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Collection of materials for technical tasks solved within the project

FIT FOR CAREER

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Vyšší odborná škola, Obchodní akademie a Střední odborné učiliště technické Chotěboř, the Czech Republic



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Istituto Superiore „Enzo Ferrari“, Barcellona P.G., Italy



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VOŠ, OA a SOUT Chotěboř
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Crane DACON (Didactic Aid for Coordinate conversiON)

Our product is a crane useful as an didactic aid (**Didactic Aid for Coordinate conversiON**). It recalculates coordinates from cartesian to polar. It's composed of a cylindrical tower, a jib with a trolley powered by a rotary motor which serves as a counterweight for the jib at the same time.

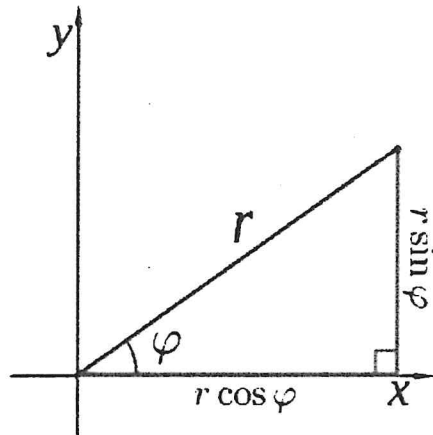
Anchoring of the jib is covered by a cupola, which at the same time covers the engine for rotating the jib and the gearbox. All of this stands in the corner of a wooden baseplate with coordinates engraved in it. The baseplate is 250 mm long and 250 mm wide.

The tower is made of aluminium alloy. It is 150 mm tall and measures 100 mm in diameter with a hole 80 mm in diameter. There lies a 3D printed gearbox flange on the tower which measures 116 mm in diameter.

The jib is made off the same aluminium alloy of rectangular profile with it. The jib is 25 mm tall, 25 mm wide and 460 mm long with walls that are 2mm thick. All of this is covered by a 3D printed cupola with the diameter of 116 mm.

The device serves as a didactic aid for the conversion of Cartesian coordinates to polar coordinates and vice versa in the first quadrant of two-dimensional space, ie the plane.

In the Cartesian 2D coordinate system, the x and y coordinate axes are perpendicular to each other and intersect at the origin. Each point is then determined by the distances from the origin x_i , y_i . In the polar coordinate system, the point is determined by the coordinates r_i and φ_i . The value of r_i indicates the distance from the origin of the coordinates. The second coordinate φ_i is the angle between the selected axis and the origin line with the specified point.



We use the following relationships to recalculate:

conversion from polar to Cartesian coordinates

$$x = r \cdot \cos \varphi$$

$$y = r \cdot \sin \varphi$$

conversion from Cartesian coordinates to polar

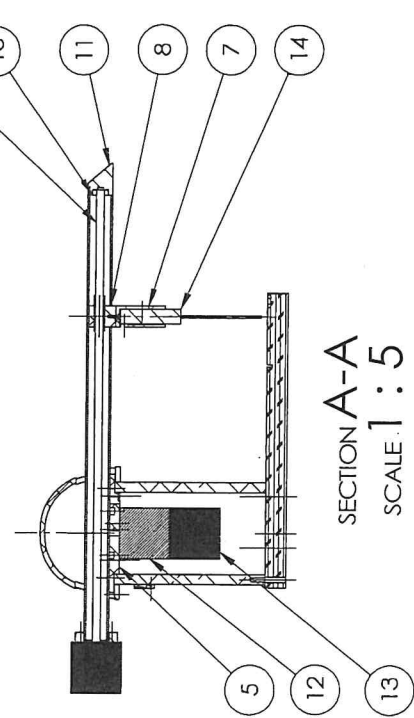
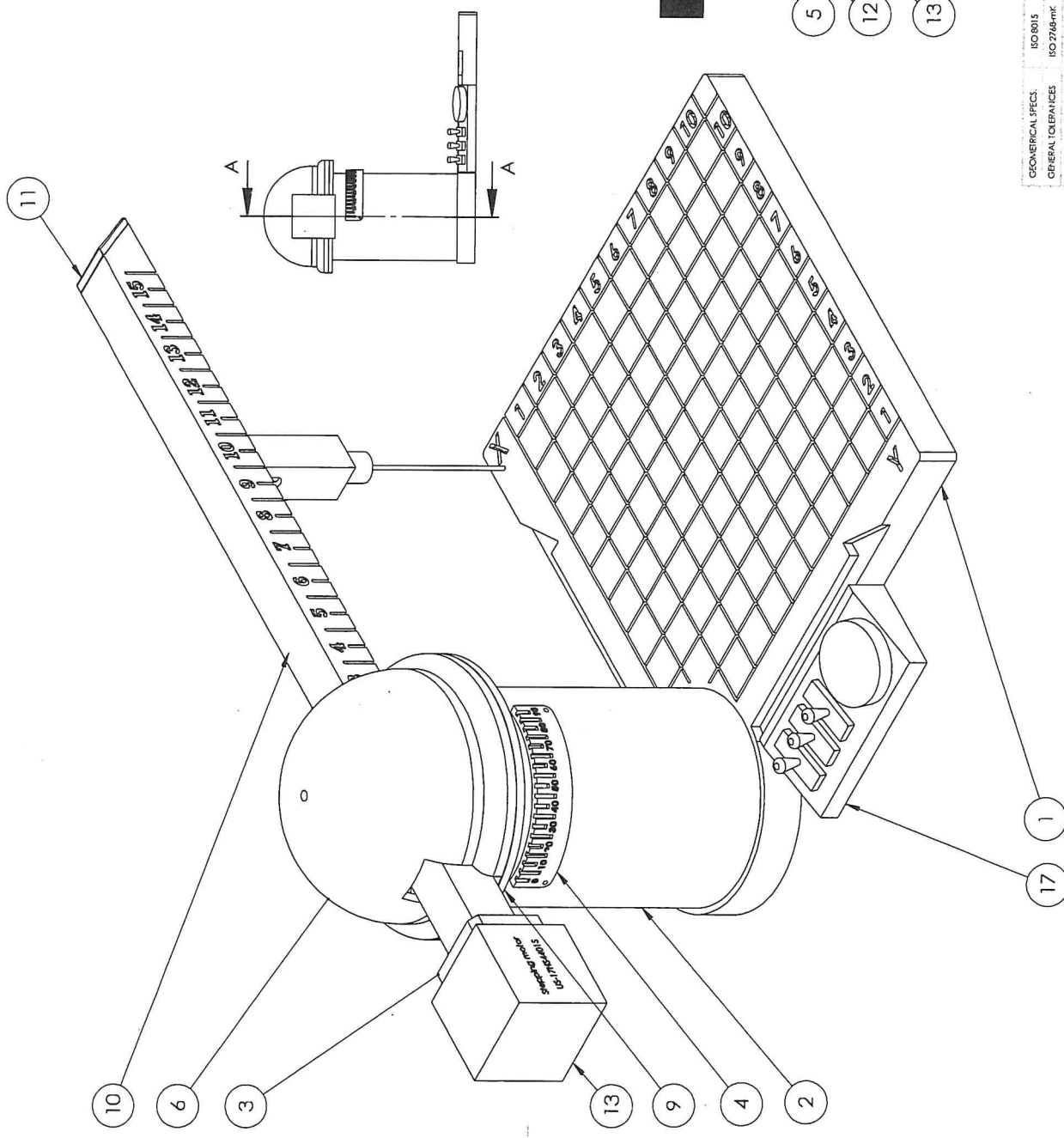
$$r = \sqrt{x^2 + y^2}$$

$$\varphi = \arctg(y / x)$$

Example of use: A point in a plane has Cartesian coordinates x and y . Calculate the polar coordinates r and φ . Perform the check on the DACON device as follows

- 1) Use the control (I) to turn the arm and set the calculated angle φ (see scale on the tube)
- 2) Use the control (II) to move the laser holder to the calculated distance r (see scale on the arm)
- 3) Activate the laser and check that it illuminates the field at the original x and y coordinates

ITEM	DESCRIPTION	MATERIAL	QTY
1	BASEPLATE	WOOD	1
2	TOWER	ALUMINIUM	1
3	MOTOR FLANGE	ALUMINIUM	1
4	SCALE	PLA 3D PRINTED	1
5	GEARBOX FLANGE	ALUMINIUM	1
6	CUPOLA	PLA 3D PRINTED	1
7	TROLLEY PART 2	PLA 3D PRINTED	1
8	TROLLEY PART 1	PLA 3D PRINTED	1
9	CUPOLA RING	PLA 3D PRINTED	1
10	JIB	ALUMINIUM	1
11	JIB PLUG	PLA 3D PRINTED	1
12	PLANETARY GEARBOX	PLA 3D PRINTED	1
13	STEPPING MOTOR US-17HS4401S	STEEL	2
14	LASER EMITTER	PLASTIC	1
15	BEARING	STEEL	1
16	THREADED ROD	STEEL	1
17	CONTROL PANEL	PLA 3D PRINTED	1



VOS OA SOUT
Chrobot

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN MILLIMETERS

MATERIAL: N/A
MAKE FROM: N/A
DATE: 02/08/22
DWG. NO.:

ISO 9015
ISO 2768-mK
SIGNATURE:

