TRADE TRAINING II-III

TTC PROGRAMME

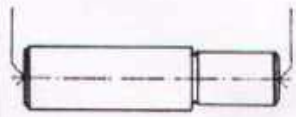
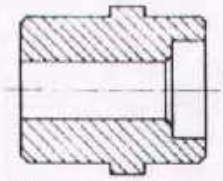
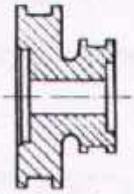
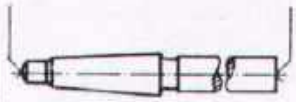
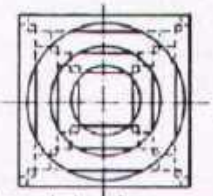
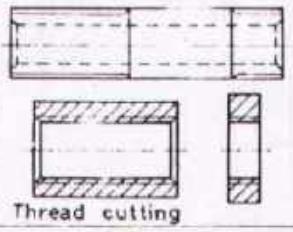
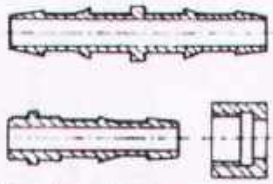
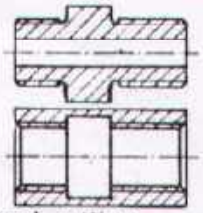
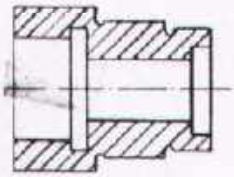
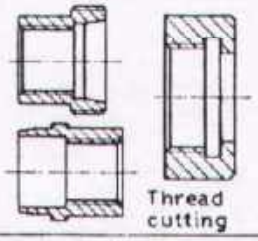
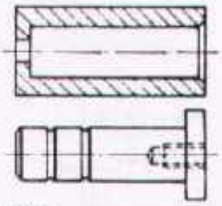
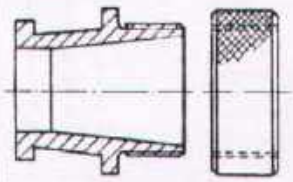
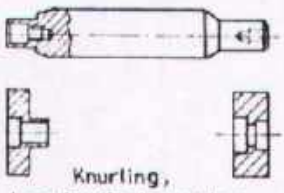
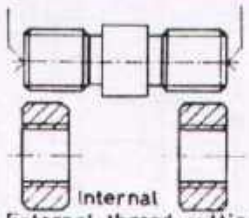
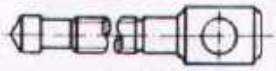
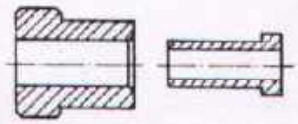
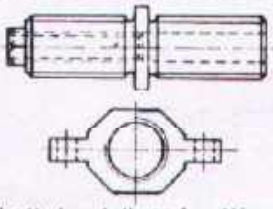
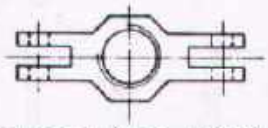
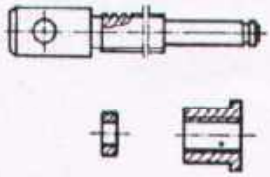
TURNER

TEVTA

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

T.T.P. Series No.25

Price Rs.45.00

 Longitudinal turning	 Turning between Centres	 Drilling, Reaming	 Drilling, Grooving
1	2 → 4.2.2/2	3 → 13	4
 Longitudinal and Taper turning	 Internal turning	 Thread cutting	 Turning of Brass
5 → 4.2.1/9	6	7	8
 Thread cutting	 Stepturning	 Thread cutting	 Fitting
9	10	11	12
 Internal taper turning	 Knurling, Longitudinal turning	 Internal & External thread cutting	 Thread cutting, Work with steadyrest
3 → 13	14 → 4.2.2/5	15	16 → 3.3.1/2
 Bush fitting	 Left hand thread cutting	 Internal Acme thread cutting	 Test piece
17	2.3.6/5 → 18 → 3.3.1/2	3.2.1/3 → 19 → 3.3.1/2	20 → 4.3.2/1

In addition to the exercises shown above, the trainees have to make parts which are needed for the training centre.

TRADE TRAINING II	LAYOUT	MP/2.1/3.11 TURNING II
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK GERMAN TECHNICAL TRAINING PROGRAMME		TURNER

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MATERIAL REQUIRED

TURNER

TRADE TRAINING II

TURNING II
No.3.1.1./1to20

	Exercise No (Length given in Millimeter)													Length per trainee	Total Length for 16 trainees	Total weight for 16 trainees
	1	2.1	2.2	2.3	2.4	2.5	3	4	5	6	7.1	7.2	7.3			
MILDSTEEL ø 38mm 1 1/2" DIA	156													156 m m	2.5 meter	22.25 kg
CARBON STEEL ø22mm 7/8" DIA 4		156												156 //	0.64 FOR 4 Trainees	1.9 //
CARBON STEEL ø26 mm 1 1/16" DIA 4			156	156	156									468 //	4.5 FOR 9 Trainees	18.9 //
CARBON STEEL ø29mm 1 1/8" DIA 3						156								156 //	0.5 FOR 3 Trainees	2.6 //
MILDSTEEL ø5omm 2" DIA							60							60 //	0.96 //	11.4 //
CASTIRON ø88mm (Block) 3 1/2" DIA								45						45 //	0.72 //	CAST IRON AS PER PATTERN.
HIGH SP. STEEL ø19mm 3/4" DIA									220					220 //	3.5 //	9.3 kg
MILDSTEEL SQUARE 44x44mm 13/4" x 1 3/4"										45				45 //	0.72 //	10 //
8 M.S. PIPE ø16mm 5/8" DIA											101			101 //	1.6 //	Running meas. 1.7 meter
M.S. ROUND ø3omm 1 1/4" DIA												50		50 //	0.8 //	4.4 kg
M.S. ROUND ø44mm 1 3/4" DIA													16	16 //	0.26 //	2.8 //

Continued

MATERIAL REQUIRED

TURNER

TRADE TRAINING II

TURNING II
No.3.1.1/8to13

	Excercise No. (Length given in millimeter)													Length per trainee	Total length for 16 trainees	Total weight for 16 trainees
	8.1	8.2	8.3	9.1	9.2	10	11.1	11.2	11.3	12.1	12.2	13.1	13.2			
BRASS ø 16mm 5/8" DIA	56													56 mm	o.9meter	1.42 kg
BRASS ø 25mm 1" DIA		21												21 mm	o.34meter	1.36 kg
BRASS ø 14mm 9/16" DIA			81											81 mm	1.3meter	1.57 kg
MILD STEEL ø32 mm 1 1/4" DIA				56	56				35					147mm	2.35meter	14.83kg
M.S. ø51mm 2" DIA						63	26					56	26	171mm	2.74meter	43.6 kg
M.S. ø 38mm 1 1/2" DIA								31						31 mm	o.5 meter	4.45 kg
M.S. ø28mm 1 1/8" DIA										61	61			122mm	2meter	9.66 kg

Continued

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

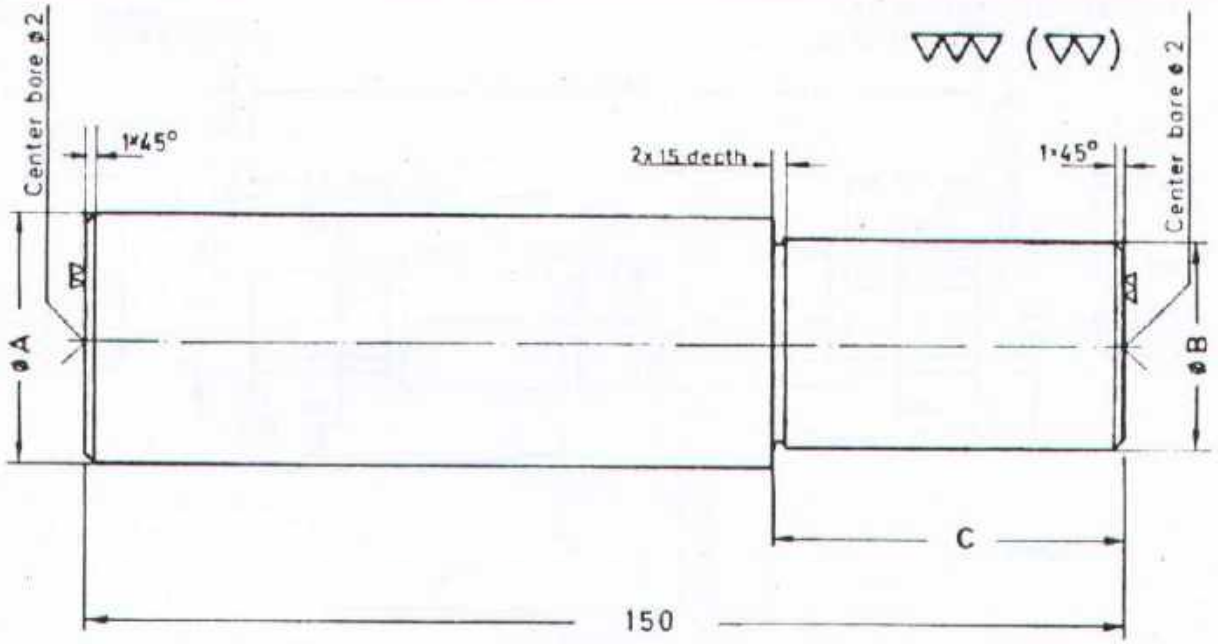
PAN-GERMAN TECHNICAL TRAINING PROGRAMME

MATERIAL REQUIRED

TRADE TRAINING II TURNER

TURNING II
No. 3.1.1/14to20

Exercise No. (Length given in Millimeter)	14.1	14.2	14.3	15.1	15.2	15.3	16	17.1	17.2	18.1	18.2	19	20.1	20.2	20.3	Length per trainee	Total length for 16 trainees	Total weight for 16 trainees
M.S. ROUND ϕ 22mm 7/8" DIA	120												270			390 mm	6.24 meter	18.6 kg
M.S. ROUND ϕ32mm 1 1/4" DIA		2	24	96												141 //	2.3 //	14.5 //
M.S. ROUND ϕ50mm 2" DIA					25	25			56							106 //	1.7 //	27.2 //
M.S. ROUND ϕ28mm 1 1/8" DIA							335									335 //	5.36 //	25.9 //
M.S. ROUND ϕ75mm 3" DIA								57								57 //	0.91 //	32.2 //
M.S. ROUND ϕ38 mm 1 1/2" DIA										121						121 //	1.94 //	17.3 //
M.S. FLAT 38x19mm 1 1/2" x 3/4"											82					82 //	1.3 //	7.3 //
M.S. FLAT 38x25mm												106				106 //	1.7 //	13 //
														30	8	38 //	0.61 //	4 //



Exercise No	øA	øB	C	Marks given
1.1	36 ± 0,2	30 ± 0,2	50 ± 0,2	
1.2	32 ± 0,1	26 ± 0,1	52 ± 0,1	
1.3	30 + 0,1	24 + 0,1	54 + 0,1	
1.4	26 - 0,1	21 - 0,1	56 - 0,1	

SCALE 1:1	MEASURING EXERCISE	MP/2.3/ 3.1.1/1
MAT: MILDSTEEL		TURNING II

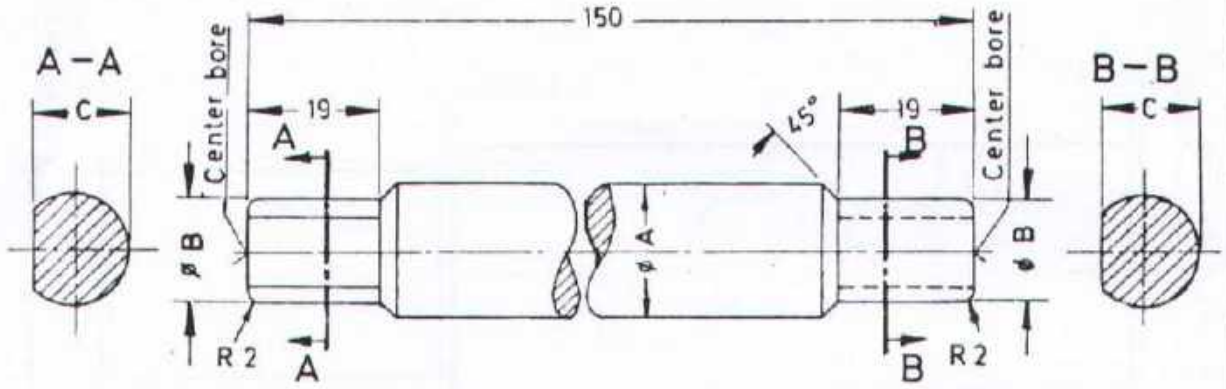
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

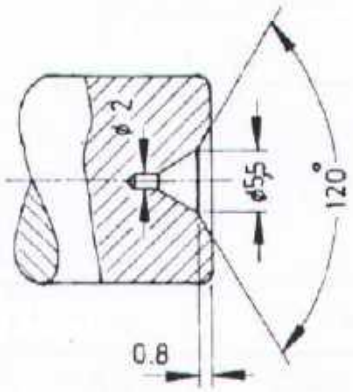
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

FOR ALL DIMENSIONS ±0.1
UNLESS OTHERWISE STATED

8





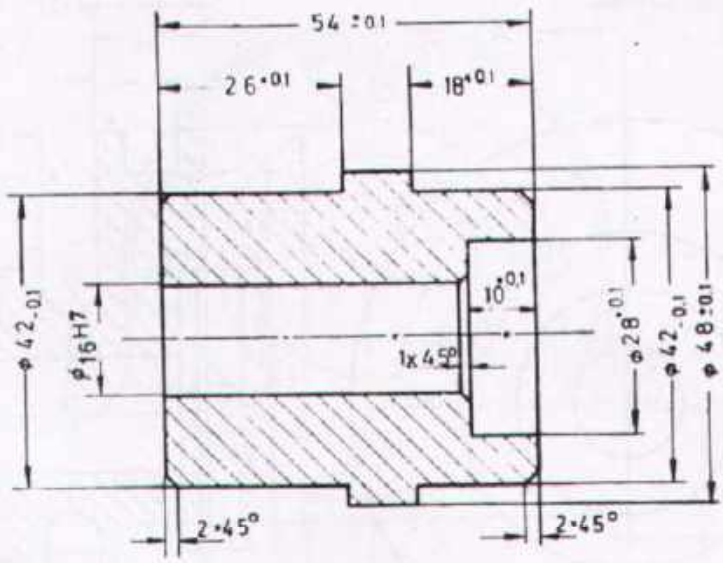
Grinding ø	ø A	ø B	C
ø 20	20 , 5	17	15
ø 21	21 , 5	18	16
ø 22	22 , 5	19	17
ø 23	23 , 5	20	18
ø 24	24 , 5	20	18

SCALE 1:1	Mandrel	MP/2.3/3.1.1/2
MAT. CARBON ST.		TURNING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER



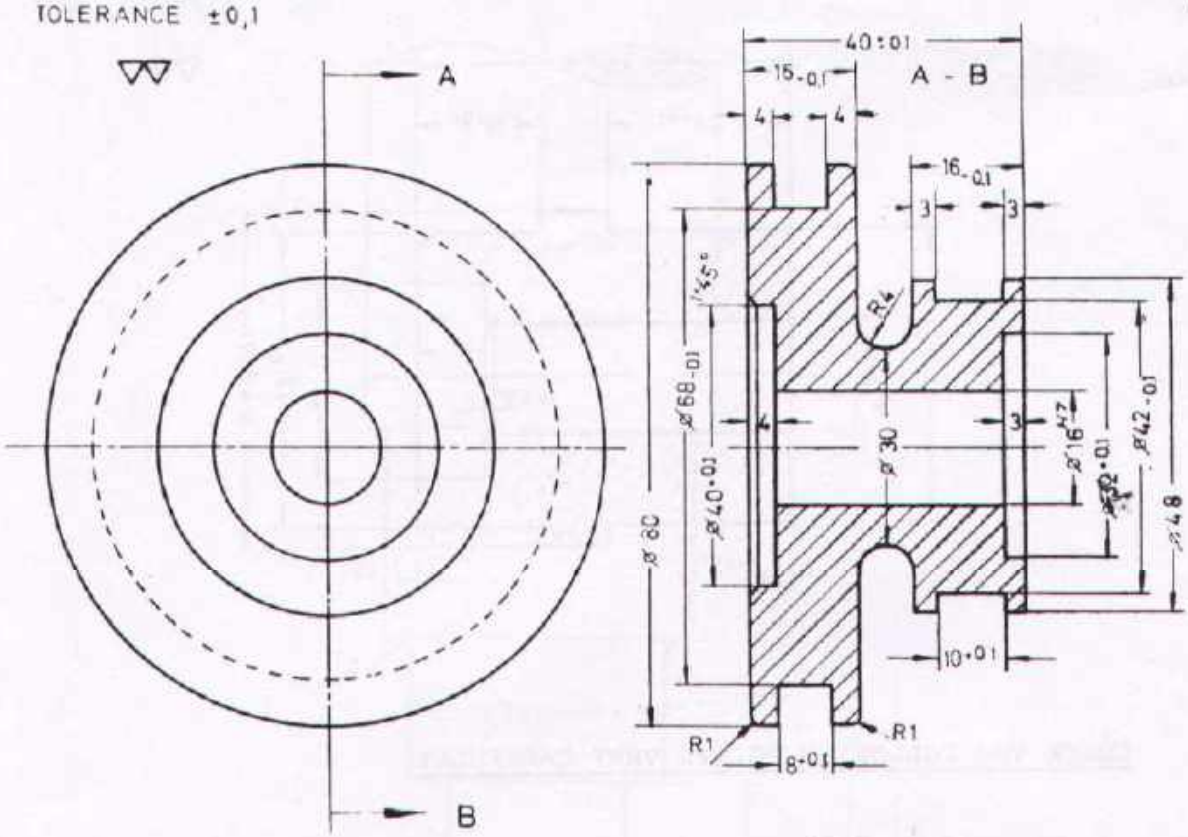
CHECK THE FOLLOWING POINTS VERY CAREFULLY

1.	54	±	0.1
2.	Ø 48	±	0.1
3.	Ø 42	-	0.1
4.	Ø 42	-	0.1
5.	Ø 28	+	0.1
6.	26	+	0.1
7.	18	+	0.1
8.	10	+	0.1
9.	Smoothness of bare		
10.	Smoothness all over		

The shoulder in the bore must be in right angle !

SCALE 1:1	BUSH	MP/2.3/ 3.1.1/ 3
MAT: MILDSTEEL		TURNING II
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		TURNER

TOLERANCE ±0,1



CHECK THE FOLLOWING POINTS VERY CAREFULLY

1. Ø 68 - 0.1
2. Ø 42 - 0.1
3. Ø 40 + 0.1
4. Ø 32 + 0.1
5. 40 ± 0.1
6. 16 - 0.1
7. 8 + 0.1
8. 16 - 0.1
9. 10 + 0.1
10. Smoothness all over

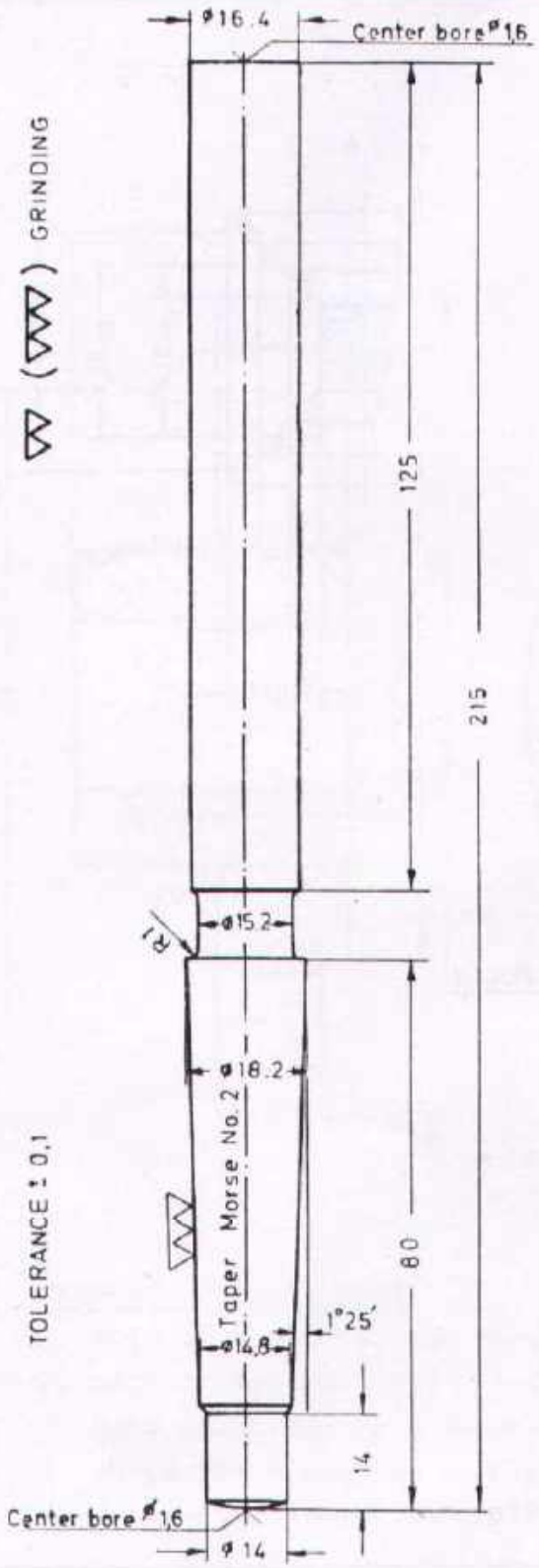
Mind the hard casting skin when you choose the depth of the first cut !

SCALE 1:1	PULLEY	MP/2.3/3.1.1/4
MAT CAST IRON		TURNING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER



▽ (▽▽▽) GRINDING

TOLERANCE ± 0,1

CHECK THE FOLLOWING POINTS VERY CAREFULLY

1. ø 16.4
2. ø 18.2
3. 125
4. 80
5. 1:4

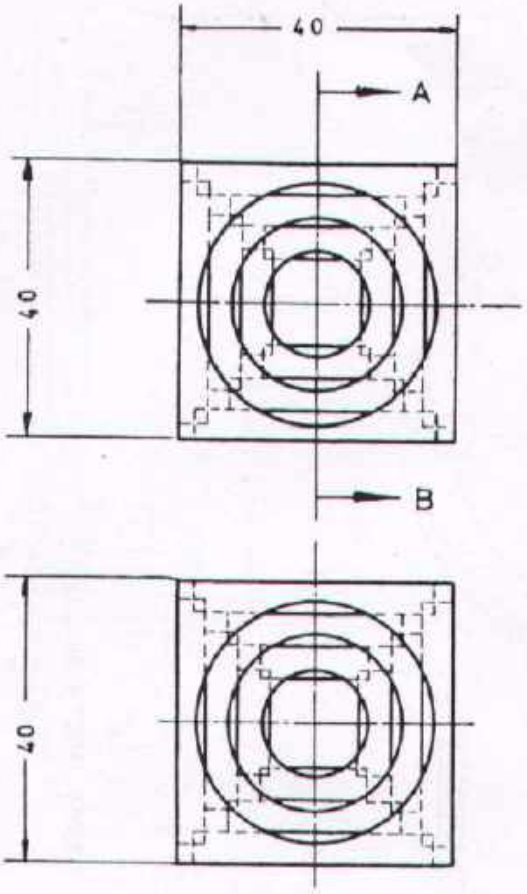
Use the Taper gauge to check the taper Morse No. 2

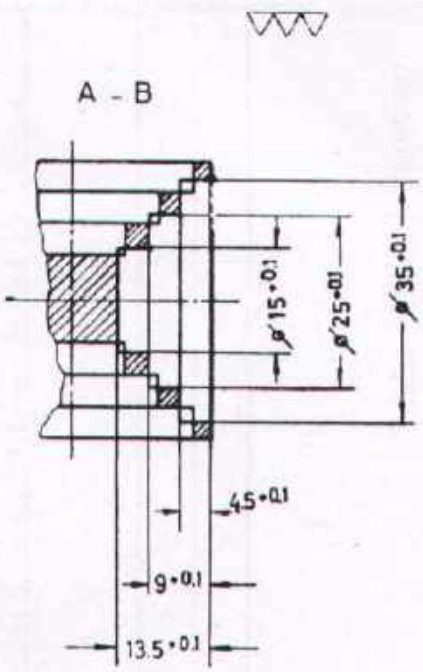
SCALE 1:1	DRILL BODY	MP/23/311/5
MAT. HIGH SP. ST.		TURNING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER





CHECK THE FOLLOWING POINTS VERY CAREFULLY

1. Ø 35 + 0.1
2. Ø 25 + 0.1
3. Ø 15 + 0.1
4. 13.5 + 0.1
5. 9.0 + 0.1
6. 4.5 + 0.1
7. Smoothness of stepped hole 35 mm
8. Smoothness of stepped hole 25 mm
9. Smoothness of stepped hole 15 mm
10. Smoothness all over

Use a suitable filling disc when chucking the ready machine side !

