# TRADE TRAINING I

## TTC PROGRAMME

# TURNER
# MACHINIST

TEVTA

GOVERNMENT OF THE PUNJAB
TECHNICAL EDUCATION & VOCATIONAL TRAINING AUTHORITY
PUNJAB BOARD OF TECHNICAL EDUCATION
TRADE TESTING CELL, LAHORE.

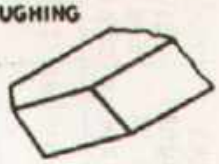
T.T.P Series No. 24

Price Rs.29.00

## HINTS FOR OFFHAND GRINDING

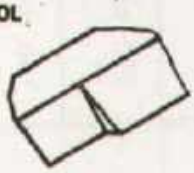
1

RIGHT HAND ROUGHING TOOL



1.0.3/01 → 2

RIGHT HAND SIDE TOOL



1.0.3/01 → 3

CENTRE PUNCH

4

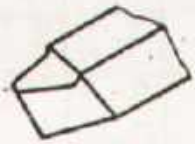
SCRIBER

5

FLAT CHISEL

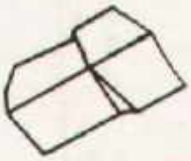
6

ROUND NOSE SMOOTHING TOOL



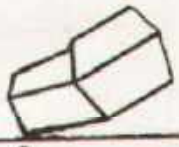
1.0.3/01 → 7

RIGHT HAND SIDE TOOL



1.0.3/01 → 8

RIGHT HAND ROUGHING TOOL



1.0.3/01 → 9

TWIST DRILL

10

THE ABOVE SHOWN EXERCISES SHOULD BE COMPLETED WITHIN 2 WEEKS.

AFTER COMPLETION OF THIS OFFHAND GRINDING COURSE, THE TRAINEES SHOULD BE ABLE TO SHARPEN THE EXERCISED TOOLS IN CORRECT MANNER AND WITHOUT ANY ASSISTANCE.

THE REQUIRED MATERIALS FOR THE TOOL BITS ARE TO BE TAKEN FROM SHAPING EX.1.0.3/01. FOR THE OTHER EXERCISES WORN-OUT OR BLUNT TOOLS CAN BE USED.

| | | |
|---|---|---|
| SCALE | **LAYOUT** | No 1.0.5/1-10 |
| MATERIAL | | OFFHAND GRINDING |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

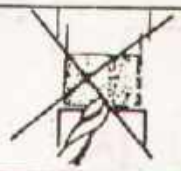
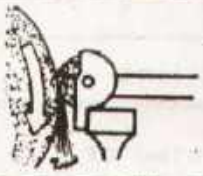
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

# MATERIAL REQUIRED

TRADE TRAINING 1 — TURNER / MACHINIST & FITTER

OFF HAND GRINDING
No. 1.0.5/1 to 10

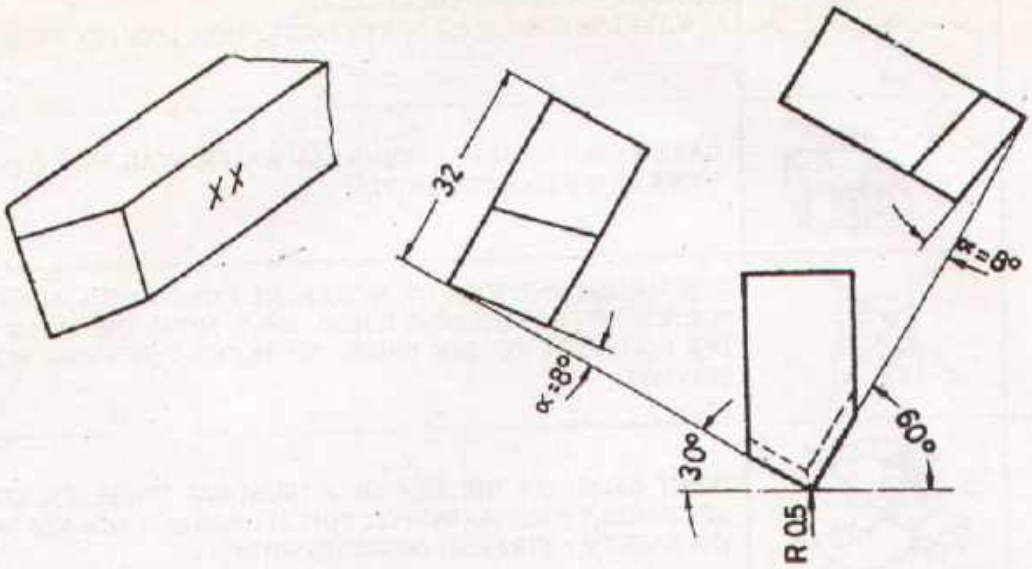
| | Exercise No. (Length given in Millimeter) | | | | | | | | | Length per Trainee | Total length for 16 Trainees | Total weight for 16 Trainees |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 10 | | | | |
| M.S.Squ. 16x16 mm R.H.Roughing Tool | 150 | | | | | | | | | 150 mm | 2.4 meter | 4.9 kg |
| M.S.Squ. 16x16 mm R.H.Side Tool | | 150 | | | | | | | | 150 mm | 2.4 meter | 4.9 kg |
| Tool Steel Ø 5 mm or Spring Steel | | | 175 | | | | | | | 175 mm | 2.8 meter | 0.5 kg |
| Tool Steel 22x11mm preforged | | | | 150 | | | | | | 150 mm | 2.4 meter | 4.6 kg |
| M.S Squ. 16x16 mm Round Nose Smoothing Tool | | | | | 150 | | | | | 150 mm | 2.4 meter | 4.9 kg |
| M.S.Squ. 16x16 mm R.H. Side Tool | | | | | | 150 | | | | 150 mm | 2.4 meter | 4.9 kg |
| M.S.Squ. 16x16 mm R.H. Roughing Tool | | | | | | | 150 | | | 150 mm | 2.4 meter | 4.9 kg |
| worn out or condemned drills various sizes | | | | | | | | | | 1 Nos. | 16 Nos. | 16 Nos. |

| | | |
|---|---|---|
| 1 |  | WHEN WORKING ON A GRINDING MACHINE, MAKE SURE THAT GUARDS AND HOODS ARE SECURELY PLACED.<br>ALWAYS USE SOME SORT OF EYE PROTECTION, LIKE GOGGLES! |
| 2 |  | HAVE A CONTAINER OF COOL CLEAN WATER AVAILABLE TO COOL THE WORK AS IT BECOMES HEATED. |
| 3 |  | DON'T PRESS THE TOOL OR WORKPIECE CONSTANTLY AGAINST ONE PORTION OF THE GRINDING WHEEL ONLY. MOVE THE WORK ACROSS THE FULL FACE OF THE WHEEL TO PREVENT IT FROM BECOMING GROOVED. |
| 4 |  | DON'T GRIND ON THE SIDE OF A GRINDING WHEEL EXCEPT WHEN ABSOLUTELY NECESSARY! FOR ROUGH GRINDING ALWAYS WORK ON THE FACE OF A STRAIGHT GRINDING WHEEL! |
| 5 |  | BLUNT, GLAZED, GROOVE OR WOBBLING WHEELS MUST BE DRESSED OR TRUED. |
| 6 |  | DON'T WORK ON A GRINDING MACHINE WHICH HAS AN ABNORMAL 'SOUND'. MAY BE THE WHEEL HAS FRACTURES OR CRACKS OR IS NOT PROPERLY BALANCED. |
| 7 |  | WHEN GRINDING, KEEP THE TOOL REST ADJUSTED CLOSE TO THE WHEEL. A MAXIMUM DISTANCE OF 2 MM (1/16 IN.) IS RECOMMENDED TO PREVENT THE WORK FROM BEING CAUGHT BETWEEN THE REST AND THE WHEEL. |
| 8 |  | SMALLER TOOLS DON'T HOLD ON THE TOOL REST; SUPPORT THEM IN THE LEFT HAND AND SUPPORT THIS HAND WITH THE TOOL REST. VERY SMALL PARTS HOLD IN SUITABLE FIXTURES OR WITH PLIERS. |
| 9 |  | FOR HEAVY WORK, BIG GRINDING MACHINES AND COARSE GRIT WHEELS ARE REQUIRED. FOR FINE WORK, FINE GRIT WHEELS ARE REQUIRED. IF SPECIAL WORK OR MATERIALS OTHER THAN STEEL HAVE TO BE GROUND, ASK YOUR INSTRUCTOR! |

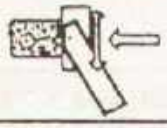
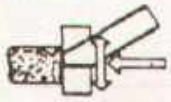
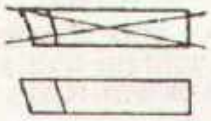
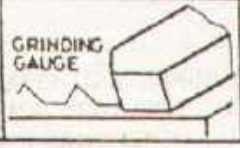
| | | |
|---|---|---|
| SCALE | HINTS FOR OFFHAND GRINDING | NO 105/01 |
| MATERIAL | | OFFHAND GRINDING |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



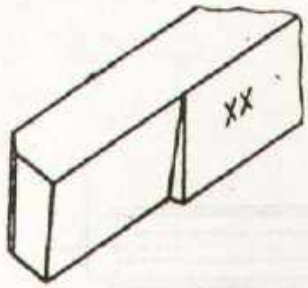

SEQUENCE OE OPERATIONS

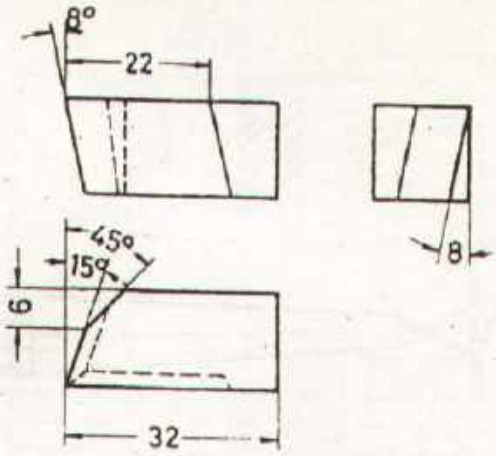
| NO. | Symbol | Tools | Descriptions |
|---|---|---|---|
| 1 |  | PEDESTAL WHEEL GRINDING MACHINE SAFETY GOGGLES BEVEL PROTRACTOR | GRINDING OF $60^{\circ}$ ANGLE |
| 2 |  | AS UNDER NO. 1 | GRINDING OF $30^{\circ}$ ANGLE |
| 3 |  | CUP WHEEL GRINDING MACHINE SAFETY GOGGLES GRINDING GAUGE | GRINDING OF $60^{\circ}$ $30^{\circ}$ ANGLES & RADIUS |
| 4 |  | TO AVOID HOLLOW GRINDING, THE CUP WHEEL GRINDER SHOULD BE USED FOR FINAL GRINDING | |
| 5 |   | GRINDING GAUGE | CHECKING OF CLEARANCE ANGLES. HOLD THE GRINDING GAUGE IN RIGHT ANGLE. |

| | | |
|---|---|---|
| SCALE 1:1 | RIGHT HAND ROUGHING TOOL (WITHOUT TOP RAKE ANGLE) | No 1.0 5/02 |
| MAT From Ex.1.0.3/1 | | OFFHAND GRINDING |

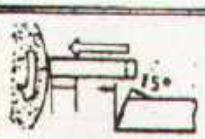
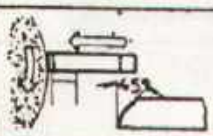
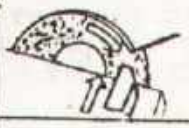
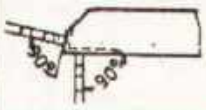
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME



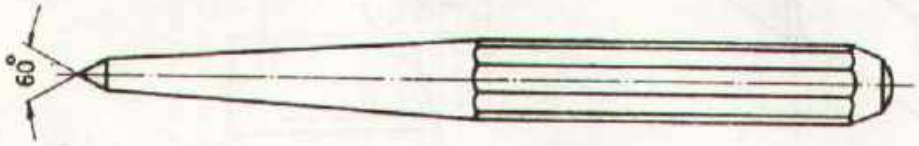

## SEQUENCE OF OPERATIONS

| NO | Symbol | Tools | Descriptions |
|---|---|---|---|
| 1 |  | PEDESTAL WHEEL GRINDING MACHINE SAFETY GOGGLES BEVEL PROTRACTOR | PREGRINDING OF 15° ANGLE |
| 2 |  | AS UNDER NO. 1 | PREGRINDING OF 45° ANGLE |
| 3 |  | CUP WHEEL GRINDING MACHINE SAFETY GOGGLES GRINDING GAUGE | GRINDING OF SECONDARY CLEARANCE ANGLE 8° |
| 4 |  | AS UNDER NO. 3 | GRINDING OF SIDE CLEARANCE ANGLE 8° |
| 5 |   | GRINDING GAUGE | CHECKING |
| 6 |  | GRINDING GAUGE | CHECKING |

| | | |
|---|---|---|
| SCALE 1:1 | RIGHT HAND SIDE TOOL (WITHOUT TOP RAKE ANGLE) | No. 1.0 5/03 |
| MAT. From Ex.1-0.3/1 | | OFFHAND GRINDING |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

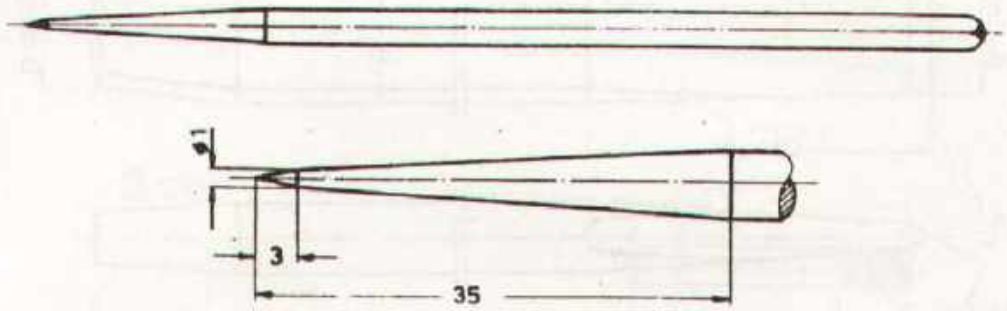



| Nos. | Symbol | Tools | Descriptions |
|---|---|---|---|
| 1 |  | PEDESTAL WHEEL GRINDING MACHINE | ROTATE THE CENTRE PUNCH TO PRODUCE CONICAL POINT |
| | | SAFETY GOGGLES | |
| | | | COOL THE CENTRE POINT AS SOON AS IT BECOMES HEATED |
| |  | BEVEL PROTRACTOR | |

| | | |
|---|---|---|
| SCALE 1 : 1 | CENTRE PUNCH | NO 1.0.5/04 |
| MAT. CARBON STEEL | from Ex. 2.13.2/18 | OFFHAND GRINDING |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

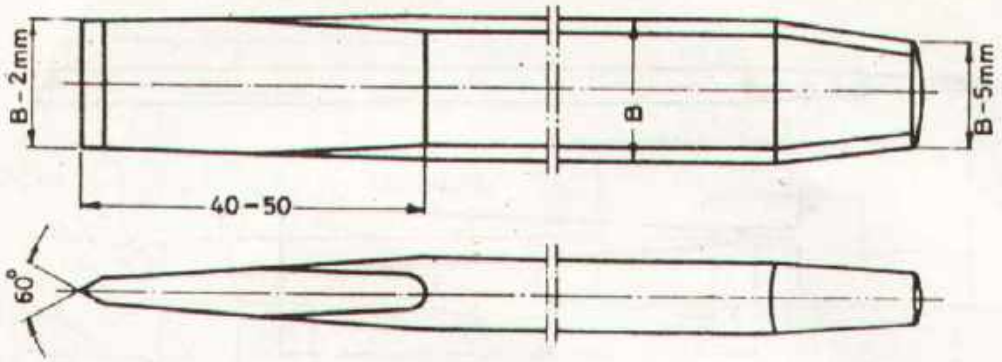


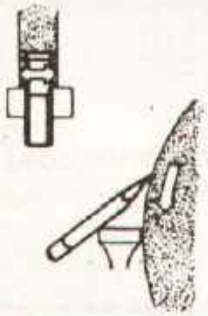

| Nos | Symbol | Tools | Descriptions |
|---|---|---|---|
| 1 |  | PEDESTAL WHEEL GRINDING MACHINE<br>SAFETY GOGGLES<br>CHECKING TOOLS | GRINDING OF LONG CONE |
| 2 |  | PEDESTAL WHEEL GRINDING MACHINE<br>SAFETY GOGGLES | GRINDING OF CONICAL POINT |

| | | |
|---|---|---|
| SCALE 1:1, 2:1 | SCRIBER | NO 105/05 |
| MAT. CARBON STEEL | | OFFHAND GRINDING |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME.