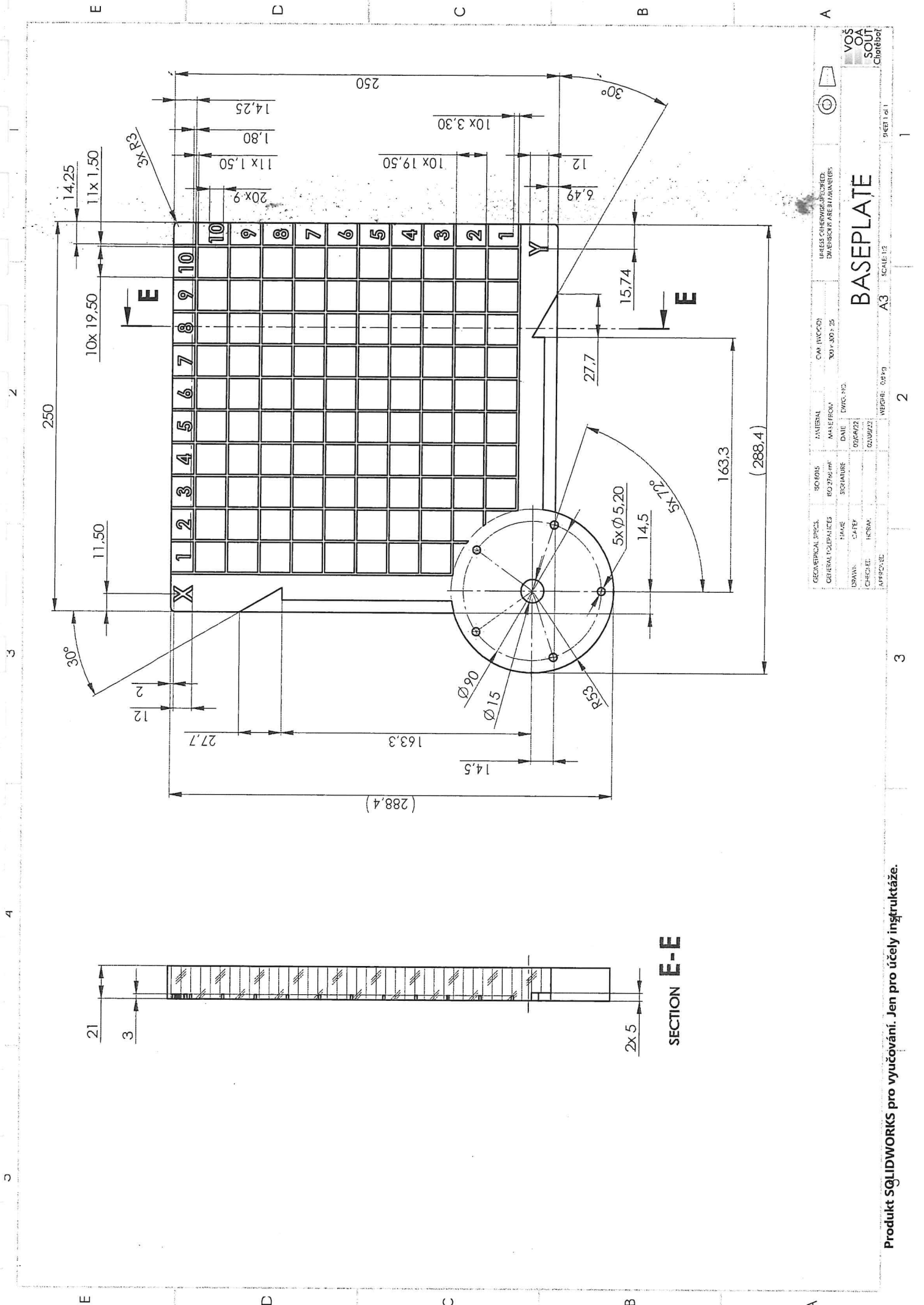
GENERAL TOLERANCES
NAME: HOPAK
HOPAK:
CHECKER:
APPROVED:

CRANE ASSEMBLY

WEIGHT: 3.5 kg

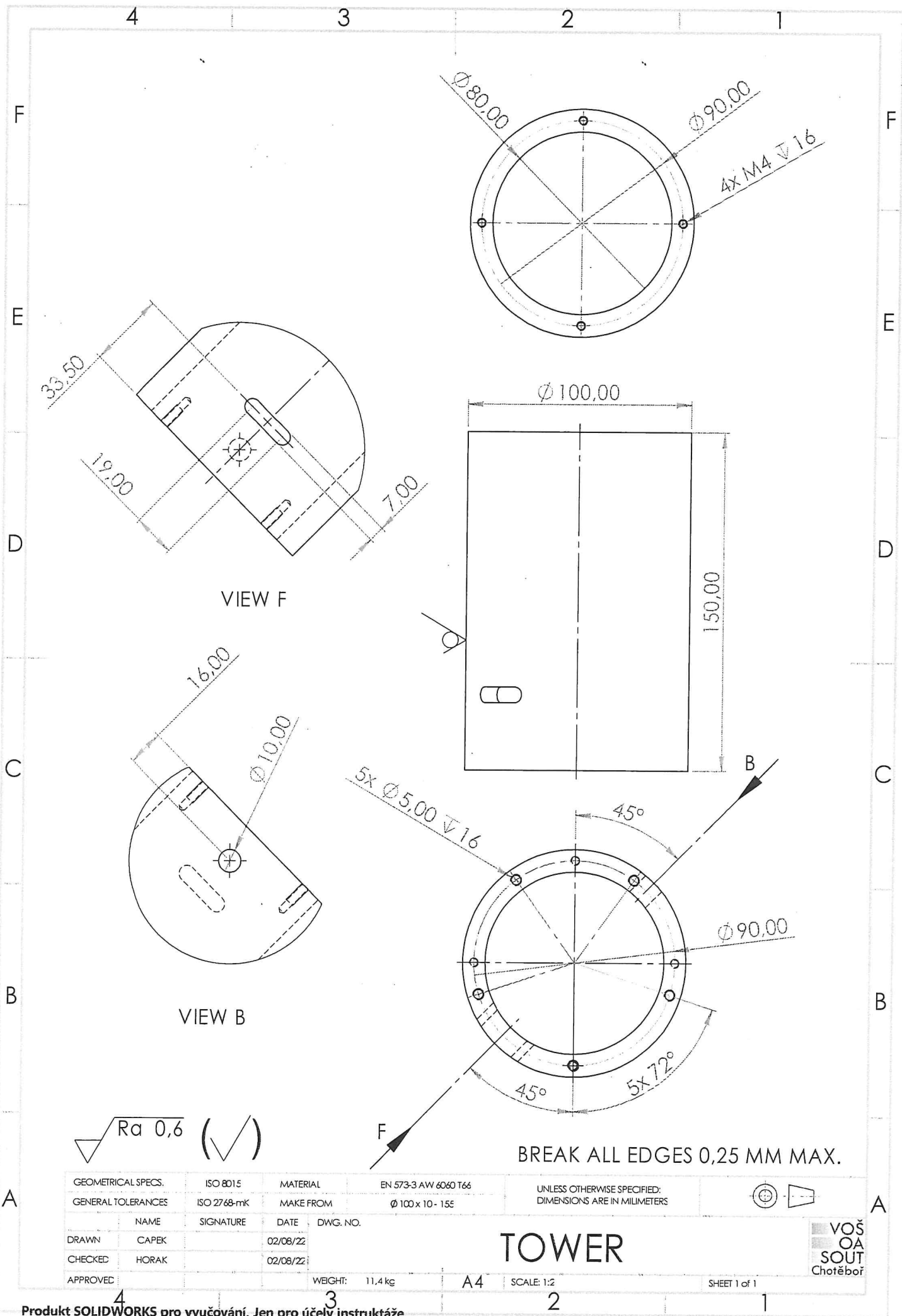
A3 SCALE 1:2

SHEET 1 of 1



GEOGRAPHICAL SPICES		ISO 9001	MATERIAL		CM (VCC02)	UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS	
GENERAL TOLERANCES		ISO 2768/MS	MANUFACTURE		NO. 1, 301, 25	BASEPLATE	
DATE	02/26/22	DATE	02/26/22	DATE	02/26/22	SCALE: 1:2	
SIGNATURE		SIGNATURE		SIGNATURE		SHEET 1 of 1	
NAME	CAFEE	NAME	HRVAN	NAME		WEIGHT: 0,217g	
CHARGE	HRVAN	CHARGE		CHARGE		A3	
APPROVAL		APPROVAL		APPROVAL		2	

Produkt SGLIDWORKS pro vyučování. Jen pro účely inžinierství.