SCALE 1:1	PAPER WEIGHT	MP/23/ 3.1.1/6
MAT: MILDSTEEL		TURNING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

TURNER

SCALE 1:1

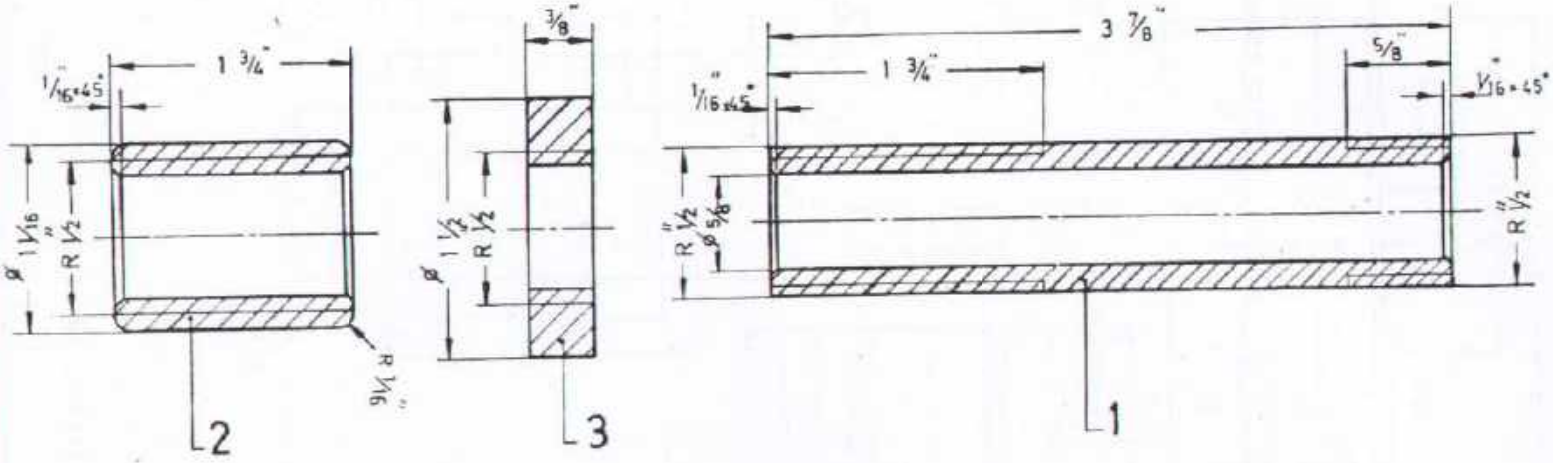
MAT. MILDSTEEL

PIPE LONG-THREADING

MP/2.3/3.11/7

TURNING II

TOLERANCE ±1/64"

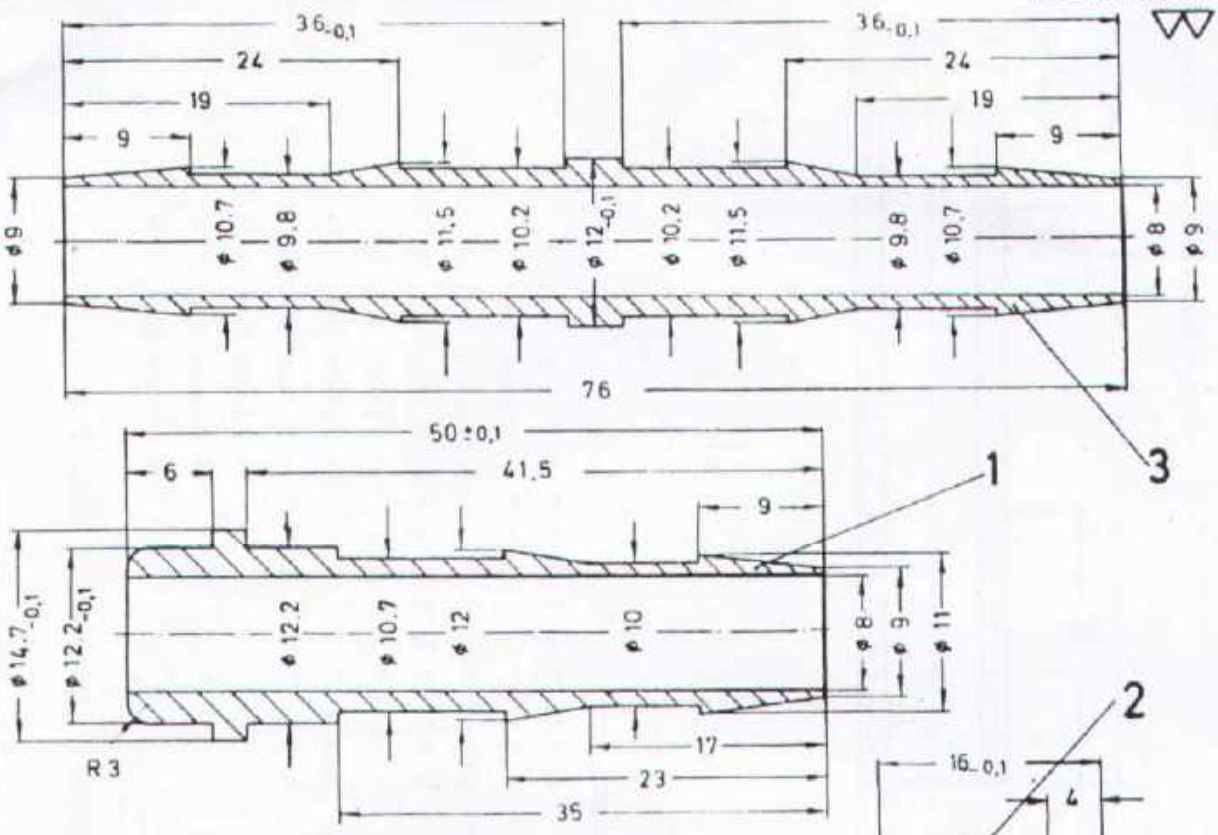


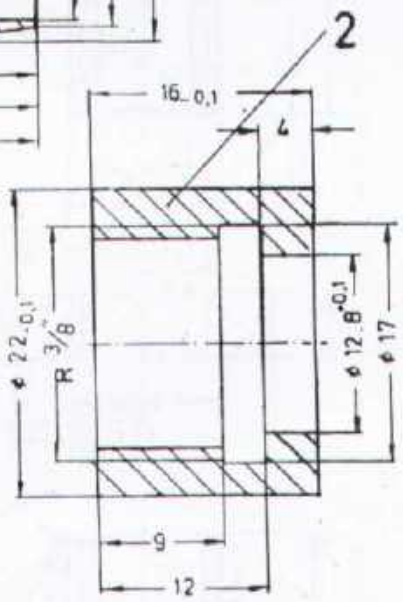
CHECK THE FOLLOWING POINTS VERY CAREFULLY

1.	Smoothness pipe thread	R 1/2 " x 1 3/4 "	- Piece No. 1
2.	Smoothness pipe thread	R 1/2 " x 5/8 "	- Piece No. 1
3.	Smoothness drilled hole	Ø 5/8 "	- Piece No. 1
4.	Smoothness pipe thread	R 1/2 " x 1 3/4 "	- Piece No. 2
5.	Smoothness outside diameter	1 1/16" x 1 3/4 "	- Piece No. 2
6.	Accuracy of pipe thread connection	R 1/2 "	- Piece No. 1 + 2
7.	Smoothness pipe thread	R 1/2 " x 3/8 "	- Piece No. 3
8.	Smoothness of faces		- Piece No. 3
9.	Accuracy of pipe thread connection	R 1/2 "	- Piece No. 1 + 3
10.	Smoothness and accuracy all over		- Piece No. 1 + 3

Prepare parts 2 and 3 first and check part 1 with their help !

TOLERANCE ± 0.1





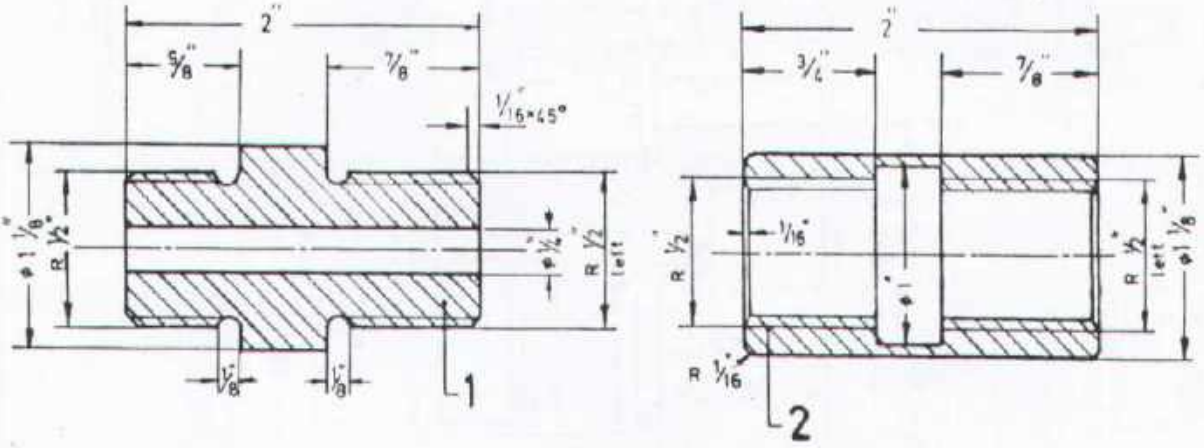
CHECK THE FOLLOWING POINTS VERY CAREFULLY

1.		50	± 0.1	- Piece No. 1
2.	Ø	14.7	- 0.1	- Piece No. 1
3.	Ø	12.2	- 0.1	- Piece No. 1
4.		16	- 0.1	- Piece No. 2
5.	Ø	22	- 0.1	- Piece No. 2
6.	Ø	12.8	+ 0.1	- Piece No. 2
7.		38	- 0.1	- Piece No. 3
8.		38	- 0.1	- Piece No. 3
9.	Ø	12	- 0.1	- Piece No. 3
10.	Smoothness all over- Piece No. 1 - 3			

Mind that the cutting angles for brass differ from those for steel !

SCALE 1:1	RUBBER PIPE CONNECTION	MP/2.3/3.1.1/8
MAT: BRASS		TURNING II
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		TURNER

TOLERANCE ±1/64"



CHECK THE FOLLOWING POINTS VERY CAREFULLY

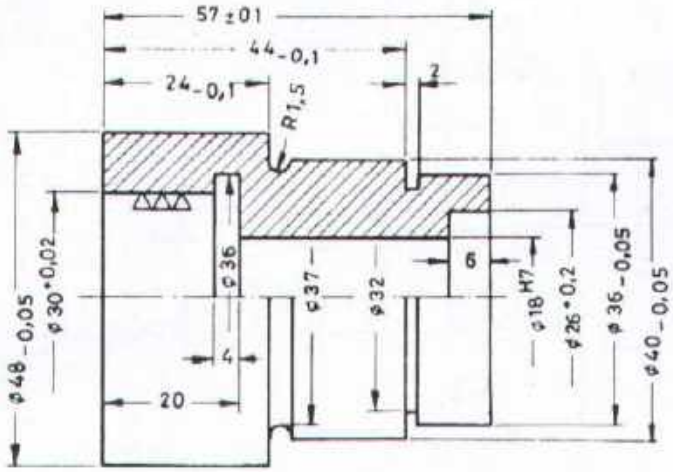
1.	Smoothness pipe thread	R 1/2" x 7/8"	- Piece No. 1
2.	Smoothness pipe thread	R 1/2" x 5/8"	- Piece No. 1
3.	Smoothness drilled hole	Ø 1/4"	- Piece No. 1
4.	Smoothness of faces		- Piece No. 1
5.	Smoothness pipe thread	R 1/2" x 7/8"	- Piece No. 2
6.	Smoothness pipe thread	R 1/2" x 3/4"	- Piece No. 2
7.	Smoothness outside diameter	1 1/8"	- Piece No. 2
8.	Smoothness of face and radius		- Piece No. 2
9.	Accuracy of connection	R 1/2" right	- Piece No. 1 + 2
10.	Accuracy of connection	R 1/2" left	- Piece No. 1 + 2

Mind the left hand and right hand threads on both workpieces !

SCALE 1:1	DOUBLE NIPPLE AND SOCKET	MP/2.3/ 3.1.1/9
MAT: MILDSTEEL		TURNING II

▽▽ (▽▽▽)

Tolerance ± 0,1
unless otherwise stated



SEQUENCE OF OPERATION

1. Clamp the workpiece in the chuck, drill and bore (ream) the holes 18H7 and Ø 30 + 0.02.
   Prepare the internal recess Ø 36.
2. Turn the diameter 48 - 0.05 roughly (48.5).
3. Clamp on rough turned diameter 48.5 and check for true running, then bore Ø 26 + 0.2.
4. Hold the workpiece on a mandrel and finish the outside diameters and grooves according to the drawing.

Check the recess in the bore with spring caliper.

SCALE 1:1	STEPPED BUSH	MP/2.3/3.1.1/10
MAT. MILD STEEL		TURNING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

TURNING II

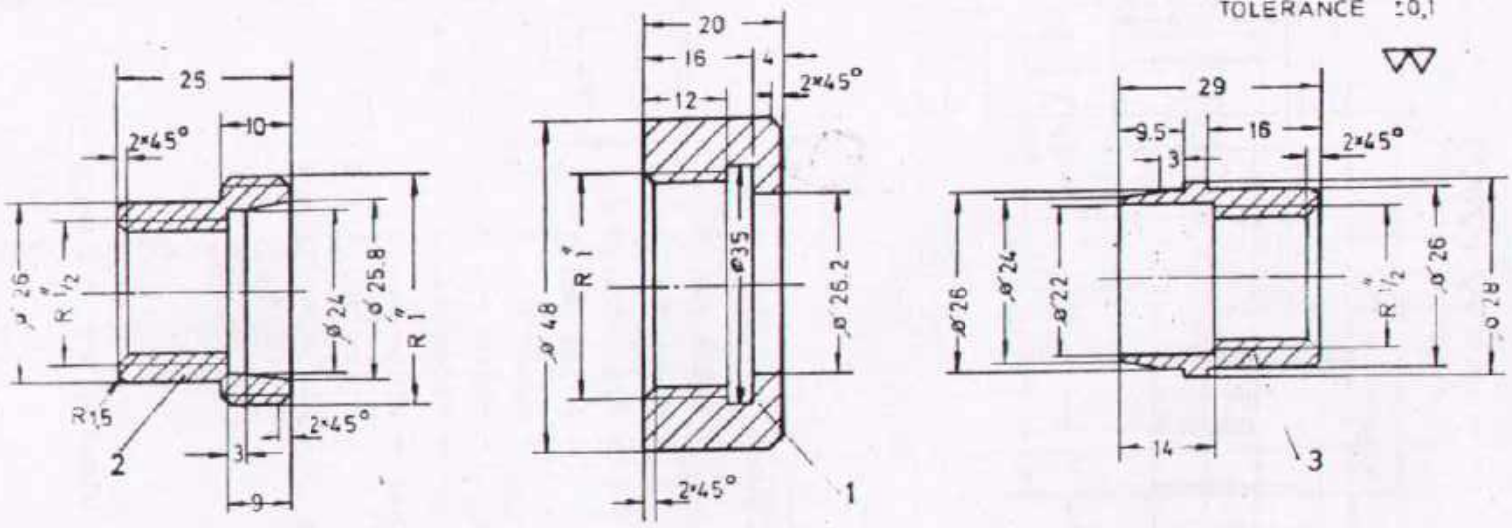
MP/23/ 3.1.1/11

UNION NUT

MAT: MILDSTEEL

SCALE 1:1

TOLERANCE ±0,1



Material : Mild - steel

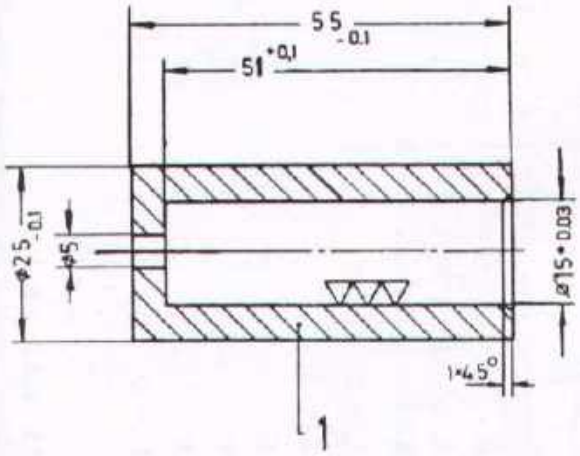
CHECK THE FOLLOWING POINTS VERY CAREFULLY

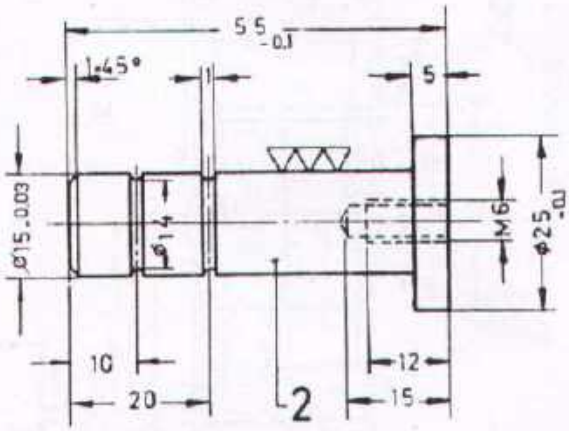
1.	Smoothness pipe thread R 1 " x 12	- Piece No. 1
2.	Smoothness pipe thread R 1 " x 10	- Piece No. 2
3.	Smoothness pipe thread R 1/2 " x 16	- Piece No. 2
4.	Smoothness pipe thread R 1/2 " x 15	- Piece No. 3
5.	Accuracy of pipe thread connection R 1"	- Piece No. 1 + 2
6.	Accuracy of taper fit	- Piece No. 2 + 3
7.	Accuracy and smoothness all over	- Piece No. 1
8.	Accuracy and smoothness all over	- Piece No. 2
9.	Accuracy and smoothness all over	- Piece No. 3
10.	Accuracy and smoothness all over	- Piece No. 1 - 3

Complete part 1 first and cut the 1" thread on part 2 to fit with it !

TOLERANCE ± 0.1

▽▽ (▽▽▽)





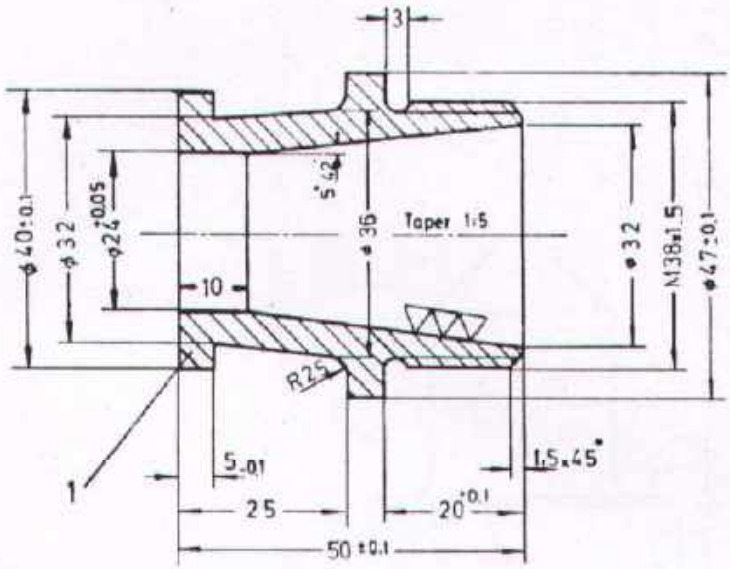
CHECK THE FOLLOWING POINTS VERY CAREFULLY

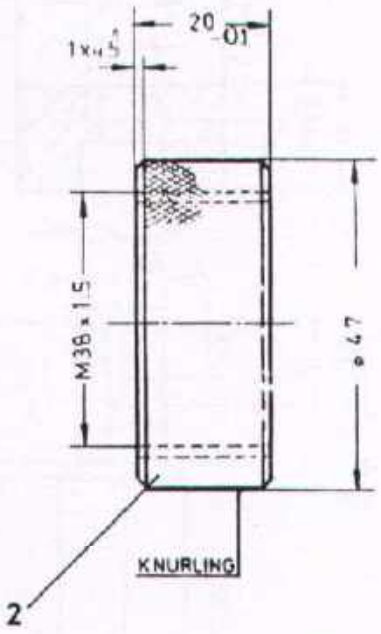
1.	55 - 0.1	- Piece No. 1
2.	51 + 0.1	- Piece No. 1
3.	ø 25 - 0.1	- Piece No. 1
4.	ø 15 ± 0.03	- Piece No. 1
5.	55 - 0.1	- Piece No. 2
6.	ø 25 - 0.1	- Piece No. 2
7.	ø 15 ± 0.03	- Piece No. 2
8.	Accuracy and smoothness of notches	- Piece No. 2
9.	Accuracy of bolt connection	- Piece No. 1 + 2
10.	Smoothness all over	- Piece No. 1 + 2

Check the compression of the unit by closing the ø 5 mm hole with the finger-tip !

SCALE.1:1	PLUNGER AND ZYLINDER	MP/2.3/ 3.1.1/12
MAT.:MILDSTEEL		TURNING II

TOLERANCE ±0.2





CHECK THE FOLLOWING POINTS VERY CAREFULLY

1. 50 ± 0.1 - Piece No. 1
2. Ø 47 ± 0.1 - Piece No. 1
3. Ø 40 ± 0.1 - Piece No. 1
4. Ø 24 + 0.05 - Piece No. 1
5. Accuracy of fine pitch thread M 38 x 1.5 - Piece No. 1
6. Accuracy of taper 1 : 5 - Piece No. 1
7. Smoothness all over - Piece No. 1
8. Accuracy of fine pitch thread M 38 x 1.5 - Piece No. 2
9. Accuracy and smoothness all over - Piece No. 2
10. Accuracy of thread connection M 38 x 1.5 - Piece No. 1 + 2

Check the taper with a taper gauge !

SCALE 1:1	TAPERBUSH WITH RINGNUT	MP/2.3/3.1.1/13
MAT: MILDSTEEL	FROM EX.3	TURNING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

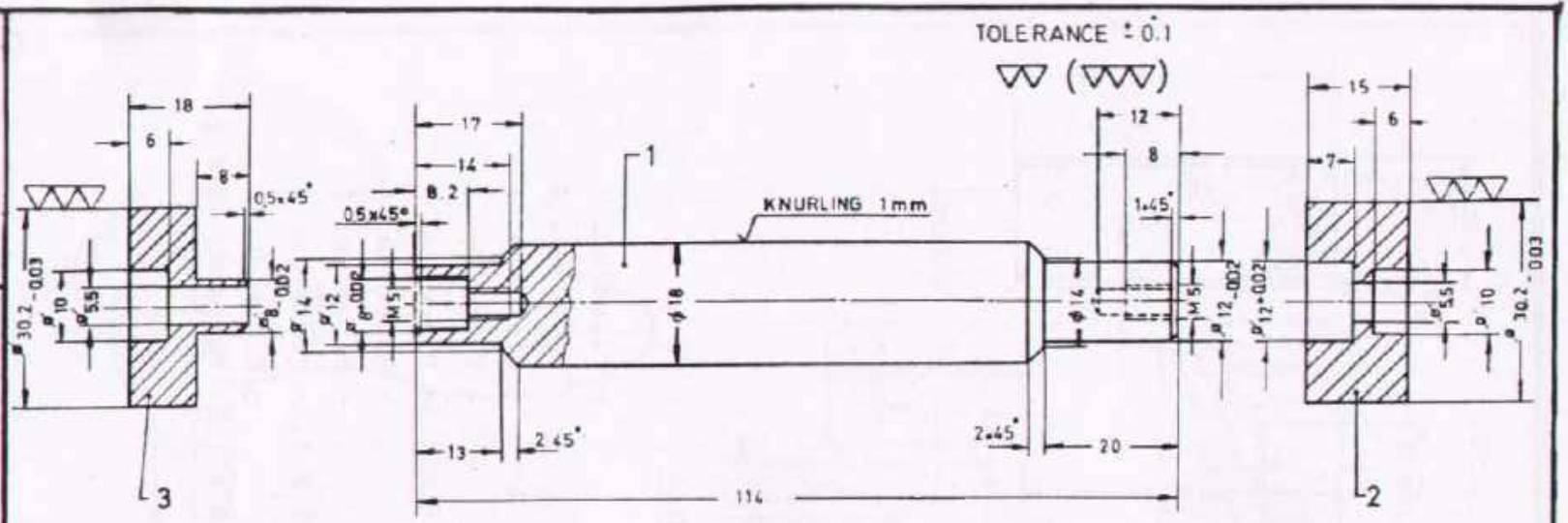
SCALE 1:1

MAT: MILDSTEEL

PLUG GAUGE

TURNING II

MP/2.3/3.1.1/14



CHECK THE FOLLOWING POINTS VERY CAREFULLY

1.	Ø 12 - 0.02	- Piece No. 1
2.	Ø 30.2 - 0.03	- Piece No. 2
3.	Ø 30.2 - 0.03	- Piece No. 3
4.	Ø 8 - 0.02	- Piece No. 3
5.	Fit	- Piece No. 1 + 2
6.	Fit	- Piece No. 1 + 3
7.	Smoothness Ø 30.2	- Piece No. 2
8.	Smoothness Ø 30.2	- Piece No. 3
9.	Knurling 1 mm	- Piece No. 1
10.	Smoothness all over	- Piece No. 1 - 3

Check bores Ø 8 and Ø 12 with plug gauges !

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

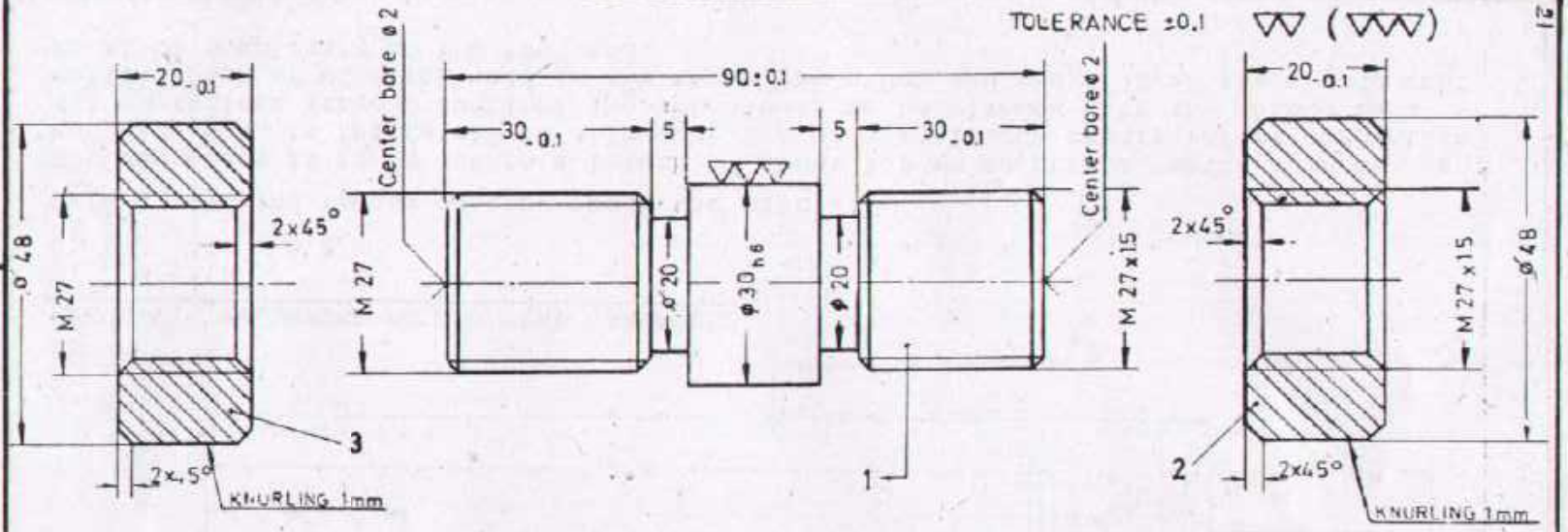
SCALE

MAT. MILD STEEL

SCREW FITTING

TURNING II

MP/23/3.1.1/15



Material: Mild-steel

CHECK THE FOLLOWING POINTS VERY CAREFULLY

1.	90 ± 0.1	- Piece No. 1
2.	30 - 0.1	- Piece No. 1
3.	30 - 0.1	- Piece No. 1
4.	20 - 0.1	- Piece No. 2
5.	20 - 0.1	- Piece No. 3
6.	Accuracy of fine pitch thread M 27 x 1.5	- Piece No. 1 + 2
7.	Thread fit M 27 x 1.5	- Piece No. 1 + 2
8.	Accuracy of metric-thread M 27	- Piece No. 1 + 3
9.	Thread fit M 27	- Piece No. 1 + 3
10.	Smoothness all over	- Piece No. 1 - 3

Find out the pitch of M 27 from the table book !

