

Всина ось на роб.
нам. расстояния
сместены по ширине
EIGHT EQUI-SPACED
GROOVES. SHIFT IN.
PITCH 12°

Минимум знаков
TO BE MARKED BY ETCHING

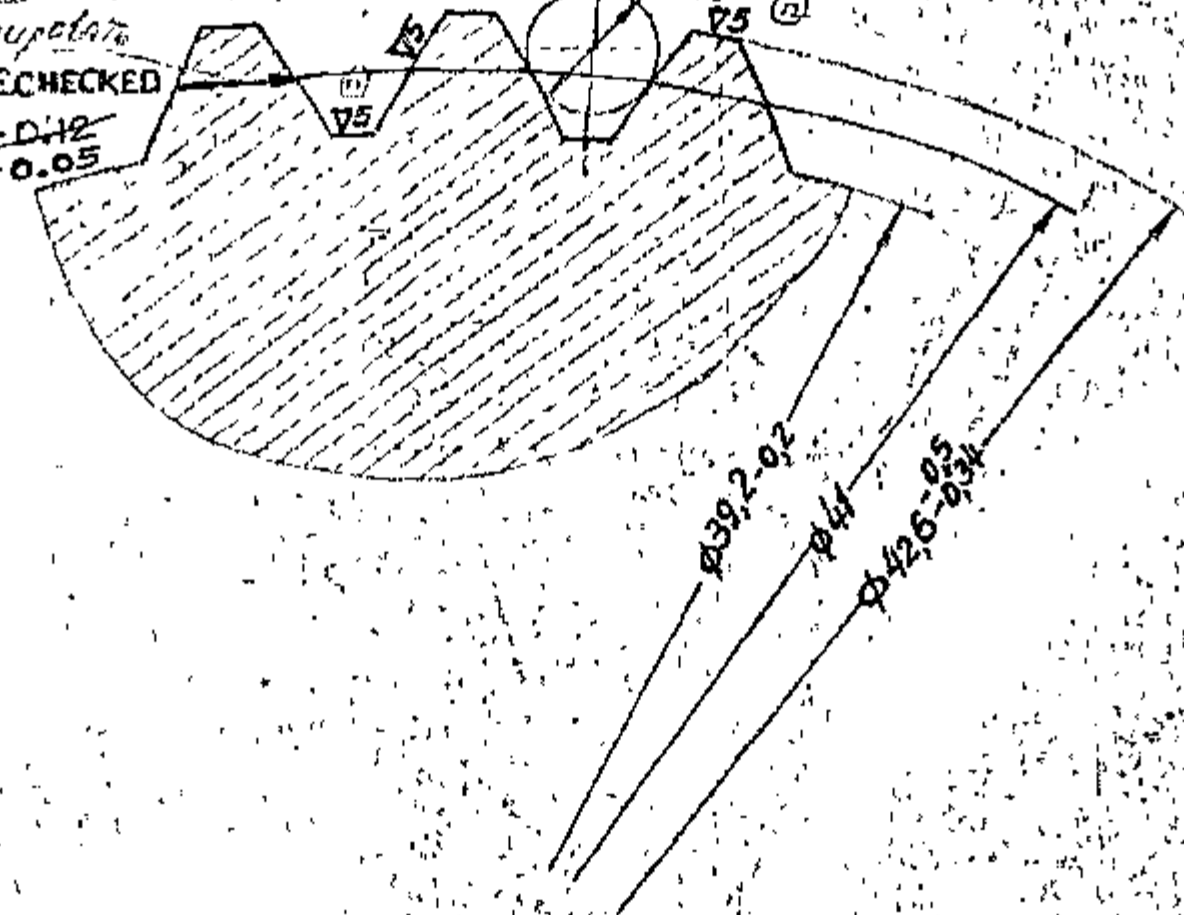
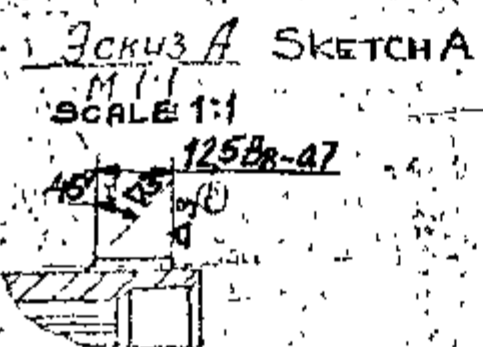