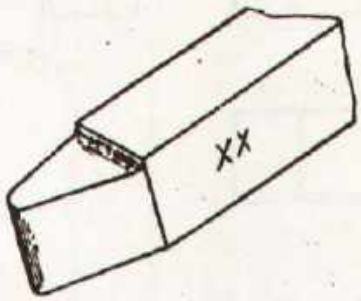


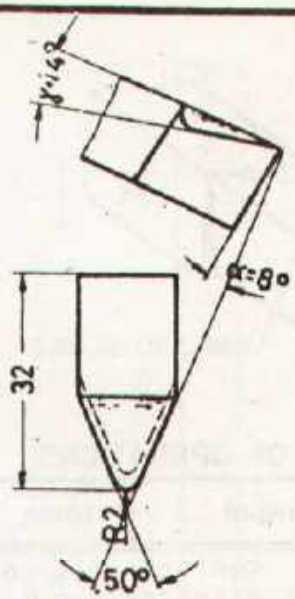

| Nos. | Symbol | Tools | Descriptions |
|---|---|---|---|
| 1 |  | PEDESTAL WHEEL GRINDING MACHINE<br><br>SAFETY GOGGLES | GRINDING OF CHISEL HEAD |
| 2 |  | PEDESTAL WHEEL GRINDING MACHINE<br><br>SAFETY GOGGLES | GRINDING OF THE LONG CONICAL PORTION |
| 3 |  | PEDESTAL WHEEL GRINDING MACHINE<br><br>SAFETY GOGGLES | SHARPENING OF CUTTING EDGE |

| | | |
|---|---|---|
| SCALE 1 : 1 | FLAT CHISEL | NO 1.0 5 / 06 |
| MAT. CARBON STEEL | | OFFHAND GRINDING |

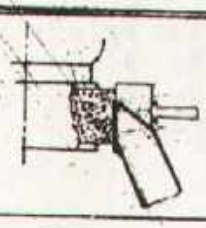
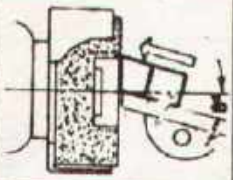
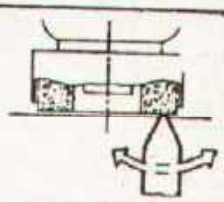
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



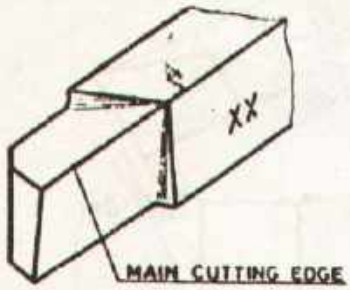

SEQUENCE OF OPERATIONS

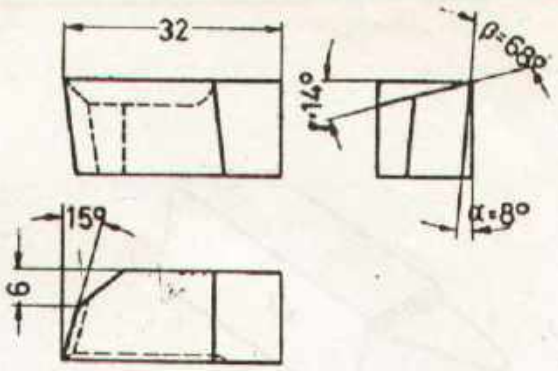
| NO. | Symbol | Tools | Descriptions |
|---|---|---|---|
| 1 |  | PEDESTAL WHEEL GRINDING MACHINE<br>SAFETY GOGGLES<br>GRINDING GAUGE | PREGRINDING OF 50° |
| 2 |  | CUP WHEEL GRINDING MACHINE<br>SAFETY GOGGLES<br>GRINDING GAUGE | GRINDING OF CLEARANCE ANGLE 8° |
| 3 |  | CUP WHEEL GRINDING MACHINE<br>SAFETY GOGGLES<br>RADIUS GAUGE | GRINDING OF RADIUS 2 MM |
| 4 |  | GRINDING MACHINE<br>SAFETY GOGGLES<br>GRINDING GAUGE | GRINDING OF TOP RAKE ANGLE 14°, AS SHOWN ON STRAIGHT GRINDING WHEEL |

| | | |
|---|---|---|
| SCALE 1:1 | ROUND NOSE SMOOTHING TOOL | No. 1 0.5/07 |
| MAT. From Ex. 1.0.3/1 | | OFF-HAND GRINDING |

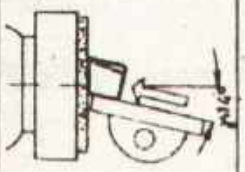
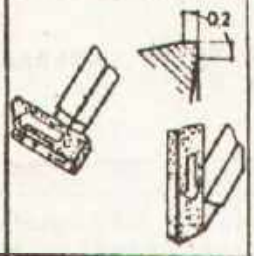
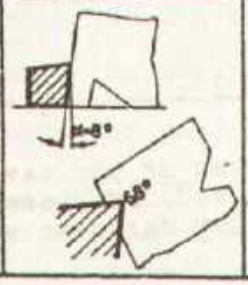
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



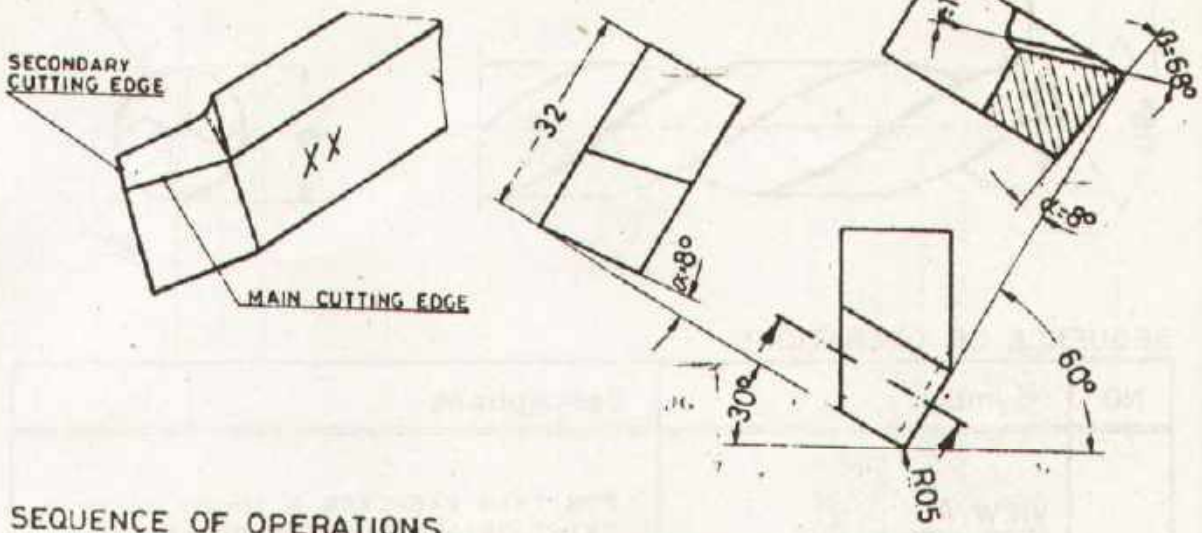

## SEQUENCE OF OPERATIONS

| NO. | Symbol | Tools | Descriptions |
|---|---|---|---|
| 1 | COMPLETE THE TOOL UPTO THE STAGE AS DONF IN EXERCISE 1.0.4/02 | | |
| 2 |  | CUP WHEEL GRINDING MACHINE<br>SAFETY GOGGLES | ADJUSTING OF GRINDING TABLE TO 14°<br>CRINDING OF TOP RAKE ANGLE $\gamma$ = 14° |
| 3 |  | OILSTONE | OILSTONING OF THE CUTTING EDGE |
| 4 |  | GRINDING GAUGE | CHECKING OF CLEARANCE ANGLE $\alpha$ = 8°<br>CHECKING OG CUTTING ANGLE $\beta$ = 68° |

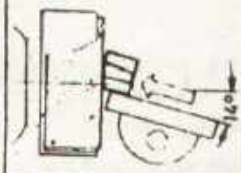
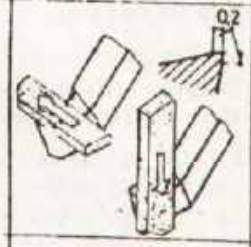
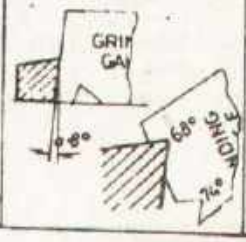
| | | |
|---|---|---|
| SCALE 1:1 | RIGHT HAND SIDE TOOL | No. 1.0.5/08 |
| MAT. From Ex.1.0.2/1 | | OFFHAND GRINDING |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



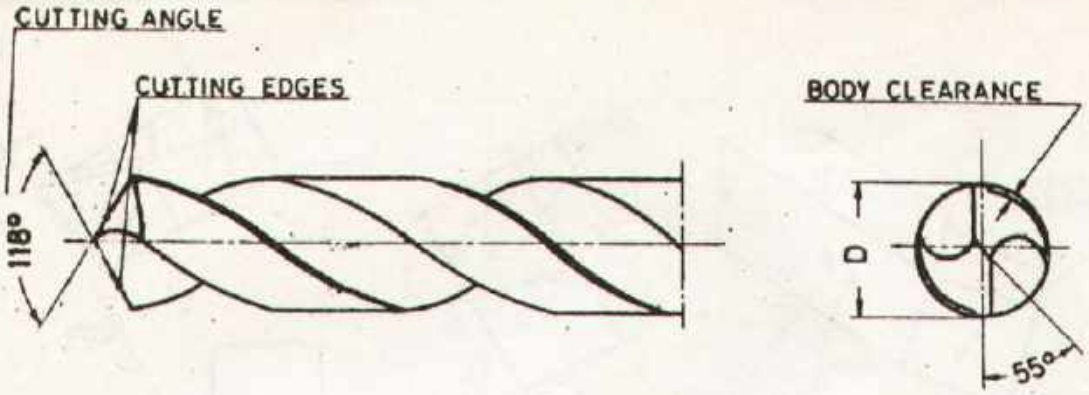

SEQUENCE OF OPERATIONS

| NO | Symbol | Tools | Descriptions |
|---|---|---|---|
| 1 | COMPLETE THE TOOL UPTO THE STAGE AS DONE IN EXERCISE 1.0.4/01. | | |
| 2 |  | CUP WHEEL GRINDING MACHINE<br>SAFETY GOGGLES | ADJUSTING OF GRINDING TABLE TO 14°.<br>GRINDING OF TOP RAKE ANGLE $\gamma$ = 14°. |
| 3 |  | OILSTONE | OILSTONING THE CUTTING EDGE, TO PRODUCE BETTER FINISH ON WORK AND TO PROLONG THE LIFE OF THE TOOL. |
| 4 |  | GRINDING GAUGE | CHECKING OF CLEARANCE ANGLE $\alpha$ = 8°.<br>CHECKING OF CUTTING ANGLE $\beta$ = 68° |

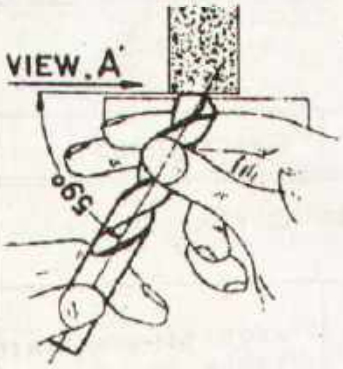
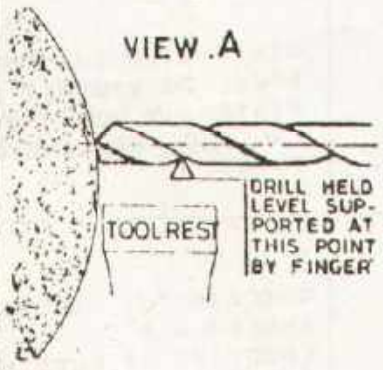
| | | |
|---|---|---|
| SCALE 1:1 | RIGHT HAND ROUGHING TOOL | No. 1.0.5/09 |
| MAT. From Ex 1.0.2/1 | | OFFHAND GRINDING |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

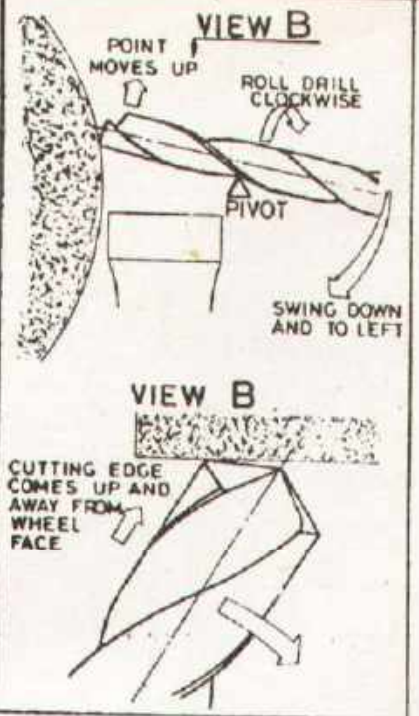
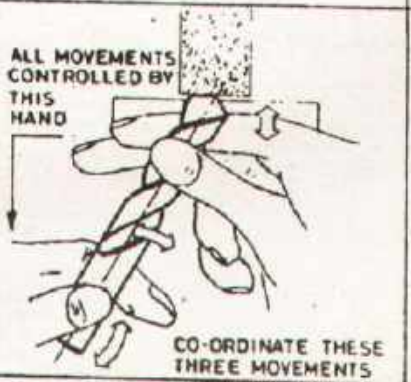
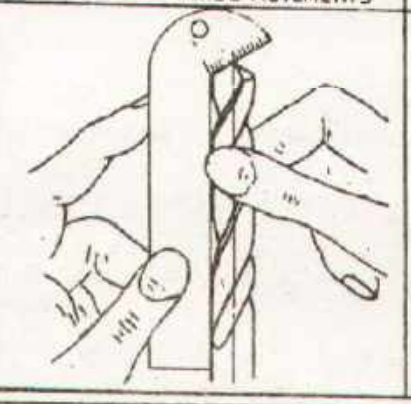



## SEQUENCE OF OPERATIONS

| NO. | Symbol | Descriptions |
|---|---|---|
| 1 |     | FOR THIS EXERCISE A 10 TO 15 MM Ø TWIST DRILL WOULD BE SUITABLE.<br>EITHER THE TWIST DRILL CAN BE HELD AS SHOWN OR THE HANDS CAN BE PLACED IN OPPOSITE POSITION.<br>1.1 STAND IN FRONT OF THE WHEEL AND SLIGHTLY TO THE LEFT OF THE MACHINE.<br>1.2 HOLD THE DRILL BETWEEN THE THUMB AND FIRST FINGER OF THE RIGHT (OR LEFT) HAND.<br>1.3 SUPPORT THE HAND ON THE TOOL REST WITH OTHER FINGERS.<br>1.4 HOLD THE SHANK OF THE DRILL BETWEEN THE THUMB AND FINGER OF THE LEFT (OR RIGHT) HAND.<br>1.5 POSITION YOURSELF BY MOVING THE FEET SO THAT THE DRILL MAKES AN ANGLE OF 59° TO THE WHEEL FACE.<br>1.6 HOLD THE DRILL LEVEL AND TWIST IT UNTIL ONE CUTTING EDGE IS HORIZONTAL AND PARALLEL TO THE WHEEL FACE. |

cont.. 10.1

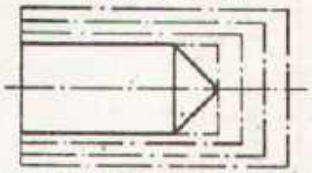
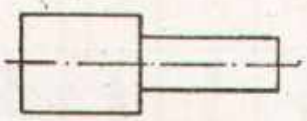
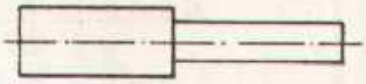
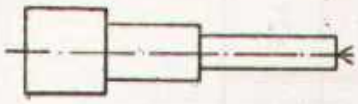
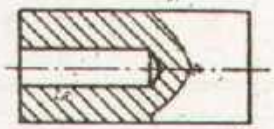
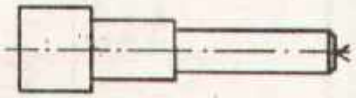
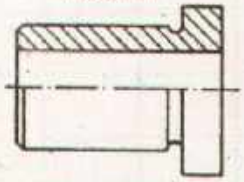
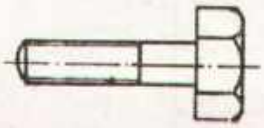
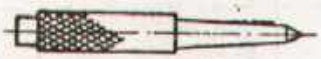
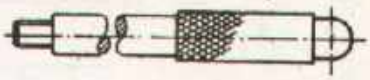
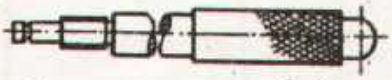
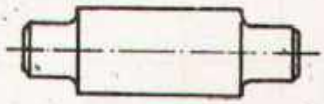
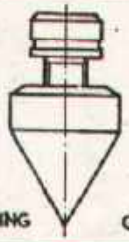
| | | |
|---|---|---|
| SCALE 1 : 1 | TWIST DRILL SHARPENG. | No. 1.0.5/10 |
| MAT. HIGH SPEED ST. | | OFFHAND GRINDING |

| | | |
|---|---|---|
| 2 |  | 2.1 SWING THE SHANK OF THE DRILL SLIGHTLY DOWNWARDS AND TO THE LEFT (OR RIGHT) HAND. THE OTHER HAND IS SUPPORTED BY THE TOOL REST.<br>2.2 ROLL THE DRILL TO THE RIGHT BY TURNING IT BETWEEN THE THUMB AND FINGER, AS YOU SWING THE HAND DOWN.<br>2.3 APPLY A SLIGHT FORWARD MOTION TO YOUR HAND. THIS PRODUCES THE LIP CLEARANCE. |
| 3 |  | 3.1 MOVE THE DRILL BACK CLEAR OF THE WHEEL FACE.<br>3.2 TURN THE DRILL OVER WITHOUT MOVING THE POSITION. THIS PRESENTS THE SECOND EDGE TO THE WHEEL FACE AT THE SAME ANGLE AS THE FIRST CUTTING EDGE.<br>PROCEED TO SHARPEN THE SECOND CUTTING EDGE USING THE SAME DRILL MOVEMENT AS BEFORE. |
| 4 |  | 4.1 USE A DRILL GAUGE TO CHECK THAT THE CUTTING ANGLE IS CORRECT 118° FOR MILD STEEL, THE CUTTING EDGES ARE OF EQUAL LENGTH THE LIP CLEARANCES ARE EQUAL AND CORRECT ABOUT 10 TO 12 DEGREES. |

| | | |
|---|---|---|
| SCALE 1:1 | TWIST DRILL SHARPENING | No. D 5/10-1 |
| MAT. HIGH SPEED ST. | | OFFHAND GRINDING |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

| | | |
|---|---|---|
| ROUND BAR  CHUCKING, FACING, LONGITUDINAL T. | FITTING  CHUCKING, FACING, STEP TURNING | BLADE HOLDER  CHUCKING, FACING, STEP TURNING |
| 1 → 2.05/1 | 2 → 7 | 3 → 2.04/5 |
| BLADE HOLDER  FACING, CENTERING, STEP TURNING | FITTING  DRILLING, LONGITUDINAL TURNING | BLADE HOLDER  EXERCISING OF KNOWN OPERATIONS |
| 4 → 6 | 5 → 7 | 6 → 2.04/7 |
| FITTING  FORM TURNING, FITTING | BUSH  DRILLING, TURNING ON MANDREL | NUT  DRILLING, PARTING, TAPPING |
| 2 → 7 ← 7 | 8 | 9 → 2.06/1 |
| SCREW BOLT  THREAD CUTTING, CHAMFERING | CENTRE PUNCH  KNURLING, TAPER TURNING | HANDLE FOR TAP WRENCH  KNURLING, FORM TURNING |
| 10 → 2.06/1 | 11 | 12 → 2.06/8 |
| HANDLE FOR TAPWRENCH  KNURLING, FORM TURNING | ROUND GUIDE  TURNING BETWEEN CENTRES | PLUMMET  TAPER TURNING GROOVING |
| 13 → 2.06/8 | 14 → 2.05/5 | 15 |