ø 30 h6	+ 0.033
	+ 0.017

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK: GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

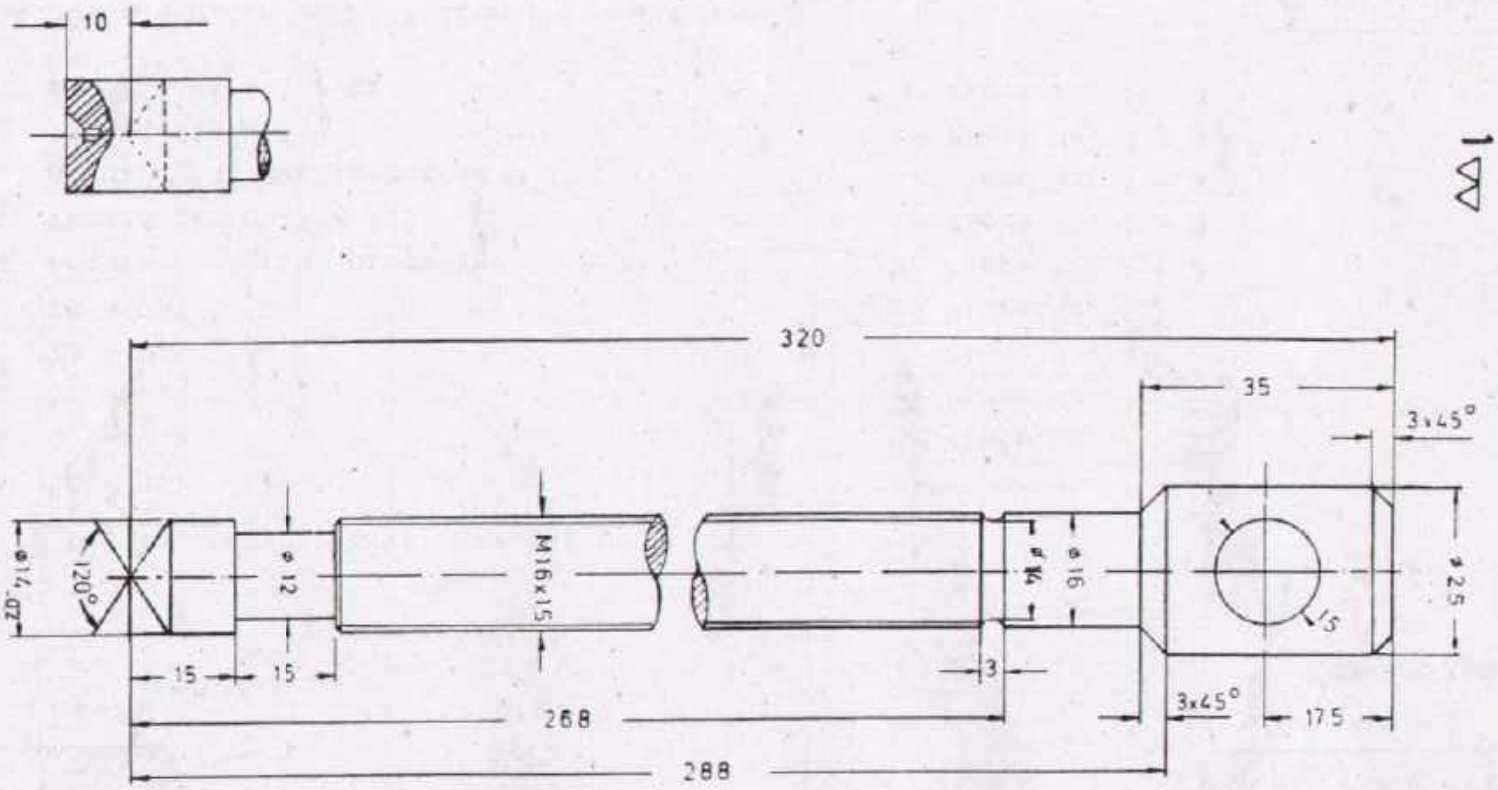
SCALE 1:1

MAT: MILDSTEEL

SPINDLE

MP/2.3/ 3.1.1/16

TURNING II



1 ▽

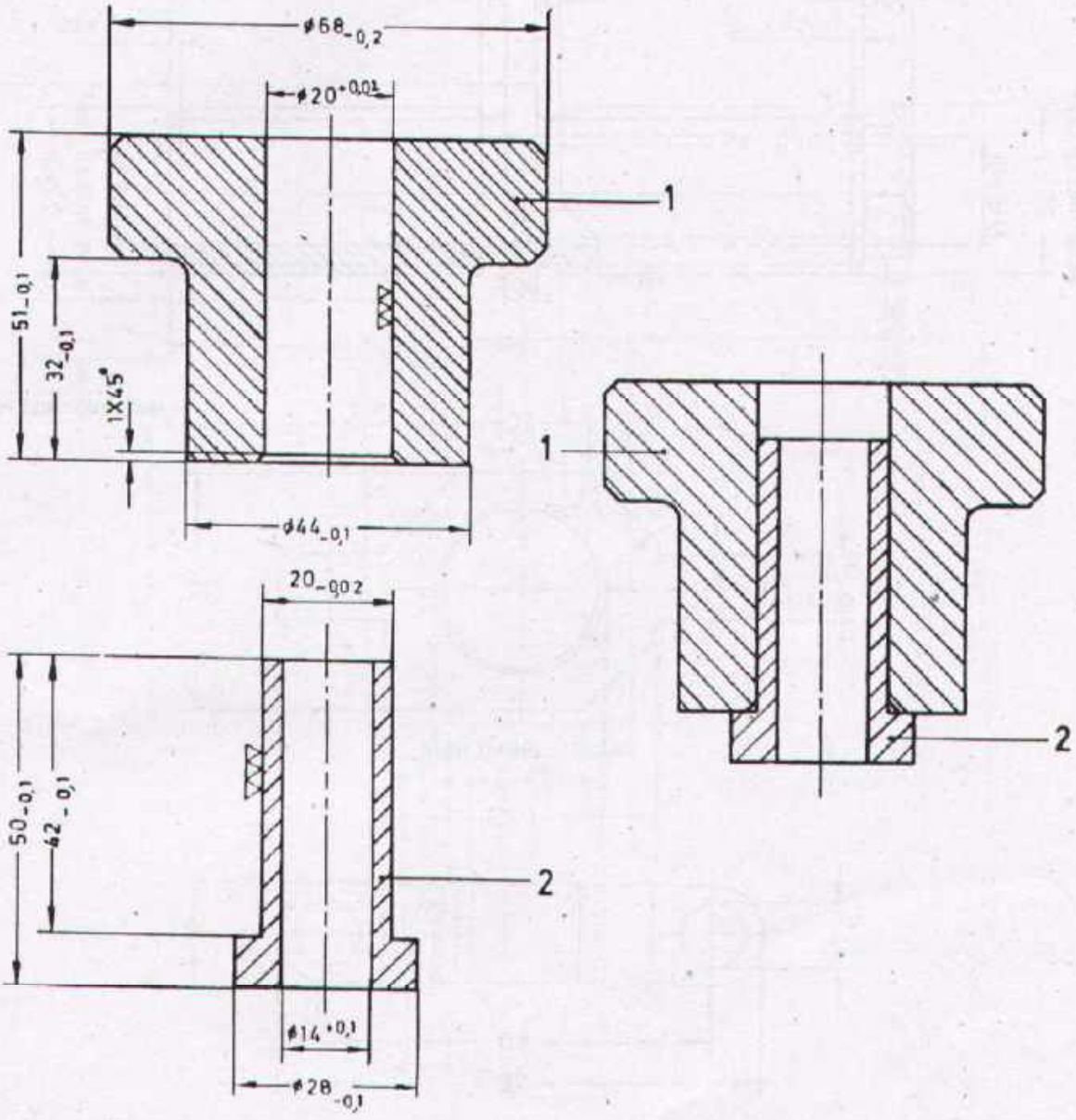
CHECK THE FOLLOWING POINTS VERY CAREFULLY

1. Ø 16
2. Ø 14 - 0.2

Before starting thread cutting check the pitch.

The raw piece is to be cut to a length of about 335 mm so that a centre bore can be made as shown in the detail to allow the use of a tailstock centre. After completing all operations (thread cutting) the spindle is to be clamped with the thread in a collet chuck or with the head in the three jaw chuck and the Ø 12 in the steady rest to allow completion of the 120° end.

TOLERANCE FOR ALL DIM. ±0.1
UNLESS OTHERWISE STATED

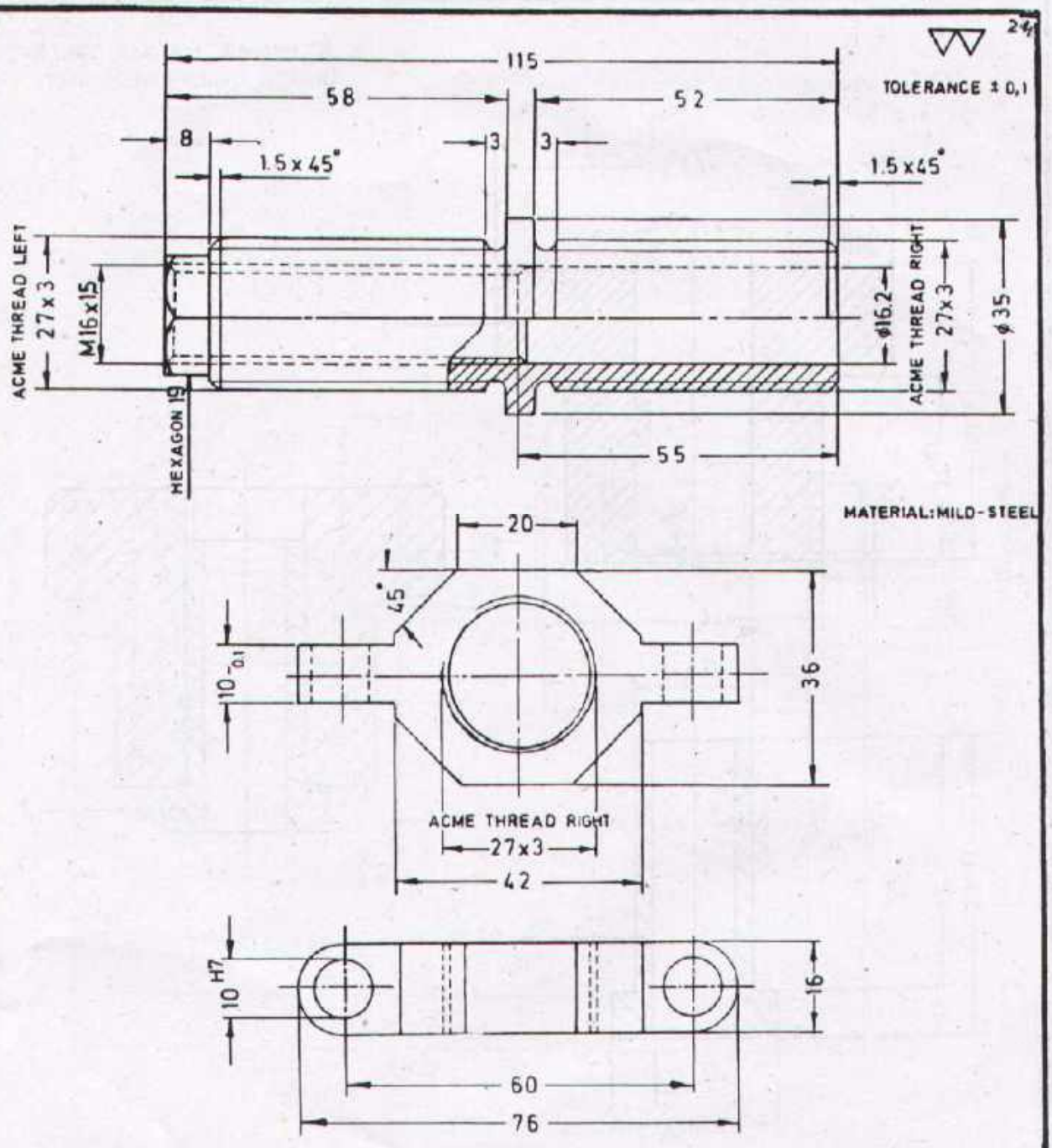


SCALE 1:1	BUSH FITTING	MP/2-3/3.1.1/17
MAT. MILDSTEEL		TURNING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER



SCALE 1:1	SCREW SOCKET AND NUT	MP/23/3.1.1/18
MAT: MILDSTEEL	FROM 23.6/5	TURNING II

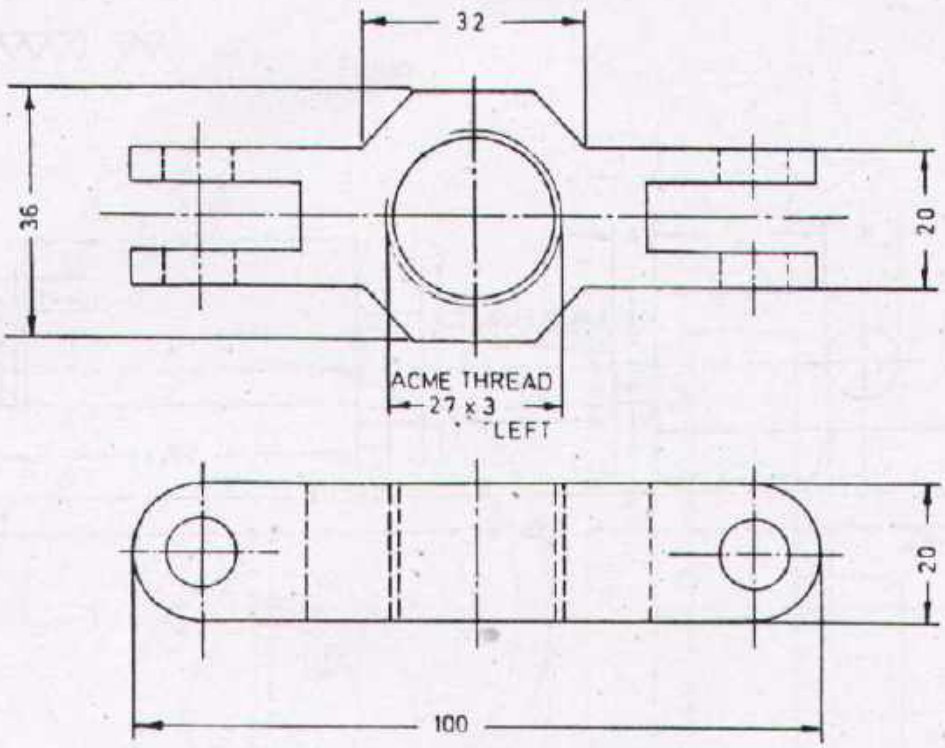
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

25 ▽▽

TOLERANCE ± 01 UNLESS OTHERWISE STATED



SEQUENCE OF OPERATION

1. Mount four jaws chuck on Lathe Machine.
2. Hold finished milled workpiece in four jaws chuck and check true running.
3. Bore core diameter for Acme thread 27 x 3.
4. Cut left hand Acme thread.

CAUTION

Check the thread with the male piece.

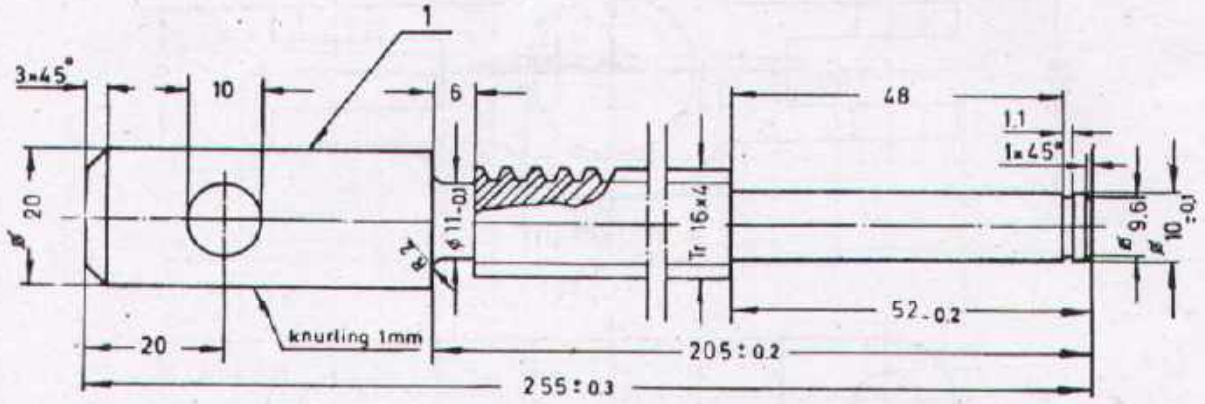
SCALE 1:1	LINK PIECE	MP/2.3/ 3.1.1/19
MAT: MILDSTEEL	FROM 3.2J/3	TURNING II

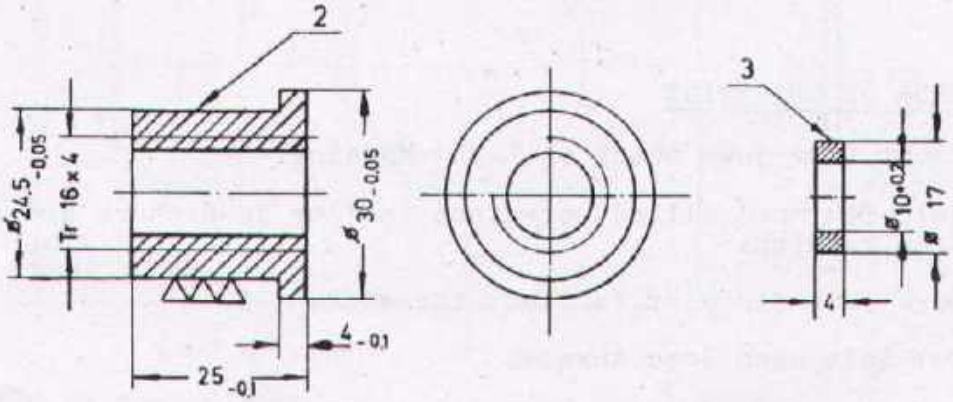
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

Tolerance ± 0.1





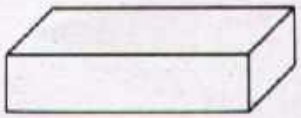
Material: Mild-steel
Brass

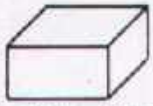
SCALE 1:1	SPINDLE AND THREAD BUSH	MP/2.3/ 3.1.1/ 20
MAT:		TURNING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

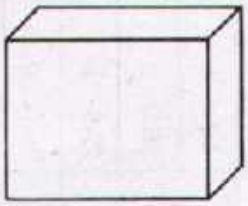
TURNER





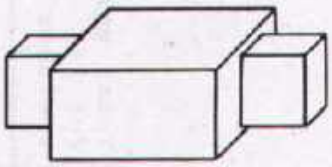
Parallel and right angle shaping

1 — 2 → 5



Shaping of Cast iron

3 → 4.1.1/6

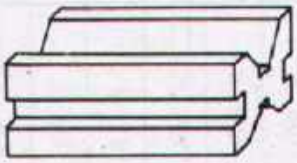


Step shaping

4 → 4.1.1/8

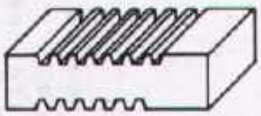
Shaping of grooves

1 → 5 → 6



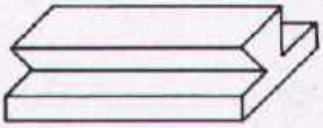
Angular shaping

5 → 6 → 3.2.4/8



Rack shaping

7

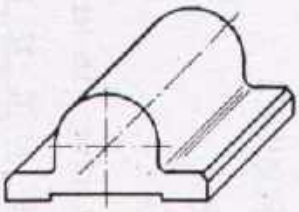


Dove tail shaping, external

8

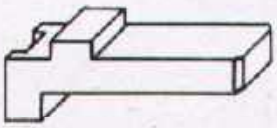
Dove tail shaping internal

9



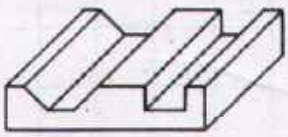
Form shaping

10 → 4.1.2/5



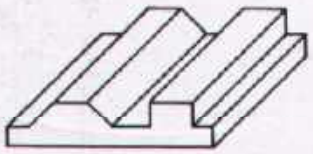
Step shaping

11



Internal from shaping

12



External form shaping

13

In addition to the exercises shown above, the trainees have to make parts which are needed for the training centre.

TRADE TRAINING II	LAYOUT	MP/2.1/3.1.2 SHAPING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

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DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

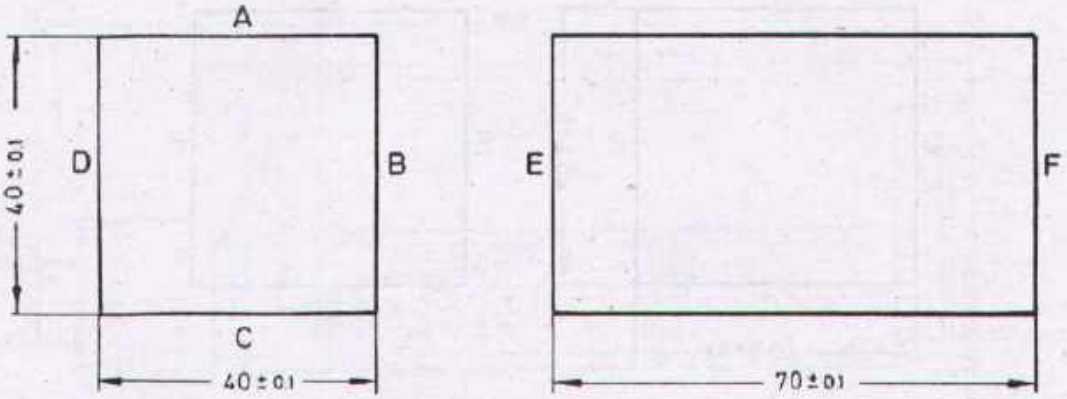
TRADE TRAINING II

MATERIAL REQUIRED

TURNER

SHAPING II
No.3.1.2/1to13

	Exercise No. (Length given in Millimeter)													Length per trainee	Total Length for 16 trainees	Total weight for 16 trainees
	1	2	3	4	7	8	9	10	11	12	13					
M.S. SQUARE 44x44mm 1 3/4" x 1 3/4" sq.	76	46							116					238 mm	3.8 meter	58.5 kg
CAST IRON 96x30mm 3 3/4" x 1 1/4"			106											106 "	1.7 "	37.0 "
CAST IRON 76x42 mm 3" x 1 3/4"				120										120 "	2 "	48.0 "
CAST IRON SQ. 44x44mm 1 3/4" x 1 3/4" sq.					156									156 "	2.5 "	36.0 "
M.S. SQ. 62x62 mm 2 1/2" x 2 1/2" sq.						26	26							52 "	0.84 "	25.5 "
CAST IRON 81x76mm 3 1/4" x 3"								156						156 "	2.5 "	114.0 "
M.S. SQUARE 75x75mm 3" x 3" sq.										25	25			50 "	0.8 "	35.5 "

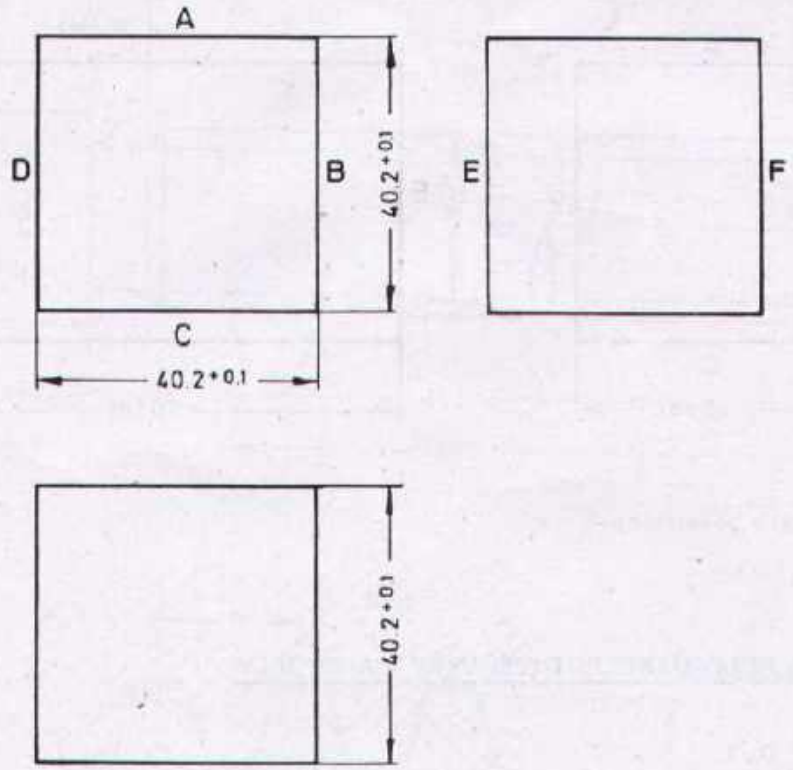


CHECK THE FOLLOWING POINTS VERY CAREFULLY

1. 40 ± 0.1
2. 40 ± 0.1
3. 70 ± 0.1
4. Angle A - B
5. Angle C - D
6. Angle A B C D - E
7. Angle A B C D - F
8. Parallel surface
9. Plane surface
10. Smoothness all over

Use parallel distance pieces to chuck the job in the vice !

SCALE 1:1	V – BLOCK	MP/23/312/1
MAT:MILD STEEL		SHAPING II



CHECK THE FOLLOWING POINTS VERY CAREFULLY

1. 40.2 + 0.1
2. 40.2 + 0.1
3. 40.2 + 0.1
4. Angle A - B
5. Angle C - D
6. Angle A B C D - E
7. Angle A B C D - F
8. Parallel surface
9. Plane surface
10. Smoothness all over

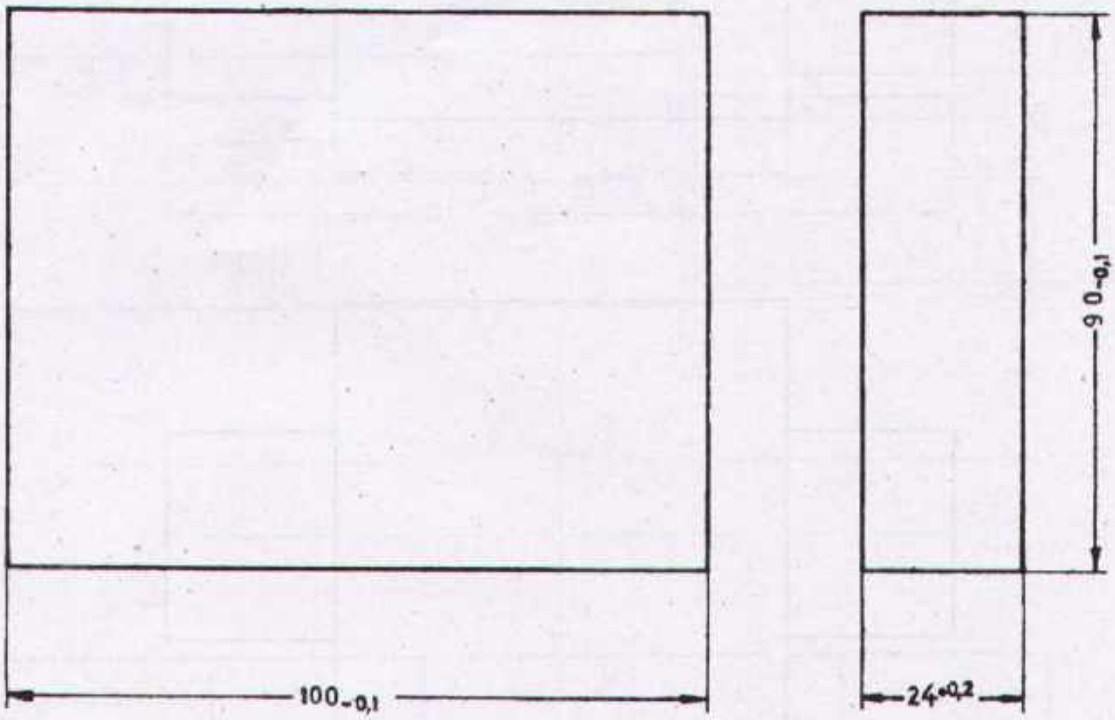
First shape two opposite surfaces parallel with each other !

SCALE 1:1	CUBE	MP/23/312/2
MAT: Mildsteel		SHAPING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER



CHECK THE FOLLOWING POINTS VERY CAREFULLY

1. Angles
2. Parallel surfaces
3. Plane surfaces
4. Smoothness all over

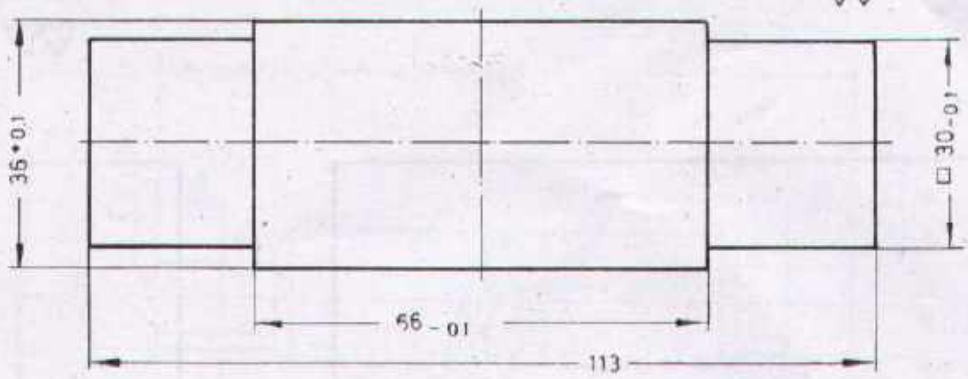
Mind the hard casting skin when you choose the depth of the first cut !