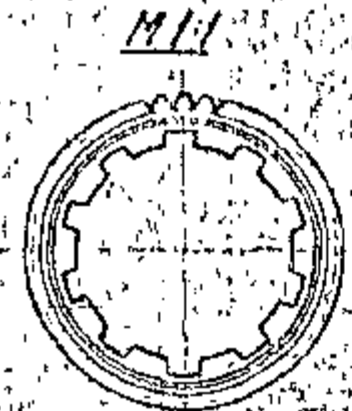
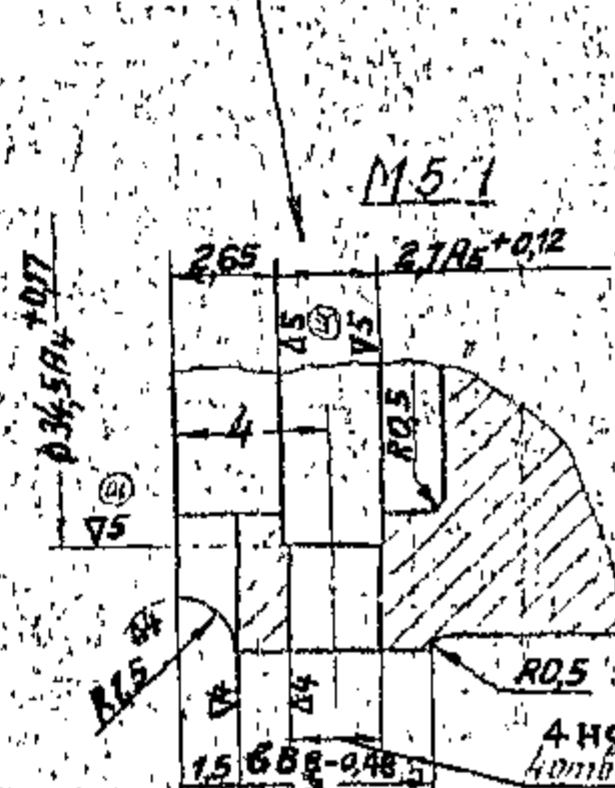
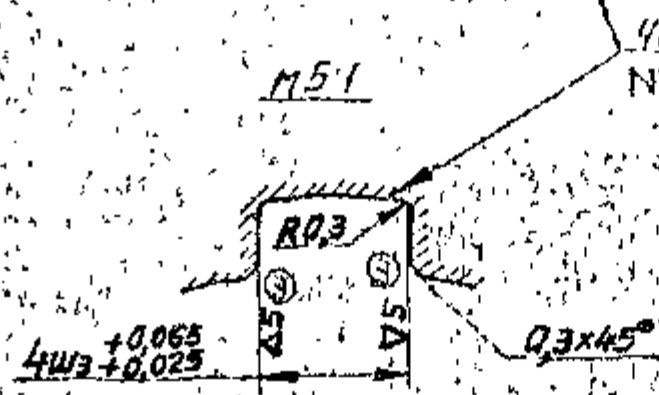
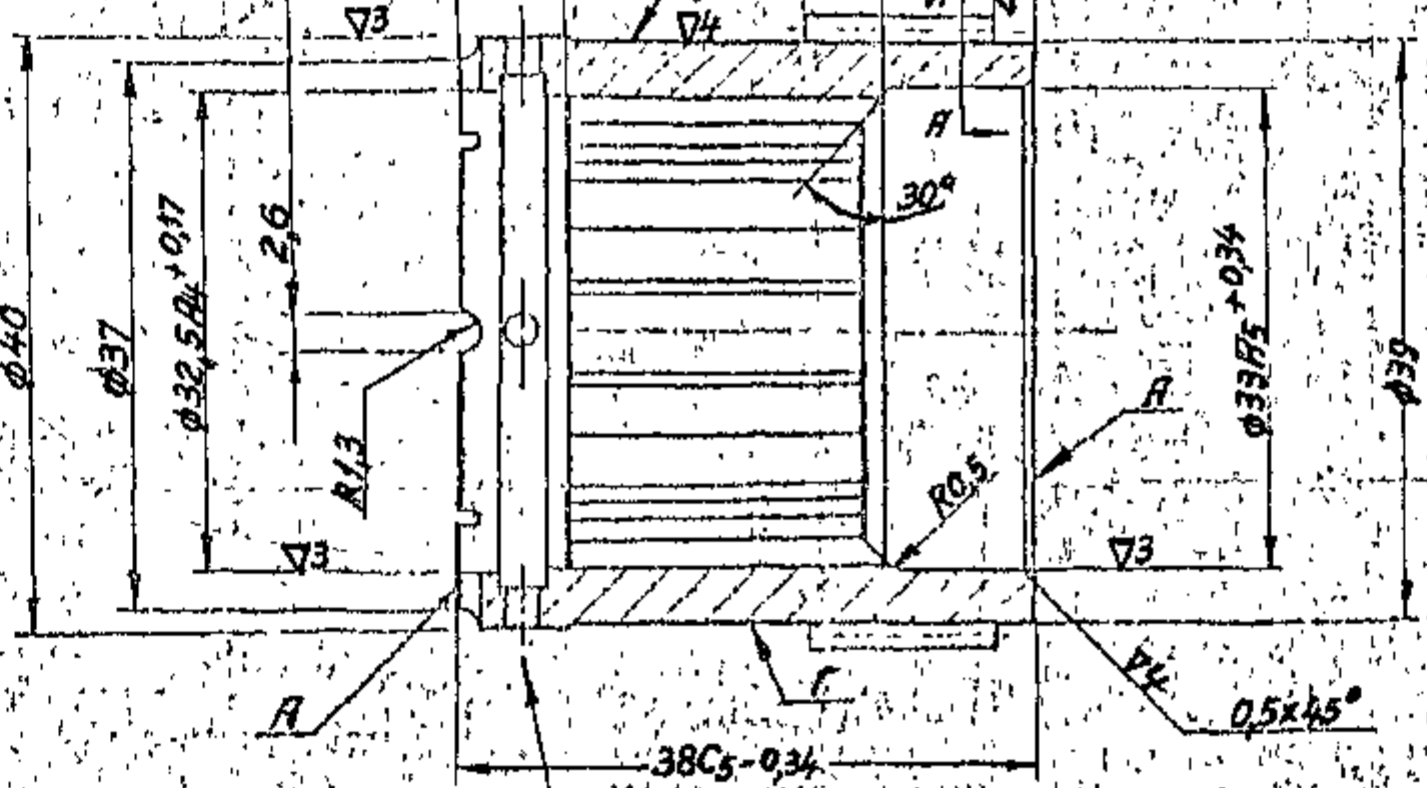
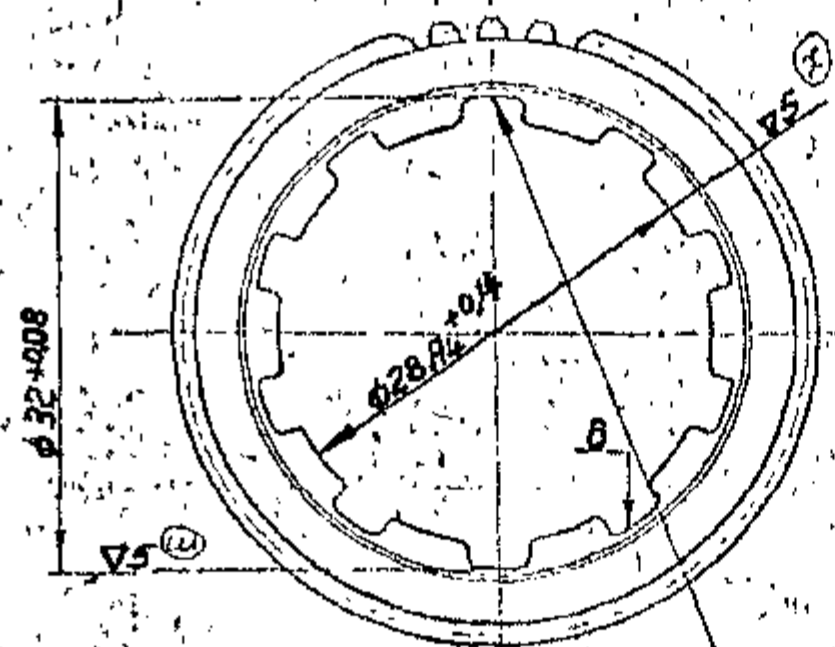
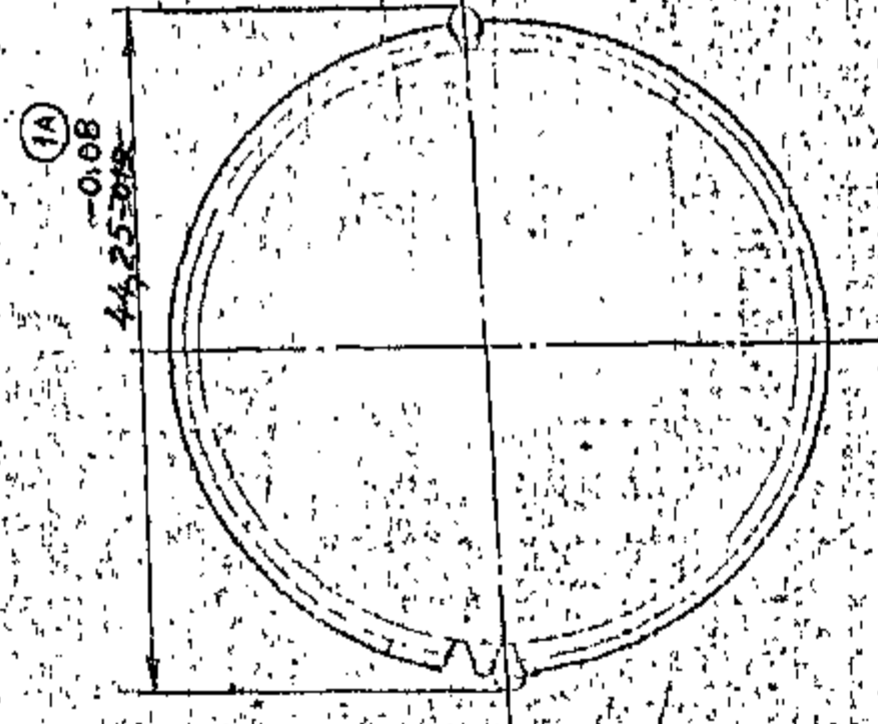