In addition to the exercises shown above, the trainees have to make turned parts which are needed for the assembling of Basic and Fitter exercises such as Inside-caliper, Screw-clamp etc.

| | | |
|---|---|---|
| TRADE TRAINING I | LAYOUT | MP/2.1/2.0.3<br>TURNING I |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER / MACHINIST

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

# MATERIAL REQUIRED

## TRADE TRAINING 1

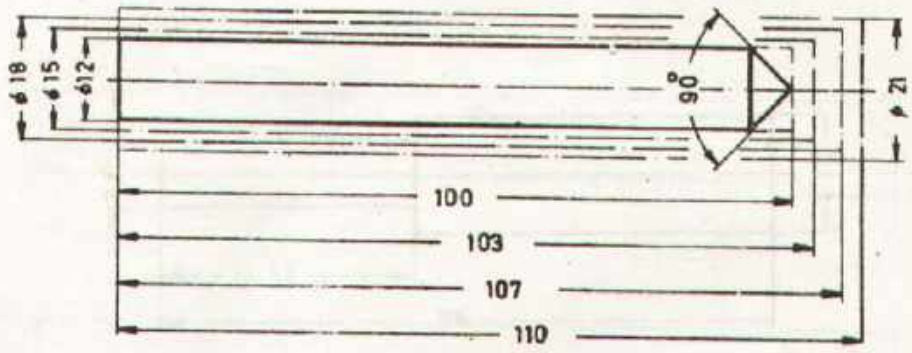
TURNER + MACHINIST

TURNING 1

| No. 2.0.3/ 1 to 15 | Exercise No. (Length given in Millimeter) | | | | | | | | | | | | | | | Length per Trainee | Total length for 16 Trainees | Total weight for 16 Trainees |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | | |
| M.S.Round Ø 25 mm (1" DIA) | 115 | | 100 | 90 | | 84 | | | 13 | 62 | | | | | 50 | 514 mm | 9.0 meter | 34.7 kg |
| M.S.Round Ø 21 mm (7/8" DIA) | | 85 | | | 62 | | | | | | | | | | 30 | 177 mm | 2.9 meter | 7.9 kg |
| M.S.Round Ø 15 mm (5/8" DIA) | | | | | | | 80<br>50 | | | | | | | | | 130 mm | 2.2 meter | 3.1 kg |
| M.S.Round Ø 38 mm (1 1/2" DIA) | | | | | | | | 46 | | | | | | | | 46 mm | 0.8 meter | 7.2 kg |
| Tool Steel Round Ø13 mm (1/2" DIA) | | | | | | | | | | | 96 | | | | | 96 mm | 1.6 meter | 1.7 kg |
| M.S.Round Ø 13 mm (1/2" DIA) | | | | | | | | | | | | | 150 | | | 150 mm | 2.5 meter | 2.6 kg |
| M.S.Round Ø 28 mm (1 1/8" DIA) | | | | | | | | | | | | | | 125 | | 125 mm | 2.1 meter | 5.32kg |

▽▽

Tolerance ±0,1




SEQUENCE OF OPERATION

1. Hold the workpiece in the three jaw chuck about half the length overhanging.
2. Face with right hand side tool.
3. Change cutting tool to right hand roughing tool and turn to Ø 21 mm.
4. Re-chuck the workpiece by holding the turned portion. Face to length 110 mm and turn to Ø 21.
5. Repeat these operations for Ø 18 mm x 107 mm and Ø 15 mm x 103 mm.
6. Use collet of Ø 15 mm and turn a portion to Ø 12 mm.
7. Change collet to Ø 12 mm and finish the full length to Ø 12 mm.
8. Hold workpiece in collet with shorter overhang and turn the $90^{\circ}$ centre by hand.
9. Adjust top slide to $45^{\circ}$ and take finish cut.
10. Face to length 100 mm.
11. Deburr and number punch.

CAUTION

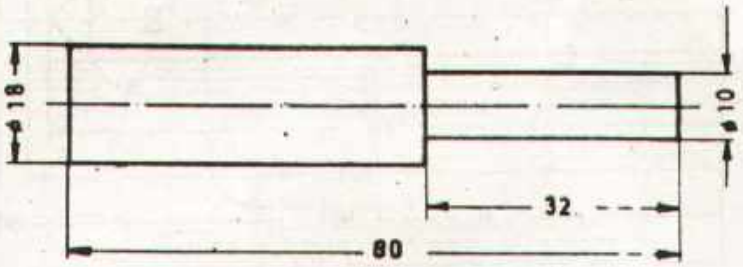
1. Deburr before chucking.
2. Set the cutting tools in centre of workpiece(check with tail-stock).
3. For longitudinal feed use hand only.
4. Set the machine at proper speed.

TOOLS REQUIRED

Right hand roughing tool
Right hand side tool
Three jaw self centering chuck
Collet chucks Ø 15 and Ø 12 mm
Vernier caliper

| | | |
|---|---|---|
| SCALE 1:1 | ROUND BAR | MP/2.3/2.03/1 |
| MAT. MILD STEEL | | TURNING I |

TOLERANCE ± 0.1




SEQUENCE OF OPERATION :

1. Hold the material in three jaw chuck.
2. Face one side and turn to Ø 18 mm at a length of about 50 mm.
3. Re-chuck and face to length 80 mm.
4. Turn the step to Ø 10 mm and length 32 mm.
5. Remove sharp edges.

CAUTION

Set the machine at proper speed.

The r.p.m. depends on diameter and material of the workpiece as well as the turning tool.

Set the cutting tool in true centre height.

Hand feed must be done equally to get a clean and smooth surface.

TOOLS REQUIRED

Right hand roughing tool

Right hand side tool

Vernier caliper

Three jaw chuck

| | | |
|---|---|---|
| SCALE 1:1 | FITTING Part-1 | MP/ 2.3/2.0.3/2 |
| MAT. MILD STEEL | | TURNING 1 |

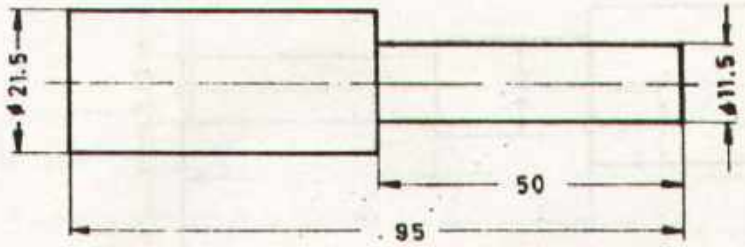
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST

▽▽

TOLERANCE ± 0.1




SEQUENCE OF OPERATION

1. Hold the material in three jaw chuck.
2. Face on side and turn to Ø 21.5 mm at a length of about 50 mm.
3. Re-chuck and face to length 95 mm.
4. Turn the step to Ø 11.5 mm, length 50 mm.
5. Remove sharp edges.

CAUTION

Hold the cutting tool as short as possible to eliminate vibration.

Always apply coolant.

TOOLS REQUIRED

Right hand roughing tool

Right hand side tool

Vernier caliper

Three jaw chuck.

| | | |
|---|---|---|
| SCALE 1:1 | BLADE HOLDER | MP/ 2.3/2.03/3 |
| MAT. MILD STEEL | | TURNING I |

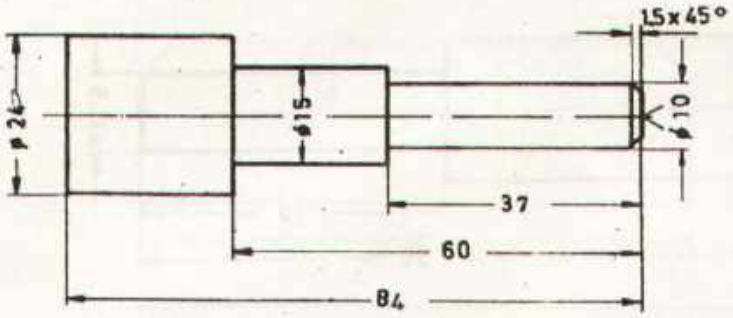
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST

▽▽

TOLERANCE ±0.1




SEQUENCE OF OPERATION

1. Hold the material in three jaw chuck.
2. Face one side and turn to ø 24 mm, length about 40 mm.
3. Re-chuck and face to length 84 mm.
4. Centre drill.
5. Set the tailstock and turn the steps according to drawing.
6. Chamfer 1.5 x 45°
7. Deburr and number punch.

CAUTION

Grease the centre point.

For chamfering use cranked turning tool.

Set automatic feed accordingly.

TOOLS REQUIRED

Right hand roughing tool

Right hand side tool

Centre drill 1.6 mm

Right hand cranked tool

Dead centre for tailstock.

| SCALE 1:1 | BLADE HOLDER | MP/2.3/2.0.3/4 |
|---|---|---|
| MAT. MILD STEEL | | TURNING 1 |

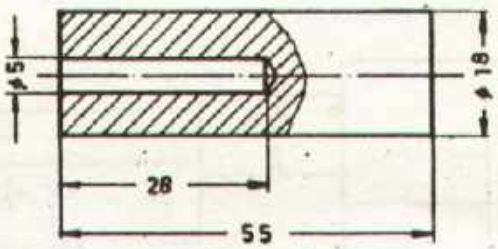
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST

▽▽

TOLERANCE ±.01




SEQUENCE OF OPERATION

1. Hold material in three jaw chuck about half the length overhanging.
2. Face on side and turn to Ø 18 mm.
3. Re-chuck by holding the turned portion.
4. Face to length 55 mm and finish to Ø 18 mm.
5. Centre drill and drill hole Ø 5 mm x 28 mm.
6. Deburr and number punch.

CAUTION

Carefully advance centre drill into workpiece to full depth of chamfer.

Apply firm and even pressure to tailstock handwheel to feed drill into the workpiece.

Note the calibration on tailstock for the required depth.

TOOLS REQUIRED

Right hand side tool

Centre drill 1.6 mm

Twist drill Ø 5 mm

Vernier caliper

Three jaw chuck

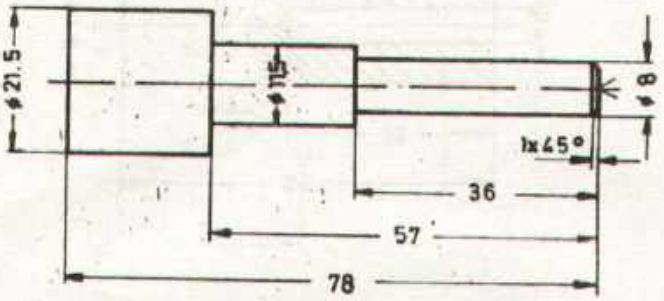
| | | |
|---|---|---|
| SCALE 1:1 | FITTING (PART 2) | MP/2.3/2.0.3/5 |
| MAT. MILD STEEL | | TURNING 1 |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST

TOLERANCE ± 0.1




SEQUENCE OF OPERATION

1. Hold the material in three jaw chuck.
2. Face and turn to ø 21.5 mm.
3. Re-chuck and face to length 78 mm.
4. Re-centre.
5. Set the tailstock and turn the steps according to drawing.
6. Chamfer 1 x 45°.
7. Deburr and number punch.

TOOLS REQUIRED

Right hand side tool

Right hand cranked tool

Centre drill 1.6 mm

Drill chuck

Vernier caliper

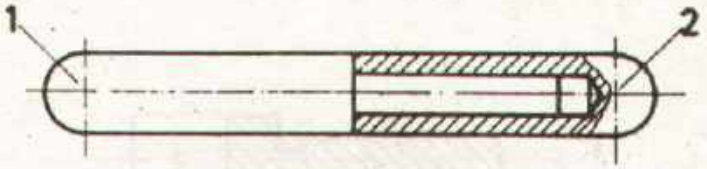
| | | |
|---|---|---|
| SCALE 1:1 | BLADE HOLDER | MP 2.3/2.03/6 |
| MAT. MILD STEEL | | TURNING I |

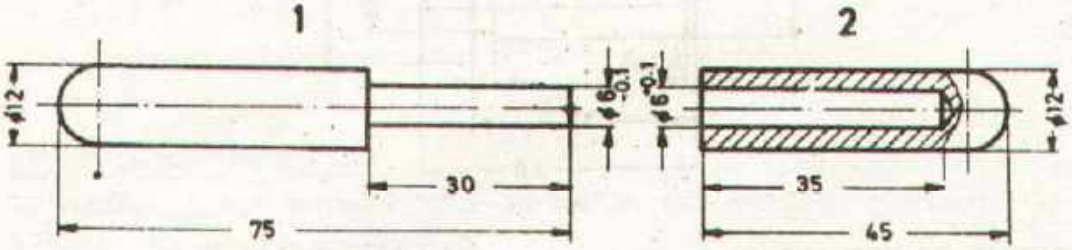
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST

TOLERANCE ± 0.1
UNLESS OTHERWISE STATED




SEQUENCE OF OPERATION

1. Hold part 1 in three jaw chuck.
2. Turn to Ø 12 mm.
3. Turn part 2 at about half the length to Ø 12 mm.
4. Remove three jaw chuck and fix collet chuck with Ø 12 mm collet.
5. Hold part 1 in collet and turn to Ø 6 mm, face to length 30 mm.
6. Finish part 2 to outside Ø 12 mm and drill hole Ø 6 mm.
7. Set the forming tool R 6 mm and turn the radii at part 1 and 2 - Mind the length.

CAUTION

Hold forming tool and workpiece as short as possible to avoid vibration.
Apply plenty of coolant.

TOOLS REQUIRED

Right hand side tool
Forming tool R 6 mm
Twist drill Ø 6 mm
Drill chuck
Radius gauge R 6 mm
Vernier caliper

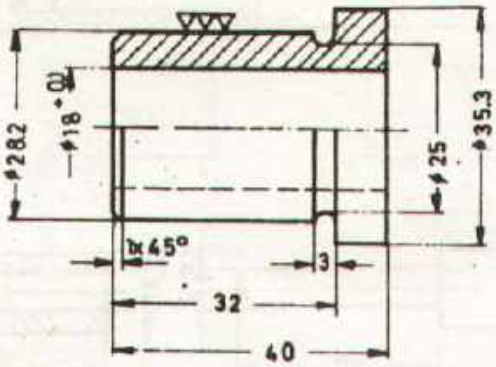
| | | |
|---|---|---|
| SCALE 1:1 | FITTING | MP 2.3/2.0.3/7 |
| MAT. MILD STEEL | | TURNING I |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST

▽▽(▽▽▽)

TOLERANCE ± 0.1
UNLESS OTHERWISE STATED




SEQUENCE OF OPERATION

1. Hold workpiece in three jaw chuck.
2. Face on side and centre drill.
3. Drill pilot hole Ø 6 mm - drill to Ø 17.5 mm.
4. Finish the hole with boring tool to Ø 18 mm.
5. Re-chuck and face to length 40 mm.
6. Hold bush on a mandrel between centres and turn the outside Ø 35.3 and Ø 28.2 mm.
7. Turn the groove and chamfer.

CAUTION

Use proper mandrel size.

Observe the finishing symbols.

TOOLS REQUIRED

Right hand side tool

Boring tool

Grooving tool

Twist drill Ø 6 mm and Ø 17.5 mm

Vernier caliper

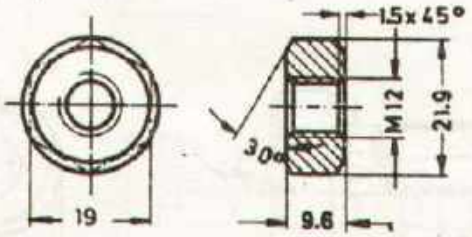
| | | |
|---|---|---|
| SCALE 1:1 | BUSH | MP 2.3/2.0.3/8 |
| MAT. MILD STEEL | | TURNING 1 |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST

TOLERANCE ± 0.1




SEQUENCE OF OPERATION

1. Hold round bar in three jaw chuck.
2. Face one side, centre drill and drill hole for M 12 internal thread.
3. Tapping of M 12 thread.
4. Turn outer Ø 21.9 mm chamfer one side.
5. Parting off.
6. Face to length 9.6 mm chamfer.

CAUTION

Parting tool must be exact in centre height.

When tapping support taps with centre point from tailstock.

Turn chuck with hand only.

TOOLS REQUIRED

Right hand side tool

Set taps M 12

Parting tool

Vernier caliper

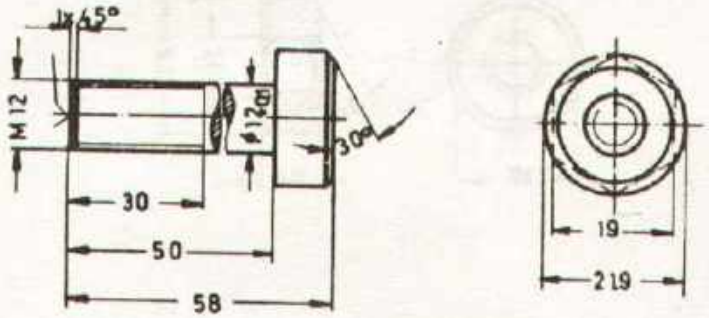
| | | |
|---|---|---|
| SCALE 1:1 | NUT | MP 2.3/2.0.3/9 |
| MAT. ITW - CARB. ST. | | TURNING I |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST

TOLERANCE±0.1
UNLESS OTHERWISE STATED




SEQUENCE OF OPERATION

1. Hold material in three jaw chuck.
2. Face and centre drill.
3. Turn to Ø 12 mm at a length of 50 mm and chamfer.
4. Cut thread M 12 with die and diestock.
5. Remove three jaw chuck and fix collet chuck with 12 mm collet.
6. Turn head to Ø 21.9 mm and face to length 58 mm.

CAUTION

Support die with tailstock when cutting thread.
Turn chuck with hand only.