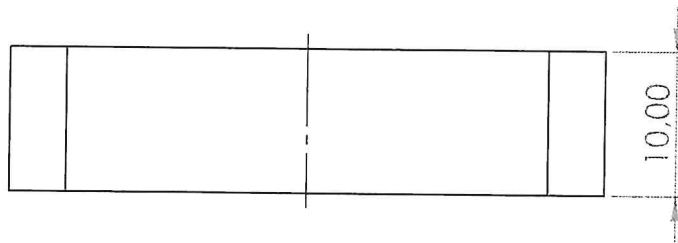
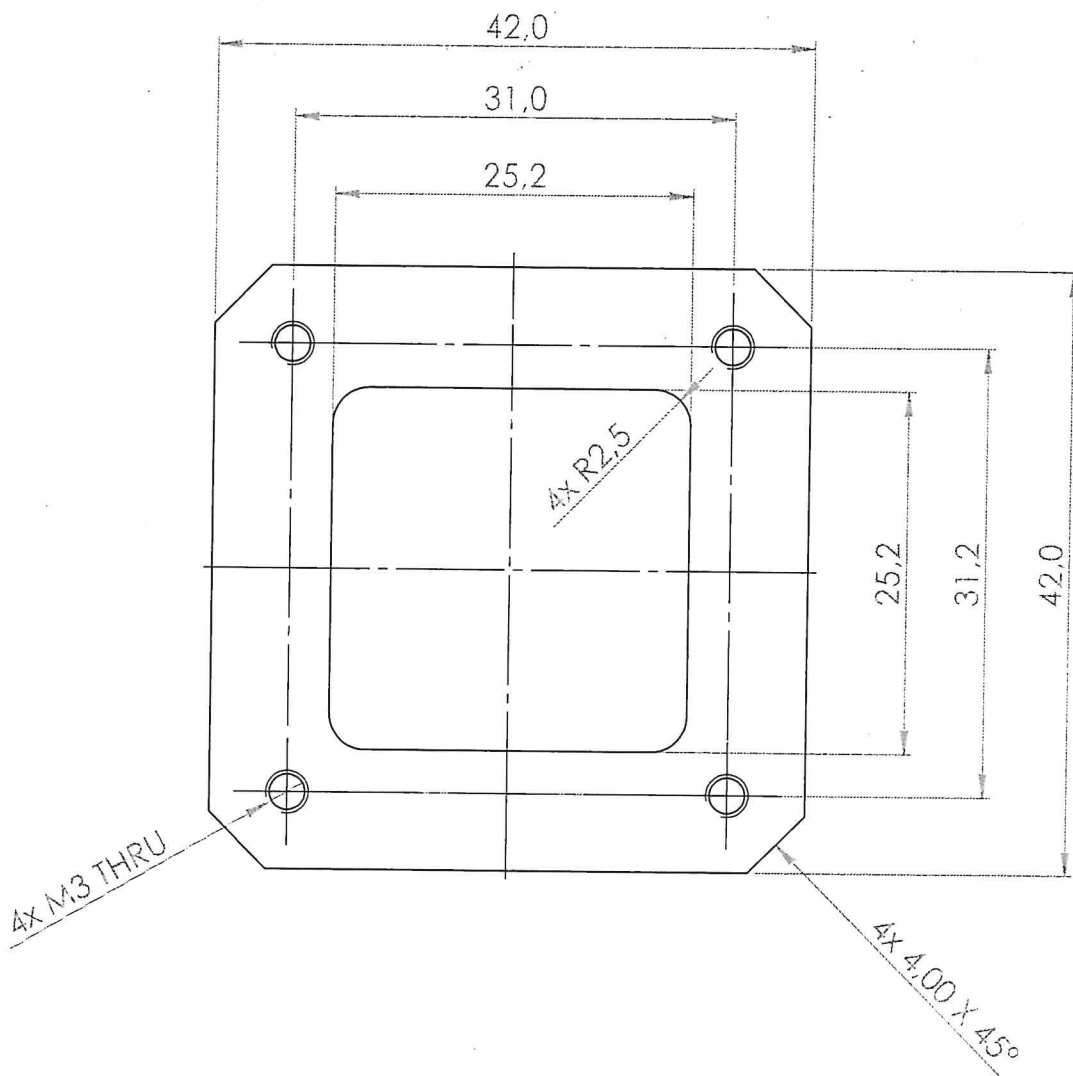
$\sqrt{Ra\ 0,6}$ (✓)

BREAK ALL EDGES 0,25 MM MAX.

GEOMETRICAL SPECS.	ISO 8015	MATERIAL	EN 573-3 AW 6060 T66	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	
GENERAL TOLERANCES	ISO 2768-mk	MAKE FROM	Ø 100 x 10 - 155		
	NAME	SIGNATURE	DATE	DWG. NO.	
DRAWN	CAPEK		02/08/22		
CHECKED	HORAK		02/08/22		
APPROVED					

TOWER

VOŠ
OA
SOUT
Chotěboř



∇ Ra 1,6

BREAK ALL EDGES 0,25 MM MAX.

GEOMETRICAL SPECS.	ISO 8015	MATERIAL	EN 573-3 AW 6063 T66	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS
GENERAL TOLERANCES	ISO 2768-mK	MAKE FROM	45 x 45 x 15	
	NAME	SIGNATURE	DATE	DWG. NO.
DRAWN	CAPEK		02/08/22	
CHECKED	HORAK		02/08/22	
APPROVED				