Схема контроля
толщины зубьев.
CHECKING DIAGRAM
OF TOOTH THICKNESS



У6 UNLESS OTHERWISE STATED

ELEMENTS OF SPLINES	SPLINE
MODULE	1
NUMBER OF SPLINES	41
PRESSURE ANGLE	30°

INSPECTION GROUP III, TT-11

HRC. 33-37

DIMENSIONS WITH UNSPECIFIED TOLERANCES SHOULD BE MAINTAINED AS PER ACCURACY CLASS 7 OST 1010.

RUN OUT OF SURFACES A RELATIVE TO THE AXIS OF SURFACE B SHOULD NOT EXCEED 0.03mm.

RUN OUT OF INVOLUTE SPLINES ON PITCH CIRCLE RELATIVE TO THE AXIS OF SURFACE B SHOULD NOT EXCEED 0.1mm.

SHARP EDGES SHOULD BE BLUNTED.

RECTANGULAR SPLINES SHOULD BE CHECKED IN ACCORDANCE WITH INSTRUCTIONS UB-19

TOOL MARKS ON SURFACE Г ARE PERMISSIBLE AFTER CUTTING THE SPLINES AS PER THE STANDARD

INCREASE OF THE WIDTH OF 3 SLOTS OF SPLINES UP TO 4^{+0.085}mm IS PERMISSIBLE

COATING: CHEMICAL OXIDIZING, OIL FINISHING

POSITION OF EIGHT GROOVES R1.3 RELATIVE TO FOUR HOLES φ2.5 IS ARBITRARY UNLESS THEY COINCIDE

MAY BE MANUFACTURED AS PER SKETCH A.

3	1	75-380	С.И.И.	С.И.И.
11	3	77-445	С.И.И.	С.И.И.
11	3	77-445	С.И.И.	С.И.И.
11	3	77-445	С.И.И.	С.И.И.
11	3	77-445	С.И.И.	С.И.И.

*СБ.20-07-04
СБ.20-08-12

PROY SAMPLE SHOULD BE APPROVED BY A.I.S.D. BEFORE BULK PRODUCTION

ISSUE DATE		NATURE OF APPROVEMENTS		SCALE: 1:1	
DRAWN BY		CHECKED BY		DIMENSIONS IN mm	
TCD		TOLERANCE OF DIMS UNLESS OTHERWISE STATED		TOLERANCE OF DIMS UNLESS OTHERWISE STATED	
DATE 16/6/08		ALL THREADS TO CONFORM TO		TITLE CAM SHAFT BUSH	
D.S. LAT NUMBER		DRAWING NUMBER 307-08-3		D.S. LAT NUMBER	



COPY NO 1



ENGINE FACTORY, AVADI

PROCESS SCHEDULE

DESCRIPTION :- **CAM SHAFT BUSH**

COMPT. No :- **307-08-3** {COMMON FOR }
 {V-46 & UTD 20}

MFG. SHOP :- **SPS**

REV.No: 00

DATE:



ENGINE FACTORY AVADI

FORM No :EFA/P-038

PROCESS SCHEDULE	NOMENCLATURE	: <u>CAMSHAFT BUSH</u>
	DRAWING No	: <u>307-08-3</u>
	MATL SPECIFICATION	: <u>STEEL 38XC-GOST 4543-71- φ 45 BRT X 46MM - BHN ≤ 255.</u>

OPN No	DESCRIPTION OF OPERATION	SHT No	WORK CENTRE	SET UP TIME	OPN TIME	REMARKS
010	TURNING	3	CNC-LATHE - GDM-65/2A - HMT.			
015	TURNING	4	CNC-LATHE - GDM-65/2A - HMT.			
020	INSPECTION	-	BENCH			
030	HEAT TREATMENT - TO HRC 33 TO 37	-	H.T.P.			
040	INSPECTION	-	BENCH			
050	BROACHING	5	VERTICAL BROACHING MIC - HMT			
060	WASHING	-	WASHING PLANT			
070	EXTERNAL GRINDING	6	CYL. GRNDS MIC - HMT - G-17/1200 P			

PREPARED BY	CHECKED BY	APPROVED BY	AUTHORISED BY						SHT. No
SIGN <i>[Signature]</i>	SIGN <i>[Signature]</i>	SIGN <i>[Signature]</i>	SIGN <i>[Signature]</i>						1 OF 12
DATE 23/10/96	DATE 30.10.96	DATE 30.10.96	DATE 30.10.96						
CMI/PDO	CMI/PDO	HOS/PDO	DO/PDO						
				PDO REF	ISSUE	DATE	SIGN		



ENGINE FACTORY AVADI

FORM No :EFA/P-038

PROCESS SCHEDULE

NOMENCLATURE :
 DRAWING No : 307-08-3
 MATL SPECIFICATION :

OPN No	DESCRIPTION OF OPERATION	SHT No	WORK CENTRE	SET UP TIME	OPN TIME	REMARKS
080	SURFACE GRINDING	7	SURFACE GRNDG MIC. PRAGA			
085	GEAR HOBGING	8	GEAR HOB. MIC-HMT H-400			
090	DRILLING	9	BENCH DRILL MIC.			
100	MILLING	10	HORIZONTAL MILLING MIC HMT-FN-3H			
120	WASHING	-	WASHING PLANT			
130	DEBURRING	11	BENCH			
140	INSPECTION	-	BENCH			
150	COATING: CHEMICAL OXIDIZING & OIL FINISHING.		H.T.P/E.P.S			
160	FINAL INSPECTION	12	BENCH			