TOOLS REQUIRED

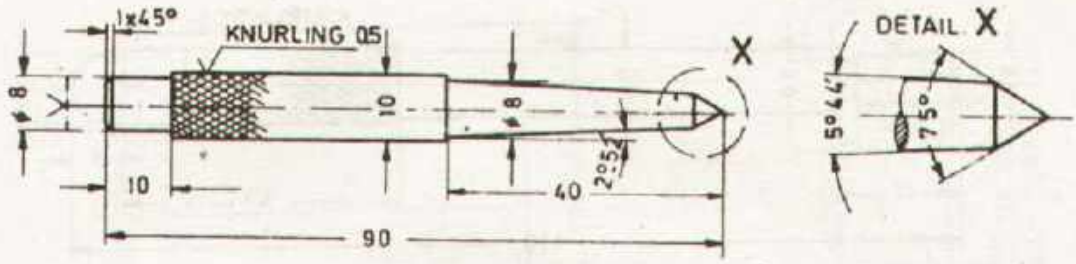
Right hand side tool
Die M 12 - diestock
Centre drill 1.6 mm
Vernier caliper
Collet chuck - 12 mm collet

| | | |
|---|---|---|
| SCALE 1:1 | SCREW BOLT | MP 2.3 / 2.0.3/10 |
| MAT. LOW CARB. ST. | | TURNING I |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER / MACHINIST

TOLERANCE ± 0.1




SEQUENCE OF OPERATION

1. Hold material in three jaw chuck.
2. Face one side and centre drill.
3. Support workpiece with revolving centre and turn to Ø 9.8 mm at a length of about 65 mm.
4. Knurl until full diamond pattern appears.
5. Re-chuck, use either collet or clamping bush.
6. Face off centre hole and turn step Ø 8 mm x 10 mm.
7. Chamfer 1 x 45°.
8. Re-chuck - hold in bush or collet.
9. Face to length 90 mm turn to Ø 8 x 40 mm.
10. Adjust top slide to 2° 52' and turn taper.
11. Adjust top slide to 37° 30' turn centre point.

CAUTION

Setting for knurling must be as rigid as possible.
Never use collet when knurling.
Use plenty of coolant to wash away chips.
Set slow speed and fast feed.
To prevent damage of knurling hold knurled portion with clamping bush or collet only.

TOOLS REQUIRED

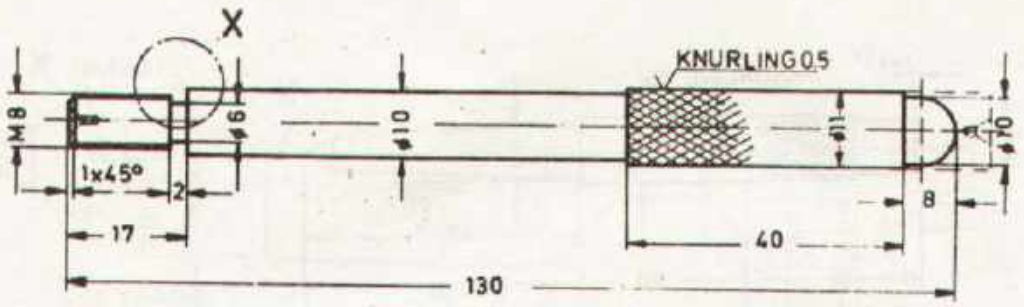
Right hand side tool
Knurling tool 0.5 mm
Centre drill 1.6 mm
Revolving centre
Vernier caliper

| | | |
|---|---|---|
| SCALE 1:1 | CENTRE PUNCH | MP 2.3/ 20.3/11 |
| MAT. C 75 TOOL ST. | | TURNING I |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST

TOLERANCE ± 0.1




SEQUENCE OF OPERATION

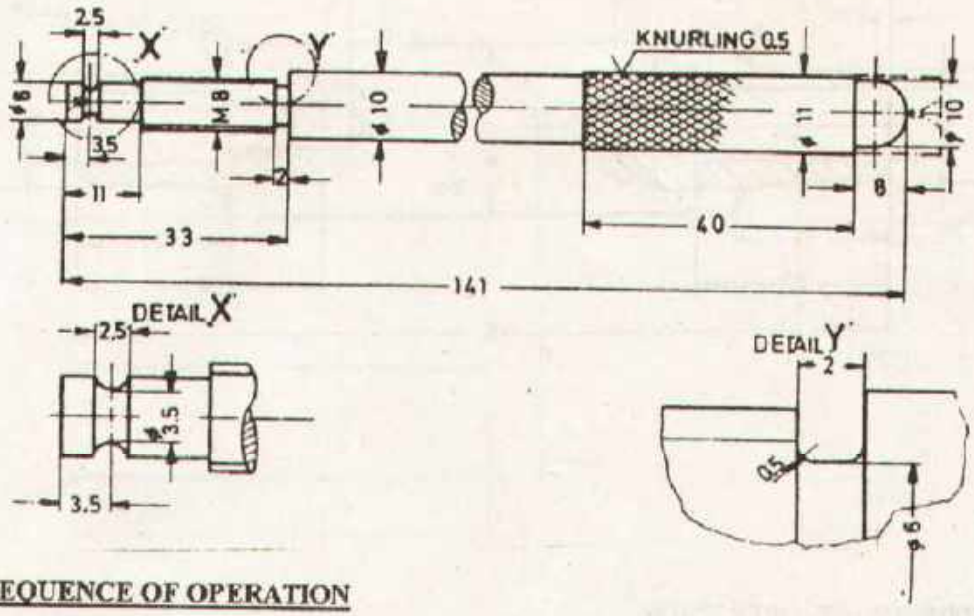
1. Hold workpiece in three jaw chuck.
2. Face on side and centre drill.
3. Support workpiece with revolving centre and turn to Ø 10.8 at a length of about 56 mm.
4. Knurl until full diamond pattern appears.
5. Face off centre hole and turn step Ø 10 mm x 8.
6. Turn radius 5 mm with forming tool.
7. Re-chuck, face to length 130 and centre drill.
8. Hold workpiece with calmping bush on the knurled portion, support with centre point.
9. Turn to Ø 10 mm and Ø 8 mm.
10. Cut the groove and chamfer.
11. Cut thread with M 8 die.

TOOLS REQUIRED

Right hand side tool
Knurling tool
Clamping bush or collet Ø 11 mm
Grooving tool
Forming tool R 5 mm
Die M 8 - diestock
Steel rule
Vernier caliper

| | | |
|---|---|---|
| SCALE 1:1 | HANDLE FOR TAP-WRENCH | MP 2.3 / 2.0.3 / 12 |
| MAT. MILD STEEL | | TURNING 1 |

TOLERANCE ± 0.1




## SEQUENCE OF OPERATION

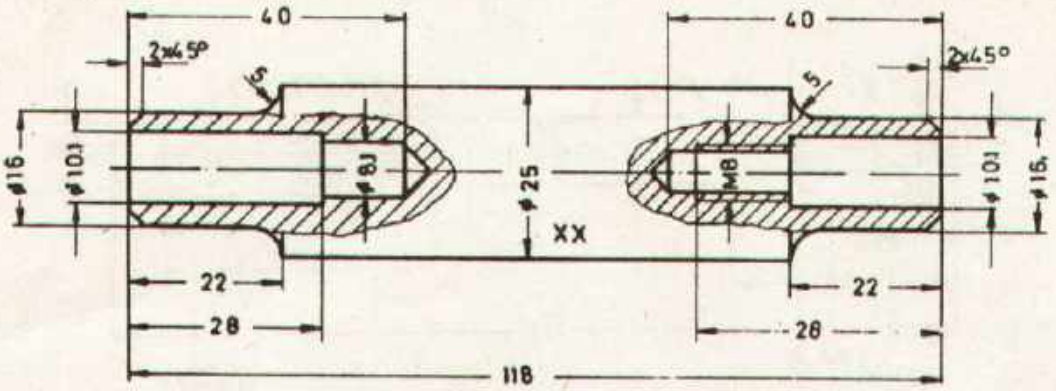
1. Hold workpiece in three jaw chuck.
2. Face one side and centre drill.
3. Support workpiece with revolving centre and turn to ∅ 10.8 mm at a length of about 56 mm.
4. Knurl until full diamond pattern appears.
5. Face off centre hole and turn step ∅ 10 mm x 8.
6. Turn radius 5 mm with forming tool.
7. Re-chuck, face to length 130 and centre drill.
8. Hold workpiece with clamping bush on the knurled portion, support with centre point.
9. Turn to ∅ 10 mm and ∅ 8 mm.
10. Cut the groove and chamfer.
11. Cut thread with M 8 die.

## TOOLS REQUIRED

Right hand side tool
Knurling tool
Clamping bush or collet ∅ 11 mm.
Crooving tool
Forming tool R 5 mm.
Die M 8 - diestock
Steel rule.
Vernier caliper

| | | |
|---|---|---|
| SCALE 1:1 | HANDLE FOR TAP WRENCH | MP 2.3/2.0.3/13 |
| MAT. MILD STEEL | | TURNING I |

TOLERANCE ± 0.1




SEQUENCE OF OPERATION

1. Hold material in three jaw chuck.
2. Face and centre drill both sides. Mind the length 118 mm.
3. Hold workpiece between centres and turn the outer shape according to drawing.
4. Hold in three jaw chuck, check true running.
5. Drill the holes and cut the thread M 8.

CAUTION

When turning between centres the two centres must be aligned to ensure parallelism.

TOOLS REQUIRED

Side cutting tool
Radius tool R 5
Twist drill Ø 10.1, Ø 8.1 and Ø 6.8
Driving plate
Dog carrier
Set tap M8
Vernier caliper

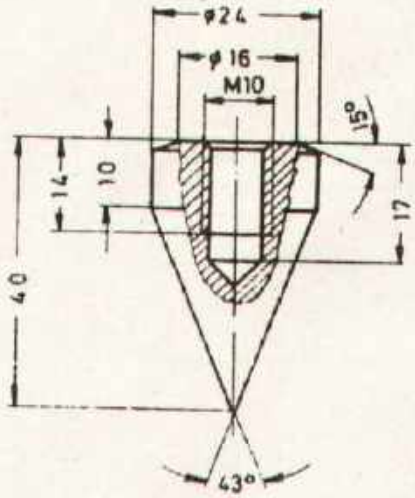
| | | |
|---|---|---|
| SCALE 1:1 | ROUND GUIDE | MP 2.3/2.0.3/14 |
| MAT. MILD STEEL | | TURNING I |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

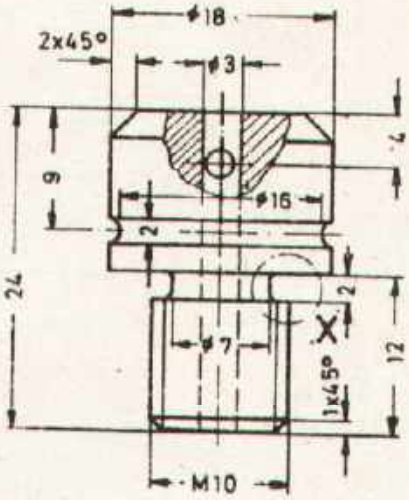
TURNER/ MACHINIST

TOLERANCE ± 01

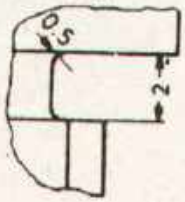
1




2 SCALE 2:1




DETAIL X




SEQUENCE OF OPERATION

1. Turn outside shape of part 2 according to drawing.
2. Cut thread M 10 with die.
3. Drill Ø 3 mm hole about 26 mm deep.
4. Part off to length 24.5 mm.
5. Hold in 10 mm collet, face to length and chamfer.
6. Face, chamfer and centre drill one side of part 1.
7. Drill hole for M 10 and tap thread M 10 x 14 deep.
8. Screw part 1 & 2 together, hold part 2 in Ø 18 mm collet.
9. Adjust top slide to 21° 30' and turn cone and outside Ø 24.

CAUTION

Observe the finishing sign.

Use collet to protect the surface when clamping.

TOOLS REQUIRED

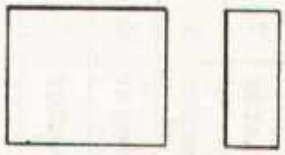
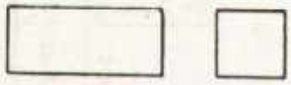
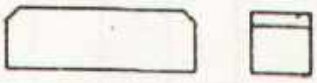
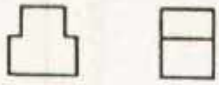
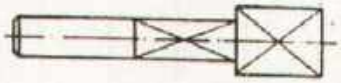
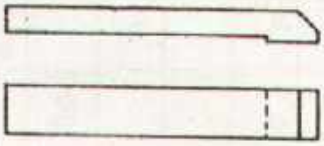
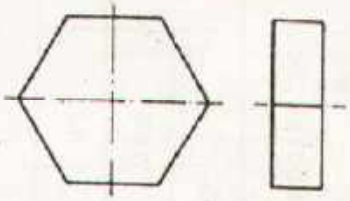
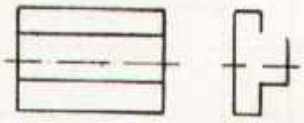
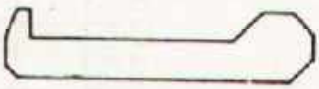
Right hand side tool
Grooving tool
Twist drill Ø 8.5, Ø 3
Set taps M 10
Parting tool
Collet Ø 18 & 10 mm
Vernier caliper

| | | |
|---|---|---|
| SCALE 1:1 (2:1) | PLUMMET | MP 2.3/2.03/15 |
| MAT. MILD STEEL | | TURNING I |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST

| | | |
|---|---|---|
| SLIDE BLOCK  Clamping , Horizontal Shaping | RECTANGLE PLATE  Clamping , Toolhead setting , Horizontal and Vertical shaping | SQUARE BLOCK  Clamping , Longitudinal and Vertical shaping |
| 1 → 9/11 | 2 → 10 | 3 → 2.0.5/2/4 |
| YOKE  Marking , Clamping , Tool setting | BLADE HOLDER  Square shaping | SQUARE GUIDE  Step shaping |
| 4 → 2.0.5/6 | 2.0.3/3 → 5 → 2.0.6/9 | 6 → 2.0.5/3 |
| BLADE HOLDER  Clamping , Square shaping | CLAMPING BAR  Angular and Step shaping | SLIDE BLOCK  Square and Groove shaping |
| 2.0.3/6 → 7 → 2.0.6/4 | 8 → 2.0.5/7 | 1 → 9 → 2.0.6/6 |
| HEXAGON PLATE  Angular shaping | SLIDE BLOCK  Square and Step shaping | JAW  Step and Angular shaping |
| 2 → 10 → 2.0.6/5 | 1 → 11 → 2.0.6/6 | 12 → 2.0.6/7 |

In addition to the exercises shown above, the trainees have to carry out practical shaping work which are needed for the training centre. One of this additional orders should not exeed 10 working hours. All additional work is to be checked and marked thoroughly.

| | | |
|---|---|---|
| TRADE TRAINING I | LAYOUT | MP/2.1/2.0.4<br>SHAPING 1 |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER / MACHINIST |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

# MATERIAL REQUIRED

## TURNER + MACHINIST

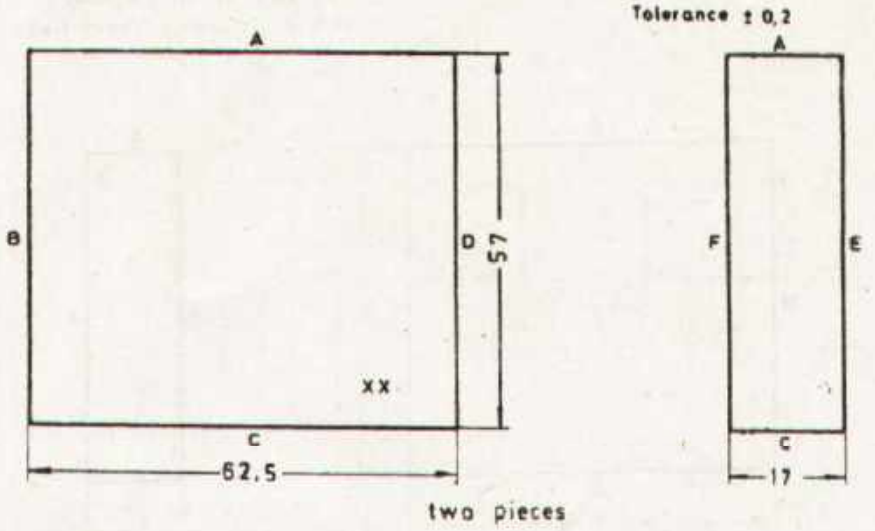
### TRADE TRAINING 1

**SHAPING 1**

| No. 2.0.4/1 to 12 | Exercise No. 1 | 2 | 3 | 4 | 6 | 8 | 10 | 12 | (Length given in Millimeter) | Length per Trainee | Total length for 16 Trainees | Total weight for 16 Trainees |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M.S.Flat 70x19 mm (2 3/4" x 3/4") | 63<br>63 | | | | | | | | | 126 mm | 2.2 meter | 20.0 kg |
| M.S.Flat 50x16 mm (2" x 5/8") | | 56 | | | | | | | | 56 mm | 0.9 meter | 5.7 kg |
| M.S.Squ. 16x16 mm (5/8" squ.) | | | 58 | | | | | | | 58 mm | 0.93meter | 1.87 kg |
| M.S.Squ. 25.4 mm (1" x 1") | | | | 86 | | | | | | 86 mm | 1.4 meter | 7.14 kg |
| M.S.Squ. 31 mm (1 1/4" squ.) | | | | | 20 | | | | | 20 mm | 0.32meter | 2.42 kg |
| M.S.Flat 37x16 mm (1 1/2" x 5/8") | | | | | | 131 | | | | 131 mm | 2.1 meter | 10.0 kg |
| M.S.Round Ø 56 mm (2 1/4") | | | | | | | 20 | | | 20 mm | 0.32meter | 3.1 kg |
| M.S.Flat 25.4x10mm (1" x 3/8") | | | | | | | | 86<br>86 | | 172 mm | 2.75meter | 4.4 kg |

**MILLING 1**

| No. 2.0.5/1 to 10 | Exercise No. 9 | 10 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M.S.Flat 25.4x13mm (1" x 1/2") | 126 | | | | | | | | | 126 mm | 2.1 meter | 5.35 kg |
| M.S.Round Ø 10 mm (3/8") | | 186 | | | | | | | | 186 mm | 3.0 meter | 1.85 kg |
| M.S.Round Ø 19 mm (3/4") | | 94 | | | | | | | | 94 mm | 1.5 meter | 3.34 kg |




SEQUENCE OF OPERATION

1. Set the shaper:
   Length of stroke about 70 mm.
2. Clamp the material in the machine vice.
   Machine the surface 'F'.
3. Clamp the material with machined side down, use proper sized parallels under the job. Machine side 'E' till the thickness of the job is 17 mm.
4. Clamp the workpiece vertical and shape side 'A' lengthwise.
5. Clamp the workpiece with side 'A' down and shape side 'C' Mind the given dimension.
6. Repeat the operations for side 'B' and 'D'. Make sure that they are precisely in right angle with the other sides and check the dimensions.