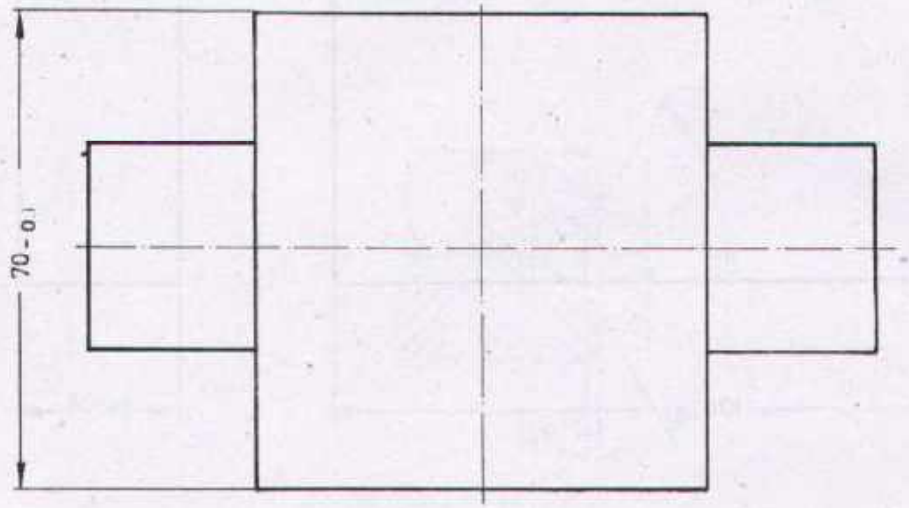
SCALE 1:1	ECCENTRIC BORING PLATE	MP/23/3.1.2/3
MAT.: CAST IRON		SHAPING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER





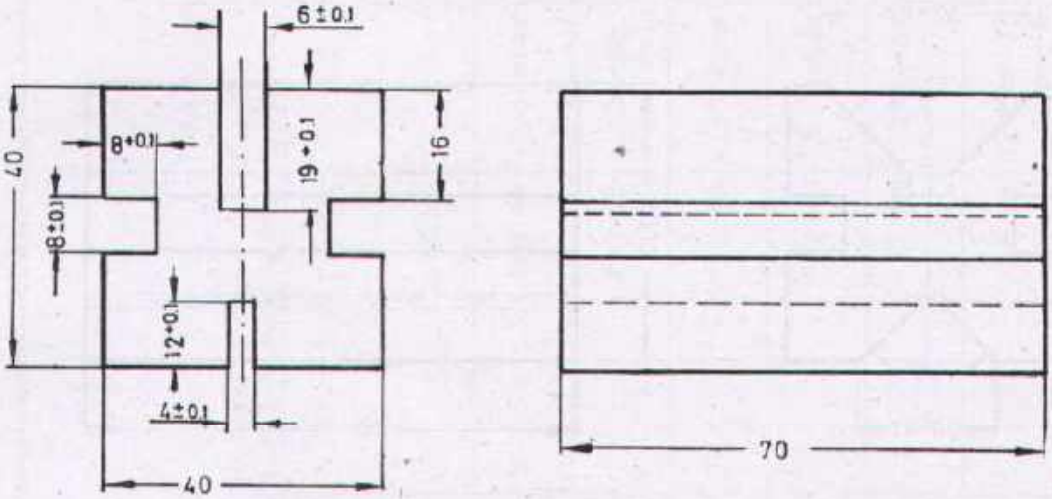
CHECK THE FOLLOWING POINTS VERY CAREFULLY

1. 70 - 0.1
2. 66 - 0.1
3. 36 + 0.1
4. 30 - 0.1
5. 30 - 0.1
6. 30 - 0.1
7. 30 - 0.1
8. Angle surface
9. Parallel surface
10. Smoothness all over

Machining of cast iron does not require any cooling liquid !

SCALE 1:1	MOVEABLE NUT	MP/ 2.3/ 3.1.2/4
MAT: CAST IRON		SHAPING II

Tolerance ± 0.1
unless otherwise stated



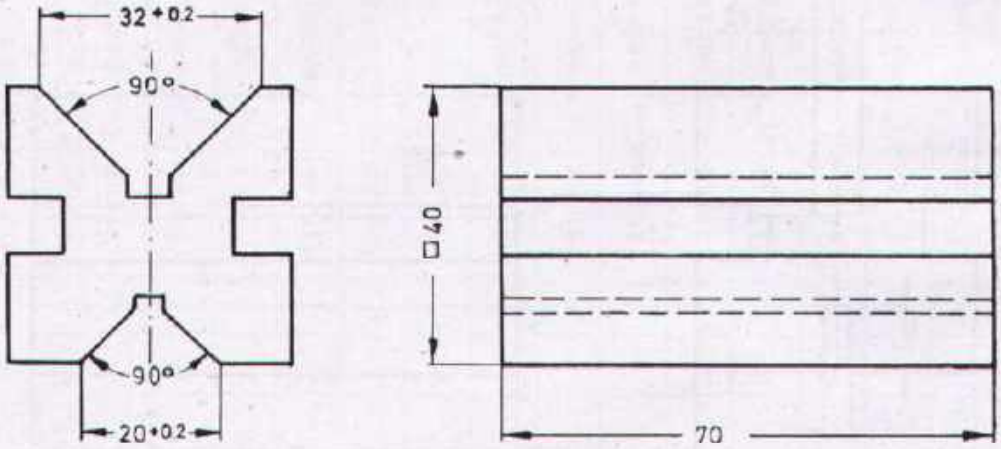
CHECK THE FOLLOWING POINTS VERY CAREFULLY

1. 18 - 0.1
2. 17 - 0.1
3. 16 - 0.1
4. 19 + 0.1
5. 12 + 0.1
6. 8 ± 0.1
7. 8 ± 0.1
8. Notches, parallel and rectangular
9. Notches, smoothness
10. Smoothness all over

Grind the slotting tool to 4 mm width to shape the 4 mm slot !

SCALE 1:1	V-BLOCK	MP/23/3.1.2/5
MAT: MILDSTEEL	Mat. from Ex 1	SHAPING II

Tolerance ± 0.2
unless otherwise stated



CHECK THE FOLLOWING POINTS CAREFULLY

1. 32 + 0.2
2. 90°
3. 20 + 0.2
4. Angle 90°
5. Parallel Surfaces
6. Smoothness all over

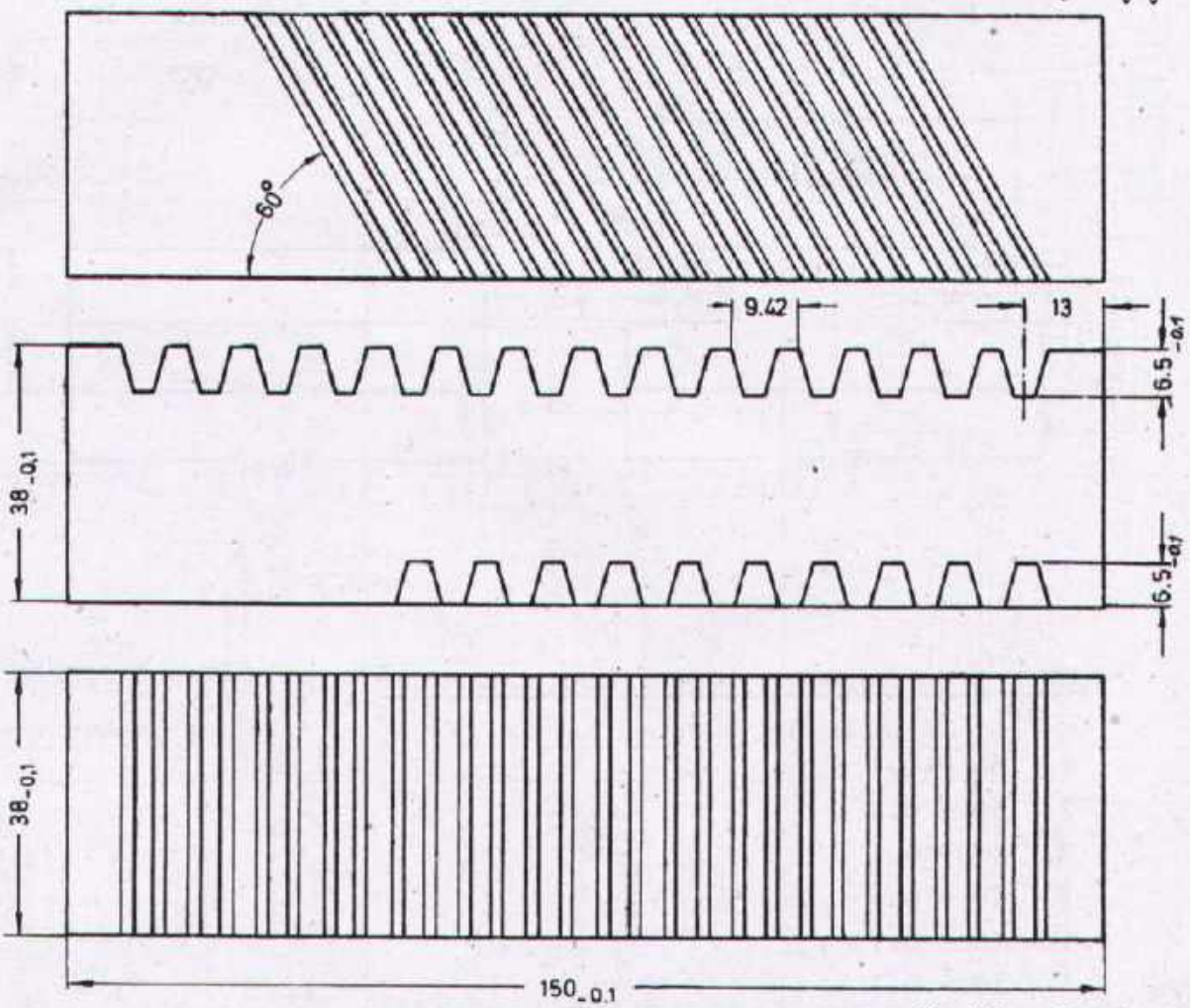
When checking the 90° angle the edge of the try-square must not touch the bottom of the groove !

SCALE 1:1	V- BLOCK	MP/2.3/3.1.2 / 6
MAT:MILDSTEEL	from Ex.5	SHAPING II

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

TURNER

Tolerance ±0,1



CHECK THE FOLLOWING POINTS VERY CAREFULLY

Modul : 3

1. 150 - 0.1
2. 38 - 0.1
3. 38 - 0.1
4. 6.5 - 0.1
5. 6.5 - 0.1
6. Accuracy of angle 60°
7. Dimensional accuracy of teeth 90°
8. Dimensional accuracy of teeth 60°
9. Angle and parallel surface
10. Smoothness all over

All teeth must be precisely parallel !

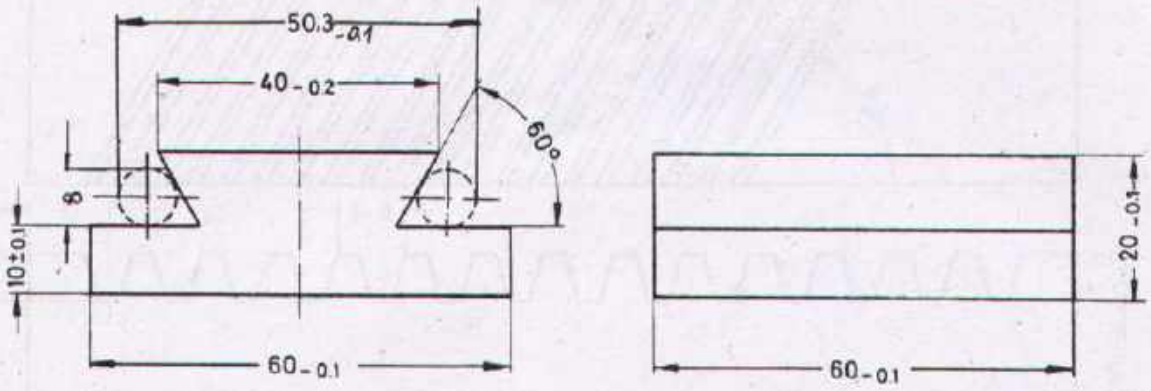
SCALE 1:1	RACK	MP/2.3/3.1.2/7
MAT: CAST IRON		SHAPING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

Tolerance ± 30'



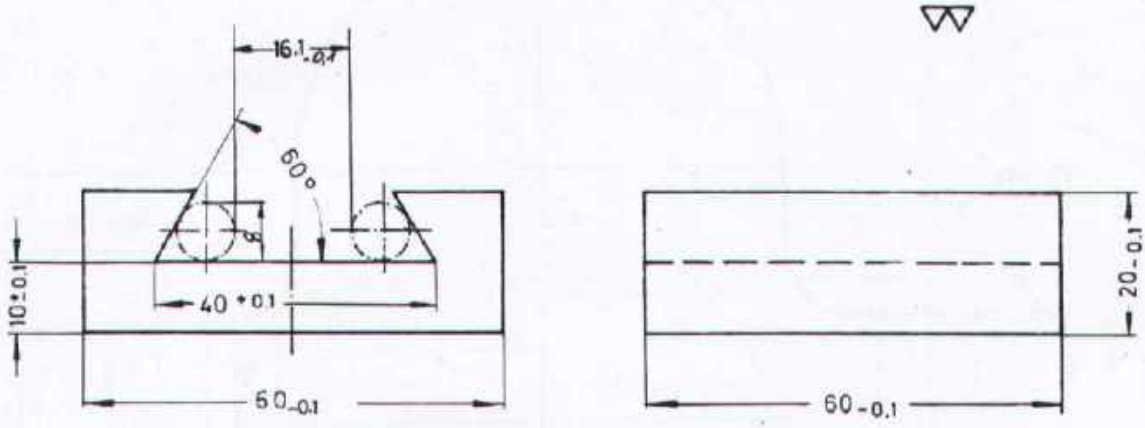
CHECK THE FOLLOWING POINTS VERY CAREFULLY

1. 60 - 0.1
2. 60 - 0.1
3. 50.3 - 0.1
4. 20 - 0.1
5. 10 ± 0.1
6. 10 ± 0.1
7. Angle 60°
8. Angle 60°
9. Angle and parallel surface
10. Smoothness all over

Debur carefully after shaping !

SCALE 1:1	DOVE TAIL	MP/2.3/3.1.2/8
MAT.: MILDSTEEL		SHAPING II

Tolerance ± 30'



CHECK THE FOLLOWING POINTS VERY CAREFULLY

1. 60 - 0.1
2. 60 - 0.1
3. 16.1 + 0.1
4. 40 + 0.1
5. 20 - 0.1
6. 10 ± 0.1
7. Angle 60°
8. Angle 60°
9. Angle and parallel surface
10. Smoothness all over

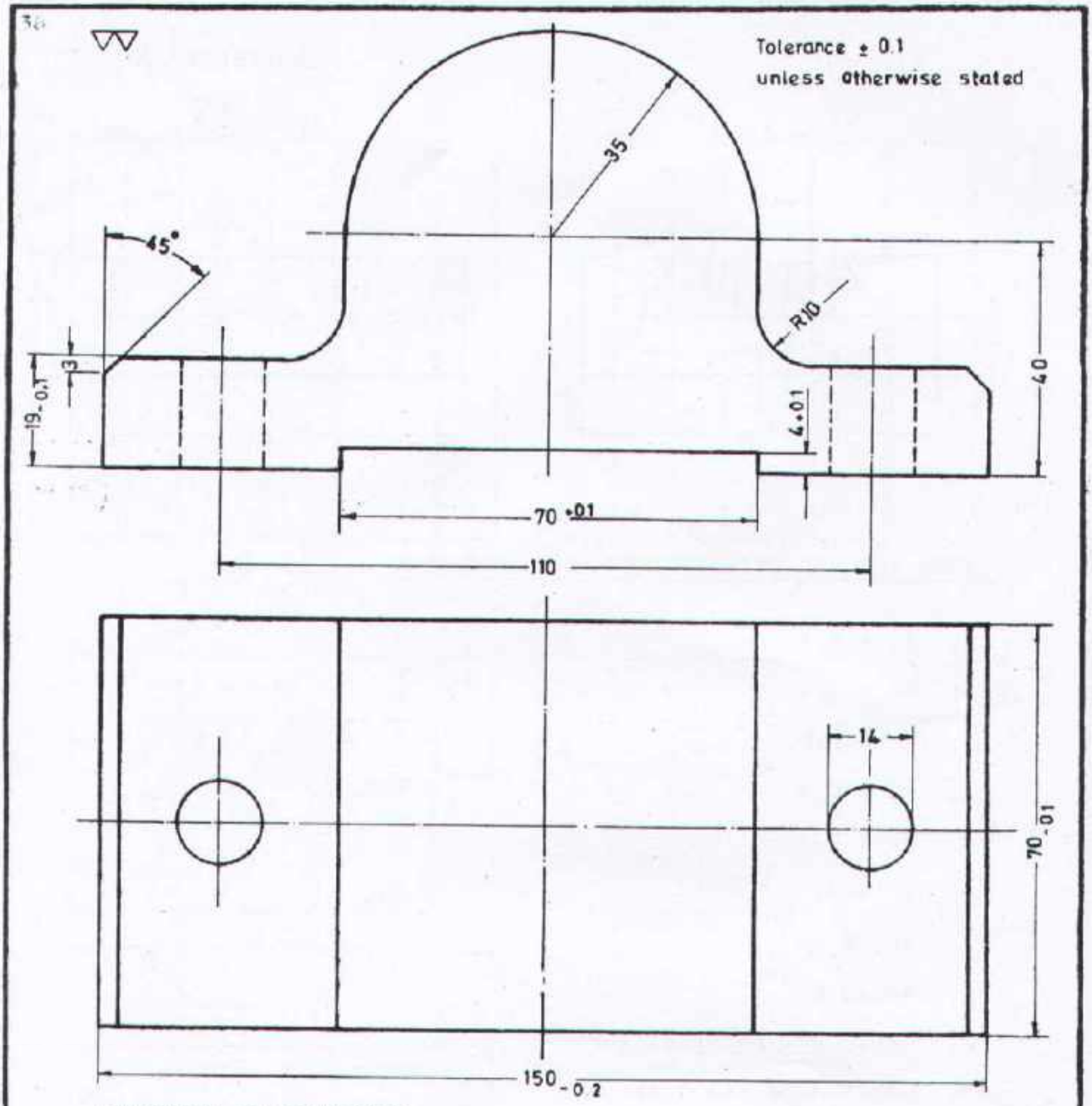
Check the dove tail with the matching piece shown in drawing no. 8 !

SCALE 1:1	DOVE TAIL	MP/2.3/3.1.2/9
MAT.: MILDSTEEL		SHAPING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER



SEQUENCE OF OPERATION

1. Shape the base surface and recess 70 x 4.
2. Use this face as a reference to shape the width 70.
3. Shape to length 150.
4. Shape radius 35 mm and thickness 19 mm.
5. Chamfer 3 x 45°.

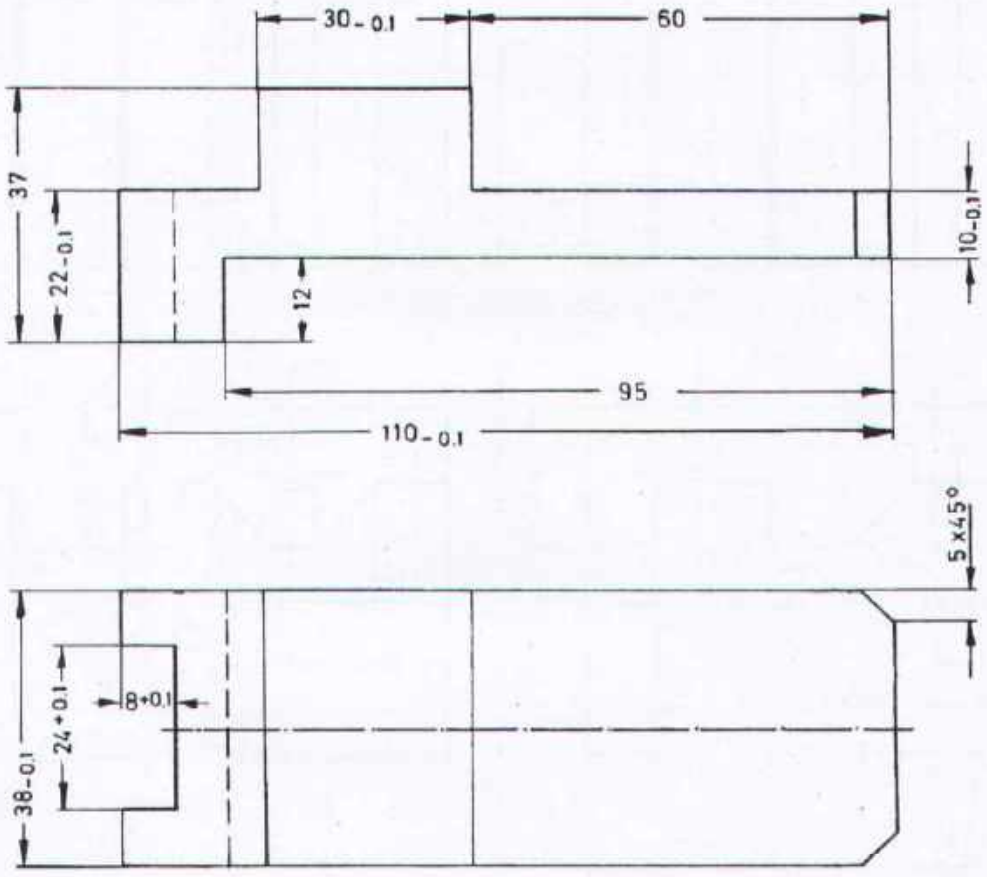
SCALE 1:1	BRACKET	MP/2.3/3.1.2/10
MAT. CAST-IRON		SHAPING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

Tolerance ± 0.1

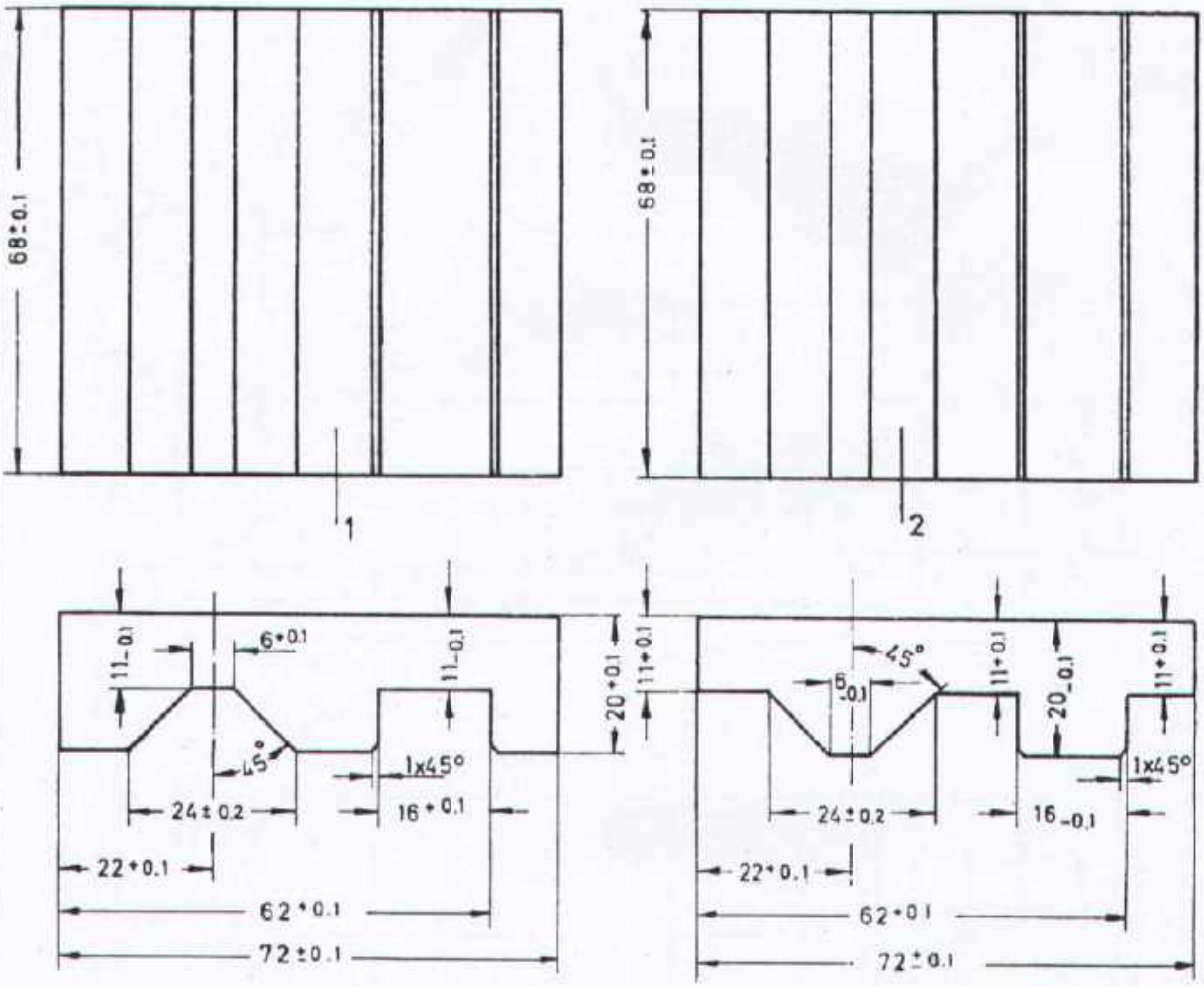


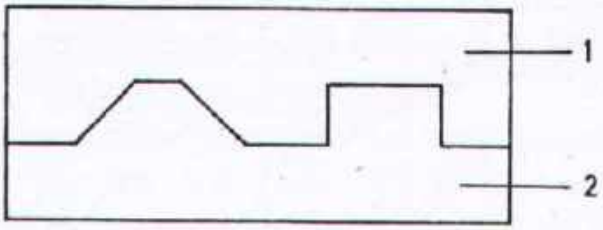
SCALE 1:1	CLAMPING TOOL	MP/2.3/3.1.2/11
MAT.MILD STEEL		SHAPING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER



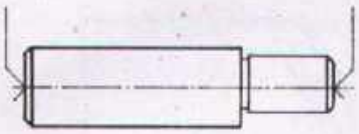


SCALE 1:1	TONGUE FITTING	MP/ 23/ 3.1.2/12-13
MAT: MILDSTEEL		SHAPING II

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

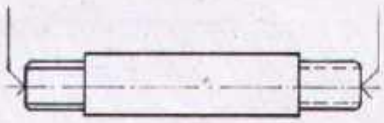
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER



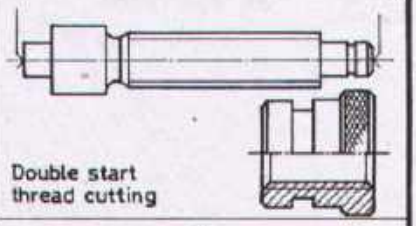
Longitudinal turning

1 → 4.2.2/1



Turning between centres

2 → 4.2.2/

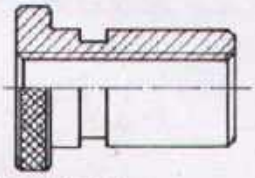


Double start thread cutting

3

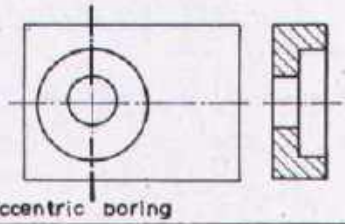
Thread cutting

4 → 4.3.2/2



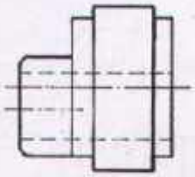
Knurling, Boring

5 → 4.3.2/2



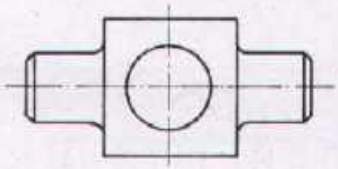
Eccentric boring

3.1.2/3 → 6



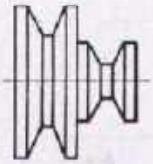
Eccentric turning

7



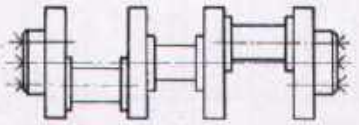
Working on a four jaw chuck

3.1.2/4 → 8



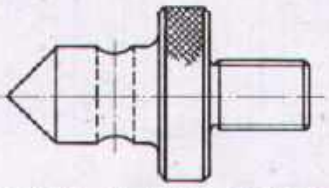
Working on a Mandrel

9



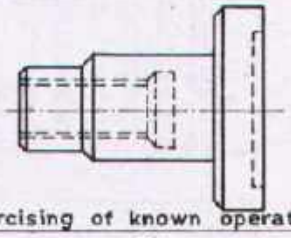
Eccentric turning

10 → 4.2.2/8



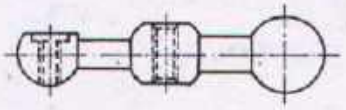
Exercising of known operations

11



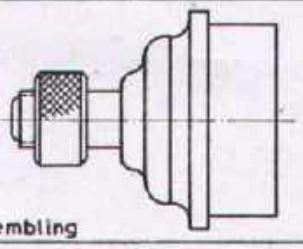
Exercising of known operations

12



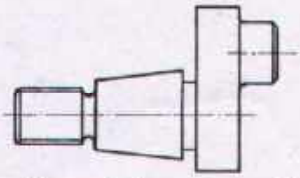
Form turning

13



Assembling

14



Exercising of known operations

15

In addition to the exercises shown above, the trainees have to make parts which are needed for the training centre.