PREPARED BY	CHECKED BY	APPROVED BY	AUTHORISED BY						SHT. No
SIGN <i>[Signature]</i>	SIGN <i>[Signature]</i>	SIGN <i>[Signature]</i>	SIGN <i>[Signature]</i>						2 OF 12
DATE 10.10.96	DATE 30.10.96	DATE 30.10.96	DATE 30.10.96						
EM-1/PDO	CM-1/PDO	HOS/PDO	DO/PDO						
				PDO REF	ISSUE	DATE	SIGN		

$\nabla 3 = Ra 20$
 $\nabla 4 = Ra 10$
 $\nabla 5 = Ra 5$

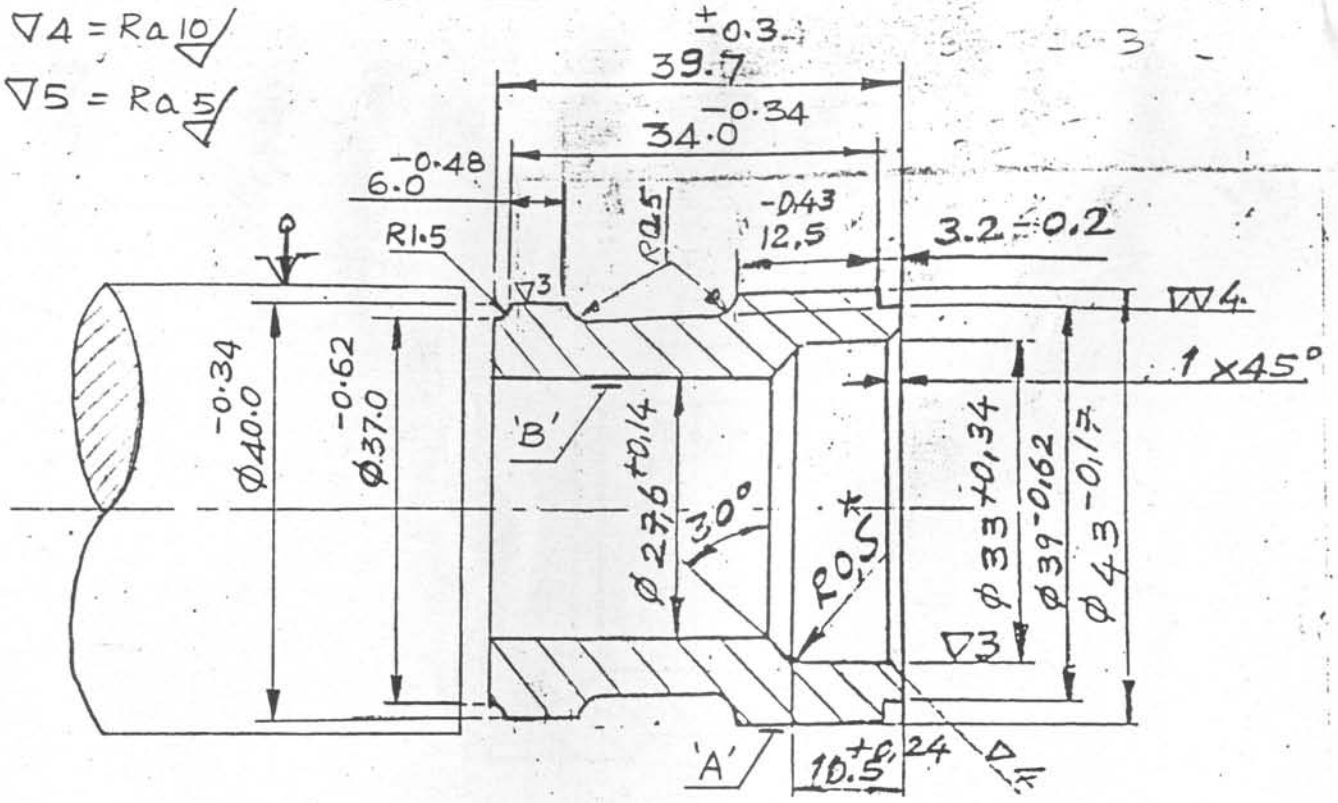
CAM SHAFT BUSH
307-08-3

MATL :- 38XC GOST 4543-71
 HARDNESS : BHN ≤ 255 .

$\nabla 4(\nabla)$

OPN. : 010

MACHINE: CNC - LATHE
 HMT: GDM - 65/2A



STD. TOOLS & GAUGES	
TURNING & FACING TOOL	PCLN R 2525 12
INSERT CNMG	120408
CENTRE DRILL	A 2.5
PILOT DRILL	$\phi 15$
DRILL	$\phi 26$
DRILL	$\phi 32$
BORING TOOL	693879-5410
INSERTS CCMT	090304
COPY TURNING TOOL	SVJBR 2525-M16
INSERT VCMM	160304

SPECIAL TOOLS & GAUGES	
PLUG GAUGES	
i) $\phi 27.6 \pm 0.14$	020/08/40
ii) $\phi 33.0 \pm 0.34$	020/08/19
GAP GAUGE	
$\phi 43.0 \pm 0.17$	025/04/104

TECH. REQ. :-

RUNOUT OF SURFACE 'A' RELATIVE TO SURFACE 'B'
 SHOULD NOT EXCEED 0.2 MM.

QSV	CHD	APPD
		21.1.9

PLANNING SHEET - PDO/EFA FORM No: EFA/P-039

NUMERCLATURE

CAM SHAFT E 3H

DRAWING NO. 307.0 3

SPR. NO. 015 TURNING

MACHINE: CNC - LATHE
GDM - 65/2A
HMT.