CAUTION:

Deburr before chucking a workpiece for the next machining operation !

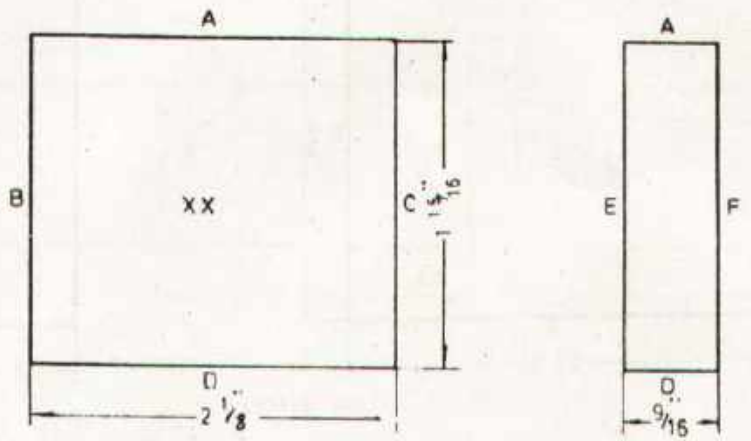
TOOLS REQUIRED

Vernier caliper, try square, shaping tool, flat file 200 x 3

| | | |
|---|---|---|
| SCALE 1:1 | SLIDE BLOCK | MP/2.3/2.04/1 |
| MAT. MILDSTEEL | | SHAPING 1 |

▽▽

Tolerance on all dimensions ± 1/16"
unless otherwise specified




SEQUENCE OF OPERATION

1. Set the shaper:
   Length of stroke about 2 1/2".
2. Chuck the workpiece vertical and machine side 'A' lengthwise.
3. Chuck again with side 'A' down and shape side 'D'. Mind the dimension.
4. Repeat the operations for side 'B' and 'C'. Chuck carefully, using the try square to make sure that all four sides are at right angle.
5. Shape the surface 'E' in right angle with the finished sides.
6. Clamp again with side 'E' down using proper sized parallels.
7. Machine side 'F' and mind the correct thickness of the workpiece.

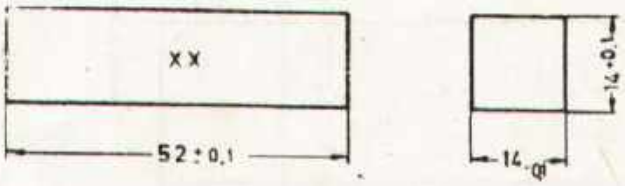
CAUTION:

Use only accurately ground parallels. If a pair of parallels is used, they must be precisely equal sized.

TOOLS REQUIRED

Vernier caliper
Try square
Shaping tool
Flat file 200 x 3

| | | |
|---|---|---|
| SCALE 1:1 | RECTANGLE PLATE | MP/2.3/2.04/2 |
| MAT: MILDSTEEL | | SHAPING 1 |




SEQUENCE OF OPERATION

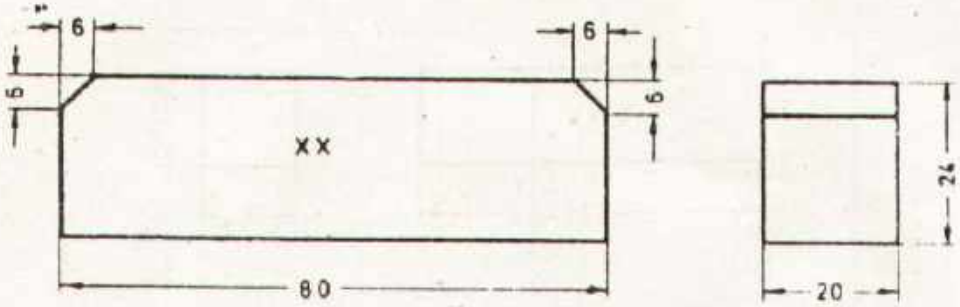
1. Set the shaper:
   Length of stroke about 62 mm.
2. Clamp the raw piece in the machine vice and shape one surface.
3. Turn the job 90° in the vice and shape the next surface. Put the machined side against the fixed jaw.
4. Repeat the operations for the remaining two surfaces. Mind right angles and tolerances.
5. Square both ends to size. Clamp the workpiece in precisely vertical position for these operations to make sure that the ends are in right angles with the sides.

TOOLS REQUIRED

Vernier caliper
Try square
Shaping tool
Flat file 200 x 3

| | | |
|---|---|---|
| SCALE 1:1 | SQUARE BLOCK | MP/2 3/2 04/3 |
| MAT: MILDSTEEL | | SHAPING 1 |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER/ MACHINIST |

Tolerance ± 0,15




SEQUENCE OF OPERATION

1. Set the shaper:
   Length of stroke about 90 mm.
2. Shape the raw piece to the dimensions 24 x 20 mm.
   Ensure that all four sides are at right angle.
3. Swivel the machine vice 90° and square the ends to size by moving the tool downward with the down-feed screw handle.
4. Mark out the chamfers 6 x 6 mm.
5. Swivel the tool-head of the shaper to 45° and arrange the apron so that the tool will raise in a direction away from the surface and will not rub during the return stroke.
6. Shape the chamfers by moving the down-feed screw.

TOOLS REQUIRED

Vernier caliper
Try square
Marking tools
Shaping tools
Flat file 200 x 3

| | | |
|---|---|---|
| SCALE 1:1 | YOKE | MP/2.3/2.04/4 |
| MAT: MILDSTEEL | | SHAPING 1 |

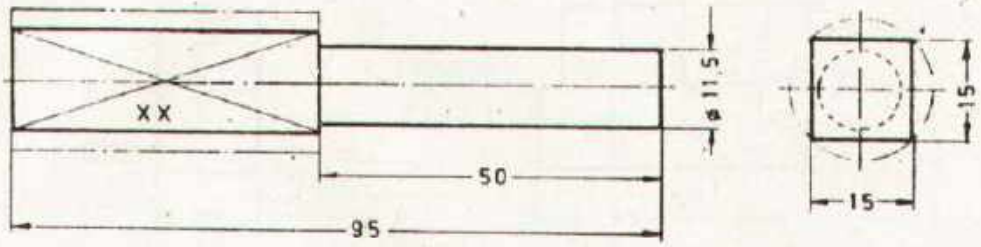
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST

▽▽

Tolerance ± 0.1




SEQUENCE OF OPERATION

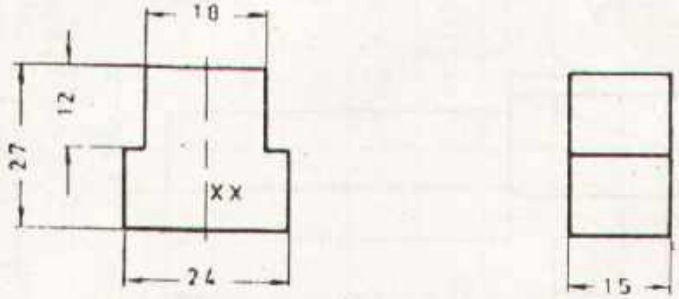
1. Mark out the square 15 x 15 mm on the marking plate.
2. Set the shaper:
   Length of stroke about 55 mm.
3. Shape the first flat up to the marking line.
4. Shape the second flat in right angle to the first.
5. Continue with the remaining two flats to complete the square.

TOOLS REQUIRED

Vernier caliper
Try square
Marking tools
Shaping tools
Flat file 200 x 3

| | | |
|---|---|---|
| SCALE 1:1 | BLADE HOLDER | MP/2.3/2.04/5 |
| MAT: MILDSTEEL from 2.03/3 | | SHAPING I |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING . PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER/ MACHINIST |

Tolerance ±0,1



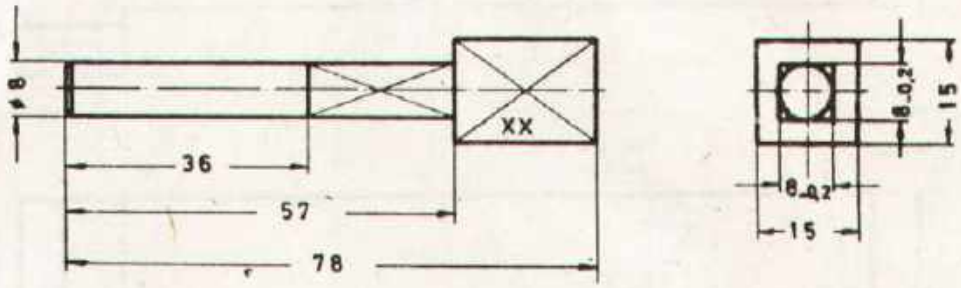

## SEQUENCE OF OPERATION

1. Set the shaper:
   Make sure to have the correct idle travel at both ends of the workpiece. About 8 mm idle travel at the beginning of the cut and 4 mm at its end will suit the small shaping machine.
2. Shape the raw piece, to the dimensions 27 x 24 x 15 mm.
3. Mark out the steps on the marking plate.
4. Clamp the job again in the vice and finish it with the right hand and left hand side cutting tool respectively.

## TOOLS REQUIRED

Vernier caliper
Try square
Marking tools
Shaping tools
Flat file 200 x 3

| | | |
|---|---|---|
| SCALE 1:1 | SQUARE. GUIDE | MP/2.3/2.04/6 |
| MAT: MILDSTEEL | | SHAPING 1 |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER. MACHINIST |




Tolerance on all dimensions ± 0,1 unless otherwise stated.

SEQUENCE OF OPERATION

1. Mark out the square 15 x 15 mm on the marking plate.
2. Set the shaper as mentioned in previous exercises.
3. Shape the first side of the big square to the marked line.
4. Shape in the same clamping the first side of the 8 mm square.
5. Rotate the workpiece 90° and shape the 2nd sides of both squares.
6. Repeat the operations till the four remaining sides are completed.

TOOLS REQUIRED

Vernier caliper
Try square
Marking tools
Shaping tools
Flat file 200 x 3

| | | |
|---|---|---|
| SCALE 1:1 | BLADE HOLDER | MP/2.3/2.04/7 |
| MAT: MILDSTEEL | From 2035 | SHAPING 1 |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

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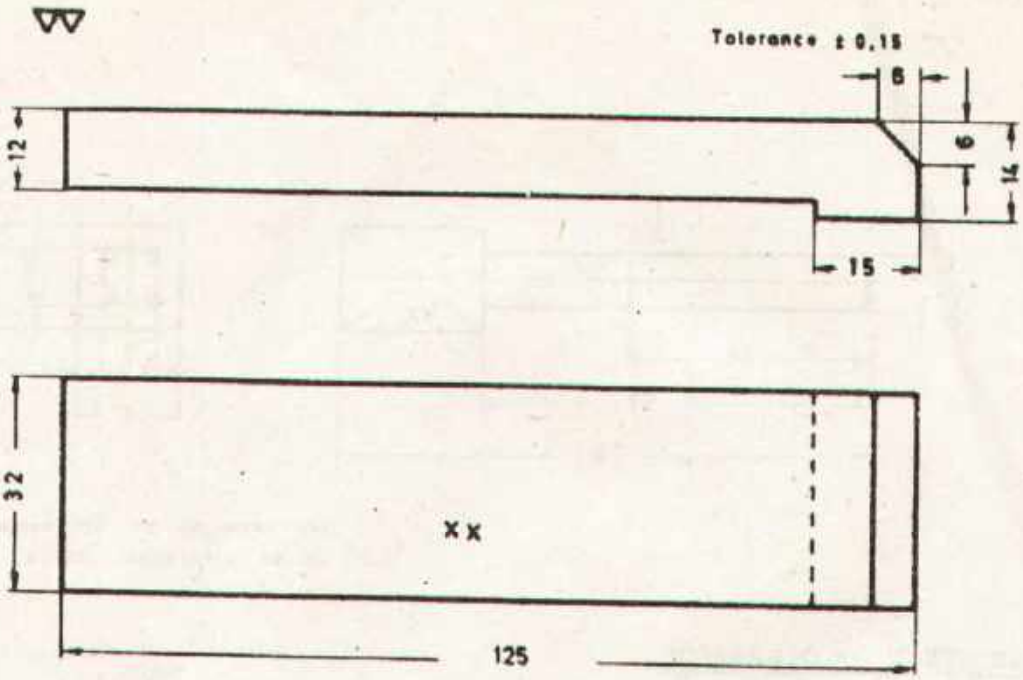


SEQUENCE OF OPERATION

1. Set the shaper:
   Length of the stroke about 135 mm.
2. Shape the raw piece to 14 mm thickness and 32 mm width.
3. Swivel the vice in right angle to the direction of the cut and let one end project a short distance from the jaws.
4. Square the end by moving the side cutting tool slowly downward with the down-feed screw-handle. Repeat the operation at the other end, till the length of the workpiece is correct.
5. Mark out the job according to drawing.
6. Clamp the job again in the vice and finish it.

TOOLS REQUIRED

Vernier caliper
Try square
Marking tools
Shaping tools
Flat file 200 x

| | | |
|---|---|---|
| SCALE 1:1 | CLAMPING BAR | MP/2.3/2.04/8 |
| MAT: MILDSTEEL | | SHAPING 1 |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER/ MACHINIST |

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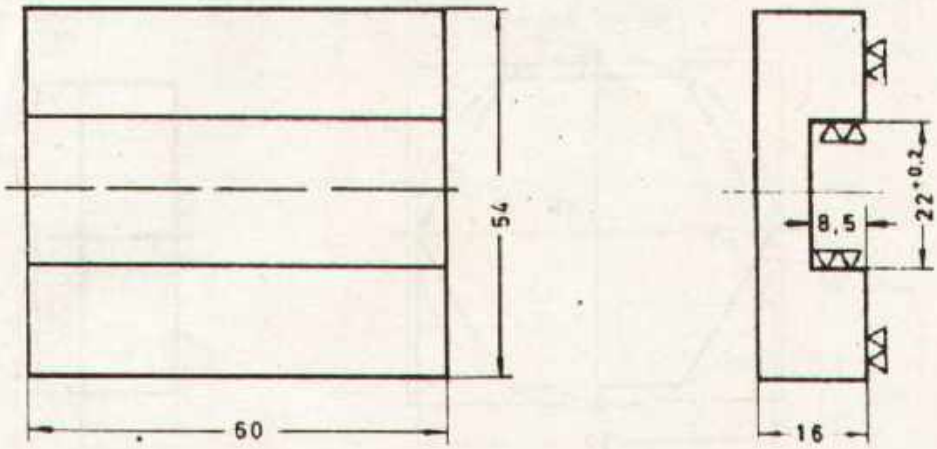
Tolerance -Q2




SEQUENCE OF OPERATION

1. Set the shaper.
2. Clamp the material and shape it to the dimensions 60 x 54 x 16 mm.
3. Mark out the groove on the marking plate.
4. Shape the groove with a parting tool.

TOOLS REQUIRED

Vernier caliper
Try square
Marking tools
Flat file 200 x 3
Right hand side tool
Parting tool

| | | |
|---|---|---|
| SCALE 1:1 | | MP/2.3/2.04/9 |
| MAT: MILDSTEEL | from 1 SLIDE BLOCK (PART 1) | SHAPING 1 |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

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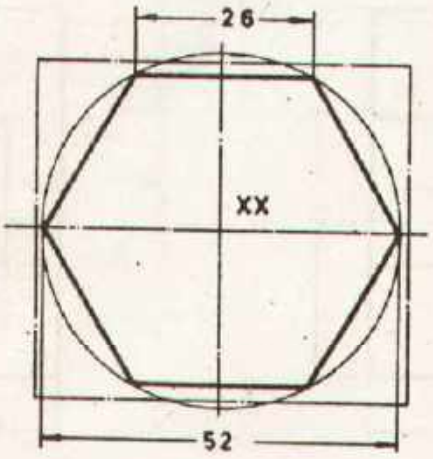
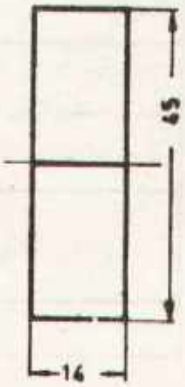
Tolerance -0.2




SEQUENCE OF OPERATION

1. Mark out the hexagon on the marking plate. One side of the hexagon is equal to the radius of the circum-circle.
2. Set the shaper.
3. Set the vice so that the jaws are at right angle to the direction of the cut and clamp the marked hexagon faces of the job.
4. Shape the first hexagon side up to the marking line.
5. Rotate the workpiece in the vice and shape the next flat. Repeat the operations for the remaining four flats. Check the angles with a $120^{\circ}$ angle gauge.
6. Shape to thickness 14 mm.

TOOLS REQUIRED

Vernier caliper
$120^{\circ}$ angle gauge
Marking tools
Shaping tools
Flat file 200 x 3

| | | |
|---|---|---|
| SCALE 1:1 | | MP/2.3/2.04/10 |
| MAT: MILDSTEEL | from 2 HEXAGON PLATE | SHAPING I |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER/ MACHINIST |

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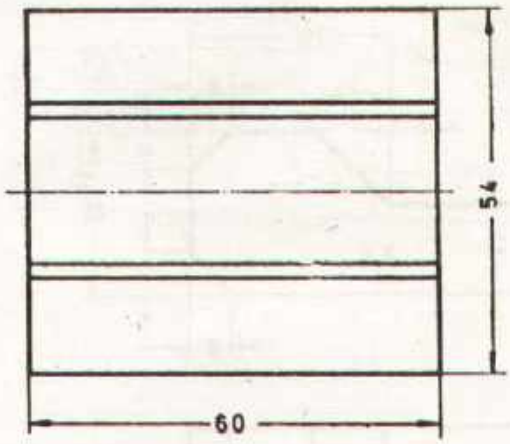
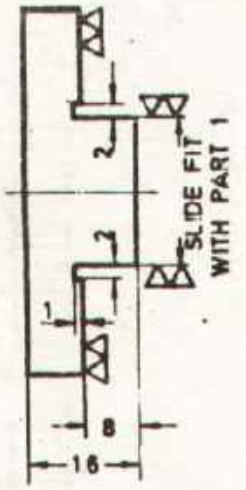
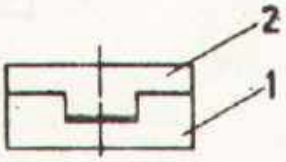
Tolerance -0,2




SEQUENCE OF OPERATION

1. Set the shaper.
2. Clamp the material and shape it to the dimensions 60 x 54 x 16 mm.
3. Mark out the exercise on the marking plate.
4. Shape the job according to the marking lines with the left hand and right hand cutting tool.
5. Shape the grooves with the parting tool.