TRADE TRAINING III	LAYOUT	MP/2.1/4.1.1 TURNING III

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MATERIAL REQUIRED

TRADE TRAINING III

TURNER

TURNING III

No.4.1.1/1 to 15

	Exercise No. (Length given in Millimeter)														Length per Trainee	Total length for 16 Trainees	Total weight for 16 Trainees
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	2.5	3.1	3.2	4.1	4.4	4.5			
M.S.Round Ø 44 mm (1 3/4" DIA)	156														156 mm	2.5 meter	30.6 kg
M.S.Round Ø 38 mm (1 1/2" DIA)		156	156												312 mm	5 meter	44.5 kg
M.S.Round Ø 32 mm (1 1/4" DIA)				156								307		5	468 mm	7.5meter	47.3 kg
Carbon St. Ø19 mm (3/4" DIA)					136	136	136								408 mm	6.53meter	14.56 kg
Carbon St. Ø22 mm (7/8" DIA)								136	136						272 mm	4.35meter	13 kg
M.S.Round Ø 26 mm (1" DIA)										190					190 mm	3 meter	12.5 kg
M.S.Round Ø 51 mm (2" DIA)											38				38 mm	0.29meter	9.6 kg
M.S.Round ϕ 19 mm (3/4" DIA)													28		28 mm	0.45meter	1 kg

continued

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TRADE TRAINING III

MATERIAL REQUIRED

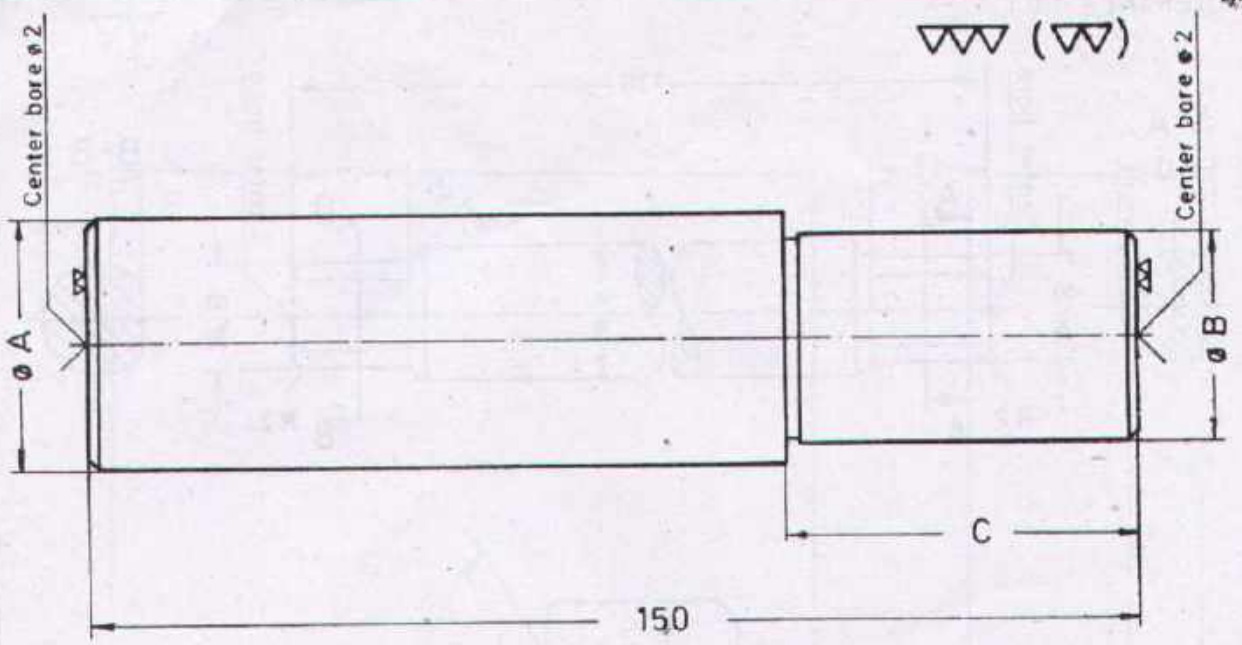
TURNING III

No. 4.1.1/

TURNER

(Length given in Millimeter)

	Exercise No. 5.2	5.3	7	9	10	11	12	13.1	13.2	13.3	14	14.2	14.3	14.4	15.1	15.2	15.3	Length per Trainee	Total length for 16 Trainees	Total weight for 16 Trainees
M.S.Round Ø70mm (2 3/4" DIA)	56																	56 mm	0.9 meter	27.0 kg
M.S.Round Ø63mm (2 1/2" DIA)		54																54 mm	0.86meter	21.3 kg
Cast Iron Ø86mm (3 3/8" DIA)			44															44 mm	0.7 meter	30.0 kg "CASTING"
Cast Iron Ø105mm (4 1/4" DIA)				46														46 mm	0.74meter	26.3 kg "CASTING"
M.S.Round Ø51mm (2" DIA)					142	91												233 mm	3.7 meter	60.0 kg
M.S.Round Ø82mm (3 1/4" DIA)							56											56 mm	0.9 meter	23.5 kg
M.S.Round Ø32mm (1 1/4" DIA)								131										131 mm	2.1 meter	13.3 kg
M.S.Round Ø22mm (7/8" DIA)									81									81 mm	1.3 meter	3.9 kg
M.S.Squ.25x25mm (1" squ.)										40								40 mm	0.64meter	3.3 kg
M.S.Round Ø82mm (3 1/4" DIA)											36							36 mm	0.58meter	23.2 kg
M.S.Round Ø63mm (2 1/2" DIA)												22						22 mm	0.35meter	8.75 kg
M.S.Round Ø25mm (1" DIA)													84					84 mm	1.34 meter	5.4 kg
M.S.Round Ø32mm (1 1/4" DIA)														21			24	45 mm	0.72meter	4.55 kg
M.S.Round Ø50mm (2" DIA)															75			75 mm	1.2 meter	19.0 kg
M.S.Round Ø44mm (1 3/4" DIA)																35		35 mm	0.56meter	6.74 kg



Exercise No	ø A	ø B	C	Marks given
1.1	38 ± 0,03	34 ± 0,03	40 ± 0,1	
1.2	36 ± 0,02	32 ± 0,02	42 ± 0,1	
1.3	33 ⁺0,02	29 ⁺0,02	44 ± 0,1	
1.4	30 -0,01	27 -0,01	46 ± 0,1	

Diameters must be checked with the Micrometer 25 to 50 mm.

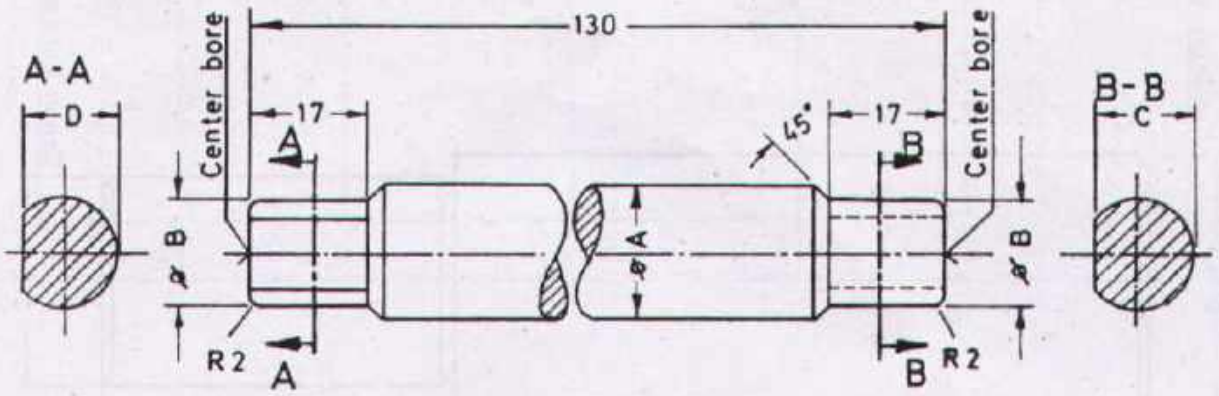
SCALE 1:1	MEASURING EXERCISE	MP/2.3/4.1.1/ 1
MAT: MILDSTEEL		TURNING III

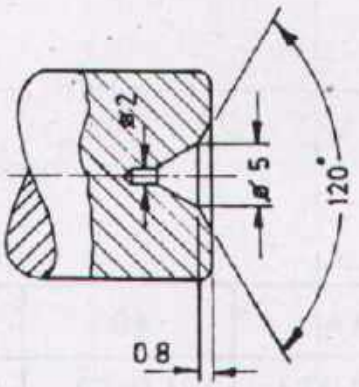
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

TOLERANCE ± 0.1





Grinding ø	ø A	ø B	C
ø 15	15,2	13	12
ø 16	16,2	14	12,5
ø 17	17,2	14,5	13
ø 18	18,2	15	13
ø 19	19,2	16	14

SCALE 1:1	Mandrel	MP/2.3/4.1.1/2
MAT.CARBON ST.		TURNING III

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

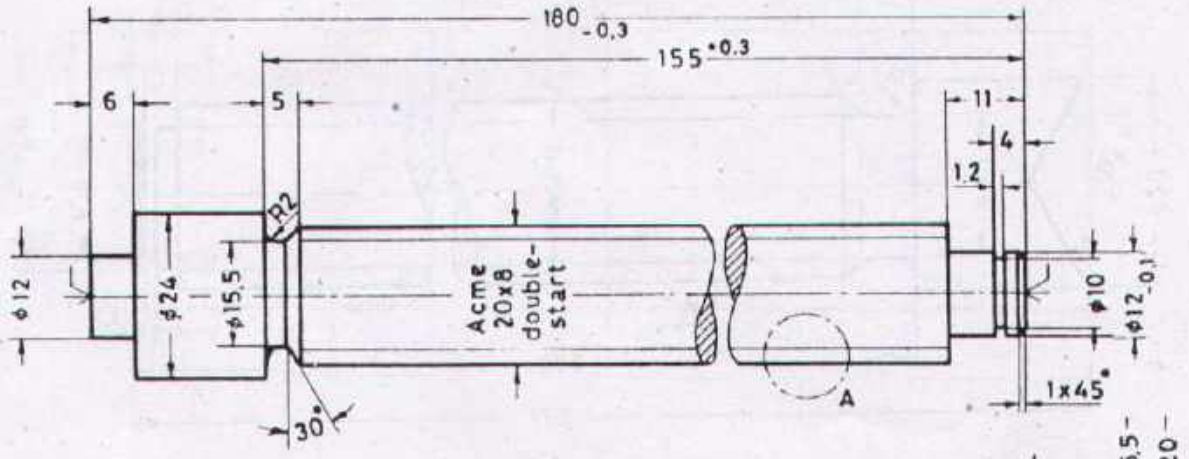
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

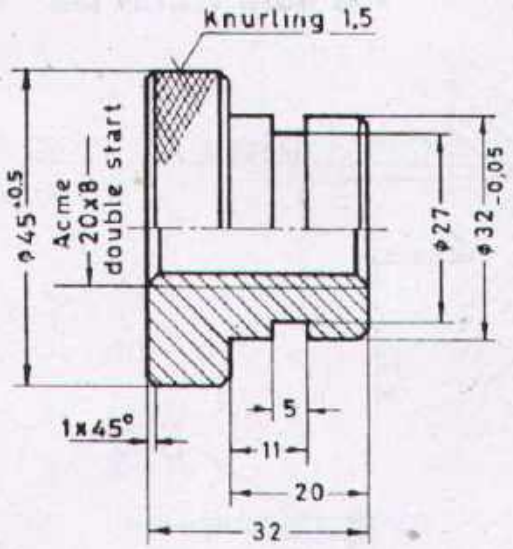
TURNER

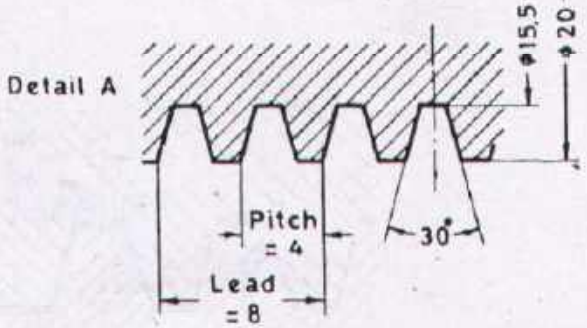
47

Tolerance ±0,1
unless otherwise stated

47





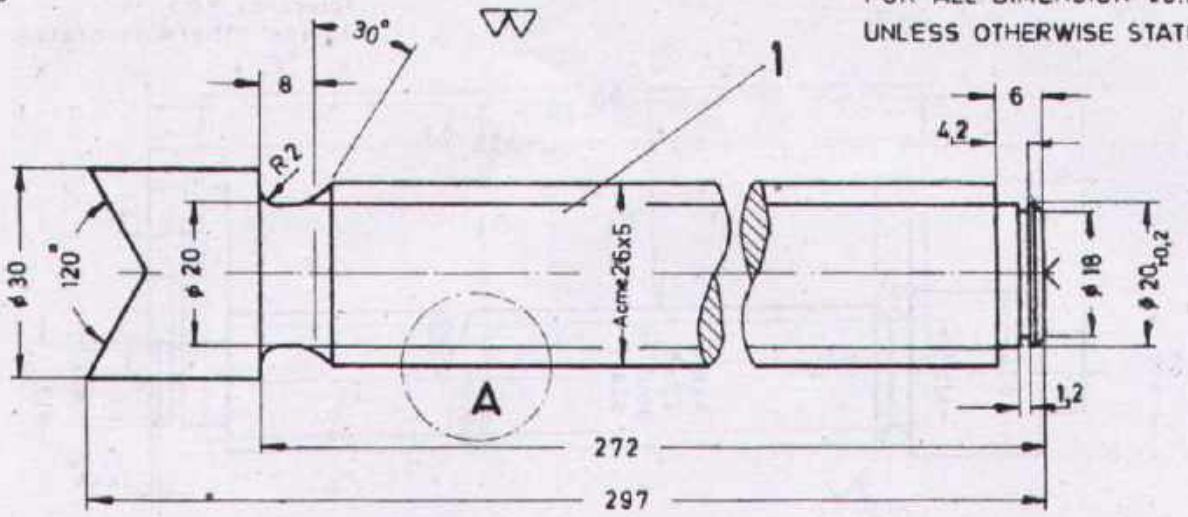


CUTTING A MULTIPLE THREAD, PROCEED AS IF CUTTING A SINGLE THREAD OF THE REQUIRED LEAD BY USING A TOOL ACCORDING TO THE GIVEN PITCH.

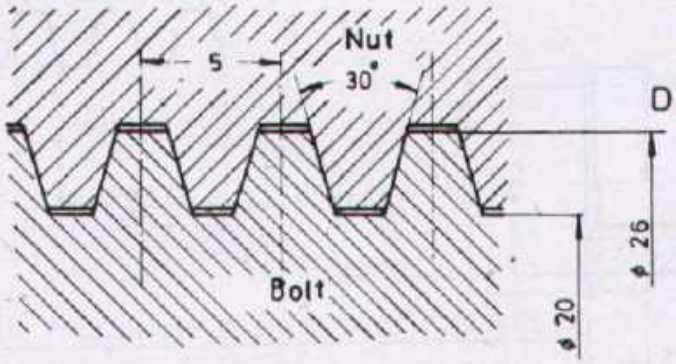
AFTER CUTTING THE FIRST THREAD GROOVE, IT IS NECESSARY TO GIVE THE WORK EXACTLY HALF A TURN WITHOUT TURNING THE LEAD SCREW.
USE THE METHOD TO DISENGAGE THE INTERMEDIATE GEAR FROM THE SCREW GEAR TO MOVE THE LATHE SPINDLE ONE HALF TURN.

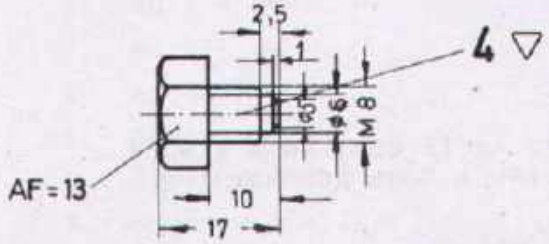
SCALE 1:1	SPINDLE AND NUT (with double thread)	MP/2.3/4.1.1/3
MAT. MILD STEEL		TURNING III

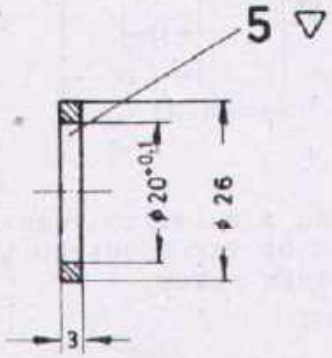
FOR ALL DIMENSION ±0.1
UNLESS OTHERWISE STATED



Acme threads ϕ 26x5 mm pitch







REQD	NAME	STANDARD	MATERIAL	NO	SIZE
1	Washer		St 37	5	ϕ30X3
1	Hexagon bolt	DIN 558	St 37	4	M8X10
1	Spindle		St 37	1	ϕ30X302

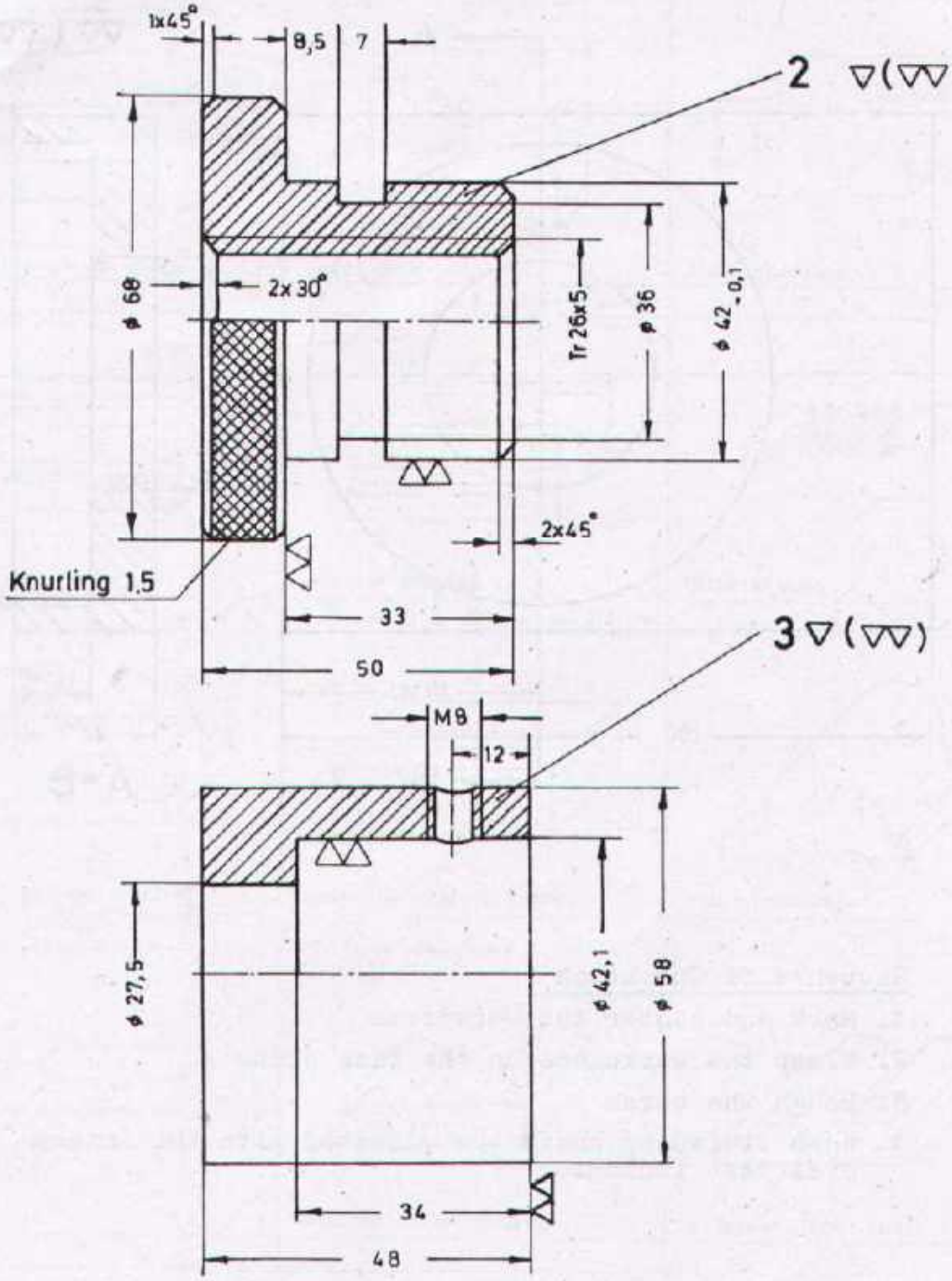
SCALE 1:1
MAT.MILD STEEL

DETAIL OF SUPPORT

MP/2.3/4.1.1/4
TURNING III

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

TURNER



Hold the nut by using the ready spindle as a mandrel to turn Ø 42 and groove.

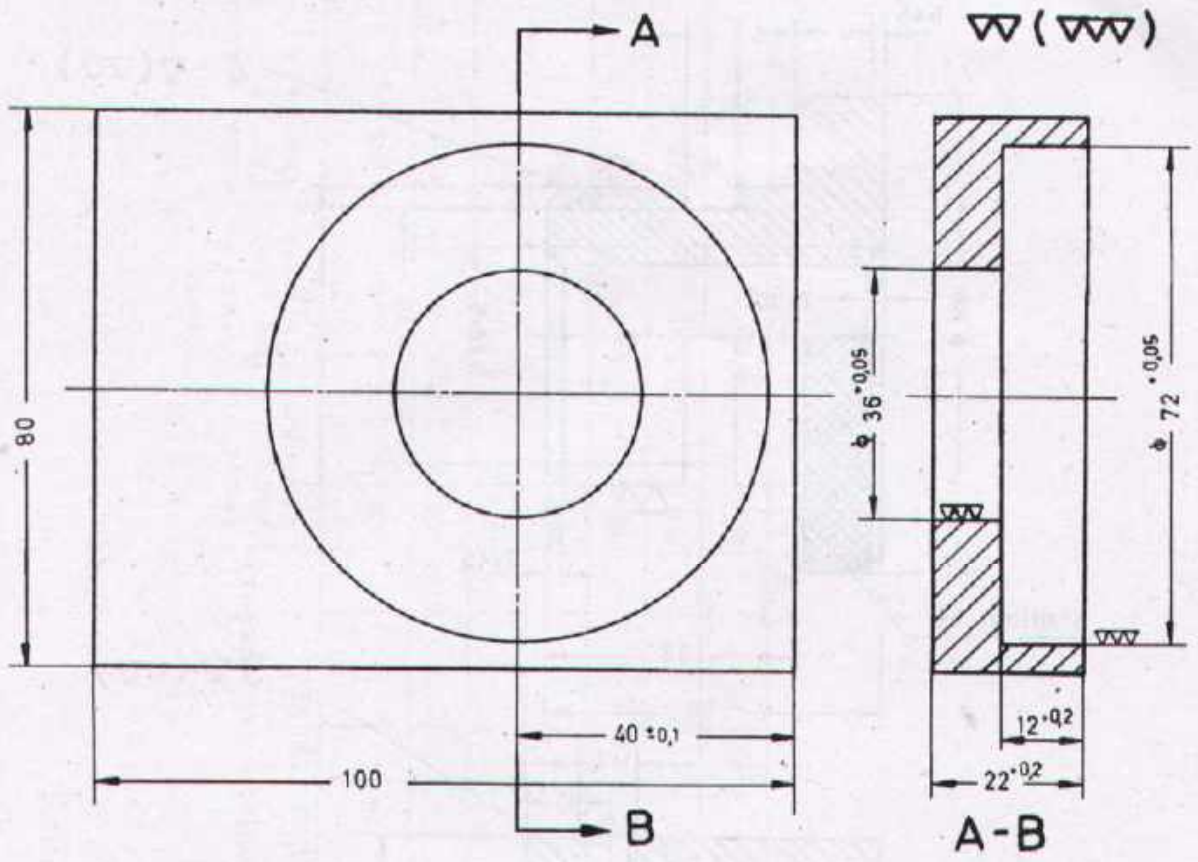
REQD	NAME	STANDARD	MATERIAL	NO	SIZE
1	Head		St 37	3	ø 60 X 50
1	Nut		St 37	2	ø 70 X 52

SCALE 1:1	DETAIL OF SUPPORT	MP/2.3/4.1.1/5
MAT. MILDSTEEL		TURNING III

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER



Sequence of Operation

1. Mark and center the workpiece
2. Clamp the workpiece on the face plate
3. Rough the bores
4. When finishing, check the diameter with the interal dial test indicator

SCALE 1:1	ECCENTRIC BORING PLATE	MP/2.3/4.1.1/6
MAT. CAST IRON	From 312/6	TURNING III

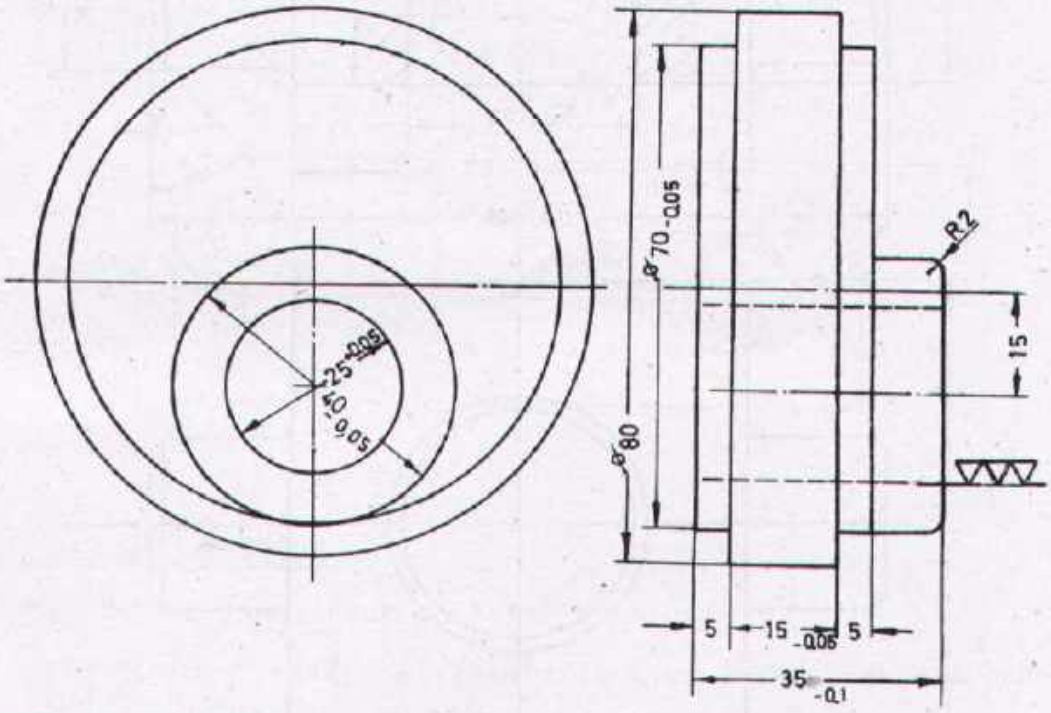
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

▽ (▽▽)

FOR ALL DIMENSIONS ± 0.1
UNLESS OTHERWISE STATED



SEQUENCE OF OPERATION

1. Hold workpiece in 3-jaw chuck, face and turn outside Ø 80 x 21.
2. Turn step Ø 70 x 5. Re-chuck, face to length 35 mm.
3. Turn step Ø 70 x 15.
4. Mark out excentre 15 mm and centre drill with the help of drilling machine.
5. Mount 4-jaw chuck.
6. Hold workpiece in such a way that the previously drilled centre hole runs true.
7. Turn excentre Ø 40 x 10 and radius 2.
8. Pre-drill and drill Ø 24.5
9. Mount boring tool and finish hole to Ø 25.