STD. TOOLS & GAUGES

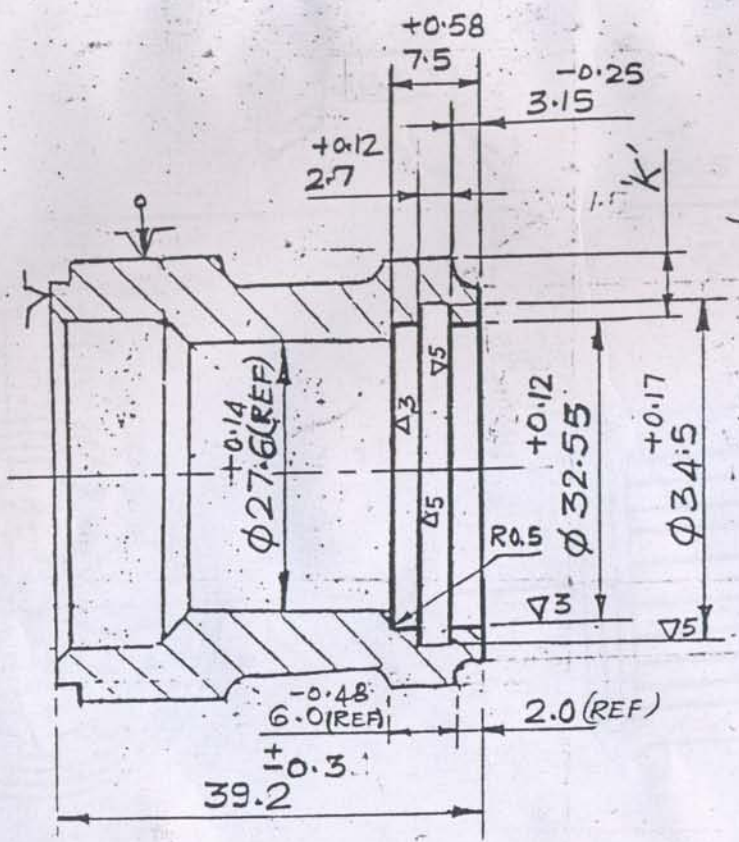
FACING TOOL	PC LNR 2525 12
INSERT CNMG	120408
BORING BAR Ø16	6938795410
INSERT CCMT	090304
INT. GROOVING TOOL R154-91	12525-3
INSERT 154-91	3265
DIAL CALIPER GAUGE.	30 TO 50

SPECIAL TOOLS & GAUGES

SOFT JAWS	020/08/41
PLUG GAUGE Ø 32.55 ^{+0.12}	
GROOVE WIDTH GAUGE 2.7 ^{+0.12}	055/11
GROOVE POSITION GAUGE 3.15 ^{+0.25}	

∇3 = Ra 20/√
∇4 = Ra 10/√
∇5 = Ra 5/√

∇4 (∇)



TECH. REQT: -

DIFFERENCE IN WALL THICKNESS 'K' SHOULD NOT EXCEED 0.5 MM.

DESIGN	CHKD.	APPD.
[Signature]	[Signature]	[Signature]
PRED.	CHD.	APPD.

NOMENCLATURE

CAM SHAFT BUSH

DRAWING N° 307-UB-3

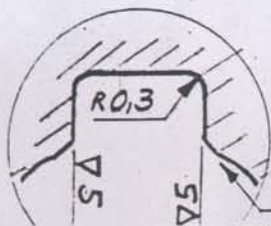
ISSUE

OP. No. 050 OPERATION BROACHING

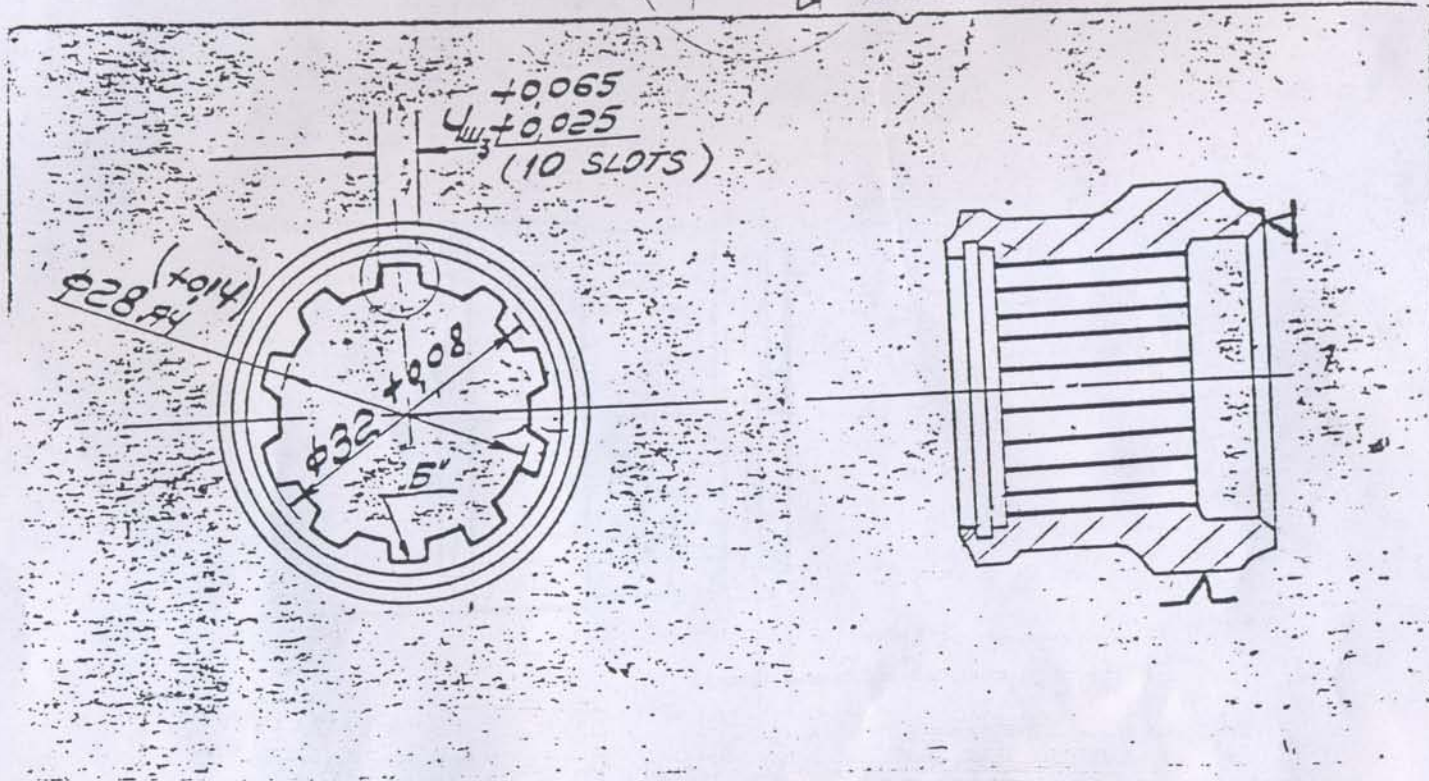
HARDNESS - 33 to 37 HRC

MACHINE: VERTICAL BROACHING M/C HMT

▽5 (▽)



0,3 x 45°



STD. TOOLS & GAUGES

SPECIAL TOOLS & GAUGES

BROACHING FIXTURE	201061
BROACH	402101
FULL FORM SPLINE GAUGE	403169
GO	-
NO GO	-

SM		
PRED.	CHD.	APPD

NOMENCLATURE

CAMSHAFT BUSH

DRAWING-No.

307-08-3

ISSUE

OPN. No.