TOOLS REQUIRED

Vernier caliper
Try square
Marking tools
Shaping tools
Flat file 200 x 3

| | | |
|---|---|---|
| SCALE 1:1 | | MP/2.3/2.04/11 |
| MAT: MILDSTEEL | from 1 SLIDE BLOCK (PART 2) | SHAPING 1 |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

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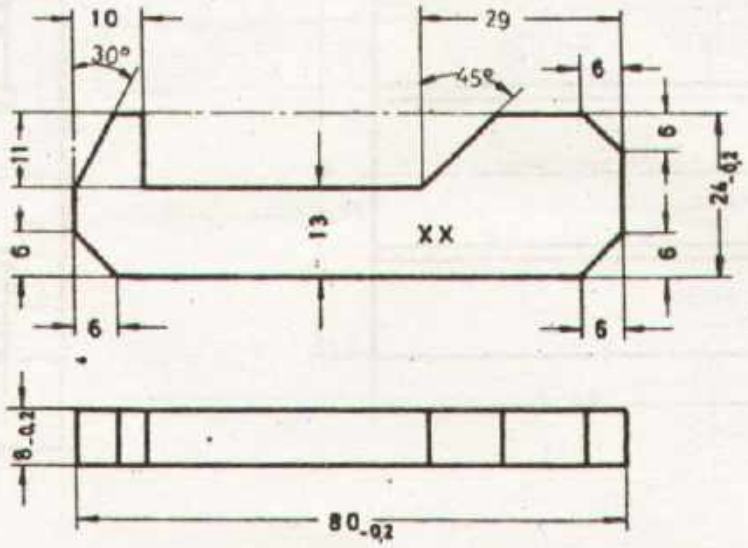


two pieces

Tolerance on all dimensions ± 0,2 mm unless otherwise stated.

SEQUENCE OF OPERATION

1. Set the shaper.
2. Shape the raw pieces to the dimensions 80 x 24 x 8 mm. Mind the tolerances shown in the drawing.
3. Mark out the jobs according to drawing.
4. Clamp the workpieces again and shape them to size.

TOOLS REQUIRED

Measuring and checking tools

Marking tools

Shaping tools

Falt file 200 x 3

| | | |
|---|---|---|
| SCALE 1:1 | JAWS | MP/2.3/2.04/12 |
| MAT: MILDSTEEL | | SHAPING 1 |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

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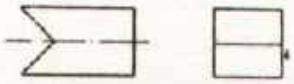
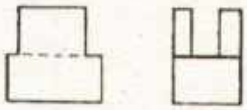
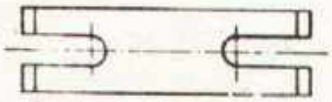
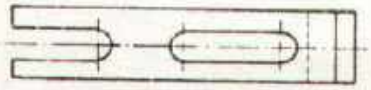
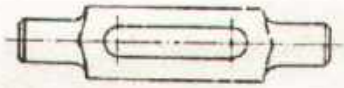
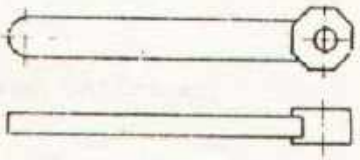
| | | |
|---|---|---|
| STUD<br>  <br>Square milling<br>2.0.3/1 → 1 → 2.0.6/3 | CLAMPING JAW<br>  <br>Vee milling<br>2.0.4/3 → 2 → 2.0.6/8 | SQUARE GUIDE<br>  <br>Slot milling<br>2.0.4/6 → 3 → 2.0.6/4 |
| CLAMPING GUIDE<br>  <br>Vee milling<br>2.0.4/3 → 4 → 2.0.6/8 | ROUND GUIDE<br>  <br>Parallel milling.<br>2.0.3/14 → 5 → 8 | YOKE<br>  <br>Slot milling<br>2.0.4/4 → 6 → 2.0.6/7 |
| CLAMPING BAR<br>  <br>Recess milling<br>2.0.4/8 → 7 → 2.0.6/5 | ROUND GUIDE<br>  <br>Internal milling.<br>5 → 8 → 2.0.6/8 | HANDLE<br>  <br>Parallel & Angular milling<br>9 → 2.0.6/3 |

In addition to the exercise shown above, the trainees have to carry out practical milling.

One of this additional work should not exeed 10 working hours. All additional work is to be checked and marked th[illegible]ly.

| | | |
|---|---|---|
| TRADE TRAINING I | LAYOUT | MP/2.1/2.0.5<br>MILLING I |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER / MACHINIST |

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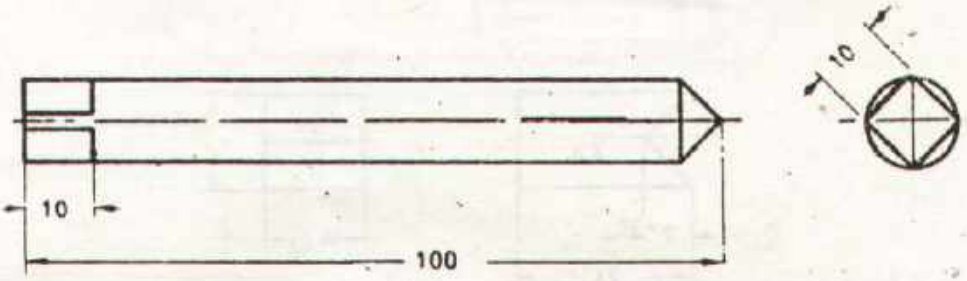
Tolerance ± 0,1




SEQUENCE OF OPERATION

1. Mark out the square 10 x 10 mm on the marking plate.
2. Set the milling machine:
   Check that the jaws of the machine vice are parallel to the movement of the table.
   Mount the side- and face cutter.
   Set speed at about 315 rpm.
3. Clamp the workpiece in the machine vice.
4. Mill the first flat up to the marked line.
   Use a feed of about 60 mm per minute.
5. Mill the 2nd flat in right angle to the first.
6. Repeat the operations till the remaining flats are completed:
   Mind right angles and tolerances.

CAUTION:

Deburr before checking a workpiece for the next machining operation.

TOOLS REQUIRED

Vernier caliper
Try square
Flat file 200 x 3
Side- and face cutter 20 mm dia
Marking tools

| | | |
|---|---|---|
| SCALE 1 : 1 | STUD | MF/2 3/2.05/1 |
| MAT: MILDSTEEL | from 2.03/1 | MILLING I |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

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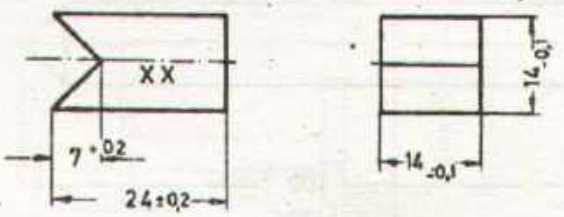



## SEQUENCE OF OPERATION

1. Mark out the job on the marking plate.
2. Set the milling machine:
   Check that the jaws of the machine vice are parallel to the horizontal milling spindle.
   Mount a 90° Vee-milling cutter on the arbor.
   Set speed at about 57 rpm.
3. Clamp the workpiece in the machine vice.
4. Mill the workpiece with a cutting depth of 5 mm.
   Use a feed of about 30 mm per minute.
5. Finish the job with a cutting depth of 2 mm.
   Mind right angles and sizes.

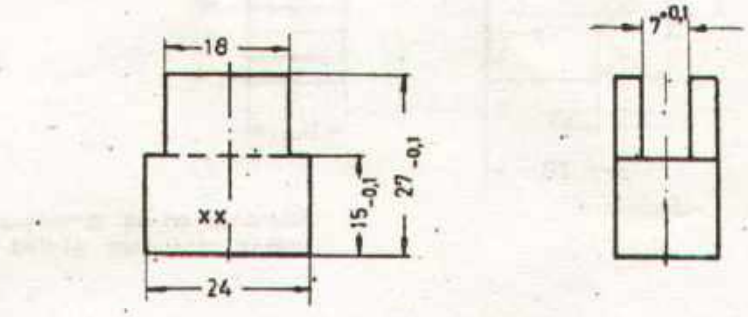
## CAUTION:

Use only accurately ground parallels. If a pair of parallels is used they must be precisely equal sized.

## TOOLS REQUIRED

Vernier caliper
Try square
Flat file 200 x 3
Vee-milling cutter 100 x 90°

| | | |
|---|---|---|
| SCALE 1:1 | | MP/2.3/2.0.5/2 |
| MAT: CARBON ST. | from 2.04/3 **CLAMPING JAW** | MILLING I |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER/ MACHINIST |



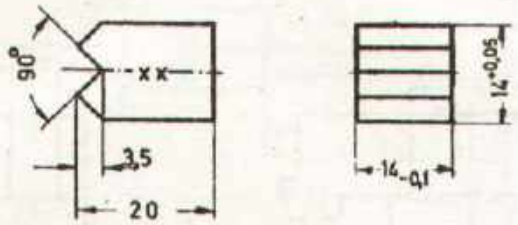

SEQUENCE OF OPERATION

1. Mark out the workpiece on the marking plate.
2. Set the milling machine and the machine vice.
   Mount the side milling cutter on the arbor.
   Set speed at about 90 rpm.
3. Clamp the workpiece in the machine vice.
4. Mill the workpiece with steps of 2 mm cutting depth.
   The feed should be about 20 mm per minute.
   Mind right angles and tolerances.

TOOLS REQUIRED

Vernier caliper
Try square
Flat file 200 x 3
Marking tools
Side milling cutter 63 x 7 mm

| | | |
|---|---|---|
| SCALE 1:1 | | MP/2.3/2.05/3 |
| MAT:MILDSTEEL | from 2.04/6 SQUARE GUIDE | MILLING I |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER/ MACHINIST |




Tolerance on all dimensions ± 0,1
unless otherwise stated

SEQUENCE OF OPERATION

1. Mark out the workpiece on the marking plate.
2. Set the milling machine and the machine vice.
   Mount the milling cutter.
3. Clamp the workpiece in the machine vice.
4. Mill the 90° groove.
   Mind right angles and tolerances.
5. Finish the workpiece.

TOOLS REQUIRED

Vernier caliper
Try square
Marking tools
Flat file 200 x 3
Double angular cutter 90°

| | | |
|---|---|---|
| SCALE 1:1 | CLAMPING JAW | MP/2.3/2.0.5/4 |
| MAT: CARBON ST. | from 2.0.4/3 | MILLING 1 |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

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MACHINIST

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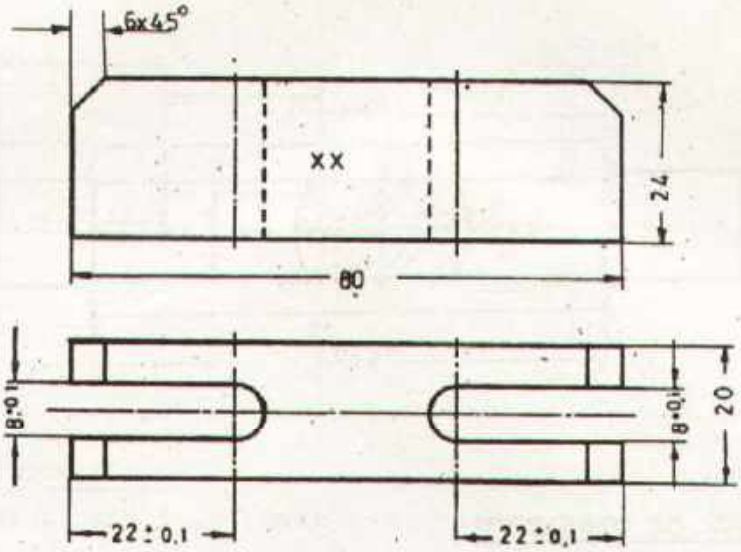
SEQUENCE OF OPERATION

1. Mark out the workpiece on the marking plate.
2. Set the milling machine and the machine vice.
   Mount the plan milling cutter on the arbor.
   Set the speed at about 115 rpm.
3. Clamp the workpiece in the machine vice.
4. Cut the first flat up to the marked line with a feed of about 60 mm per minute.
5. Repeat the operations on the 2nd flat.
   Mind parallelism and tolerances.

TOOLS REQUIRED

Vernier caliper
Try square
Marking tools
Flat file 200 x 3
Plain milling cutter 50 x 40 x 22 mm

| | | |
|---|---|---|
| SCALE 1 : 1 | | MP/2.3/2.0.5/5 |
| MAT: MILDSTEEL | from 2.03/14 ROUND GUIDE | MILLING I |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER/ MACHINIST |



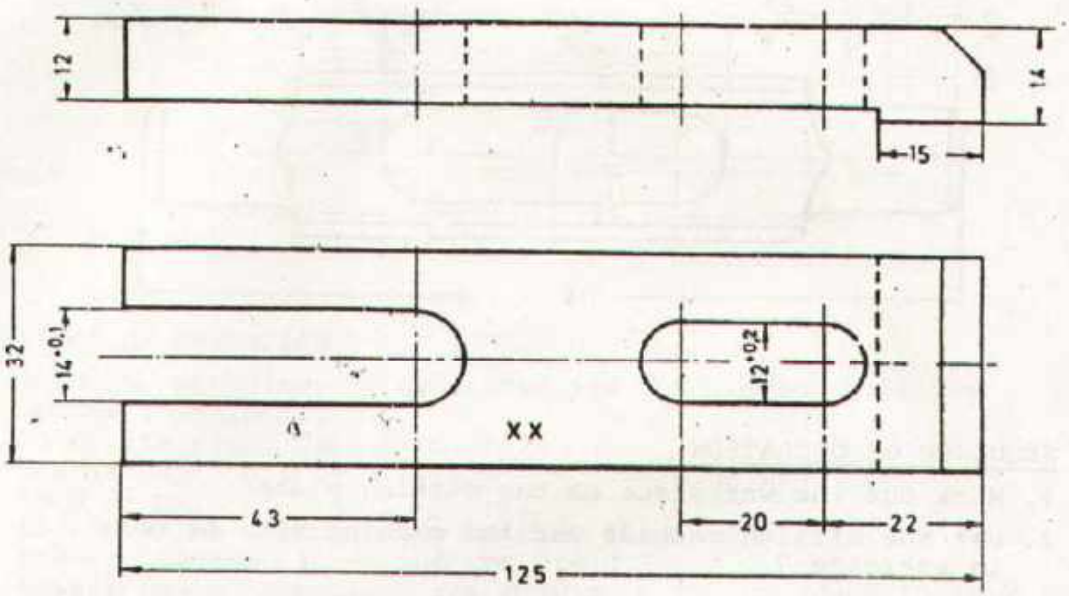

## SEQUENCE OF OPERATION

1. Mark out the job on the marking plate.
2. Set the milling machine and the machine vice.
   Mount shank end mill Ø 8 mm.
   Set the speed at about 450 rpm.
3. Clamp the workpiece in the machine vice.
4. Mill the slot in 6 or 7 machining operations.
   Each cut must be started from the open end of the slot, the cutting depth should be about 4 mm.

## TOOLS REQUIRED

Vernier caliper
Try square
Marking tools
Flat file 200 x 3
Shank end mill Ø 8 mm

| | | |
|---|---|---|
| SCALE 1:1 | YOKE | MP/2.3/2.05/6 |
| MAT: MILDSTEEL | from 2.04/4 | MILLING I |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER/ MACHINIST |




SEQUENCE OF OPERATION

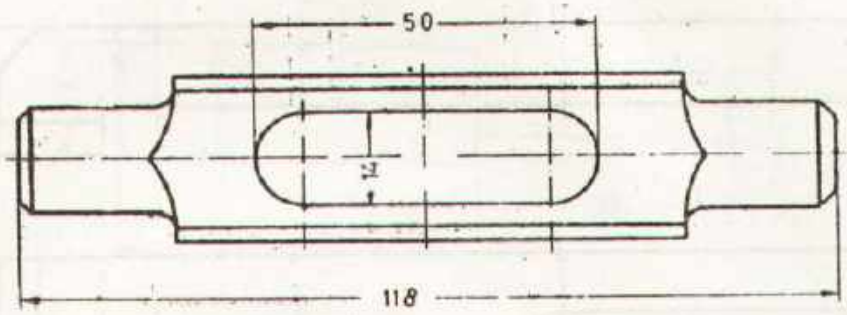
1. Mark out the job on the marking plate.
2. Set the milling machine and the machine vice.
   Set the speed at about 400 rpm..
3. Clamp the workpiece in the machine vice.
4. Mill the oblong hole in 4 steps with a cutting depth of about 3 mm each.
   The feed should be about 40 mm per minute.
5. Change the cutter and mill the open slot in the same way.

TOOLS REQUIRED

Vernier caliper
Marking tools
Flat file 200 x 3
Two lipped end milling cutter 12 mm dia and 14 mm dia.

| | | |
|---|---|---|
| SCALE 1 1 | | MP/2.3/2.05/7 |
| MAT: MILDSTEEL | from 2.04 CLAMPING BAR | MILLING 1 |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER/ MACHINIST |

Tolerance ±0,1




## SEQUENCE OF OPERATION

1. Mark out the workpiece on the marking plate.
2. Set the milling machine and the machine vice as done in exercise 7.
3. Clamp the workpiece in the machine vice.
4. Mill the oblong hole.