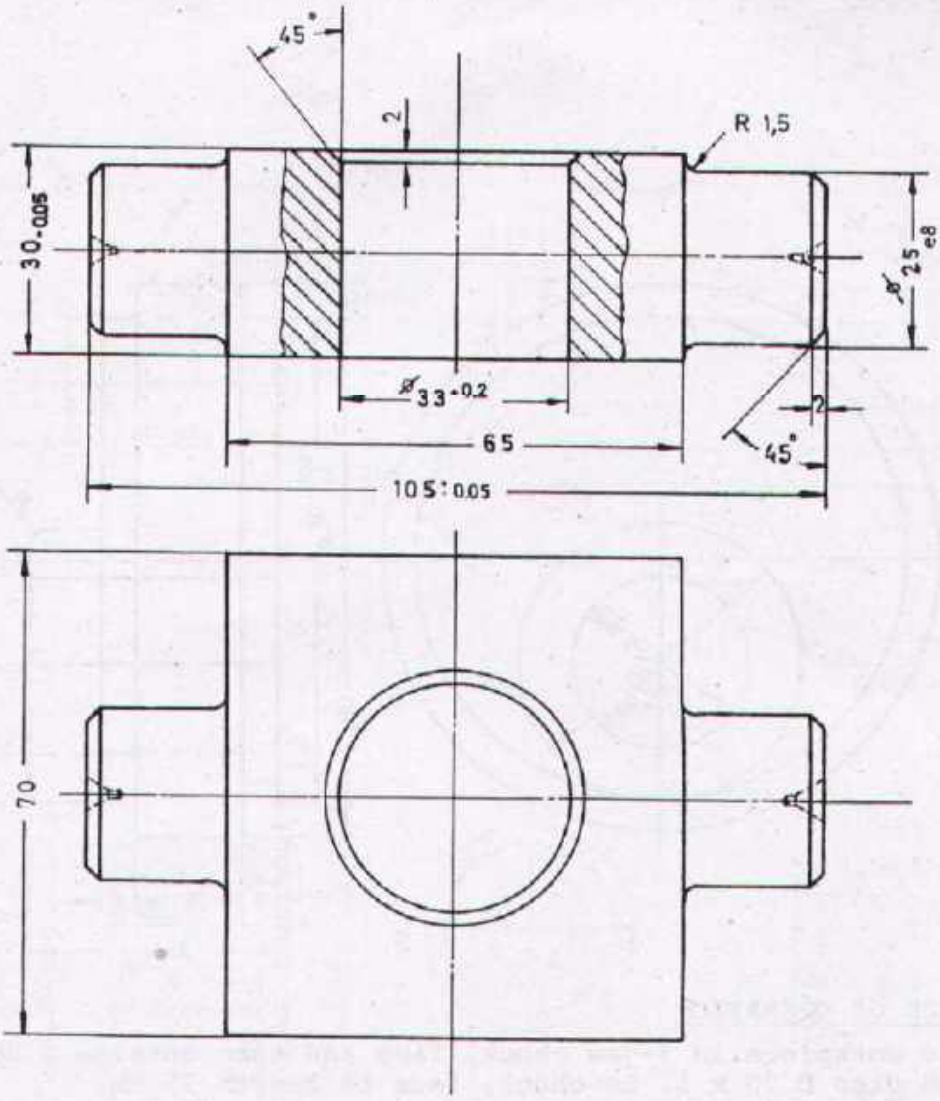
SCALE 1:1	ECCENTRIC SHEAVE	MP/23/41.1/7
MAT: CAST IRON		TURNING III

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

TURNER

Tolerance ± 0.1

▽▽ (▽▽)



SEQUENCE OF OPERATION

1. Mark out the centres and drill.
2. Hold in 4-jaw chuck, pre-drill and bore hole Ø 33.
3. Hold between centres and turn both sides to Ø 25_{e8} x 20.

	25 e8	-0.040 -0.078
SCALE 1:1	MOVEABLE NUT	MP/2.3/41.1/8
MAT: CAST IRON	From 31.2/4	TURNING III

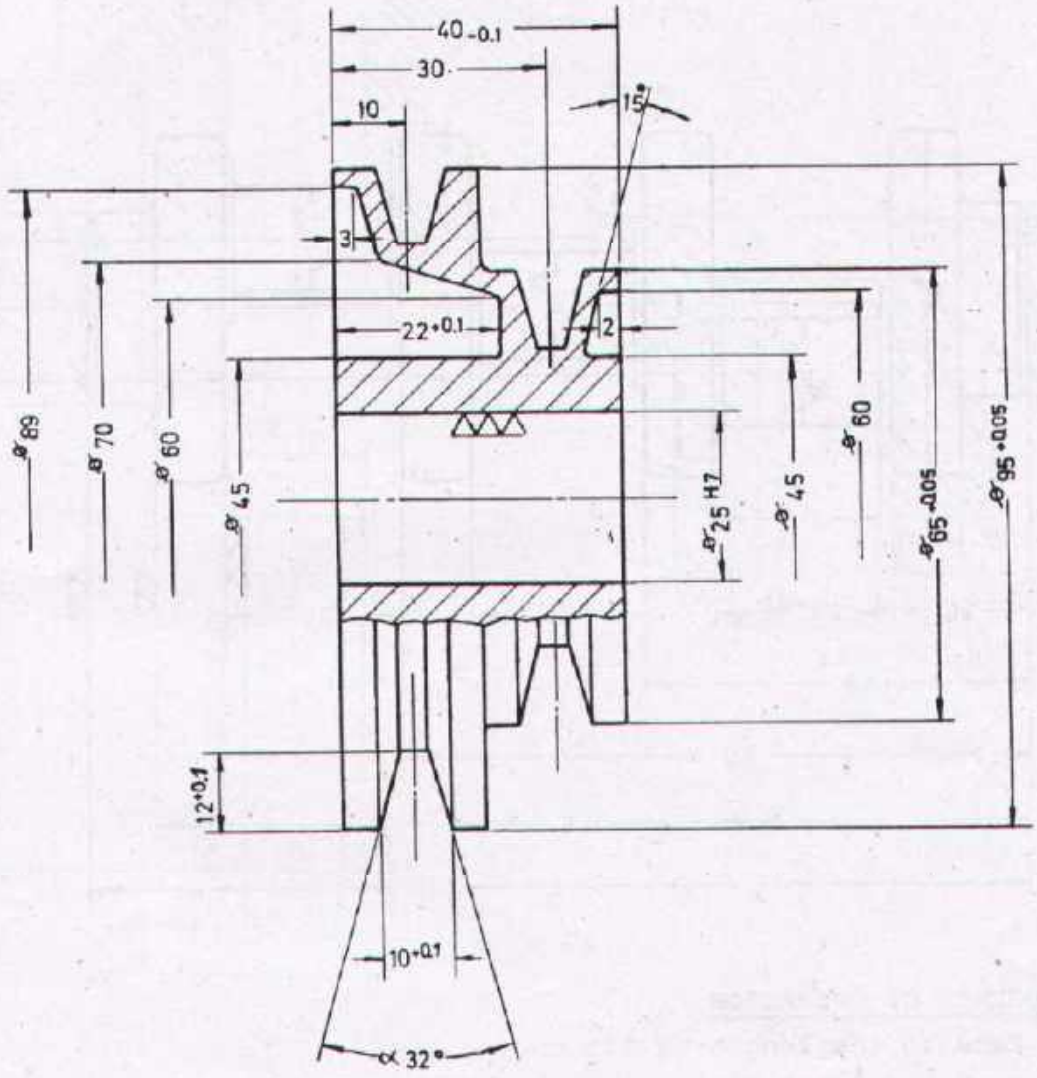
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

▽▽ (▽▽▽)

FOR ALL DIMENSIONS ± 0.1
UNLESS OTHERWISE STATED

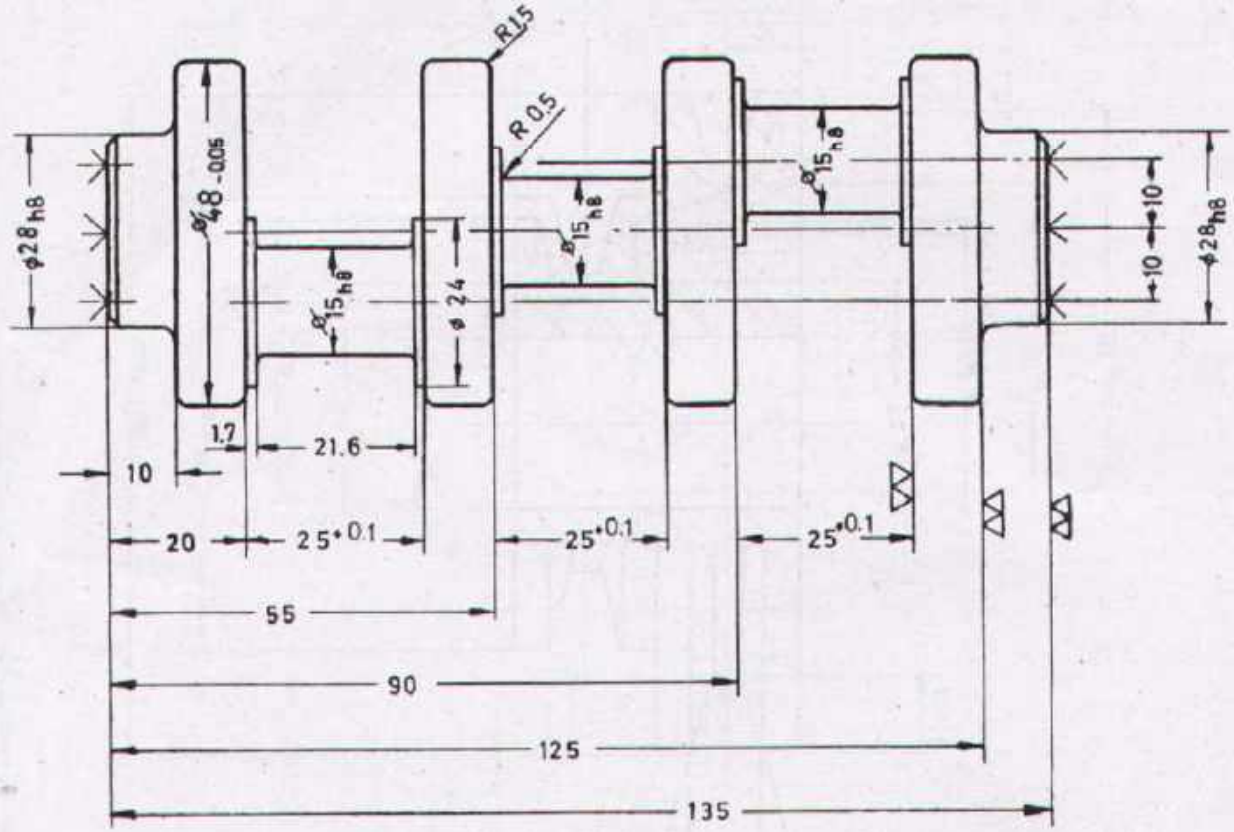


Turn the outside diameter by using a mandrel to ensure true running.

	25 H7	+0.021 0.000
SCALE 1:1	PULLEY	MP/2.3/4.1.1/9
MAT. CAST IRON		TURNING III
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		TURNER

FOR ALL DIMENSION ±0.1
UNLESS OTHERWISE STATED

▽▽▽ (▽▽)



SEQUENCE OF OPERATION

1. Face to the length of 135 mm
2. Mark and drill all 6 centres.
3. All other operations are to be completed with the workpiece held between centres.

28 ø h8	0.000 -0.033
15 ø h8	0.000 -0.027

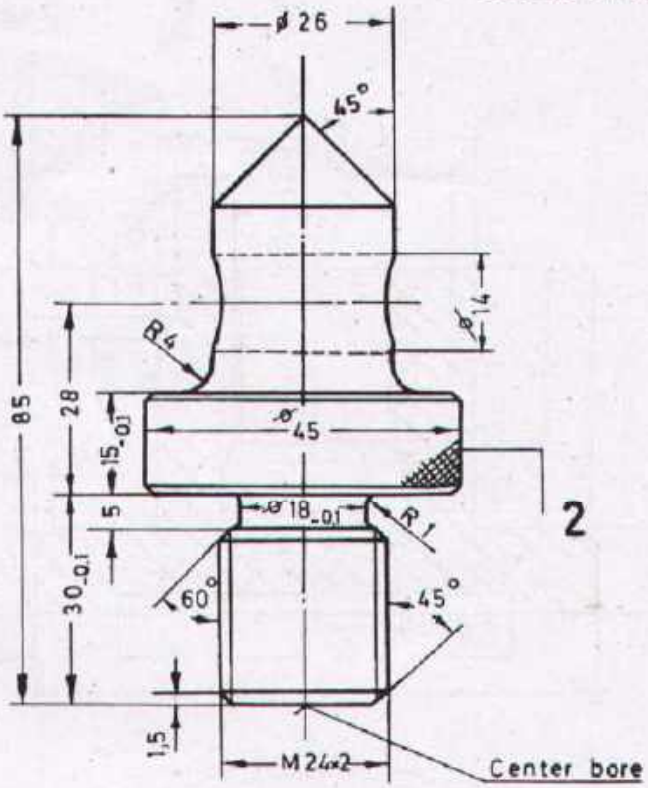
SCALE 1:1	CRANK SHAFT	MP/2.3/4.1.1/10
MAT: MILDSTEEL		TURNING III

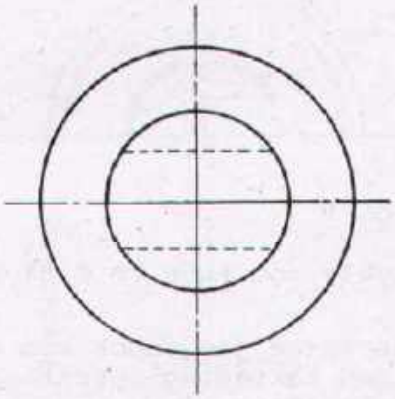
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

FOR ALL DIMENSIONS ± 0.1
UNLESS OTHERWISE STATED





SEQUENCE OF OPERATION

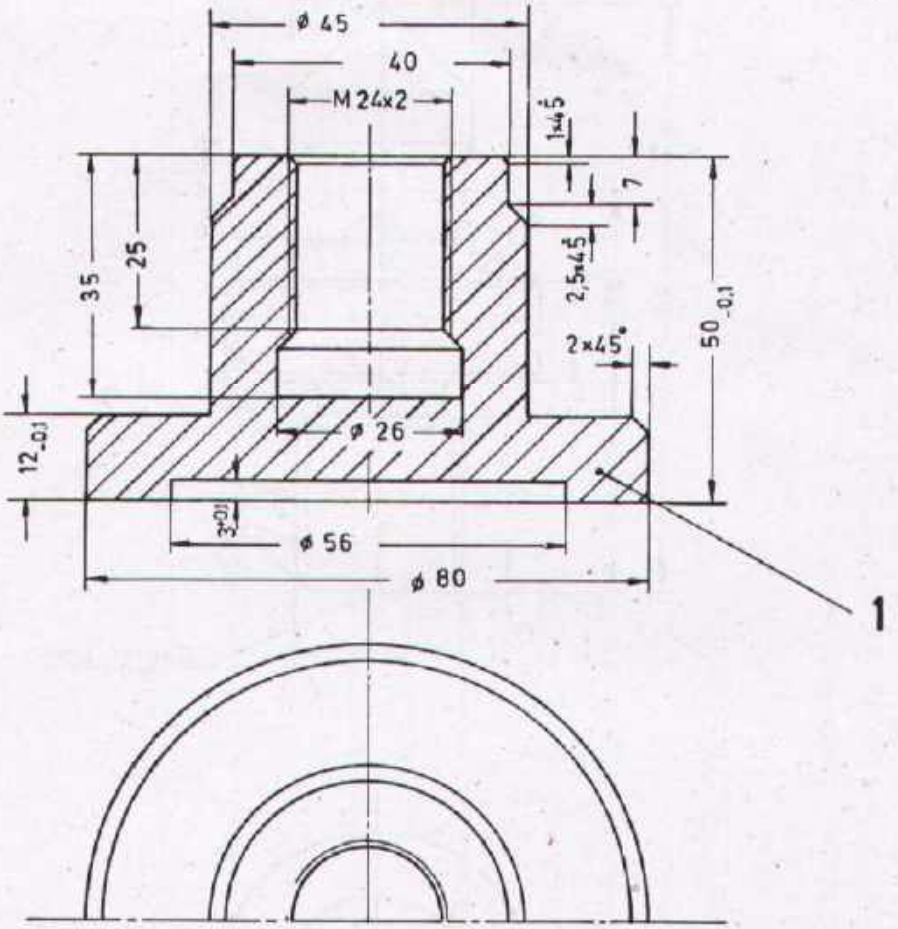
1. Turn Ø 26 to oversize 27 in the first step.
2. Hold Ø 27 in the three jaw chuck and complete knurled and threaded portions of the job.
3. Keep this job till the nut M 24 x 2 is ready as it will be needed for holding the screw during the finishing operations.

SCALE 1:1	MOVEABLE SCREW	MP/2.3/4.1.1/11
MAT: MILDSTEEL		TURNING III

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

TURNER

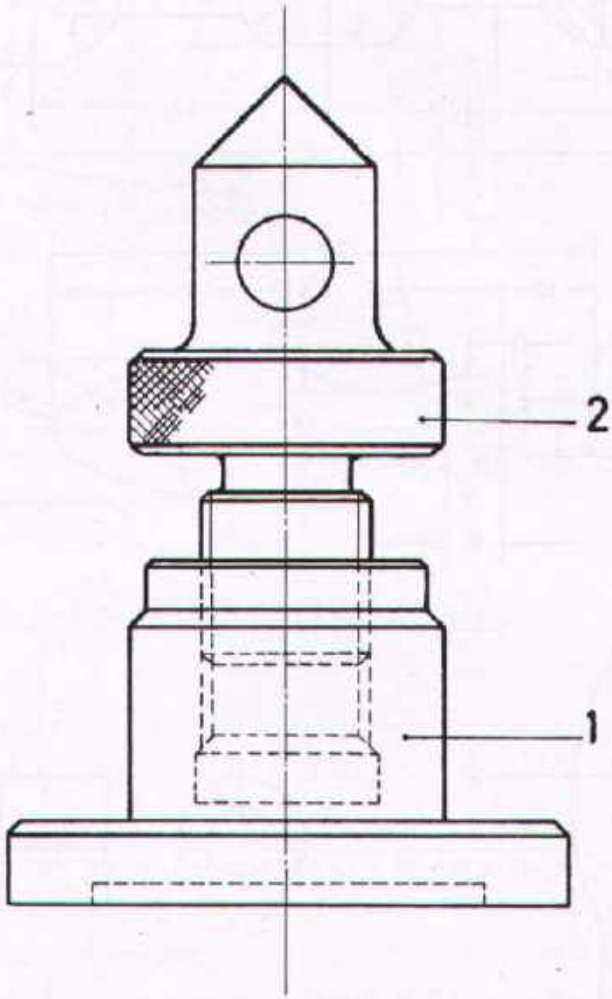
FOR ALL DIMENSIONS ±0,1
UNLESS OTHERWISE STATED



SEQUENCE OF OPERATION

1. Face one end roughly and turn to Ø 81 at a length of about 15 mm.
2. Clamp Ø 81 in the three jaw chuck and complete all turning, boring and threading operations as far as possible in this position.
3. Now use the workpiece to hold the screw from the previous exercise for the necessary operations.
4. Clamp Ø 45 and complete the base.

SCALE 1:1	BASE FOR MOVEABLE SCREW	MP/2.3/4.1.1/12
MAT: MILDSTEEL		TURNING III

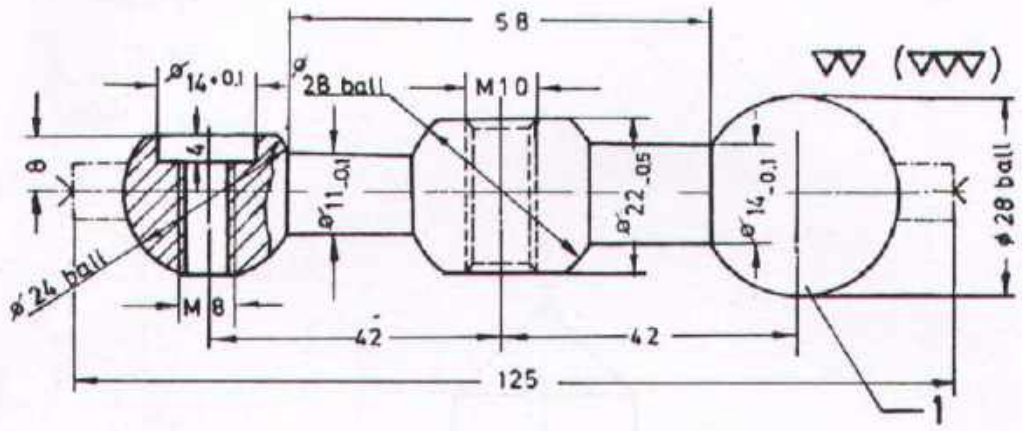


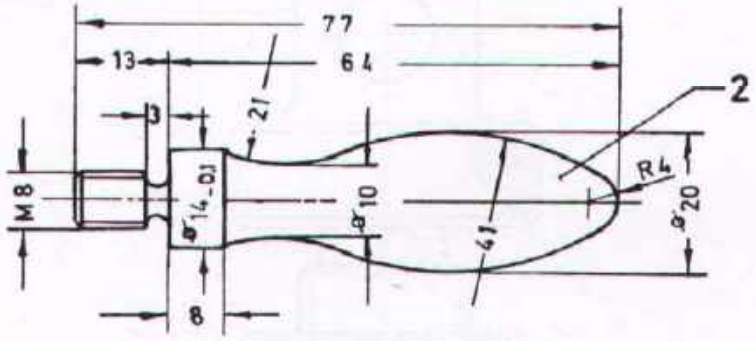
SCALE 1:1	BASE AND MOVEABLE SCREW	MP/23/4.11/12 a
MAT. MILDSTEEL		TURNING III

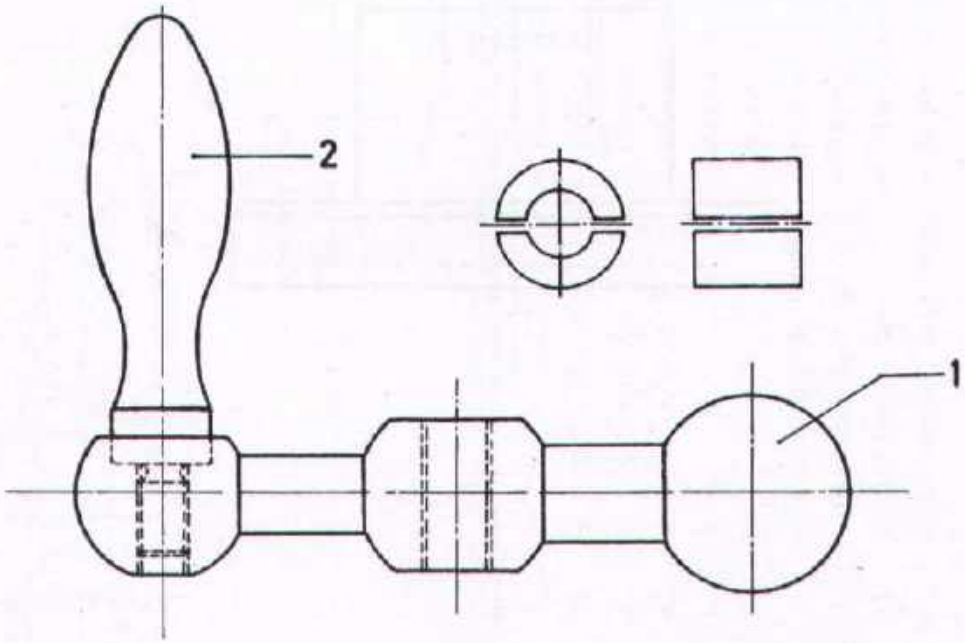
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER







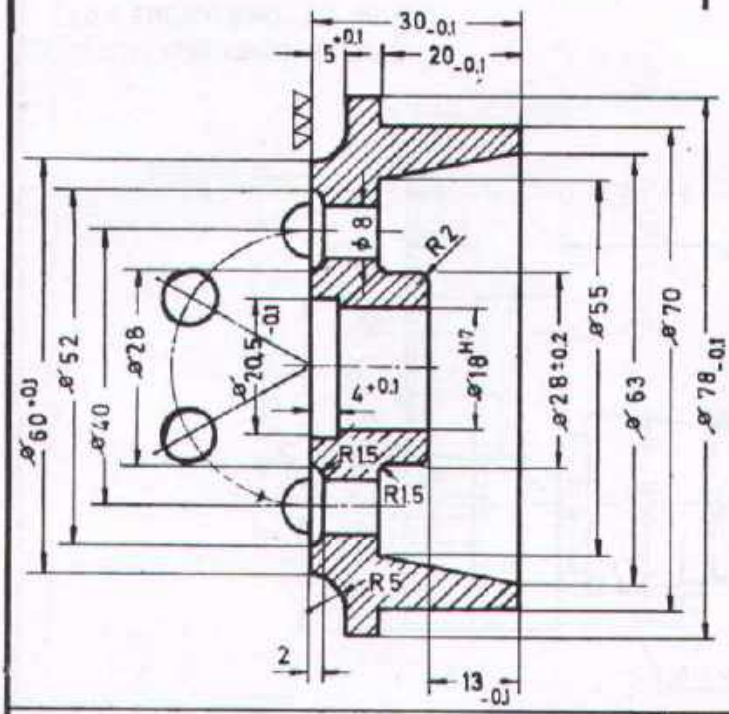
SCALE 1:1	MACHINE HANDLE	MP/2.3/4.1.1/13
MAT. MILDSTEEL		TURNING III

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

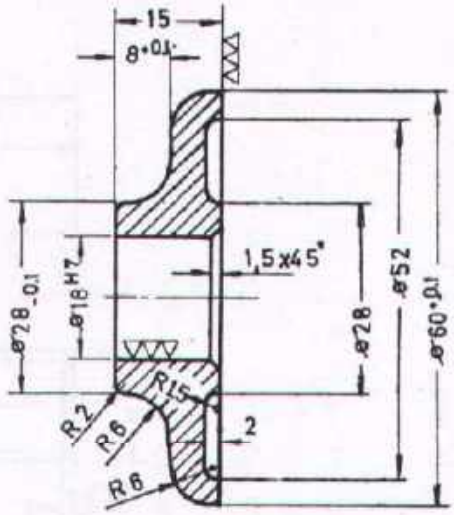
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

