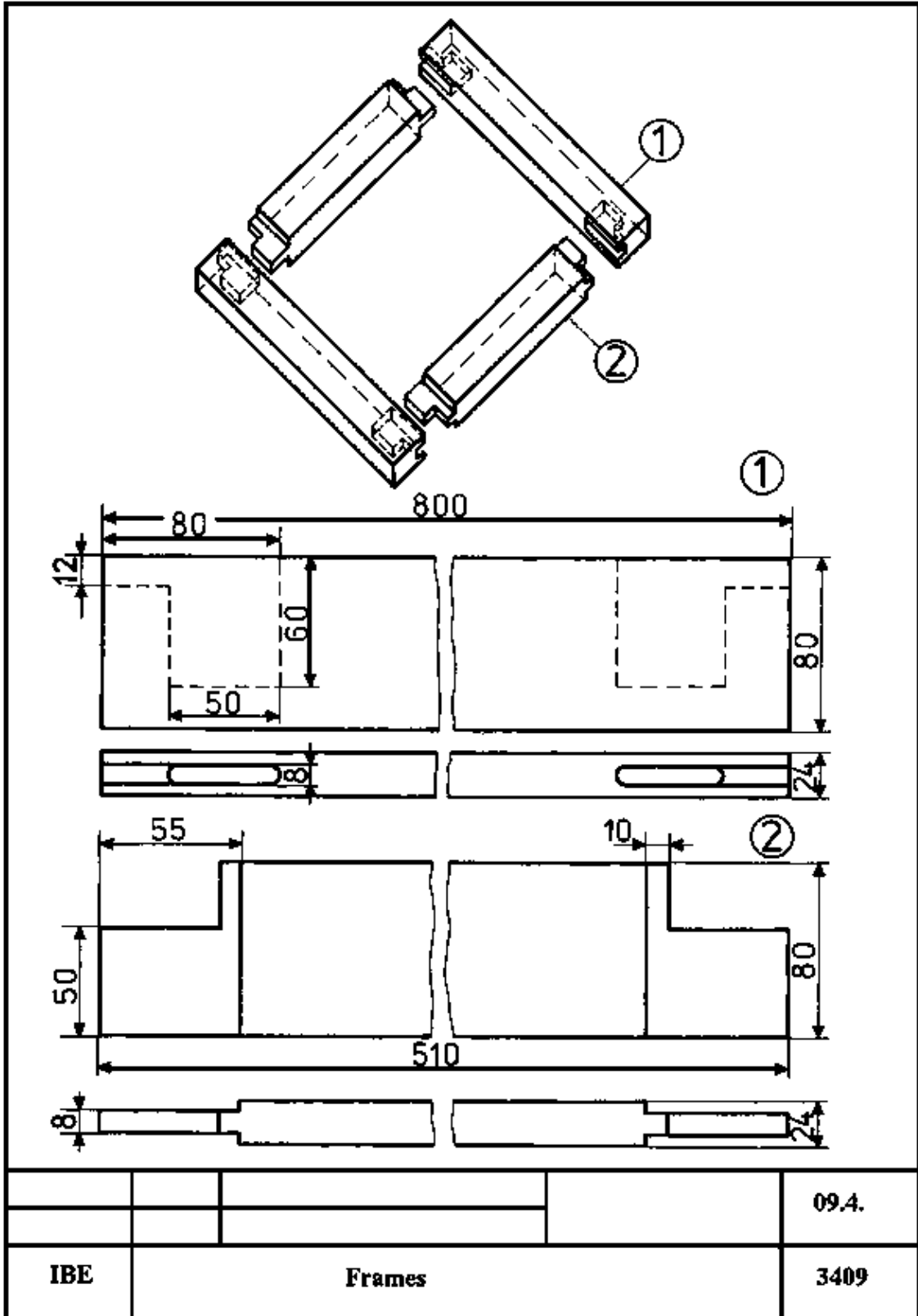
bores. Here too, do not mill deep long holes in one go. Inaccurate long holes occur because of rapid feed or of dull tools.

7. Checking the dimensional accuracy.

Checking the dimensional accuracy and cleanliness of the long holes.

Finishing:

Grinding the wide narrow faces. Glueing the frames together and grinding.



Frames

Instruction Example 09.5.: Frame Part with Mortise Dead Lock

Milling a long hole for an apron and milling a long hole for the cover of the mortise dead lock.

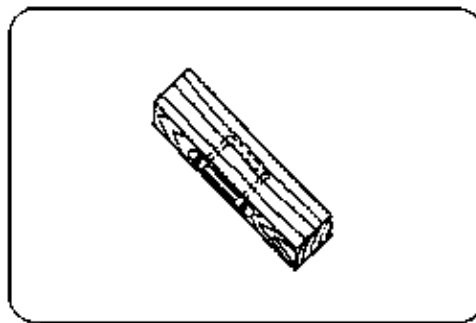
Material

- 1 furniture mortise dead lock (1)
- 1 strip with milled wide and narrow faces

length: variable

width: 80 mm

thickness: 24 mm



Machines and tools

long-hole cutter, long-hole cutting tool, scriber, pencil

Measuring and testing means

folding rule, steel square

Auxiliaries

working desk

Necessary basic knowledge

Marking and measuring, working on circular sawing machines, smooth planing milling and thickness milling machines.