## TOOLS REQUIRED

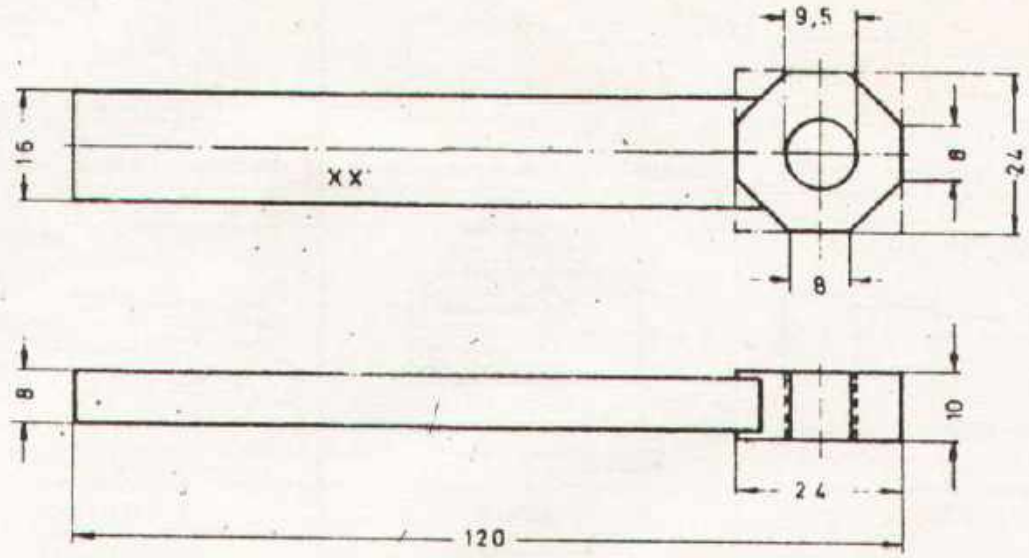
Vernier caliper
Marking tools
Flat file 200 x 3
Two lipped end milling cutter 14 mm dia.

| | | |
|---|---|---|
| SCALE 1 : 1 | ROUND GUIDE | MP/23/205/8 |
| MATMILDSTEEL | from 5 | MILLING I |

DEVELOPMEN CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST




Tolerance ± 0.1

SEQUENCE OF OPERATION

1. Mark out the workpiece on the marking plate.
2. Drill the hole 9.5 mm dia.
3. Set the milling machine and the machine vice.
   Mount the cutter.
   Set the speed at about 200 rpm.
4. Clamp the workpiece in the machine vice.
   Mill the first flat up to the marked line.
   Use a feed of about 80 mm per minute.
5. Clamp the workpiece with the finished flat down and machine the opposite side.
6. Finish the workpiece all around, check right angles and tolerances.

TOOLS REQUIRED

Vernier caliper
Marking toools
Try square
Flat file 200 x 3
Shell end mill Ø 25 mm

| | | |
|---|---|---|
| SCALE 1 1 | HANDLE | MP/23/2.05/9 |
| MAT MILDSTEEL | | MILLING 1 |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

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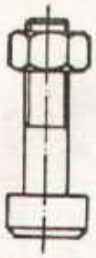
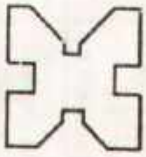
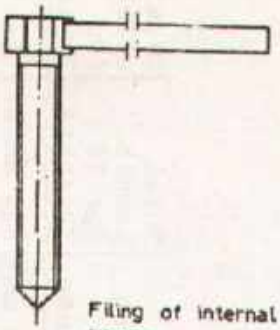
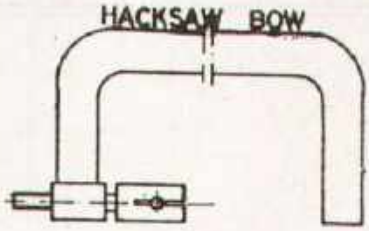
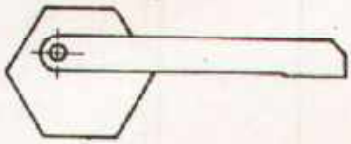
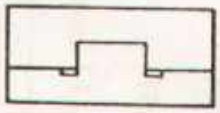
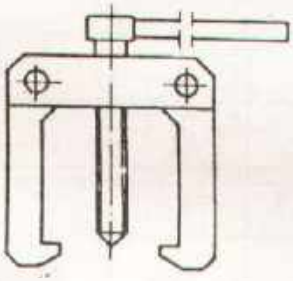
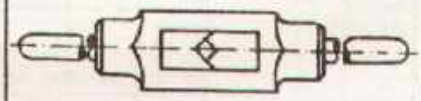
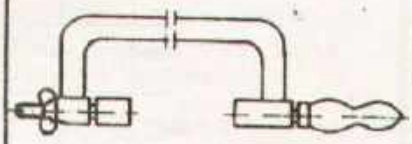
| | | |
|---|---|---|
| NUT & BOLT  Filing of hexagon | V – BLOCK  Scraping | STUD & HANDLE  Filing of internal square |
| 2.0.3/9,10 → 1 → 2.0.6/5 | 3.1.2/7 → 2 | 2.0.5/1,9 → 3 → 2.0.6/7 |
| HACKSAW BOW  Bending , Joining , Filing | ADJUSTABLE CLAMP  Drilling , Reaming | FITTING  Scraping , Fitting |
| 2.0.5/3 → 4 → 2.0.6/9 | 2.0.5/7 → 5 ← 2.0.4/10 | 2.0.4/3,11 → 6 |
| PULLER  Drilling , Tapping , Assembling | TAP WRENCH  Drilling , Assembling | HAND HACKSAW  Sawing , Marking , Assembling |
| 2.0.6/3 → 7 ← 2.0.4/12 | 2.0.3/12,13 → 8 ← 2.0.4/2,4,8 | 2.0.6/4 → 9 ← 2.0.4/5 |

In addition to the exercises shown above, the trainees have to carry out practical work.

One of these additional work should not exeed 10 working hours. All additional work is to be checked and marked thoroughly.

| | | |
|---|---|---|
| TRADE TRAINING 1 | LAYOUT | MP/21/ 2.06<br>FITTING II |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER / MACHINIST |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TRADE TRAINING 1

# MATERIAL REQUIRED

TURNER + MACHINIST

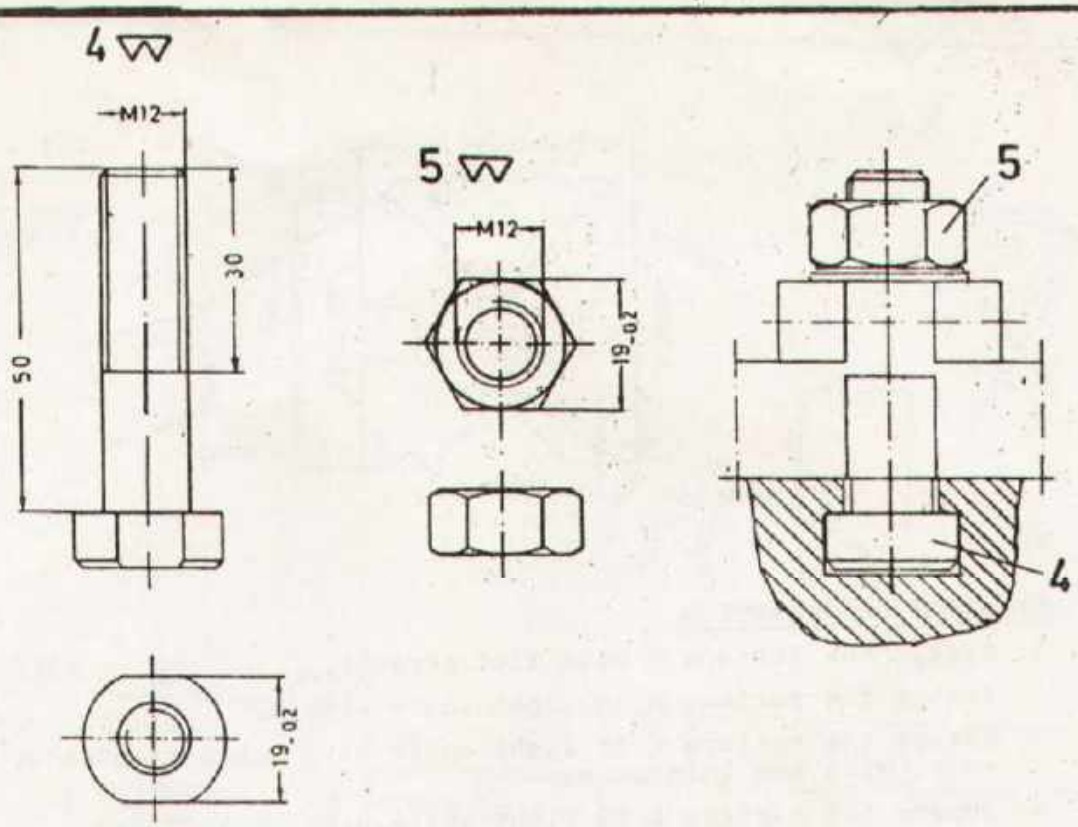
FITTING II

No.2.0.6/1 to 9

(Length given in Millimeter)

| | Exercise No. 4 | 5 | 7 | 8 | 9 | Length per Trainee | Total length for 16 Trainees | Total weight for 16 Trainees |
|---|---|---|---|---|---|---|---|---|
| M.S.Flat 19x10 mm (3/4" x 7/16") | 550 | | | | | 550 mm | 8.8 meter | 13.5 kg |
| M.S.Round Ø 6 mm (1/4" DIA) | | 38 | | | | 38 mm | 0.61meter | 1.4 kg |
| M.S.Round Ø 11 mm (7/16" DIA) (Part 1) | | | 25 | | | 25 mm | 0.4 meter | 0.3 kg |

| | | | | | | Total Nos. per Trainee | Total Nos. for 16 Trainees | |
|---|---|---|---|---|---|---|---|---|
| Washers for M-12 Bolt | | - | | | | 18 Nos. | 288 Nos. | |
| M.S.Pins Ø 4 mm x 18 mm | - | | | | | 34 Nos. | 544 Nos. | |
| M.S.Pins Ø 6 mm x 34 mm | | - | | | | 18 Nos. | 288 Nos. | |
| M.S.Pins Ø 8 mm x 22 mm | | | - | | | 32 Nos. | 512 Mos. | |
| M.S.Pins Ø 2 mm x 14 mm | | | | - | | 18 Nos. | 288 Nos. | |
| Grub Screw M4 x ℓ mm | | | | - | | 18 Nos. | 288 Nos. | |
| Hard wooden handle 100 mm, std. size | | | | | - | 20 Nos. | 320 Nos. | |
| M.S.Pins Ø 4 x 18 mm | | | | | | 34 Nos. | 544 Nos. | |
| M.S.Pins Ø 3 x 21 mm | | | | | | 18 Nos. | 288 Nos. | |



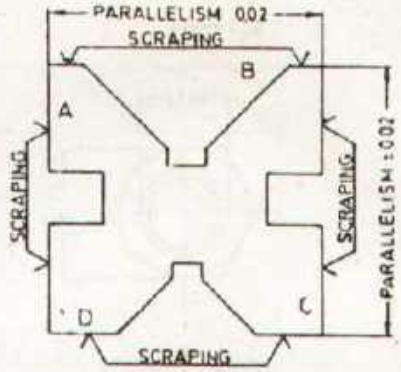

SEQUENCE OF OPERATION

1. File the size of jaw 19 mm at part 4.
2. Mark out the hexagon (size of jaw) at part 5.
   One side of the hexagon is equal to the radius of the circumcircle.
3. File the sizes of jaw 19 mm at part 5.

TOOLS REQUIRED

Measuring tools
Marking tools
Files

| | | |
|---|---|---|
| SCALE 1:1 | SCREW BOLT & NUT | MP/2.3/2.0.6/1 |
| MAT: LOW-CARB. ST | from 2.0.3/9.10 | FITTING II |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER/ MACHINIST |




SEQUENCE OF OPERATION

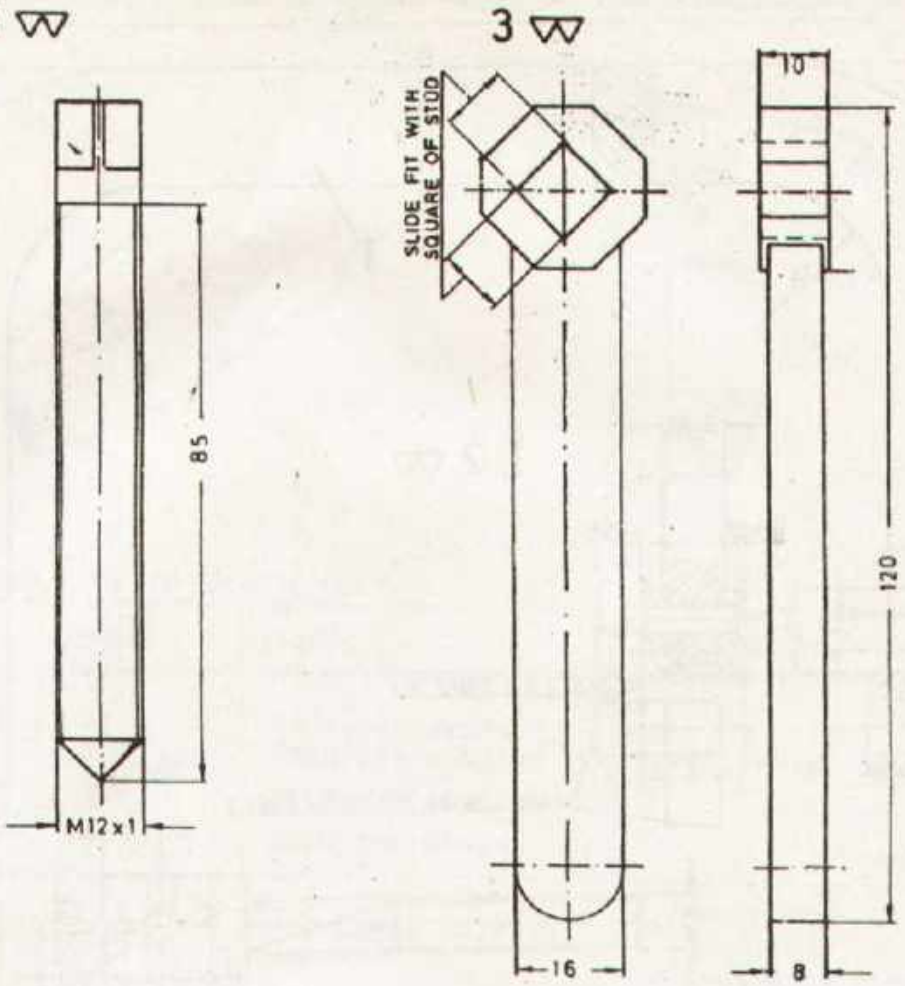
1. Scrape the surface A with flat scraper.
2. Scrape the surface B in right angle with A.
3. Scrape the surface C in right angle with B and parallel to A. Mind the tolerances.
4. Scrape the surface D in right angle with A and C and parallel to B. Mind the tolerances.

NOTE: Cover the master plate always against dust.
Don't use too much chinese-ink.
Before moving over the master plate with the job always deburr.,

TOOLS REQUIRED

Flat scraper
Master plate
Chinese-ink
Master try square
Outside micrometer 25 - 50 mm with stand

| | | |
|---|---|---|
| SCALE 1 1<br>MAT MILDSTEEL | V - BLOCK<br>from 312/7 | MP/2 3/2 0 6/3<br>FITTING II |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER<br>MACHINIST |




SEQUENCE OF OPERATION

1. Mark out the square and the radius at part 3.
2. File the square into part 3.
3. File the radius at part 3.
4. Cut the external thread M 12 x 1 at part 5.
   Mind the thread M 12 x 1 is fine thread.

TOOLS REQUIRED

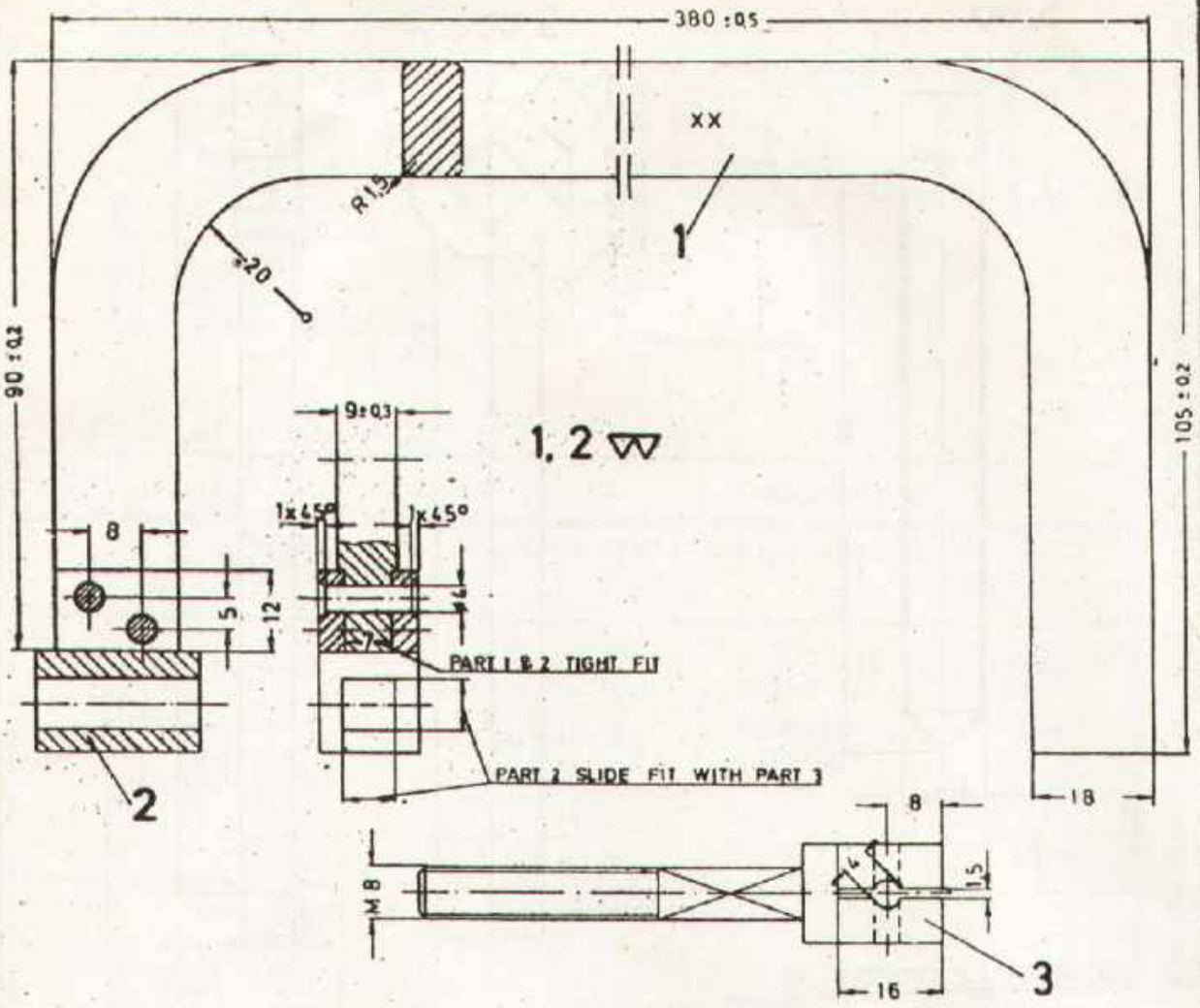
Measuring tools
Marking tools
Threading die M 12 x 1
Files

| | | |
|---|---|---|
| SCALE 1:1 | STUD WITH HANDLE | MP/2.3/2.0.6/3 |
| MAT: MILDSTEEL | from 2.0.5/1,9 | FITTING II |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST




SEQUENCE OF OPERATION

1. Bend the hacksaw bow according to given sizes.
2. Mark out and file the bow.
3. Mark out the holes at part 2 and drill them together with part 1.
4. File the square at part 2.
5. Join part 1 & 2 with the pins 4 mm Ø.
6. Mark out part 3 and finish it according to given sizes.