1

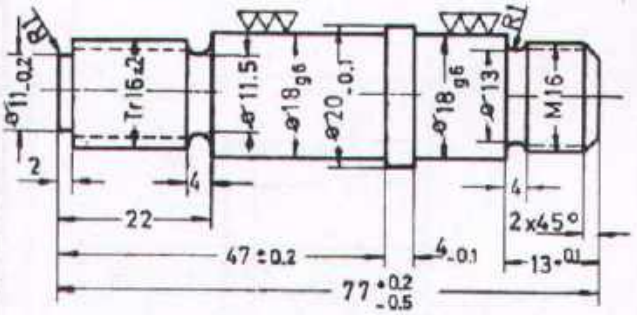


Tolerance ± 0.1



2

3



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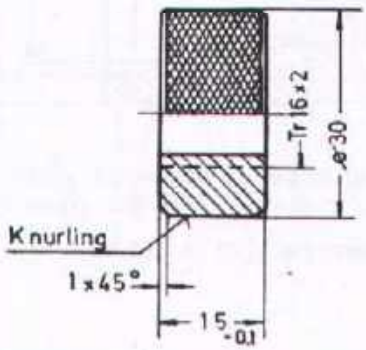
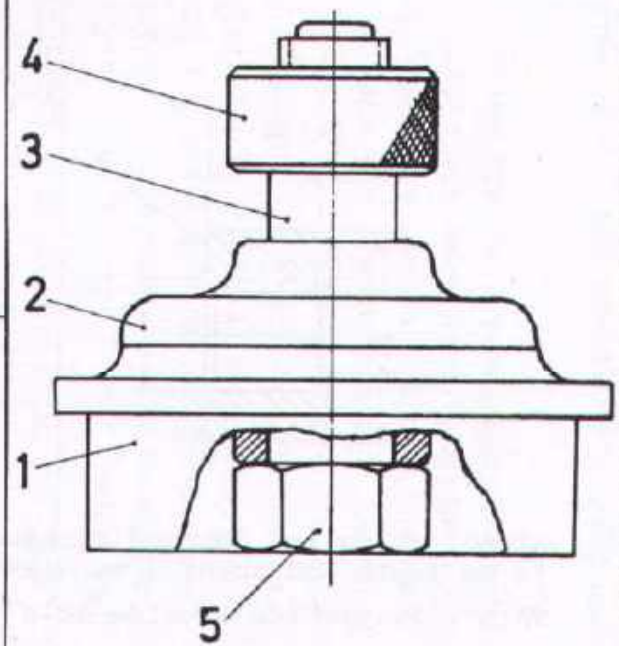




SCALE 1:1	SPINDLE AND CENTRE	MP/2-3/4.1.1/14
MAT: MILDSTEEL		TURNING III

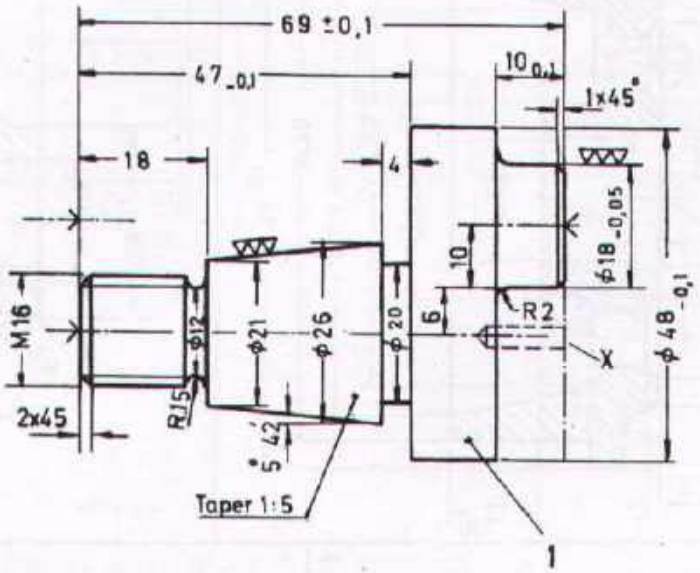
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

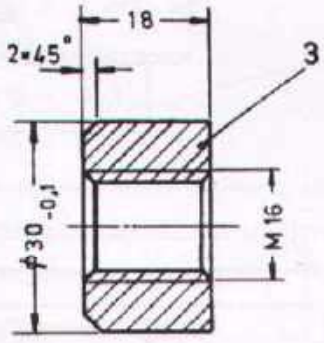
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

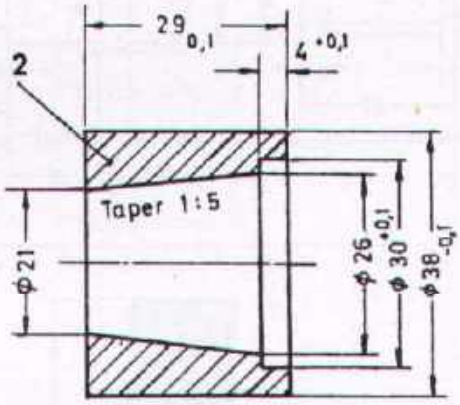
TURNER

▽▽ (▽▽▽)

FOR ALL DIMENSIONS ±0,1
UNLESS OTHERWISE STATED







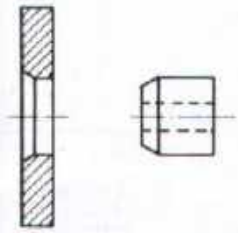
After facing the job and marking the 4 centres a hole of about 12 mm depth and about 3 mm diameter is to be drilled in place X.

This will provide a guide hole for the centre drill later.

SCALE 1:1	ECCENTRIC TAPER BOLT	MP/23/411/15
MAT: MILDSTEEL		TURNING III

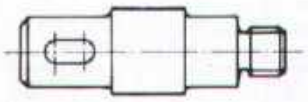
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER



Exercising of known operations

1 → 3

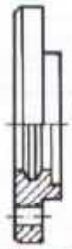


Turning within small tolerances

2 → 5

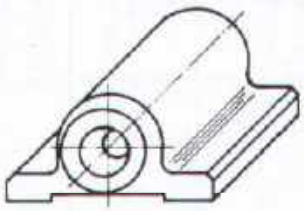
Turnig of welded parts

1 → 3 → 5



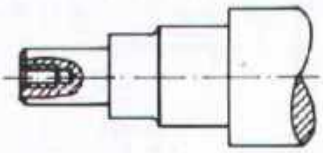
Turning of internal grooves

4 → 5



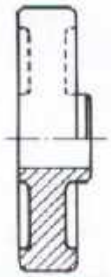
Working on a four jaw chuck

3.1.2/10 → 5 ← 2/3/4



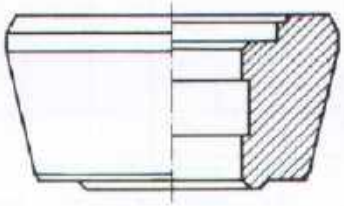
Work with steadyrest

6



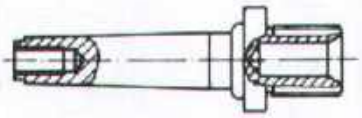
Facing of grooves

7



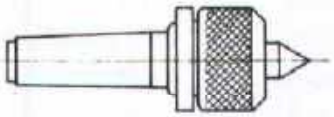
Boring to high accuracy

8 → 421/9



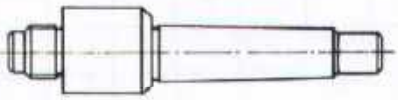
Taper turnig

9



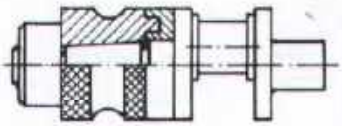
Exercising of known operations

10



Exercising of known operations

11 → 4.2.1/11



Eccentric shaft

12

In addition to the exercises shown above , the trainees have to make parts which are needed for the training centre.

TRADE TRAINING III	LAYOUT	MP/2.1/4.1.2 TURNING IV

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

MATERIAL REQUIRED

TRADE TRAINING III

TURNER

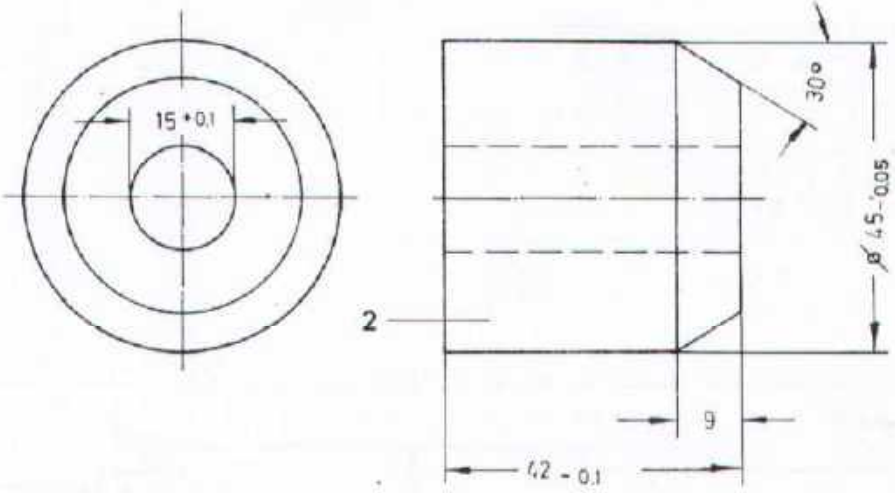
TURNING IV

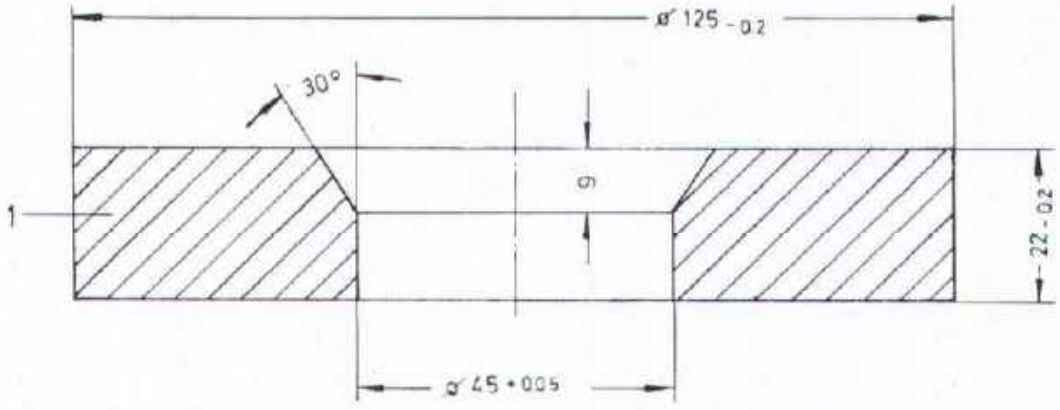
No. 4.1.2/1 to 12

Exercise No. (Length given in Millimeter)	1,1	1,2	2	4	6	7	8	9,1	9,2	9a	9a	10,1	10,2	10,3	11,1	11,2	12,1	12,2	12,3	12,4	Length per Trainee	Total length for 16 Trainees	Total weight for 16 Trainees
M.S.Round Ø 50 mm (2" DIA)	48				106					16		150	46								366 mm	5.9 meter	93.8 kg
M.S.Round Ø130 mm (5 1/4" DIA)		30																			30 mm	0.48meter	52.3 kg
M.S.Round Ø 38 mm (1 1/2" DIA)			155					106	68											22	351 mm	5.62meter	47.6 kg
M.S.Round Ø 75 mm (3" DIA)				16																	16 mm	0.256 meter	9.0 kg
Cast Iron acc. to pattern																					casting		
Cast Iron Ø105 mm (4 1/4" DIA)						28															28 mm	0.45meter	30.5 kg "CASTING"
M.S.Round Ø102 mm (4 " DIA)							56														56 mm	0.9 meter	57.6 kg
M.S.Round Ø 19 mm (3/4" DIA)											14										14 mm	0.224 meter	0.55 kg
M.S.Round Ø 25 mm (1" DIA)														68			150	48	18		284 mm	4.6 meter	28.0 kg
M.S.Round Ø 44 mm (1 3/4" DIA)															166	20					186 mm	3.0 meter	26.5 kg

	Total Nos. per Trainee	Total Nos. for 16 Trainees	
Cheese Head Screws M 5 x 15 mm	1 No.	18 Nos.	

Tolerance ± 0.2





SCALE 1:1	FLANGE	MP/23/4.1.2/1
MAT.: MILDSTEEL		TURNING IV

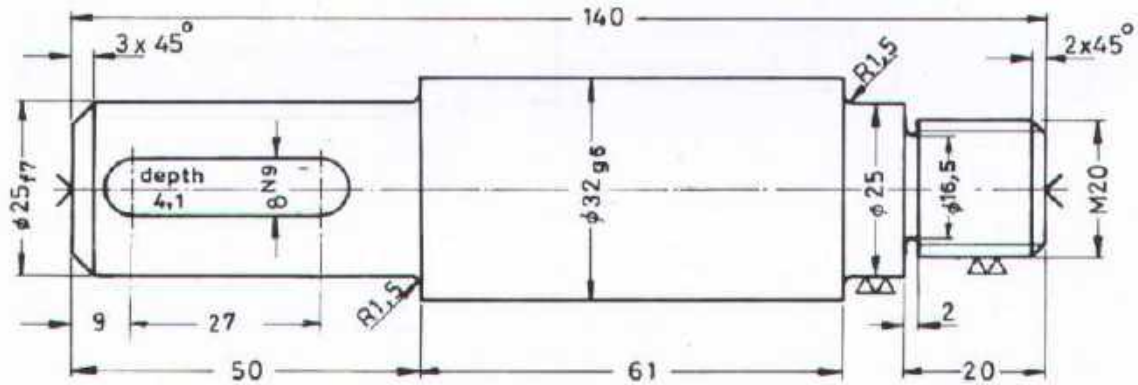
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

▽▽▽ (▽▽)

Tolerance ± 0,1
unless otherwise stated



25_{f7}	$^{-20}_{-41}$
32_{g6}	$^{-9}_{-25}$
8^{N9}	$^{0}_{-36}$

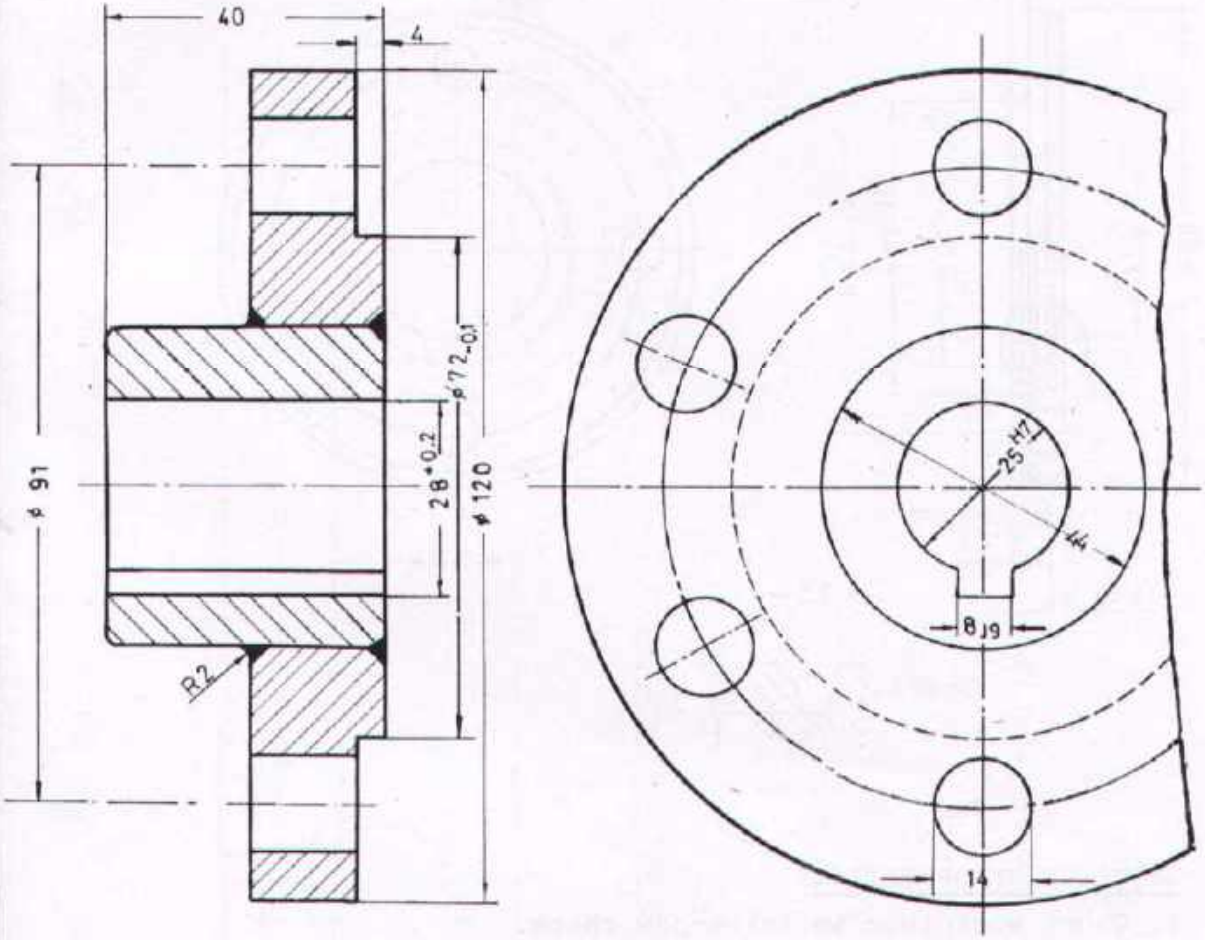
SCALE 1:1	SHAFT	Mp/2.3/4.1.2/2
MAT.: MILD STEEL		TURNING IV

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

Tolerance ± 0.1
unless otherwise stated.

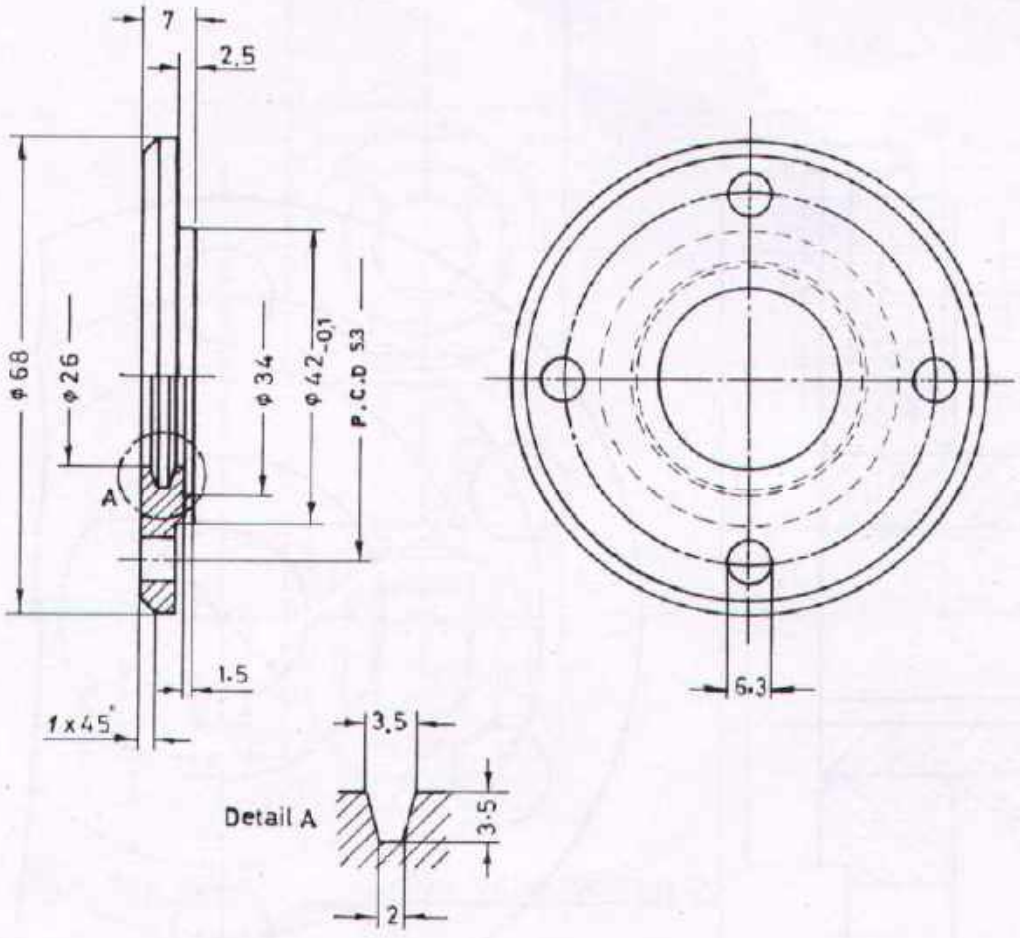


SEQUENCE OF OPERATION

1. Hold workpiece on the rough machined ø 45.
2. Machine the hole 25^{H7}, outside ø 120 and step 72 x 4.
3. Hold workpiece on a mandrel and finish the ø 44.
4. Shape the keyway on a shaping machine.

SCALE 1:1	FLANGE	MP/2.1/4.1.2/3
MAT: MILDSTEEL	From Ex.1	TURNING IV

Tolerance ±0,1
unless otherwise stated



SEQUENCE OF OPERATION

1. Chuck workpiece in three-jaw chuck.
2. Face one side.
3. Re-chuck, use distance bush to ensure parallel faces and face to thickness.
4. Turn step, drill and bore to Ø 26.
5. Turn internal groove.
6. Hold workpiece on a mandrel and turn outside diameter.

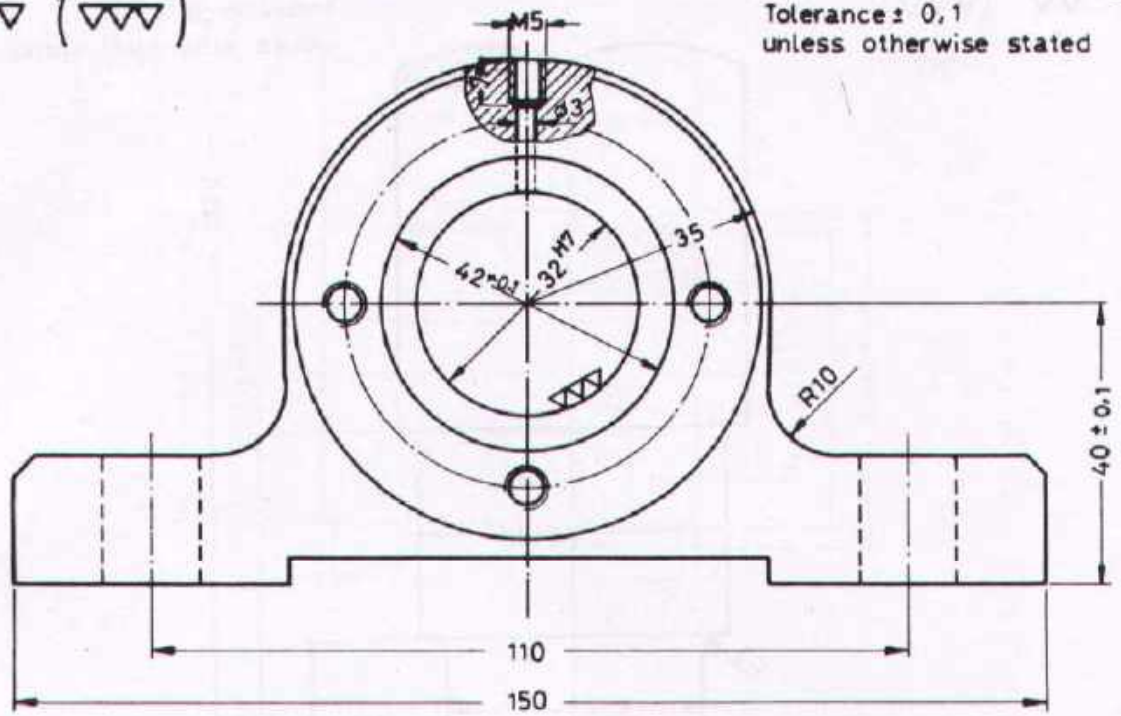
TOOLS

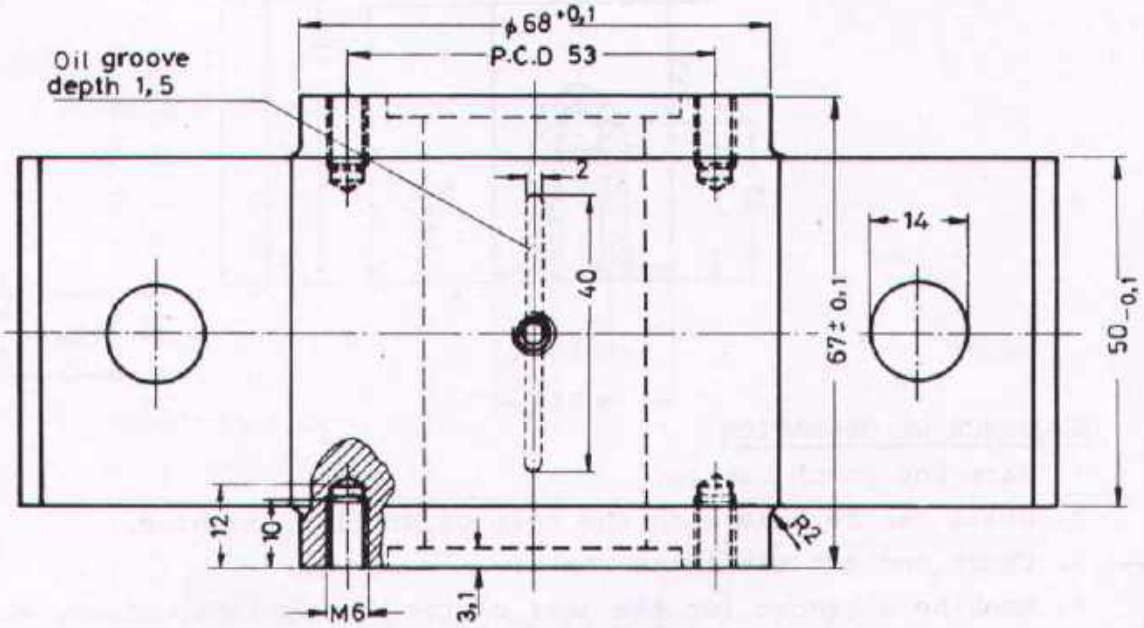
Bent roughing tool
Right hand side tool
Boring tool
Form grooving tool

SCALE 1:1	BEARING COVER	MP/2.1/4.1.2/4
MAT: MILDSTEEL		TURNING IV

▽▽ (▽▽▽)

Tolerance ± 0,1
unless otherwise stated





Note: Assemble the bearing with shaft ex.2, flange ex.3 and bearing covers ex.4

Check for smooth running.

SCALE 1:1	CAST IRON BEARING	Mp 2.3/4.1.2/5
MAT. CAST IRON	From 3.1.2/10	TURNING IV

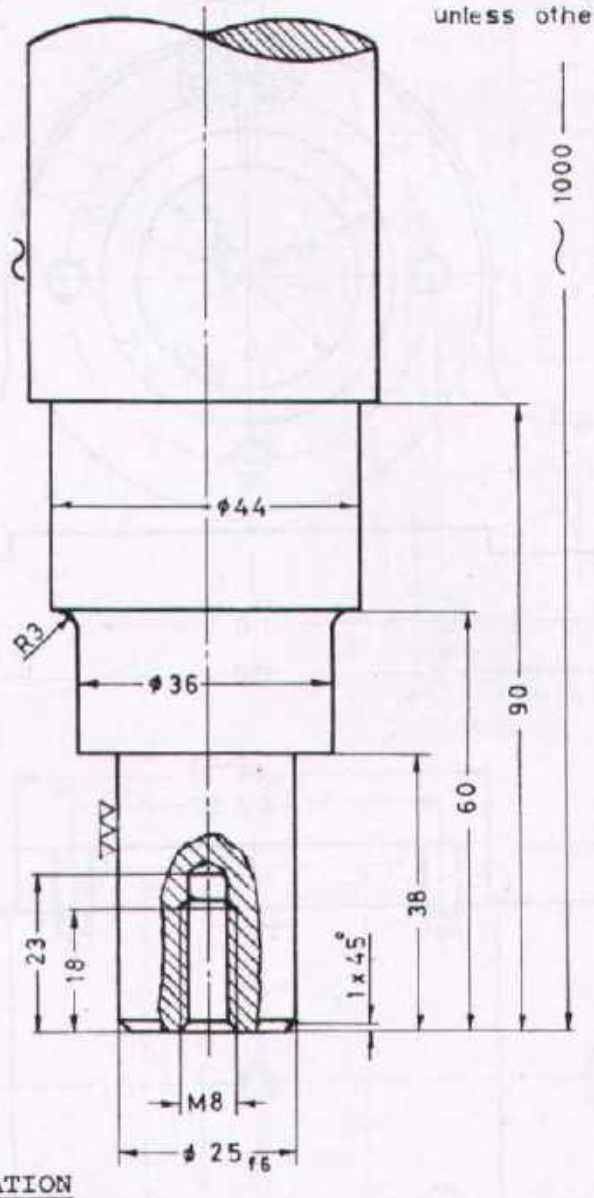
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

▽▽ (▽▽▽)

Tolerance ±0.1
unless otherwise stated



$25_{f6} = {}^{-0.020}_{-0.033}$

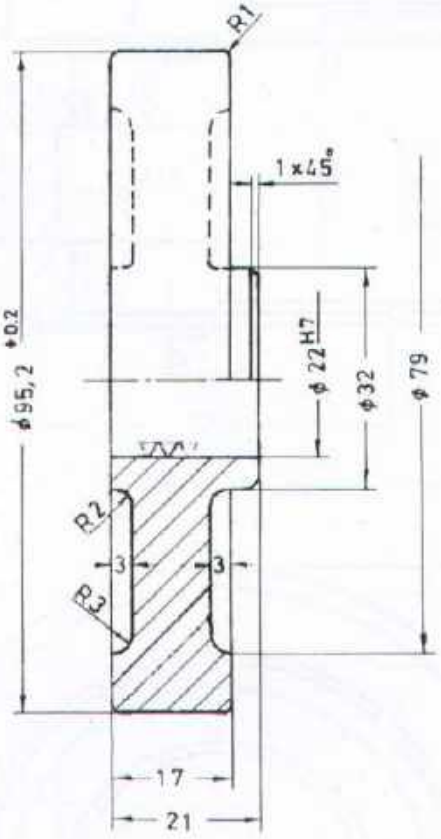
SEQUENCE OF OPERATION

1. Mark and punch centre.
2. Drill centre hole with the help of drilling machine.
3. Chuck and set the lathe centre.
4. Machine a groove for the jaws of the steady rest.
5. Set the steady and remove the lathe centre.
6. Machine to the required dimensions.
7. Part off to a length of 100 mm.