MOTOR FLANGE

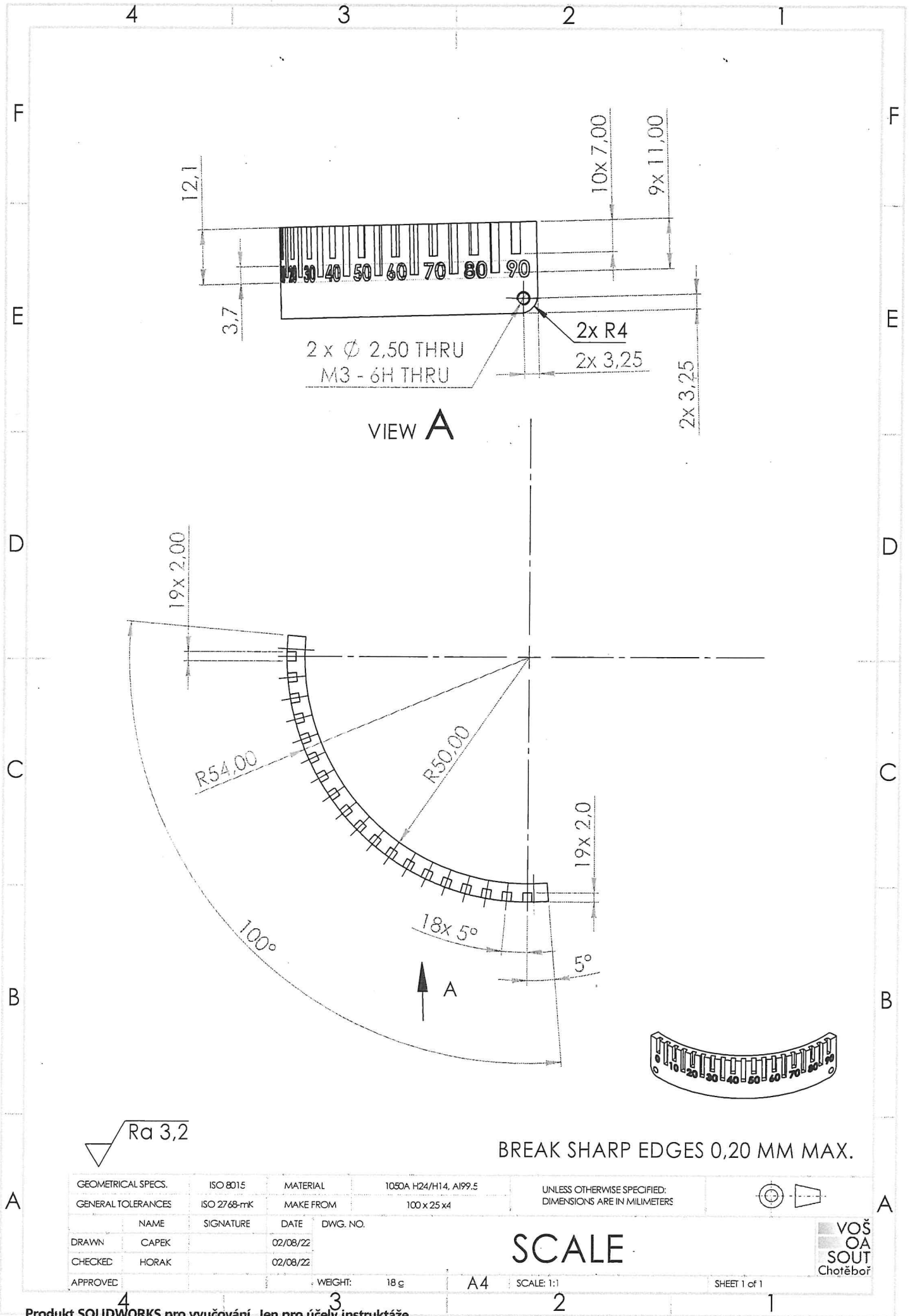
VOŠ
OA
SOUT
Chotěboř

WEIGHT: 30 g

A4

SCALE: 1:2

SHEET 1 of 1



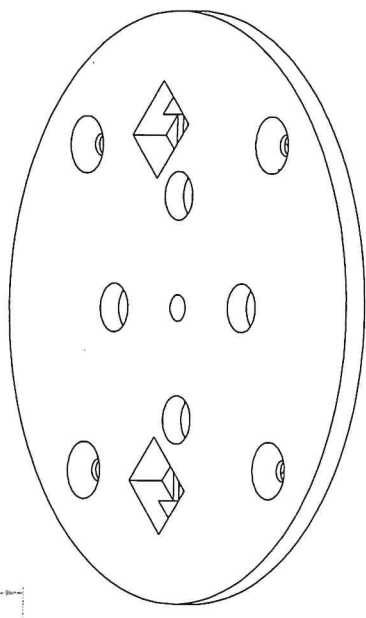
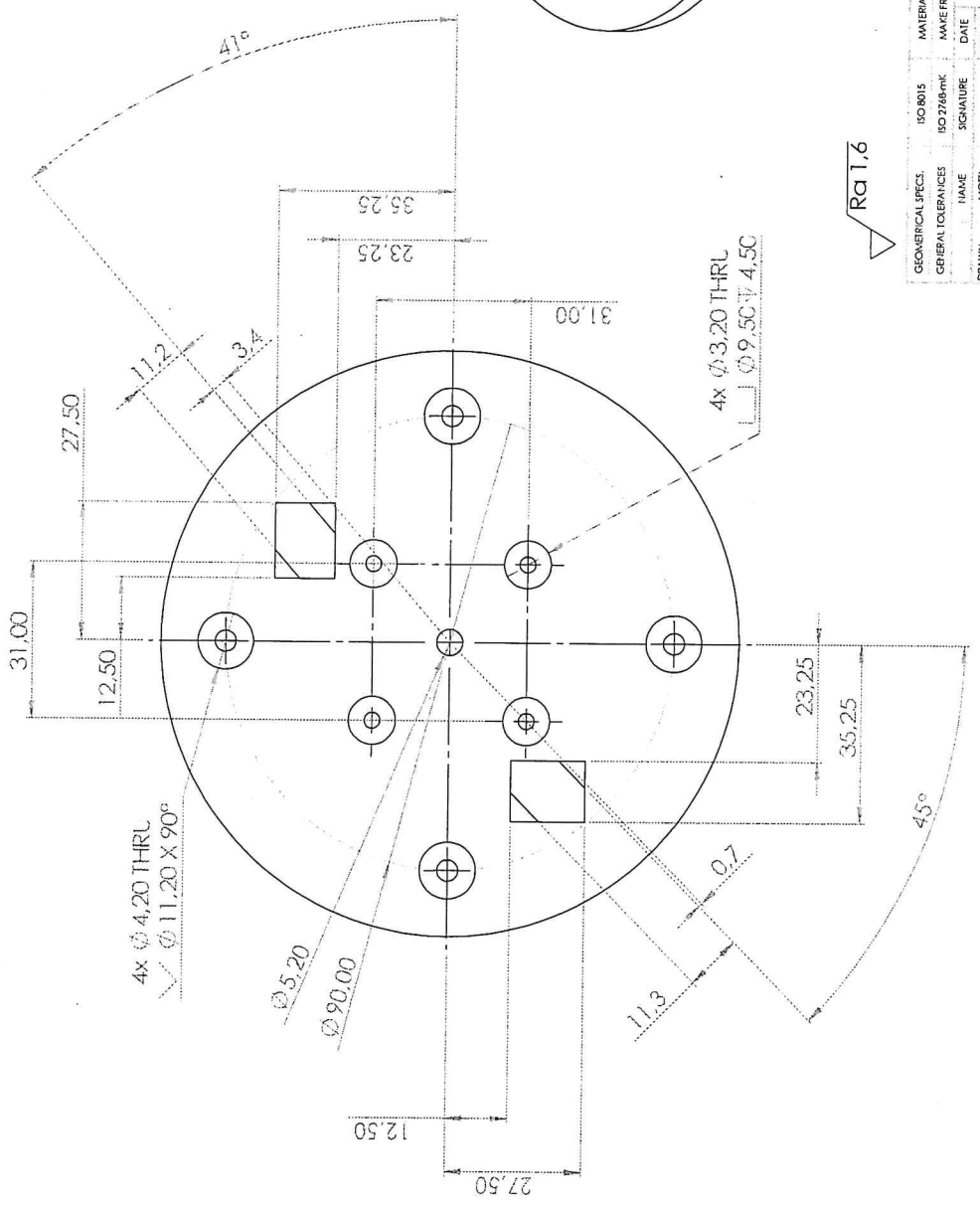
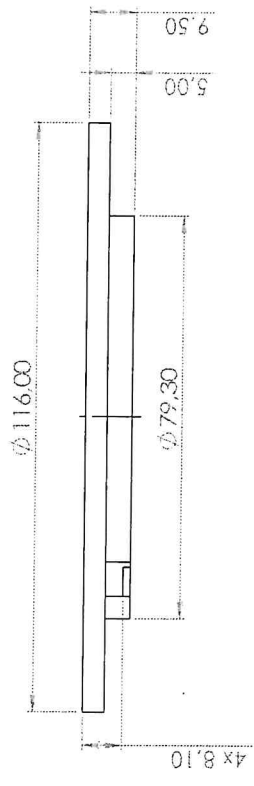
$\sqrt{\text{Ra } 3,2}$

BREAK SHARP EDGES 0,20 MM MAX.

GEOMETRICAL SPECS.		ISO 8015	MATERIAL		1050A H24/H14, Al99.5	UNLESS OTHERWISE SPECIFIED:	
GENERAL TOLERANCES		ISO 2768-mK	MAKE FROM		100 x 25 x 4	DIMENSIONS ARE IN MILLIMETERS	
NAME	SIGNATURE	DATE	DWG. NO.				
DRAWN	CAPEK	02/08/22					
CHECKED	HORAK	02/08/22					
APPROVED			WEIGHT:	18 g	A4	SCALE: 1:1	SHEET 1 of 1

SCALE

VOŠ
OA
SOUT
Chotěboř

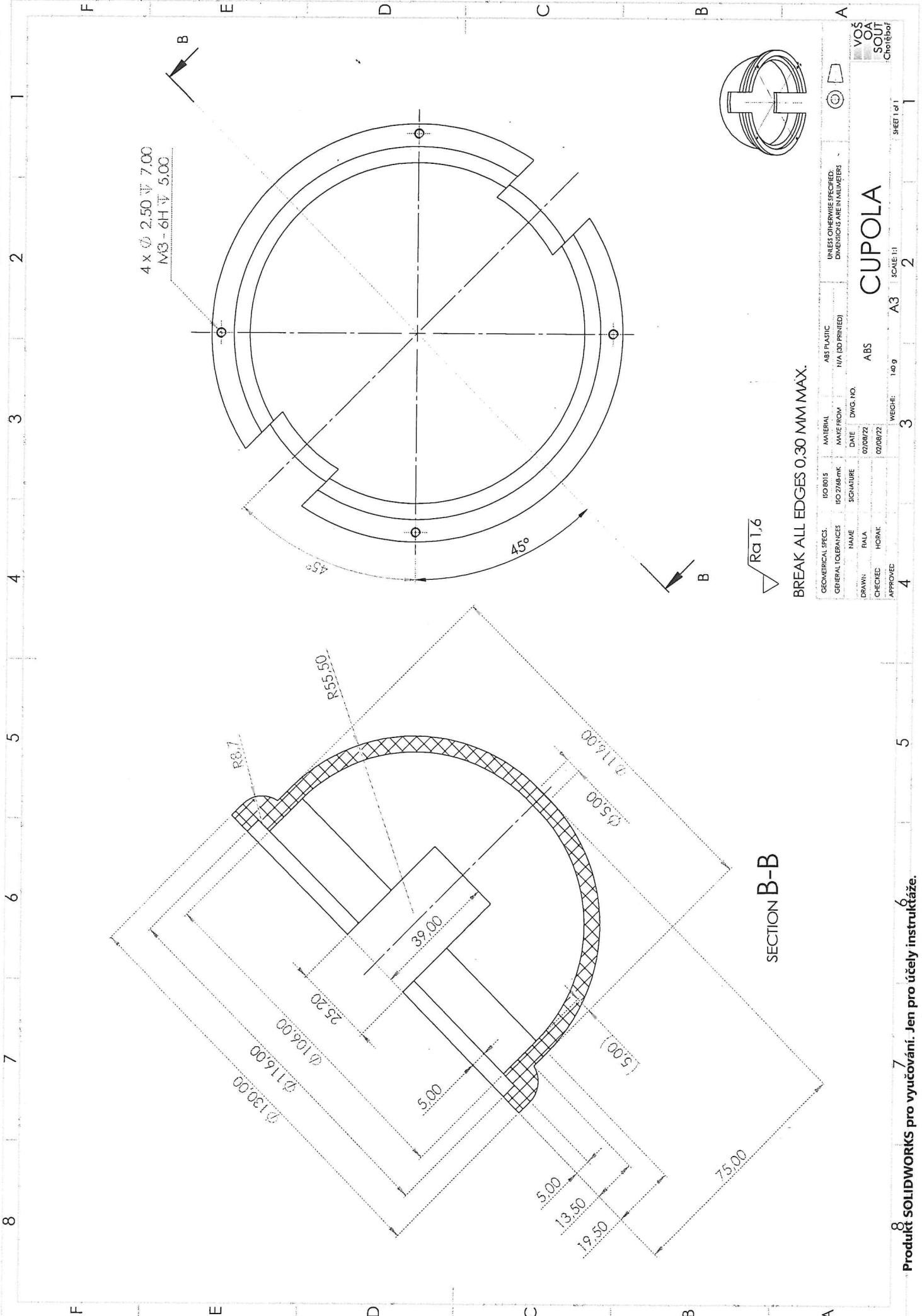


$\sqrt{Ra 1.6}$

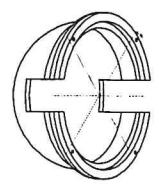
BREAK ALL EDGES 0,20 MM MAX.

GEOMETRICAL SPECS.	ISO 8015	MATERIAL	EN 1573-3 AM 682	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	VOŠ OA SOUT Charlebois
GENERAL TOLERANCES	ISO 2768-mS	MAKE FROM	$\phi 120 - 12$		
NAME	SIGNATURE	DATE	DWG. NO.		
DRAWN	MOTIL	07/08/22			
CHECKED	HORAK	07/08/22			
APPROVED					
			WEIGHT: 180 g	A3	SHEET 1 of 1