070

OPERATION

CYL. GRINDING

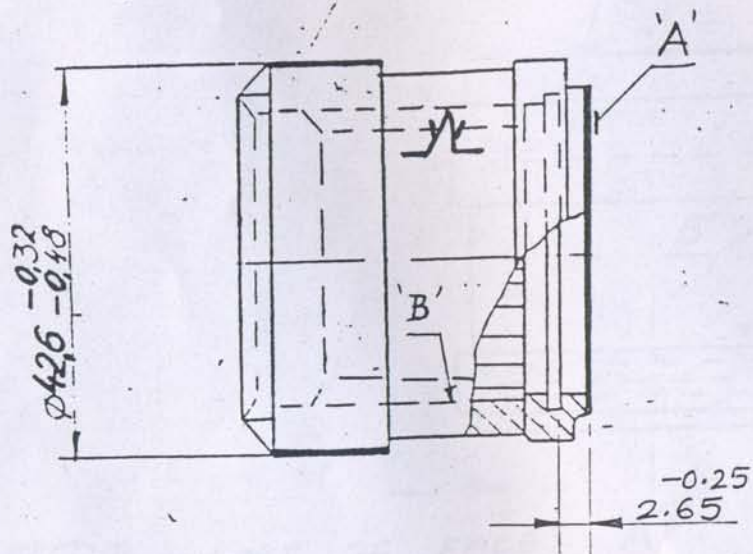
MACHINE: CYL. GRINDER
G 17/1200 P

STD. TOOLS & GAUGES

SPECIAL TOOLS & GAUGES

SPLINE MANDREL	209517/1 250
GAP GAUGE	201564
$\phi 42,6$ -0,32 -0,48	025/04/105
DEPTH GAUGE FOR DIMENSION 2.65 -0.25	077/16

Ra 2.5
▽

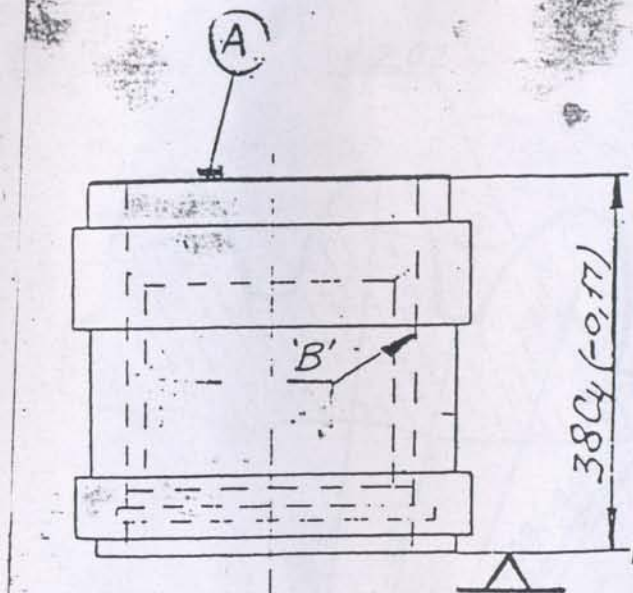
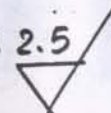


TECH. REQ'T: - RUNOUT OF FACE 'A' WITH RESPECT TO
AXIS OF SURFACE 'B' SHOULD NOT EXCEED 0.03
mm

SM		
PRED.	CHD.	APPD

MACHINE: SURFACE GRINDING
PRAGA. M/C

Ra 2.5



TECH. REQ: ① RUN OUT OF FACE 'A' RELATIVE TO
AXIS OF SURFACE 'B' SHOULD NOT EXCEED
0.03 mm.

STD. TOOLS & GAUGES

SPECIAL TOOLS & GAUGES

SNAP GAUGE }
FOR 38.0 - 0.17 } 025/04/106

SM		
PRED.	CHD.	APPD

PLANNING SHEET-PDO/EFA FORM No: EFA/P-039

НOMENCLATURE

CAMSHAFT BUSH

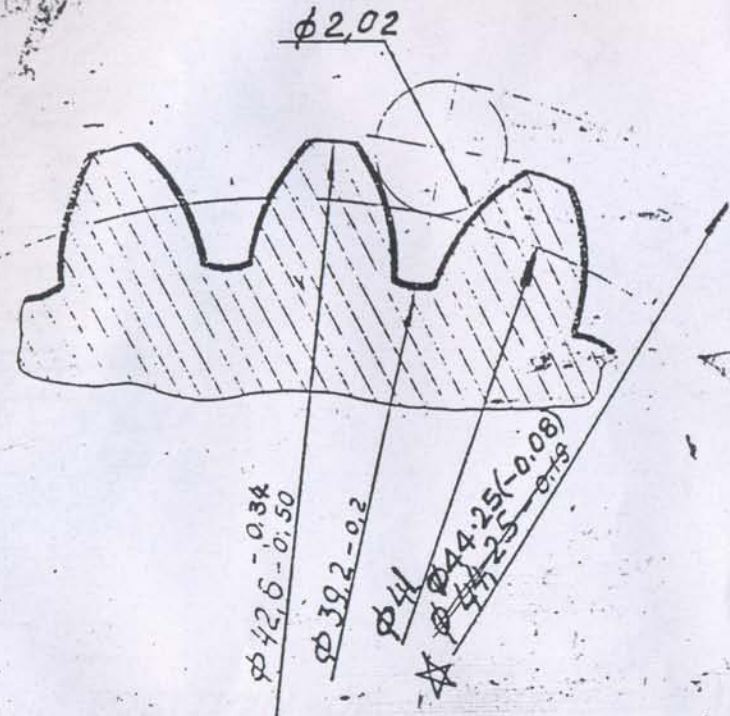
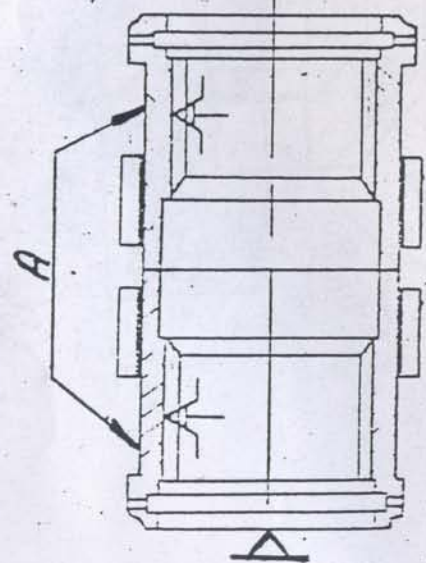
307 18-3

082 AR HOBBING

MACHINE:
GEAR HOBBER
HMT - H 400

Модуль Module	1
Число зубцов Number of teeth	41
Угол зацепления Pressure angle	30°

$\nabla 5 = R_{\nabla 5}$



TECH. REQ: - RUNOUT OF TOOTH ALONG PCD. SHOULD NOT EXCEED 0.1 mm.