SCALE 1:1	SHAFT	MP/2.3/41.2/6
MAT. MILD STEEL		TURNING IV

▽▽(▽▽▽)

Tolerance ± 0.1
unless otherwise stated



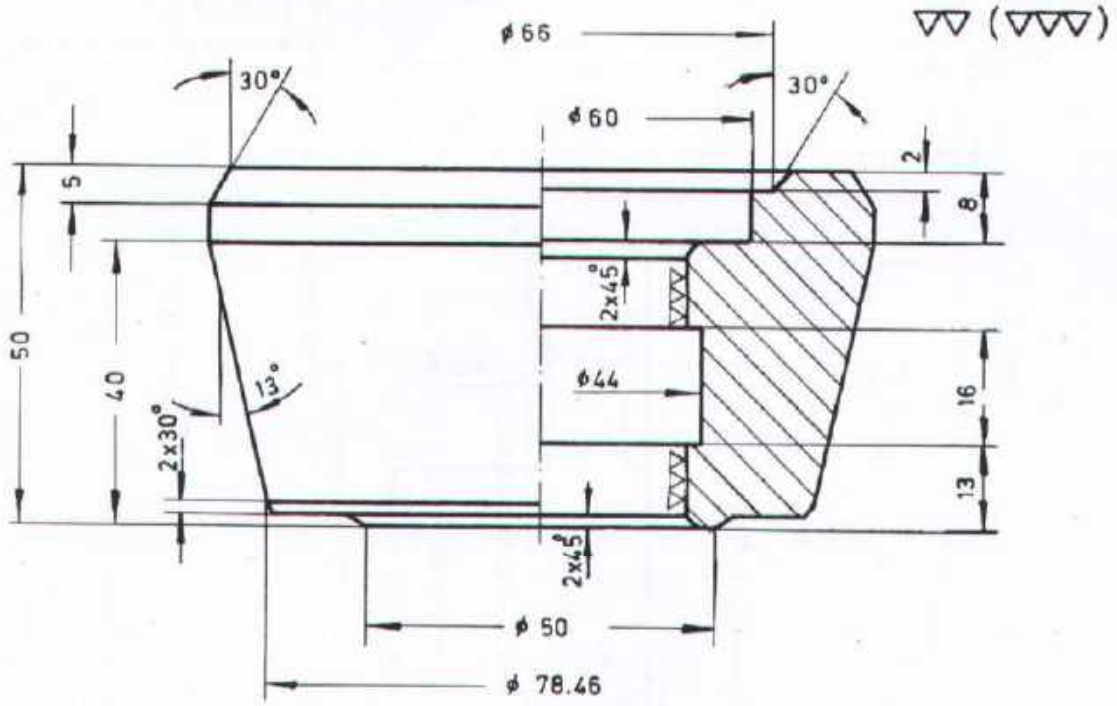
$22^{H7} = {}^{+0,021}_{0}$

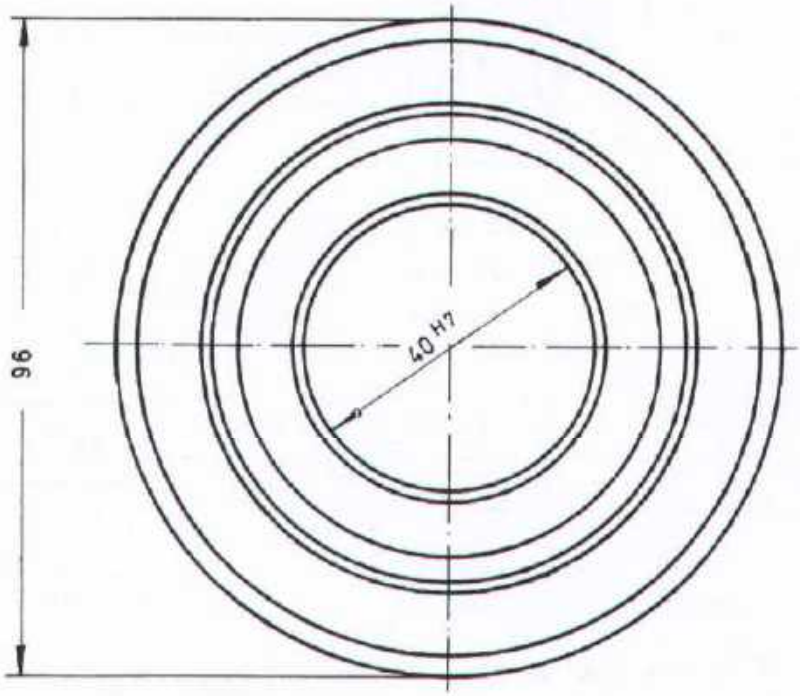
Check the hole 22^{H7} with a plug gauge.

SCALE 1:1	GEAR BLANK	MP/21/4.1.2/7
MAT CAST IRON		TURNING IV

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

TURNER





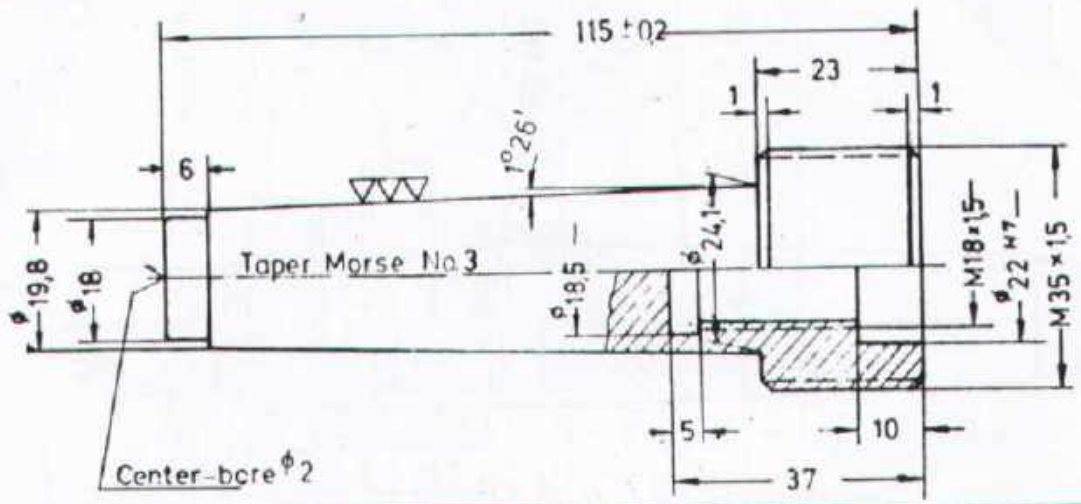
SCALE 1:1	MILLING HEAD BODY	MP/2.1/4.1.2/8
MAT MILDSTEEL		TURNING IV

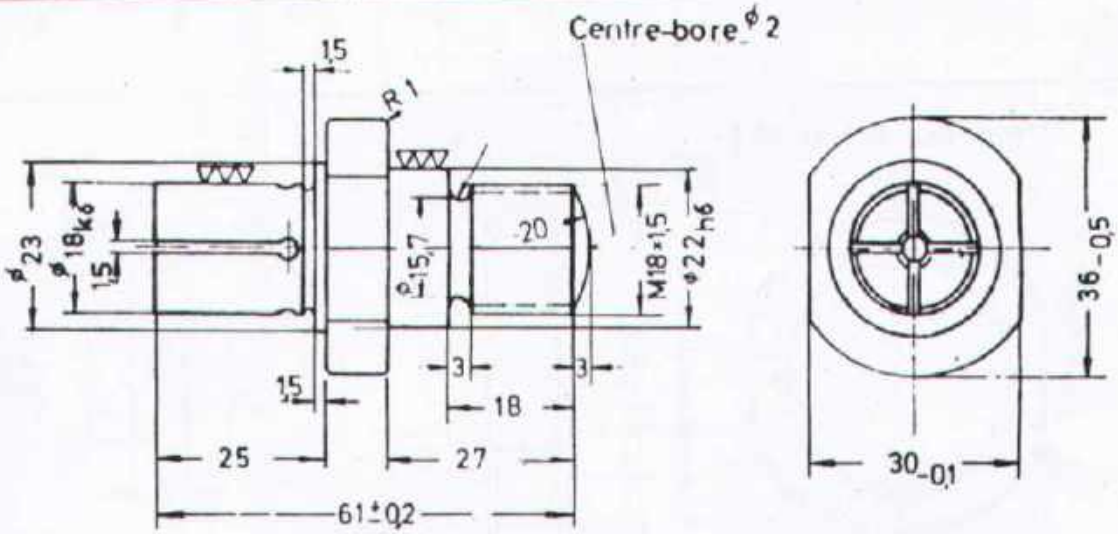
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

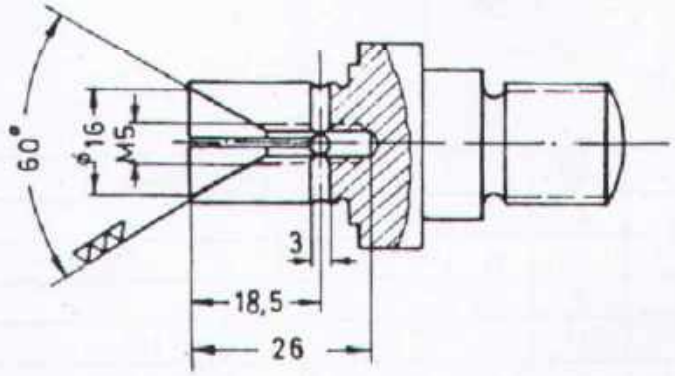
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

Tolerance ± 0,1







ø 18 k6	+ 0,015 / + 0,002
ø 22 H7	+ 0,021 / 0
ø 22 h6	0 / − 0,013

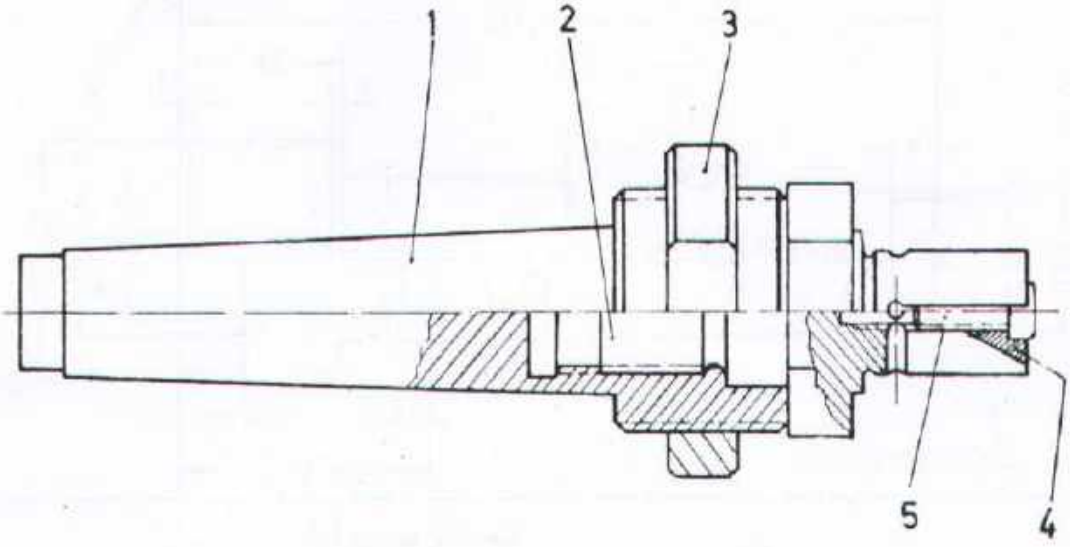
SCALE 1:1	PARTS OF	MP/2.1/4.1.2/9
MAT: MILDSTEEL	EXPANDING MANDREL	TURNING IV

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

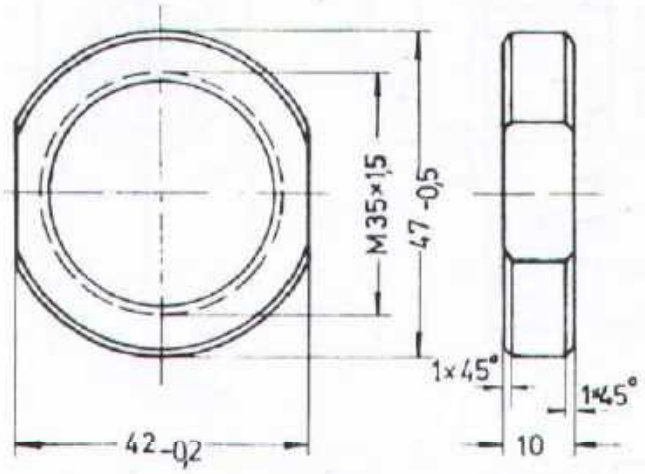
TURNER

72



Thread acc. to part No.1

3



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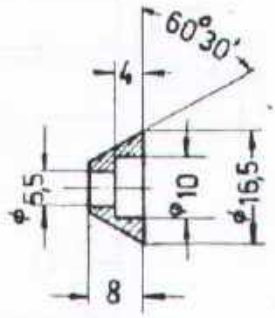


Qty.	Denomination	Part-N.	Materil	Remarks
1	Taper shank	1		
1	Mandrel	2		
1	Forcing nut	3		
1	Cone washer	4		
1	Cheese head screw	5		M5×15

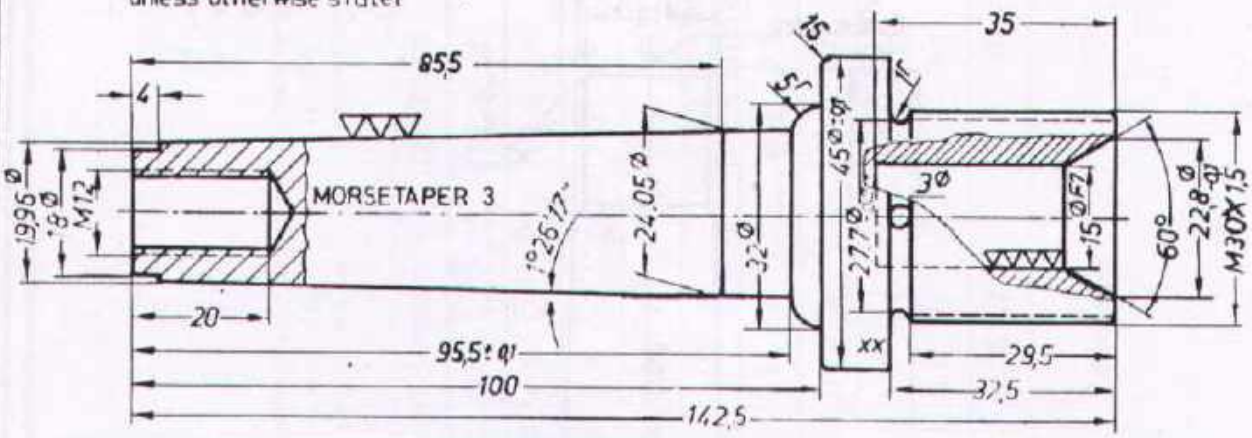
SCALE 1:1	EXPANDING MANDREL	MP/2.1/4.1.2/9a
MAT MILDSTEEL		TURNING IV

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

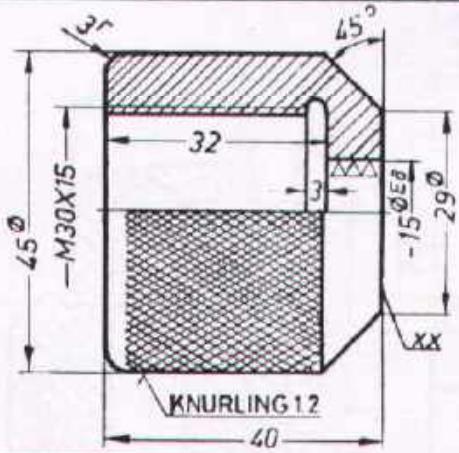
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER

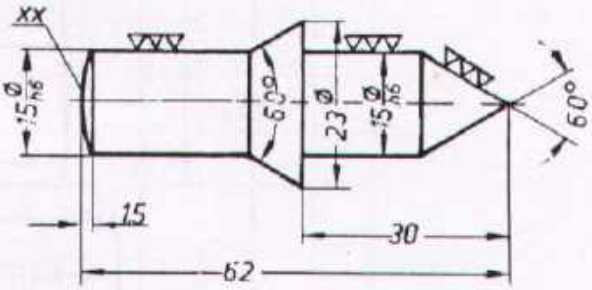
TOLERANCE ±0,2
unless otherwise statet

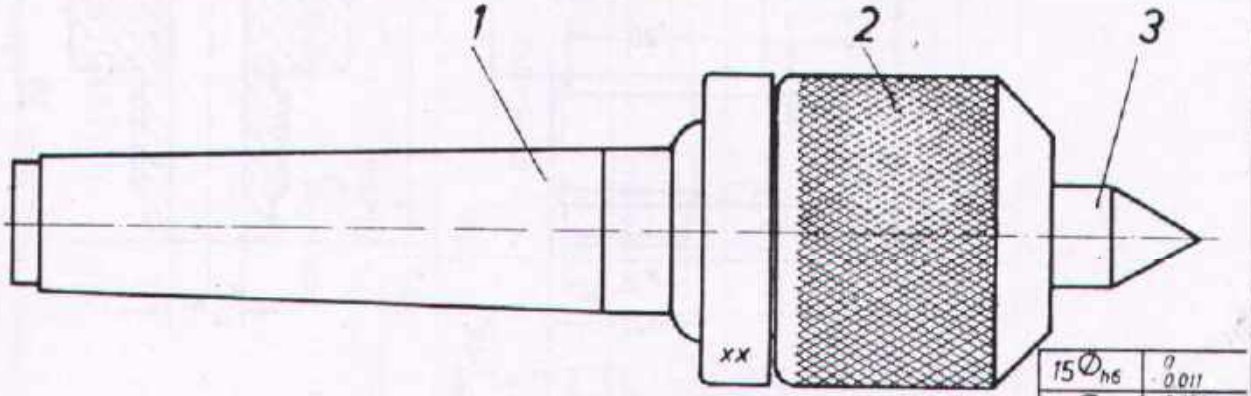


2



3





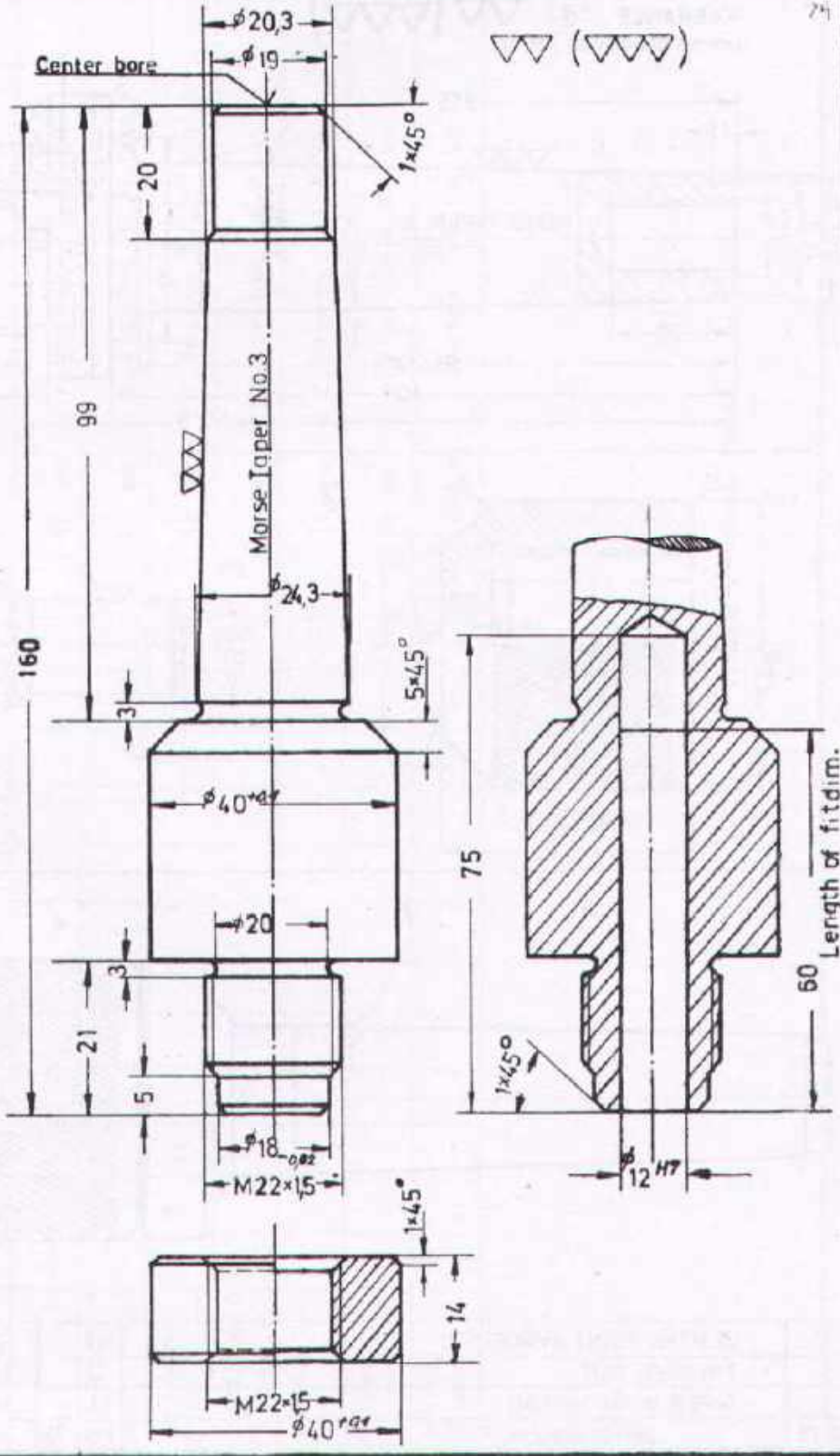
$15\varnothing_{h6}$	$^{0}_{-0.011}$		
$15\varnothing_{E8}$	$^{+0.059}_{+0.032}$		
$15\varnothing_{F7}$	$^{+0.034}_{+0.016}$		

QTY	Denomination	Part No	Material
1	CENTRE POINT (HARDENED)	3	CARBON STEEL
1	KNURLED NUT	2	MILDSTEEL
1	TAPER WITH THREAD	1	MILDSTEEL

SCALE 1:1	RUNNING CENTRE	MP/21/41 2/10
MAT:		TURNING IV

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

TURNER

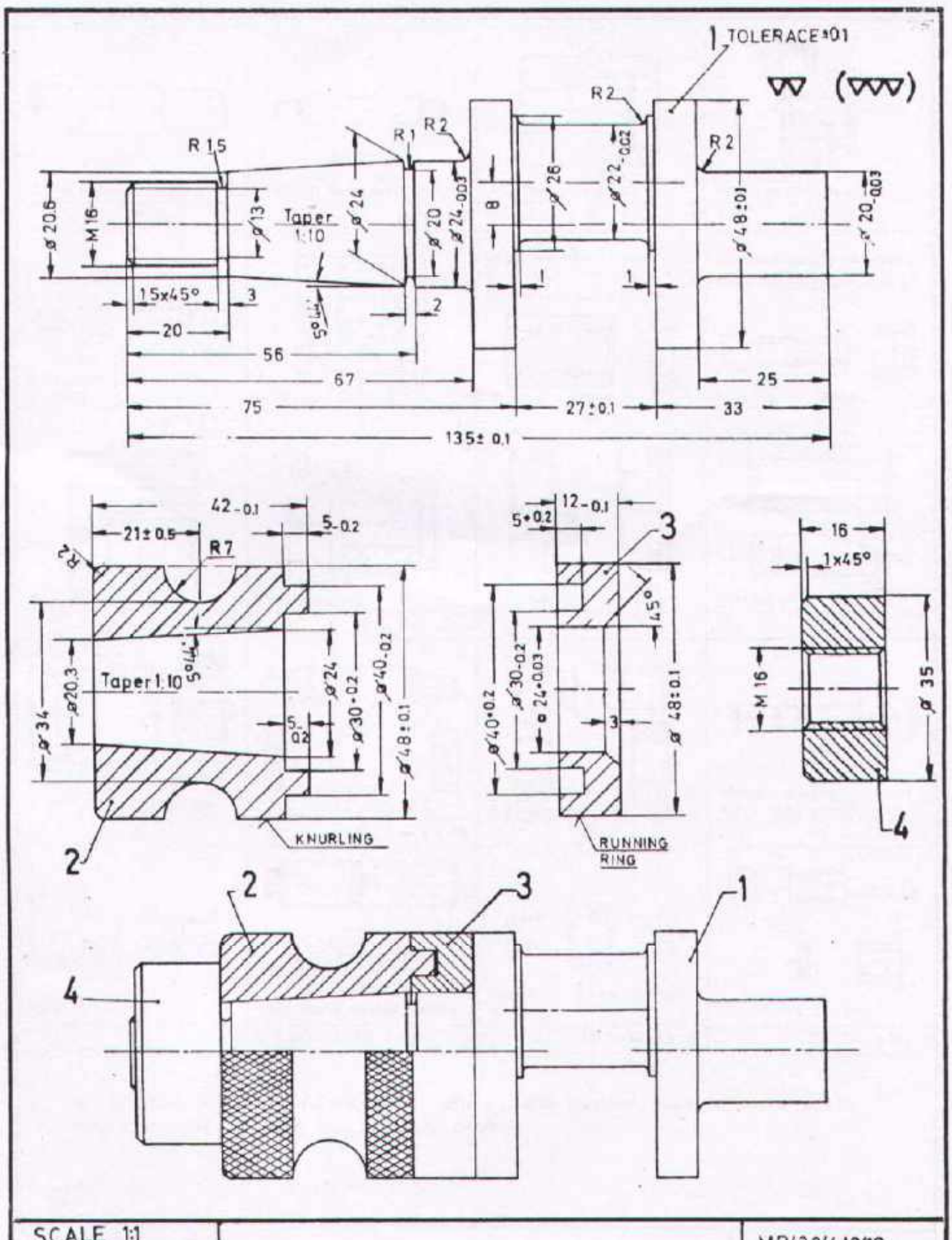


SCALE 1:1	CIRCULAR CUTTER PART 1	MP/2.3/4.12/11
MAT.: MILDSTEEL		TURNING IV

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER



SCALE 1:1	CRANKSHAFT WITH BUSH	MP/2.3/4.12/12
MAT. MILDSTEEL		TURNING IV

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

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