TOOLS REQUIRED

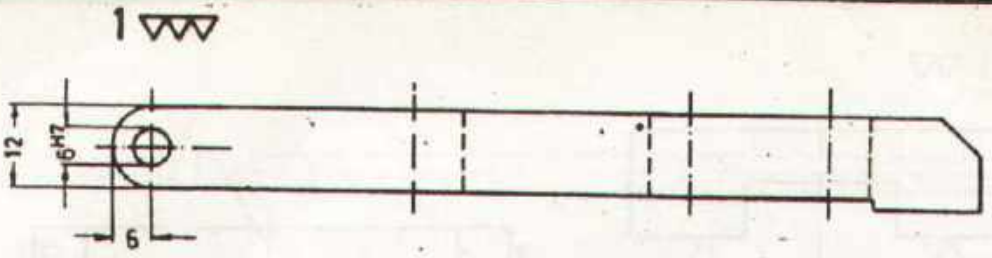
Marking- and Measuring tools
Files, Drilling tools etc.

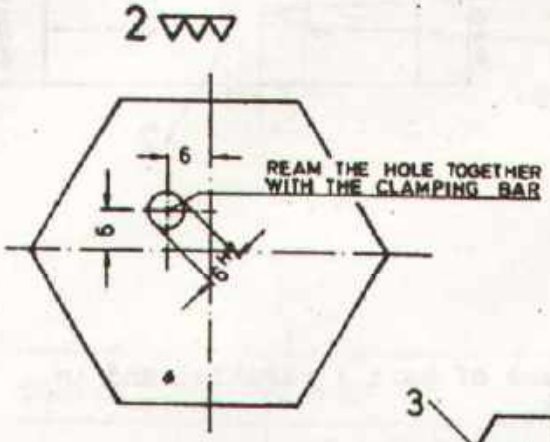
| | | |
|---|---|---|
| SCALE 1:1 | HACKSAW BOW | MP/2.3/2.0.6/4 |
| MAT: MILDSTEEL | from 205/3 | FITTING II |

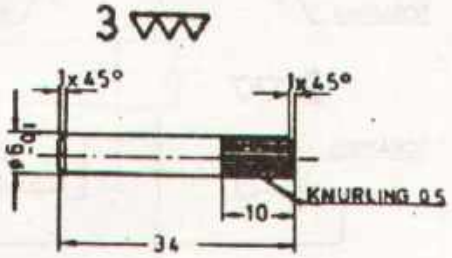
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

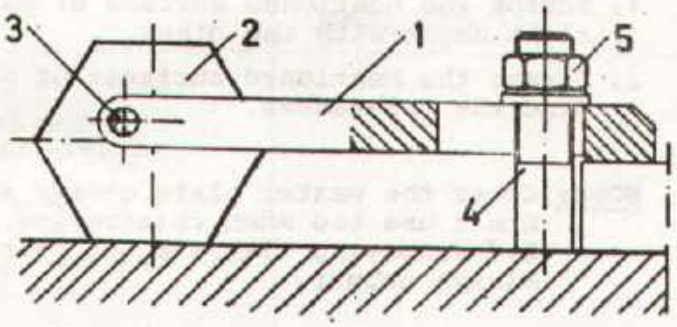
PAK-GERMAN TECHNICAL TRAINING PROGRAMME.

TURNER/ MACHINIST



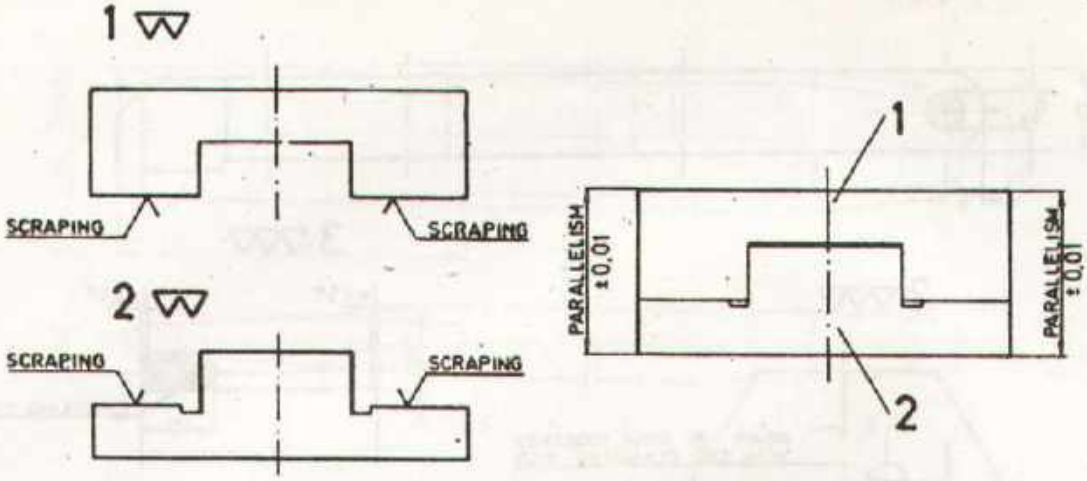

SEQUENCE OF OPERATION

1. Give material for part 3 to the turner section.
2. Mark out the holes at part 1 & 2 and drill with twist drill 5,8 mm ø.
3. Ream-off the holes at part 1 and 2 with reamer $6^{H7}$ mm.
4. Join all parts and check the function.

TOOLS REQUIRED

Marking tools
Measuring tools
Drilling tools
Reamer $6^{H7}$

| | | |
|---|---|---|
| SCALE 1:1 | ADJUSTABLE CLAMP | MP/2.3/2.06/5. |
| MAT: MILDSTEEL | from 2.05/7 | FITTING II |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING | | TURNER/ MACHINIST |
| PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | |




SEQUENCE OF OPERATION

1. Scrape the mentioned surface of part 1 parallel and in right angle with the other.
2. Scrape the mentioned surfaces of part 2. Mind the tolerances.

NOTE: Cover the master plate always against dust.
Don't use too much chinese-ink.
Before moving with the job over the master plate always deburr.

TOOLS REQUIRED

Flat scraper
Master plate
Chinese ink
Master try square
Outside micrometer 0 - 25 mm with stand

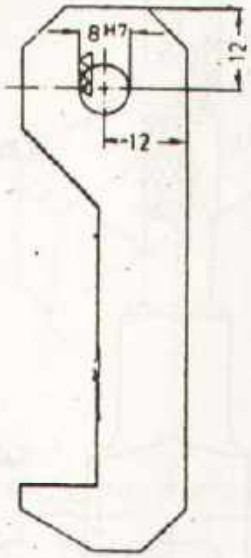
| | | |
|---|---|---|
| SCALE 1 : 1 | FITTING - PARTS | MP/2.3/2.0.6/6 |
| MAT: MILDSTEEL | from 2.04/3.11 | FITTING II |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

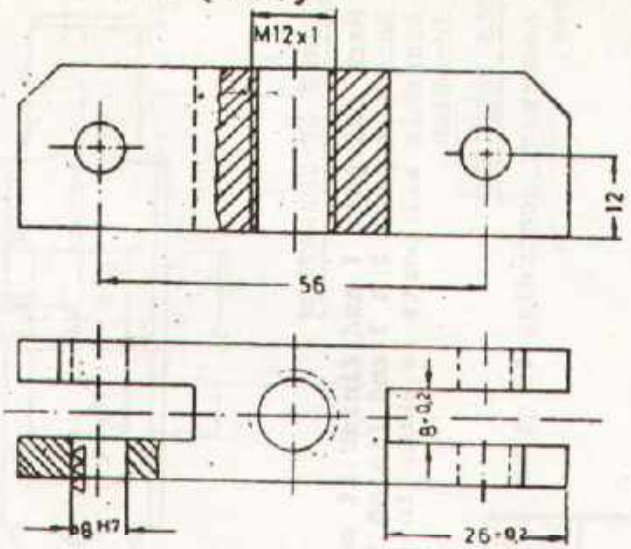
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST

2 ▽ (▽▽) 2 PIECES



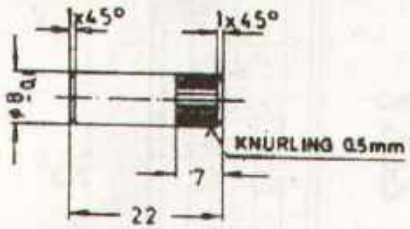

1 ▽ (▽▽)

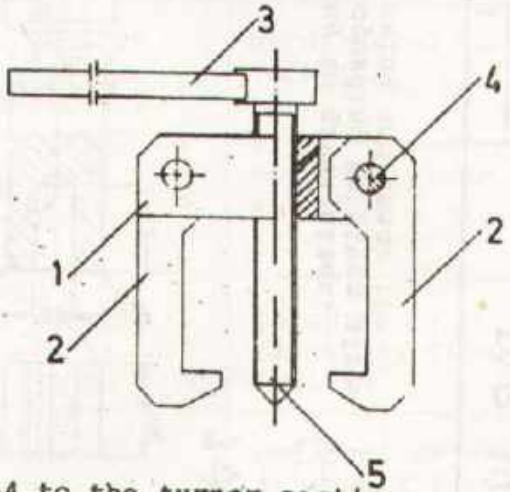






4 ▽ 2 PIECES




**SEQUENCE OF OPERATION**

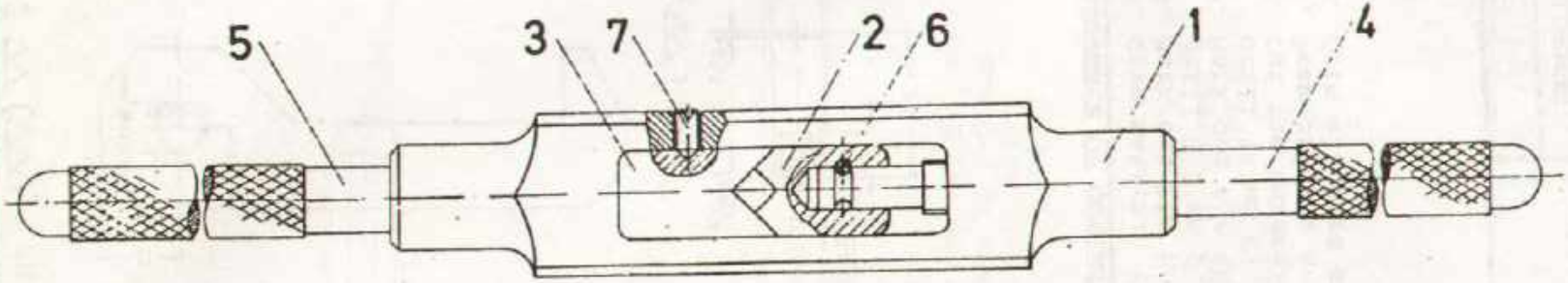
1. Give material for part 4 to the turner section.
2. Mark out the holes at part 1 and 2 and drill with drill 7.8 mm ø.
3. Mark out the threading hole at part 1 and drill it with drill 11 mm ø.
4. Cut the internal fine thread M 12 x 1.
5. Ream-off the holes of part 1 and 2 together with reame. $8^{H7}$ mm.
6. Join all part and check the function.

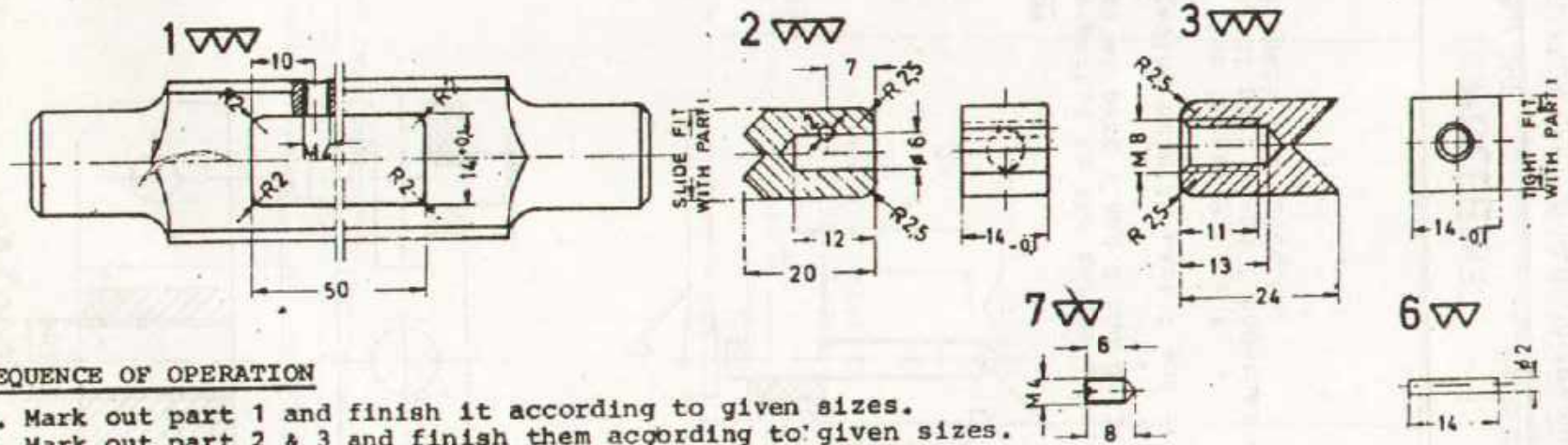
| | | |
|---|---|---|
| SCALE 1 : 1 | PULLER | MP/2.3/2.0.6/7 |
| MAT: MILDSTEEL | from 2.06/3 & 2.04/12 | FITTING II |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER/ MACHINIST



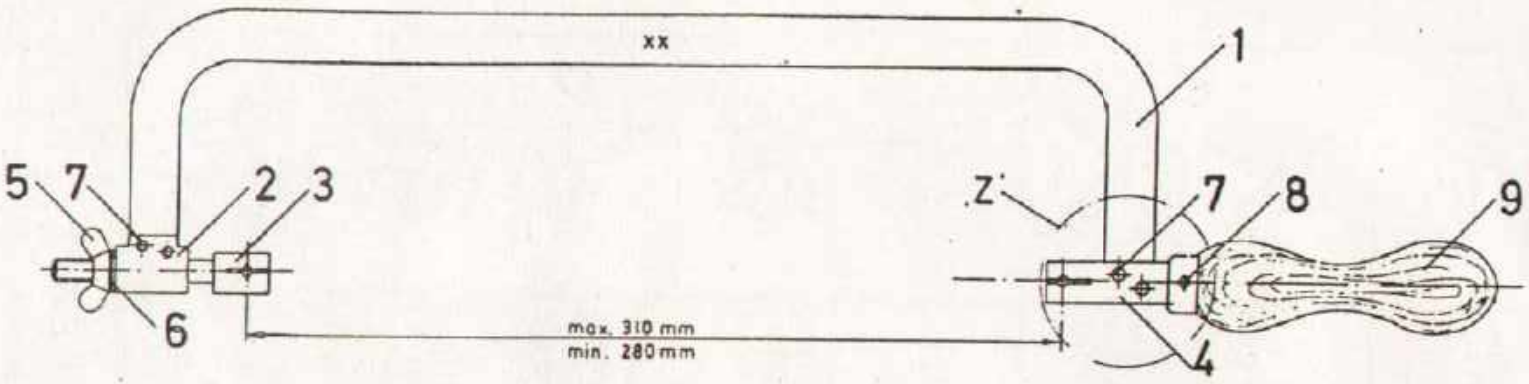

## SEQUENCE OF OPERATION

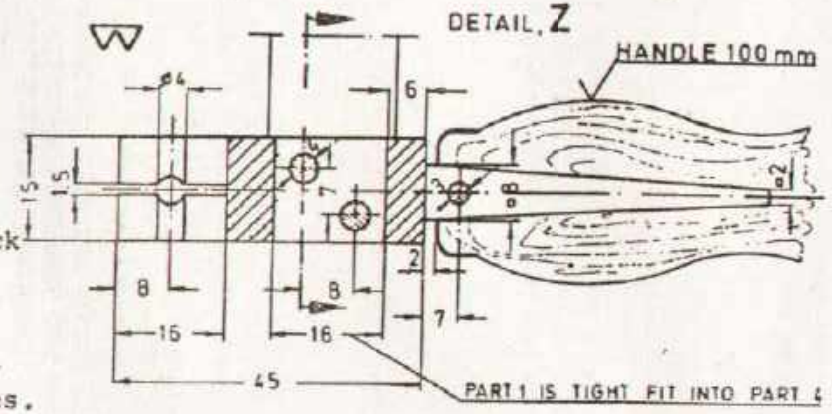
1. Mark out part 1 and finish it according to given sizes.
2. Mark out part 2 & 3 and finish them according to given sizes.
3. Assemble all parts as shown in the drawing and check the function.

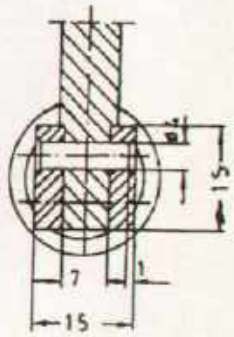
## TOOLS REQUIRED

As necessary according to given sizes.

| | | |
|---|---|---|
| SCALE 1 1 | TAP WRENCH | MP/2.3/2.5/8 |
| MAT: MILDSTEEL | from 2.0.3/12,13 & 2.0.4/2.4.8 | FITTING II |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING | | TURNER/ MACHINIST |
| PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | |




## SEQUENCE OF OPERATION

1. Mark out part 1 and 4 and finish them according to given sizes.
2. Join part 1 and 4 with part 7.
3. Fit part 9 at part 4 as shown in the drawing.
4. Assemble all other parts and check the function.

## TOOLS REQUIRED

As necessary according to given sizes.

TOLERANCE ±0.1

| | | |
|---|---|---|
| SCALE 1:1 | HAND HACKSAW from 2064&2045 | MP/2 3/2 0 6/g |
| MAT MILDSTEEL | | FITTING II |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | TURNER/ MACHINIST |