* DIMENSION $\phi 44.25^{-0.19}$ IS ALLOWED TO BE MANUFACTURED TO $\phi 44.40 / 44.02$ PROVIDED THE TECH. REQ. ① & ② GIVEN IN CB 20.08.12. ARE MAINTAINED.

STD. TOOLS & GAUGES

O.D. MLC 25-50

SPECIAL TOOLS & GAUGES

HOB - 402966
FIXTURE.

ROLLER $\phi 2.02 = 082/8$.

SM		
PRED.	CHD.	APPD

MACHINE: BENZ
DRILLING M/C.

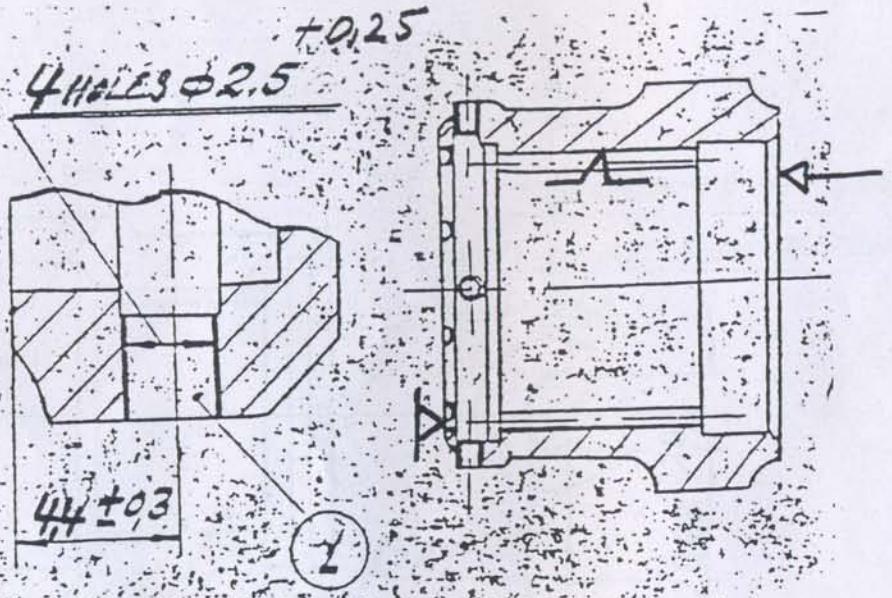
STD. TOOLS & GAUGES

DRILL $\phi 2.5$

SPECIAL TOOLS & GAUGES

DRILL JIG 401041

PLANNING SHEET - PDO/EFA FORM No: EFA/P-039



NOTE :- POSITION OF GROOVES R1.3
RELATIVE TO 4 HOLES $\phi 2.5$
IS INDIFFERENT.

SM		
PRED.	CHD.	APPD

PLANNING SHEET-PDO/EFA FORM No: EFA/P-039

NOMENCLATURE

CAM SHAFT BUSH

DRAWING No.

307-08-3

ISSUE

OP. No.

100

OPERATION

MILLING

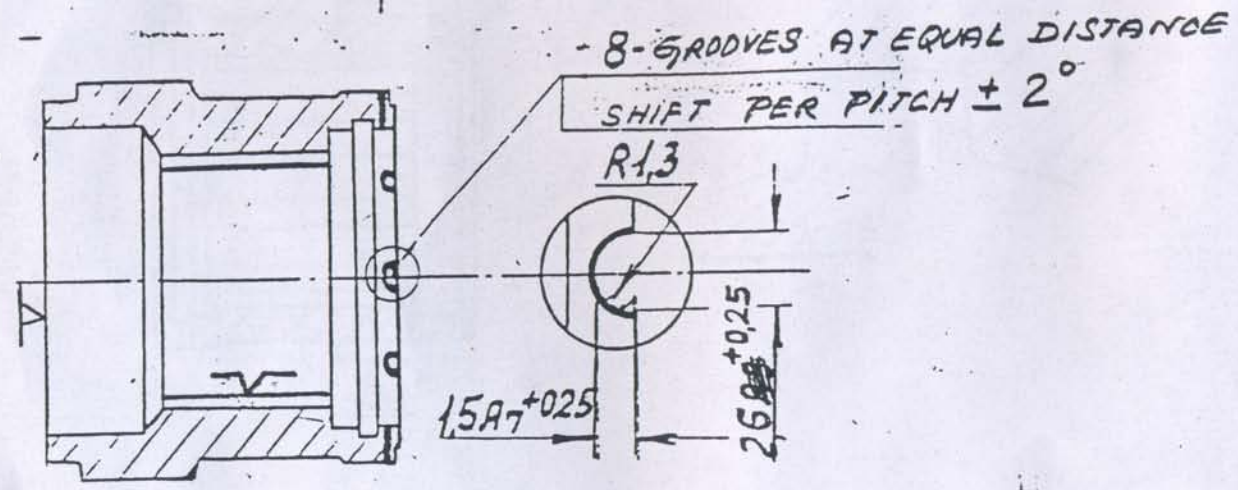
MACHINE: HORI-MILL.

HMT / FN 3H

STD. TOOLS & GAUGES

SPECIAL TOOLS & GAUGES

76



- TEMPLATE R1.3 } 403224
- ROTARY FIXTURE } 401259
- CONVEX MILLING CUTTER } 008/00/001
- (FORM)
- GAUGE TO CHECK DIMN 15- } 403224