Sequence of operations	Comments
1. Marking the length of the long hole for the apron and the cover on the narrow.	
2. Select the long-hole cutting tool according to the thickness of the apron and clamp.	Milling the long hole a bit larger. The apron should sit loose in the hole.
3. Switching on the machine.	
4. Drilling and milling the long hole for the apron.	
5. Select a long-hole cutting for the cover width and clamp it.	The diameter of the cutter should respond to the cover width, it should sit without allowance in the hole.
6. Fixing the cutting depth (x) for the cover thickness.	

7. Milling out the cover thickness between the markings.

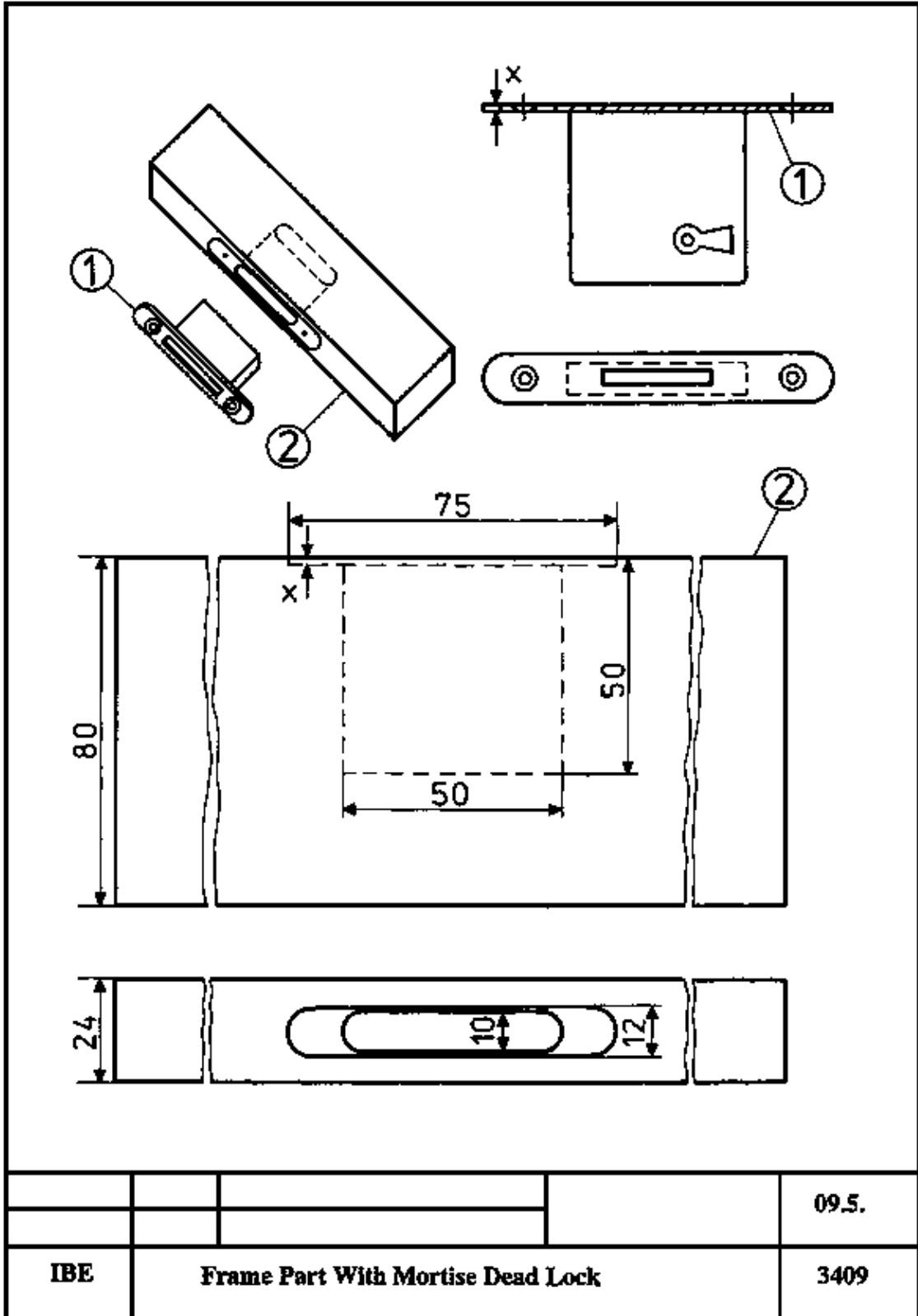
Pay attention to sharp tools and slow feed.

8. Clean the long hole from shavings and place the dead lock for checking the true-to-sizeness.

The apron should sit loose in the hole. The cover should fit close to joint into the hole.

Finishing:

Screwing the mortise dead lock into the frame part with two wood screws.



Frame Part With Mortise Dead Lock