GEARBOX FLANGE



4 x \varnothing 2.50 ∇ 7.00
M3 - 6H ∇ 5.00



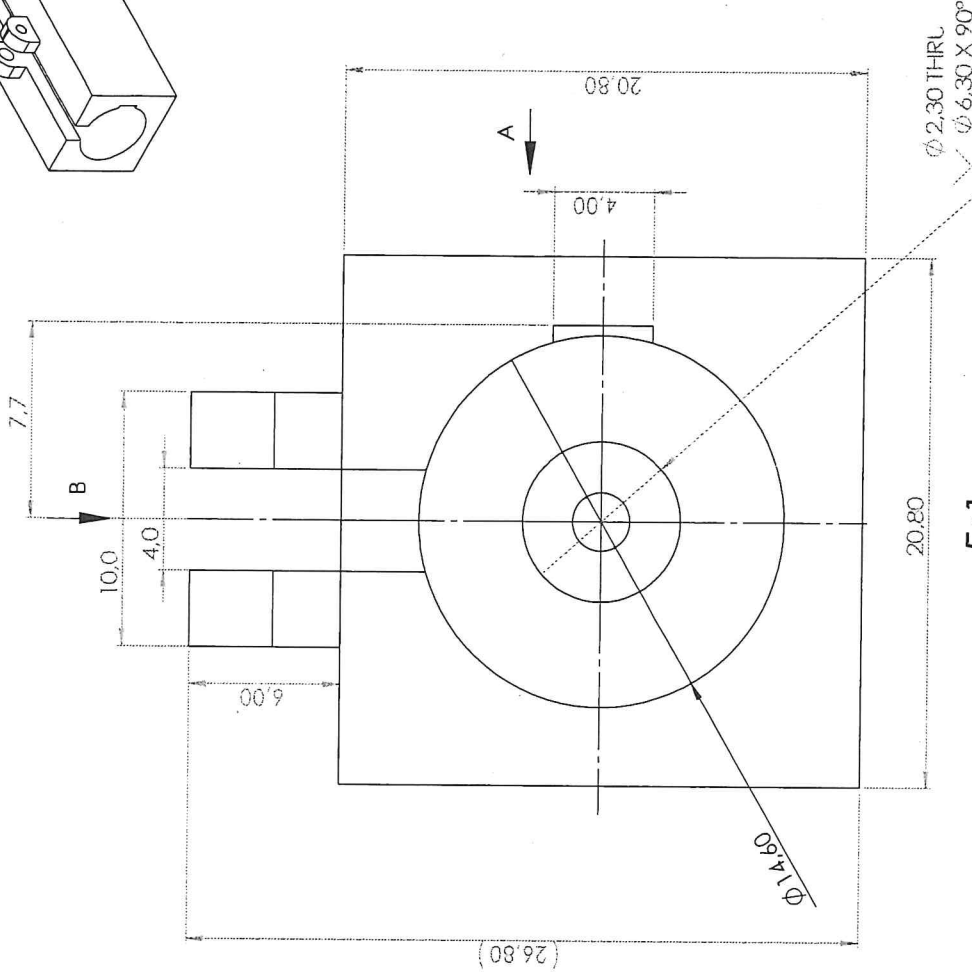
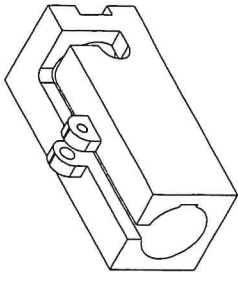
∇ Ra 1,6

BREAK ALL EDGES 0.30 MM MAX.

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS		VOŠ OJA SOUT Charlebois	
ABS PLASTIC	ABS	SCALE: 1:1	SHEET 1 of 1
HIA (DO PRINTED)	ABS	A3	2
MATERIAL	ABS	WEIGHT: 140.9	3
ISO 2768-MK	ISO 2768-MK	DWG. NO.	4
GENERAL TOLERANCES	NAME	DATE	4
ISO 2768-MK	SIGNATURE	02/08/22	4
ISO 2768-MK	NAME	02/08/22	4
ISO 2768-MK	NAME	02/08/22	4
ISO 2768-MK	NAME	02/08/22	4
ISO 2768-MK	NAME	02/08/22	4

CUPOLA

SECTION B-B



∇ Ra 1,6

BREAK ALL EDGES 0,20 MM MAX.

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS

ISO 9001
ISO 27001-PC

ISO 15725-AN 653166
30 x 30 x 55

GENERAL TOLERANCES
DRAWN: PAVLAS
CHECKED: HORAK
APPROVEE:

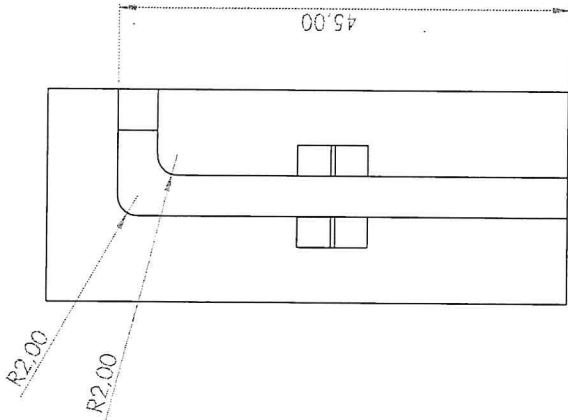
MATERIAL: 30 x 30 x 55
DATE: 02/08/22
DWG. NO.:

WEIGHT: 40,9

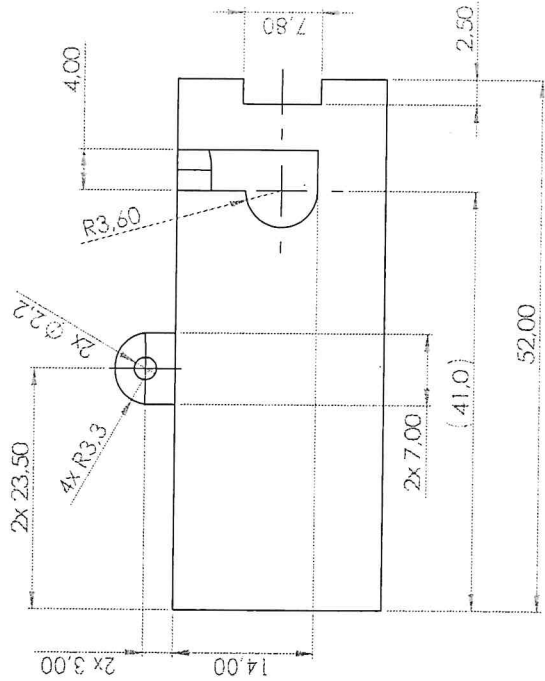
SCALE: 2:1

SHEET 1 of 1

TROLLEY PART 02

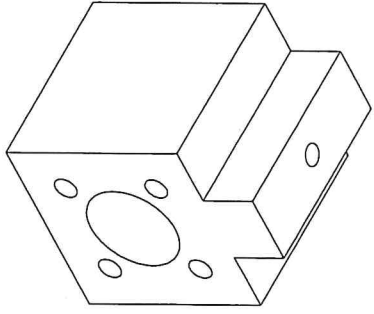
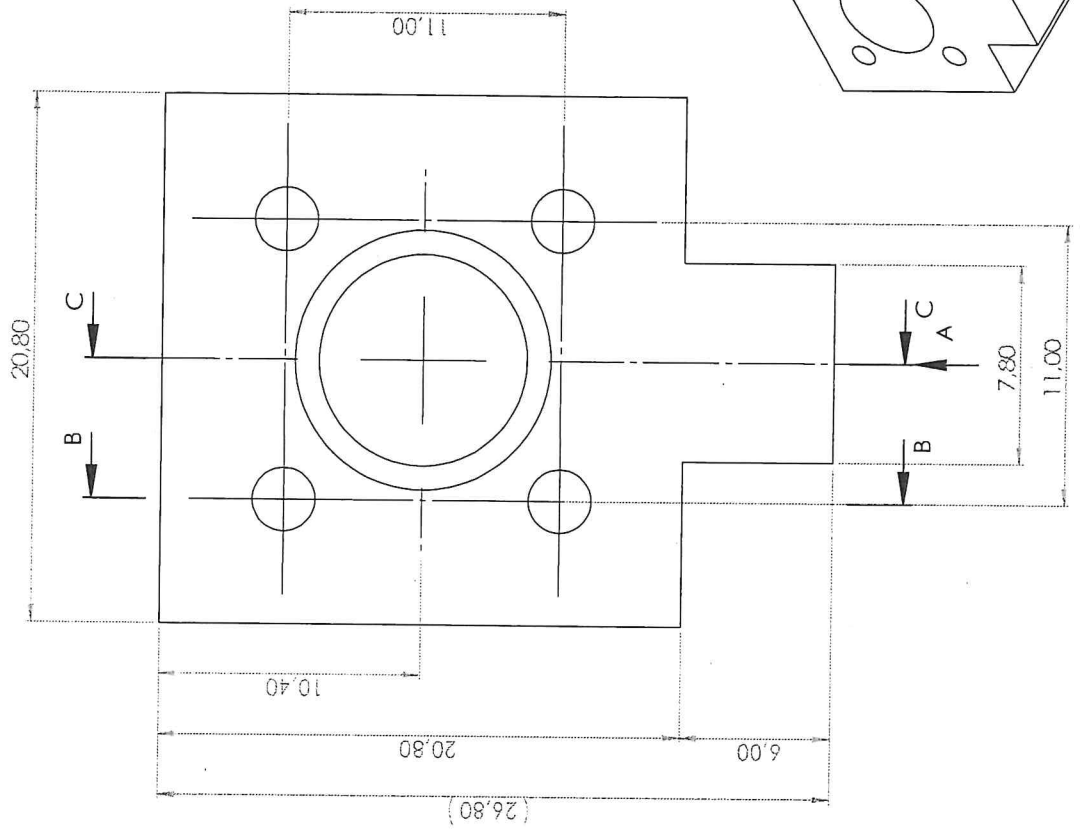


VIEW B



VIEW A

F E D C B A



BREAK ALL EDGES 0,20 MM MAX.

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS.