SM		
PRED.	CHD.	APPD

13.
NOMENCLATURE

CAM SHAFT BUSH

DRAWING NO.
307-08-3

ISSUE
1

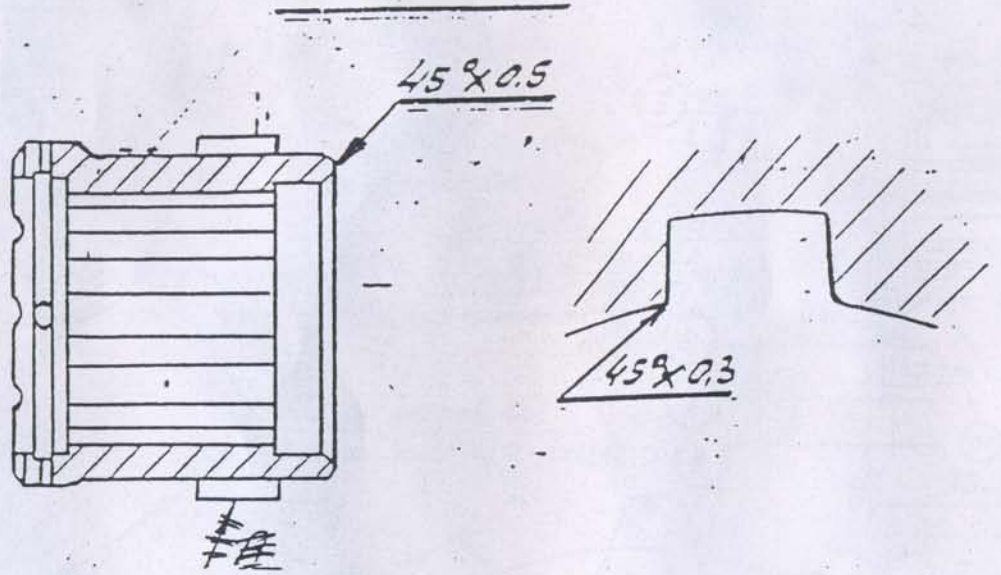
OPT. No.
130

OPERATION
DEBURRING

MACHINE:
BENCH

STD. TOOLS & GAUGES

SPECIAL TOOLS & GAUGES



BLUNT SHARP EDGES OF TEETH AND SPLINES

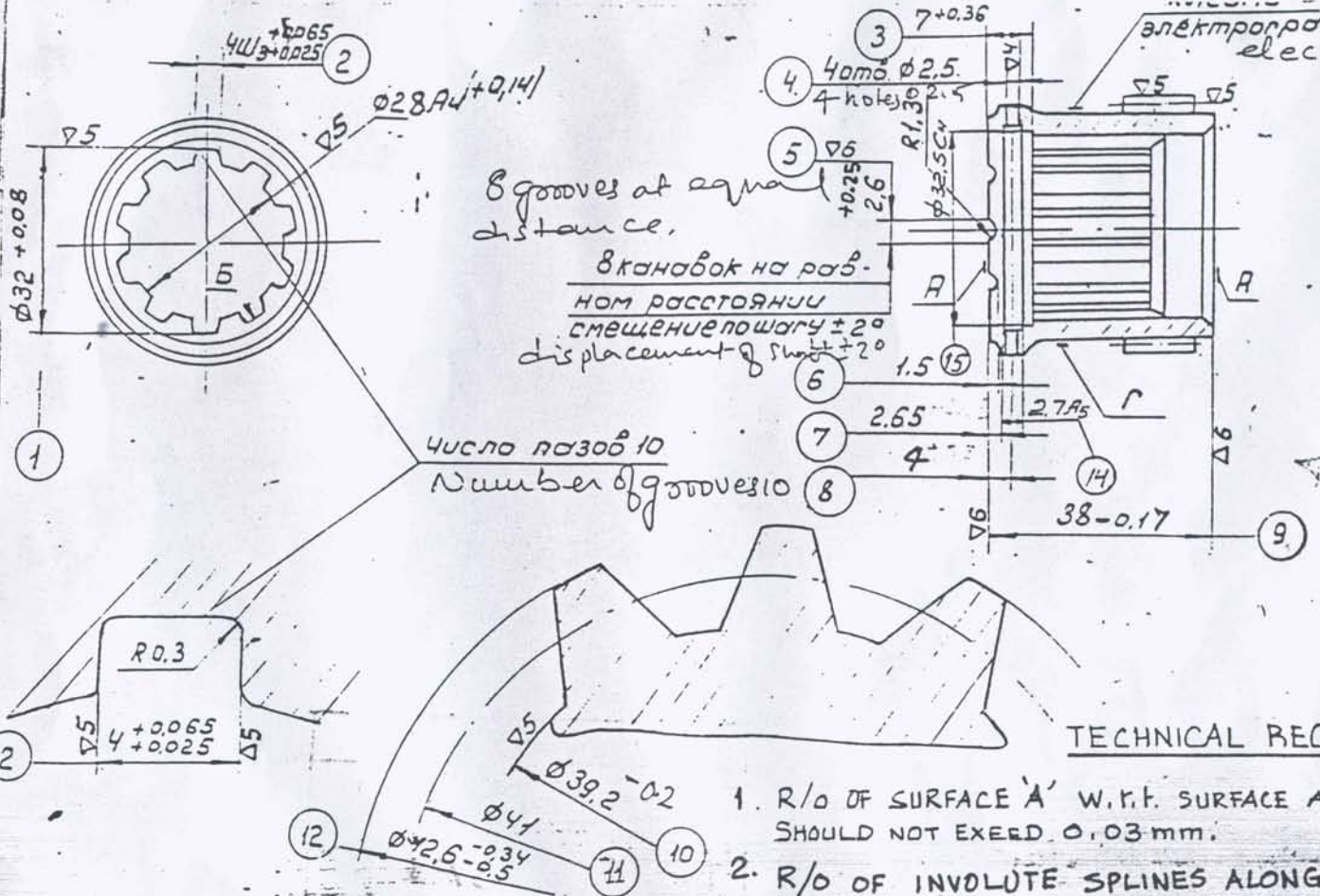
PLANNING SHEET - PDO/EFA FORM No: EFA/P-039

SM		
PRED.	CHD.	APPD

MACHINE:

STD. TOOLS & GAUGES

SPECIAL TOOLS & GAUGES



8 grooves at equal distance.
8 канавок на равном расстоянии.
смещение по ширине ± 2°
displacement of shift ± 2°

Число зубцов 10
Number of grooves 10

TECHNICAL REQUIREMENT

1. R/O OF SURFACE 'A' W.R.T. SURFACE AXIS 'B' SHOULD NOT EXCEED 0.03 mm.
2. R/O OF INVOLUTE SPLINES ALONG THE PITCH CIRCLE W.R.T. SURFACE AXIS OF 'B' SHOULD NOT EXCEED 0.1
3. RECTANGULAR SPLINES SHOULD BE CHECKED AS PER INSTRUCTION UB-19
4. ON SURFACE 'Г' PRESENCE OF TRACES AFTER MILLING SPLINES ACCORDING TO STANDARD TEMPLATE ARE ALLOWED.
5. POSITION OF 8 GROOVES R 1.3 W.R.T. FOUR HOLES Ø 2.5 IS ARBITRARY.

GO & NO GO RING GAUGE 42.6 ^{-0.02} _{-0.050}	090/017
SPL. SNAP GAUGE 39.2 ^{-0.2}	403226
TEMPLATE 15XR 18	203225
TEMPLATE 18	203224
SNAP GAUGE 38.0 ^{-0.17}	025/09/106
DEPTH GAUGE 2.65 ^{-0.025}	077/16
SPLINE GAUGE	403169
RING GAUGE FOR Ø 44.40/44.02	

PLANNING SHEET-PDO/EFA FORM No: EFA/P-039

SM		
PRED.	CHD.	APPD