TROLLEY PART 01

GEOMETRICAL STRESSES	ISO 8015	MATERIAL	EH 573-3 AW 6063 T66
GENERAL TOLERANCES	ISO 2768 mS	MAKE FROM	30 x 30 x 25
NAME	SIGNATURE	DATE	DWG. NO.
DRAWN: BURIAN		02/08/22	
CHECKED: HOJAK			
APPROVED:			
		WEIGHT: 25,9	SCALE: 1:1

√ Ra 1,6

VOS
VOA
SOUT
Chateřov

A3

3

2

1

5

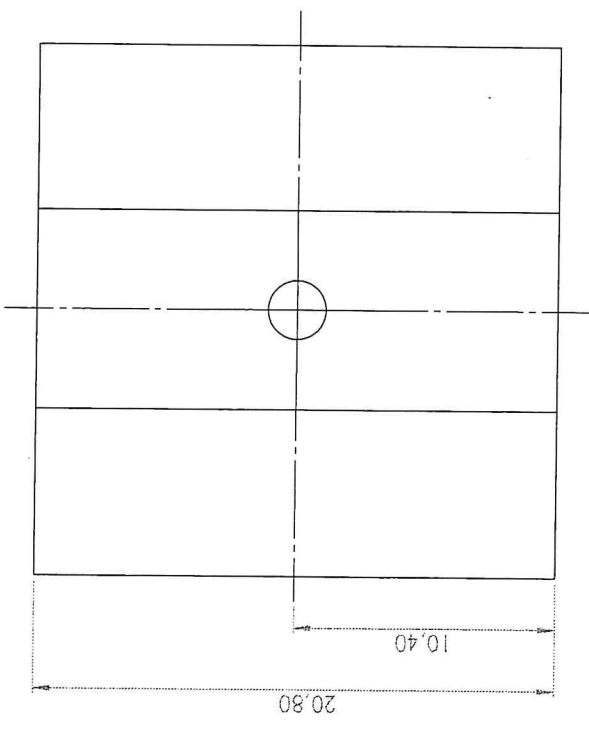
6

7

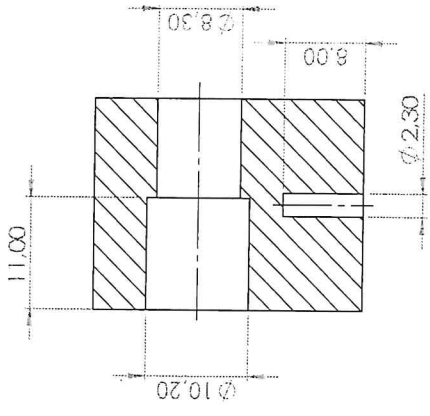
8

8

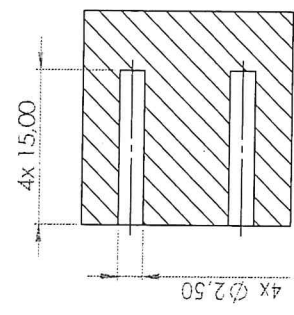
8



VIEW A

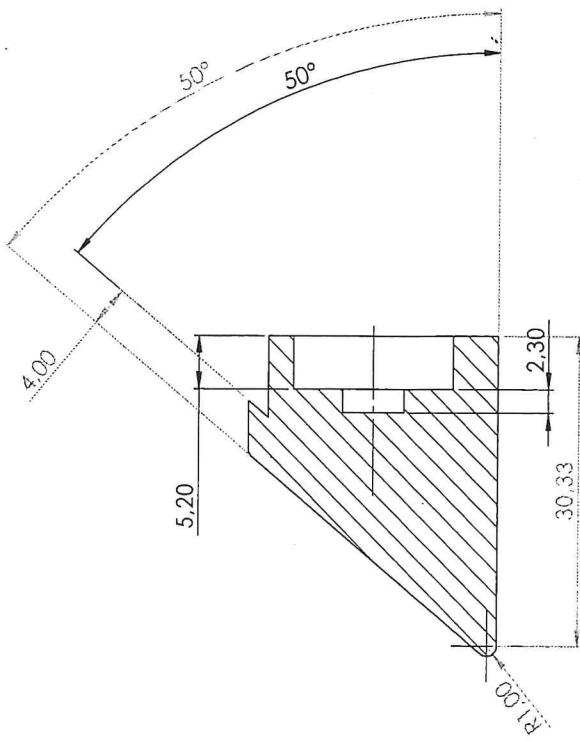
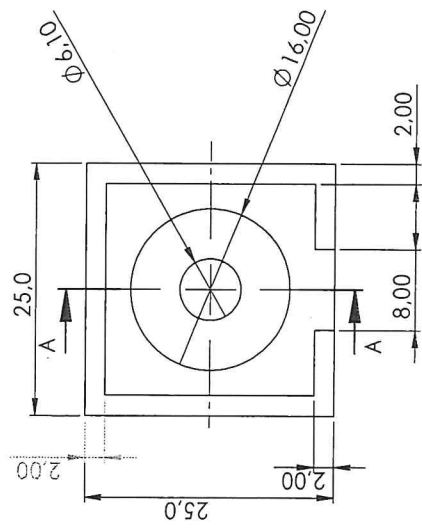


SECTION C-C
SCALE 2:1



SECTION B-B
SCALE 2:1

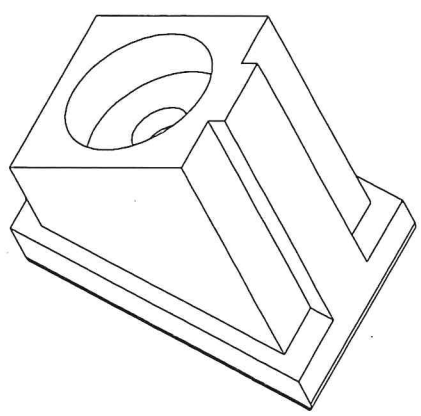
Produkt SOLIDWORKS pro vyučování. Jen pro účely instruktaže.



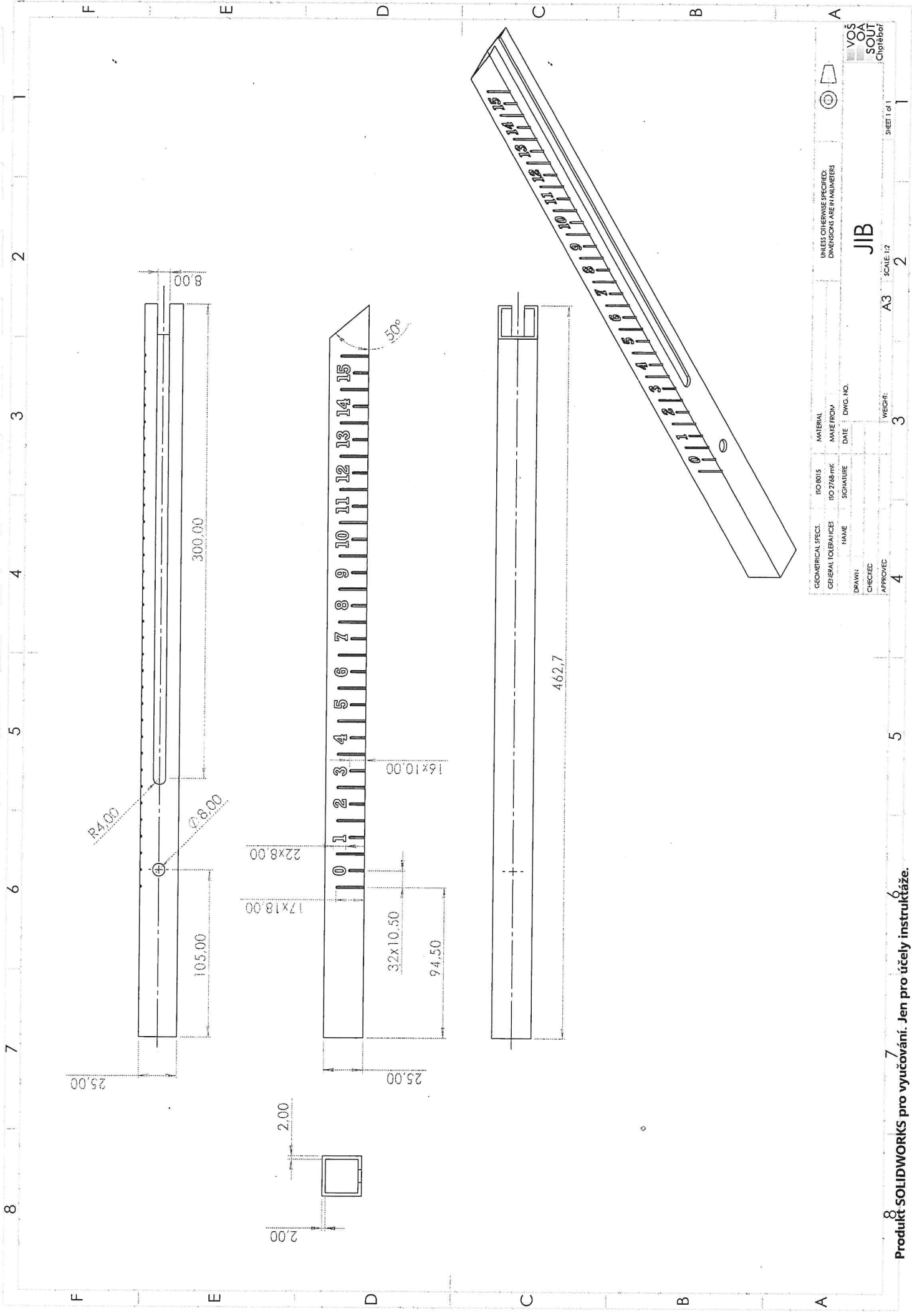
SECTION A-A

$\sqrt{Ra 1,6}$

BREAK ALL EDGES 0,30 MM MAX.

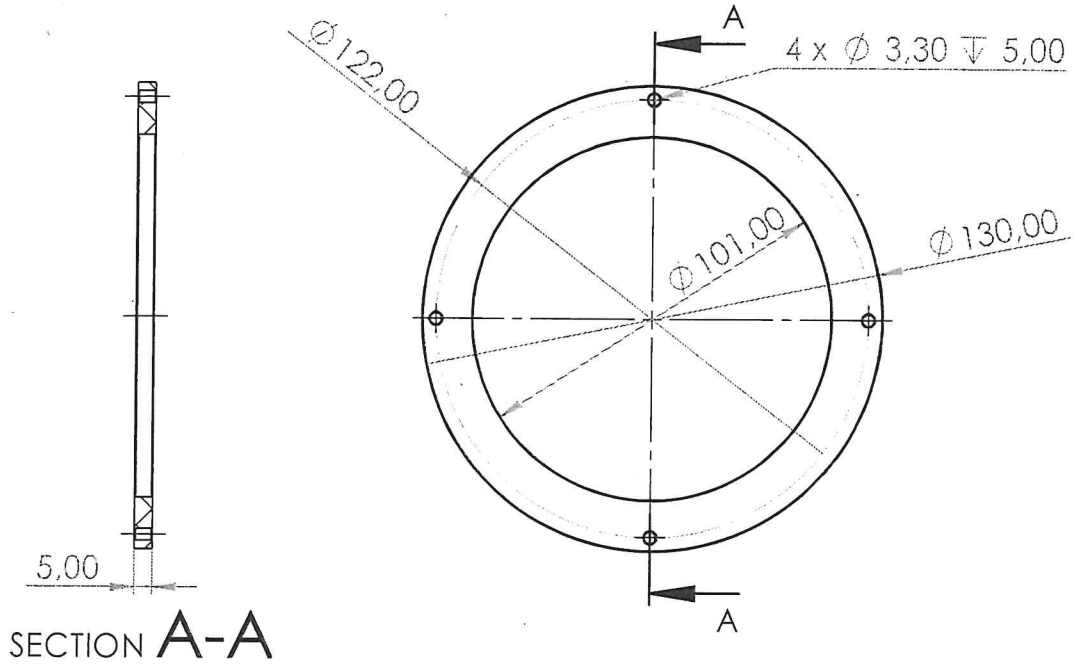


GEOLOGICAL SPECS.		MATERIAL		PET	
GENERAL TOLERANCES		ISO 2768 mK		UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS	
NAME	SIGNATURE	DATE	DWG. NO.	JIB PLUG	
DRAWN	CHECKED	APPROVED	WEIGHT:	SCALE: 2:1	
				A3	
				SHEET 1 of 1	



VOŠ SOUT Chrástbor		INLET OVERLINE SPECKLES DIMENSIONAL NUMBERS		JIB		SCALE: 1:2		SHEET 1 of 1		
GEOMETRICAL SPECS. GENERAL TOLERANCES		ISO 8015	MATERIAL NAME FROM	DATE	DWG. NO.	A3		WEIGHT: 3		
DRAWN: CHECKED:		SIGNATURE	APPROVED:		4		5		6	

8 Produkt SOLIDWORKS pro vyučování. Jen pro účely instruktáže.

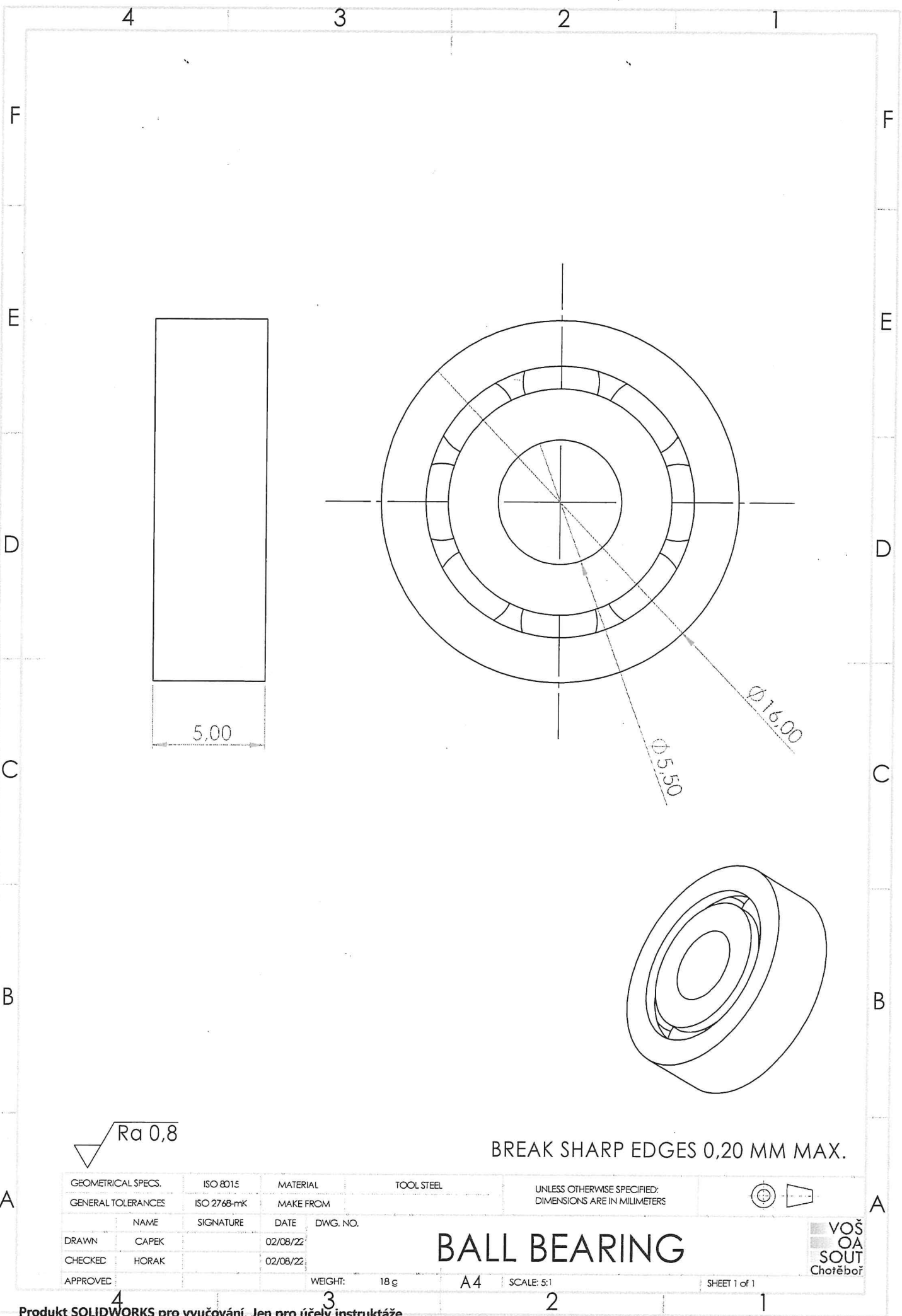


$\sqrt{\text{Ra } 1,6}$

BREAK ALL EDGES 0,20 MM MAX.

GEOMETRICAL SPECS.	ISO 8015	MATERIAL	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS		
GENERAL TOLERANCES	ISO 2768-mK	MAKE FROM			
	NAME	SIGNATURE	DATE	DWG. NO.	
DRAWN					
CHECKED					
APPROVED					
ABS CUPOLA RING			WEIGHT:	A4	SCALE: 1:2
					SHEET 1 of 1

VOŠ
OA
SOUT
Chotěboř



$\sqrt{Ra\ 0,8}$

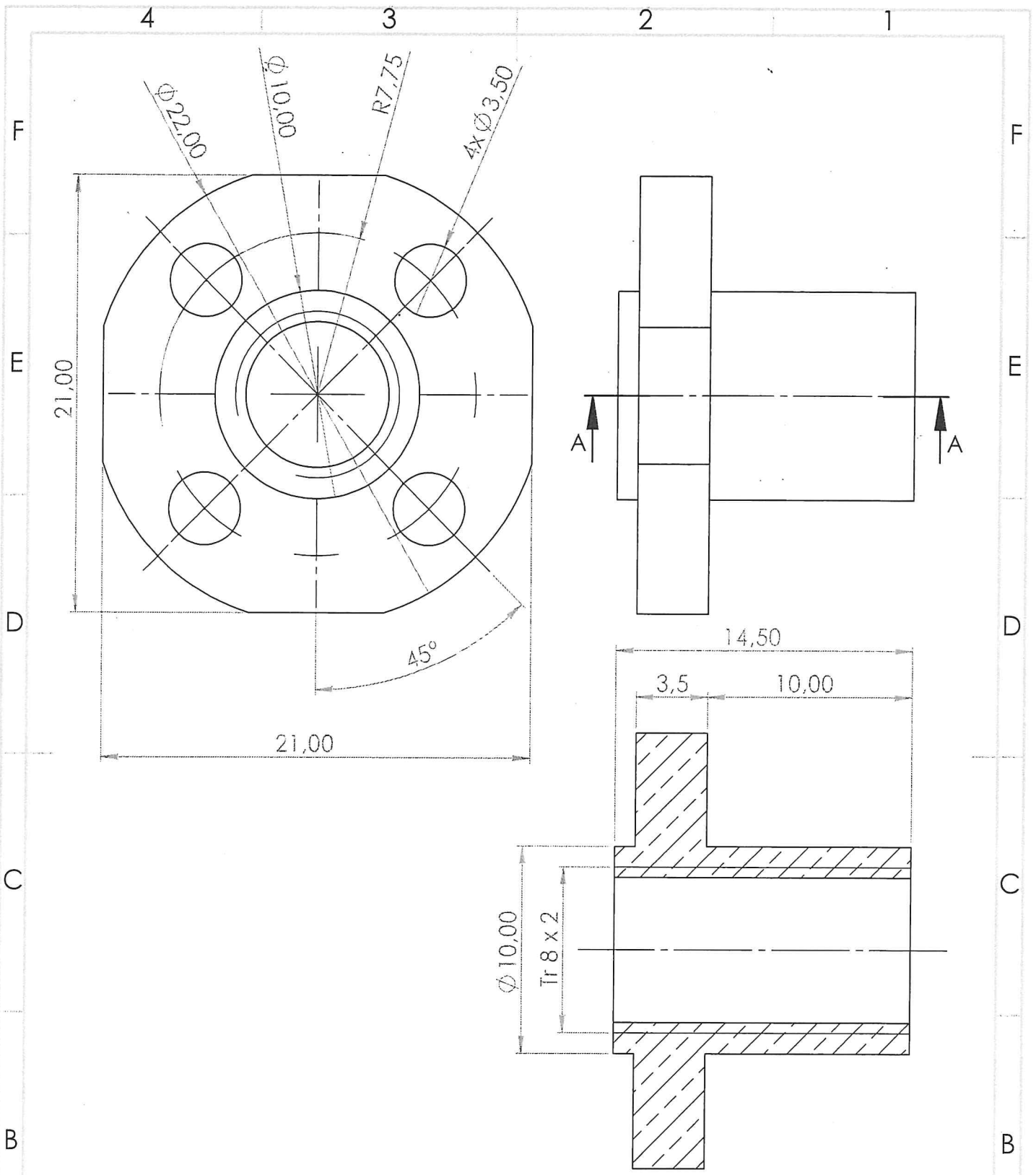
BREAK SHARP EDGES 0,20 MM MAX.

GEOMETRICAL SPECS.	ISO 8015	MATERIAL	TOOL STEEL	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	
GENERAL TOLERANCES	ISO 2768-mK	MAKE FROM			
	NAME	SIGNATURE	DATE	DWG. NO.	
DRAWN	CAPEK		02/08/22		
CHECKED	HORAK		02/08/22		
APPROVED:					

BALL BEARING

VOŠ
OA
SOUT
Chotěboř

WEIGHT: 18 g A4 SCALE: 5:1 SHEET 1 of 1



SECTION A-A

BREAK SHARP EDGES 0,20 MM MAX.

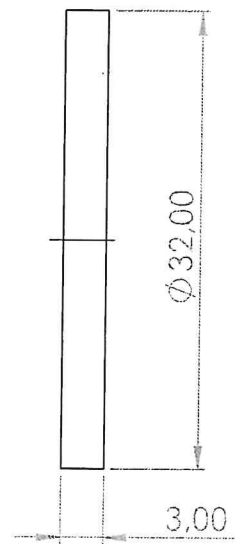
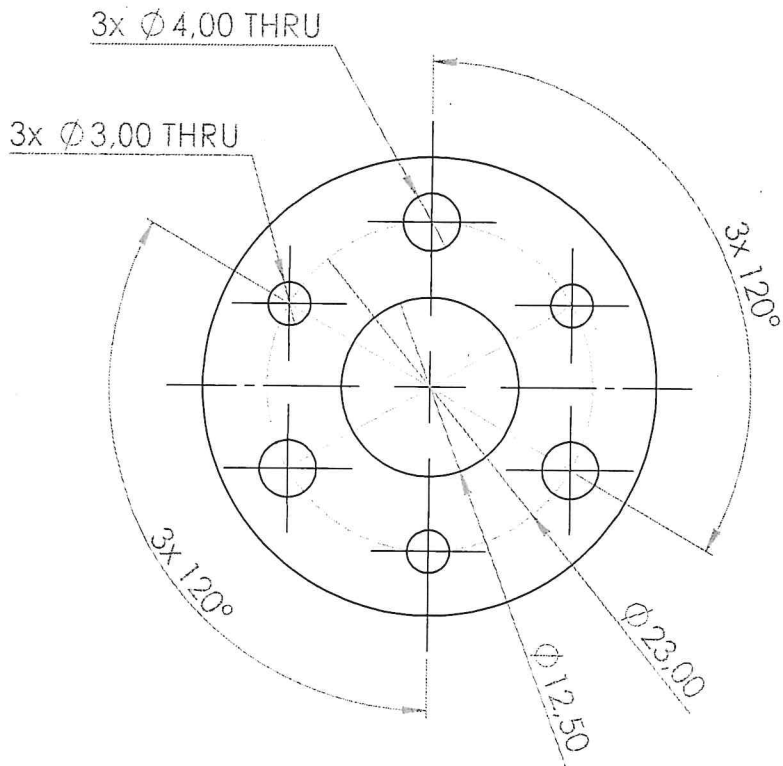
$Ra 1,6$

GEOMETRICAL SPECS.	ISO 8015	MATERIAL	BRASS Ms58	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	
GENERAL TOLERANCES	ISO 2768-mK	MAKE FROM	Ø 25-16		
	NAME	SIGNATURE	DATE	DWG. NO.	
DRAWN	CAPEK		02/08/22		
CHECKED	HORAK		02/08/22		
APPROVED					

NUT TRAPEZOIDAL

VOŠ
OA
SOUT
Chotěboř

WEIGHT: 18 g A4 SCALE: 4:1 SHEET 1 of 1



$\sqrt{Ra\ 0,8}$

BREAK ALL EDGES 0,20 MM MAX.

GEOMETRICAL SPECS.	ISO 8015	MATERIAL	EN 573-3 AW 6082	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS
GENERAL TOLERANCES	ISO 2768-mK	MAKE FROM	Ø 35 - 5	
	NAME	SIGNATURE	DATE	DWG. NO.
DRAWN	SIBERA		02/08/22	
CHECKED	HORAK		02/08/22	
APPROVED				

FLANGE 02

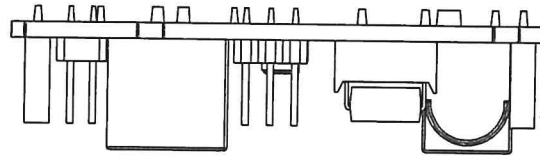
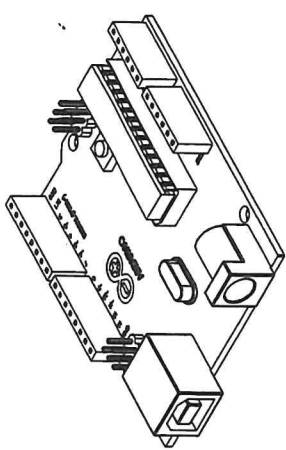
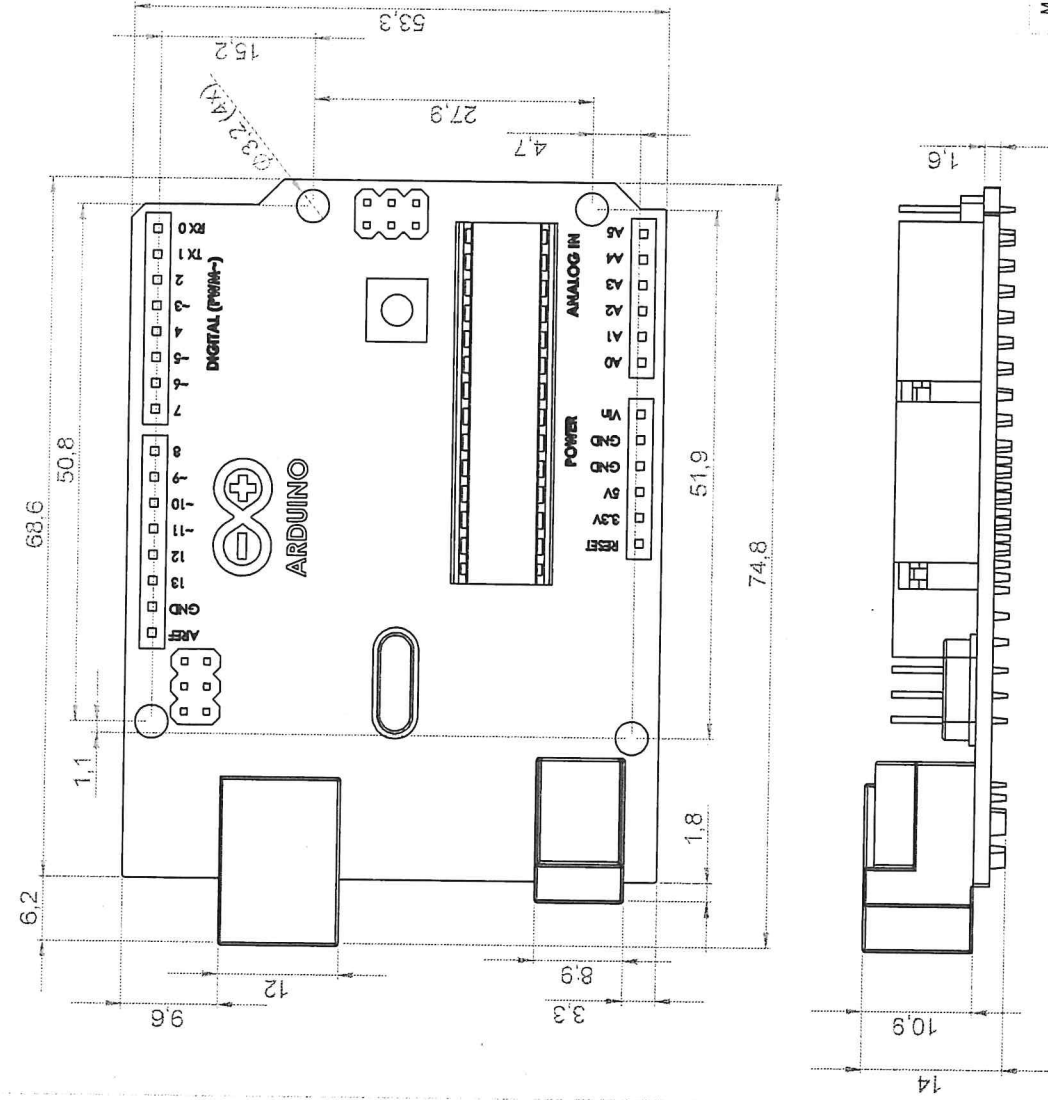
VOŠ
OA
SOUT
Chotěboř

WEIGHT: 5 g

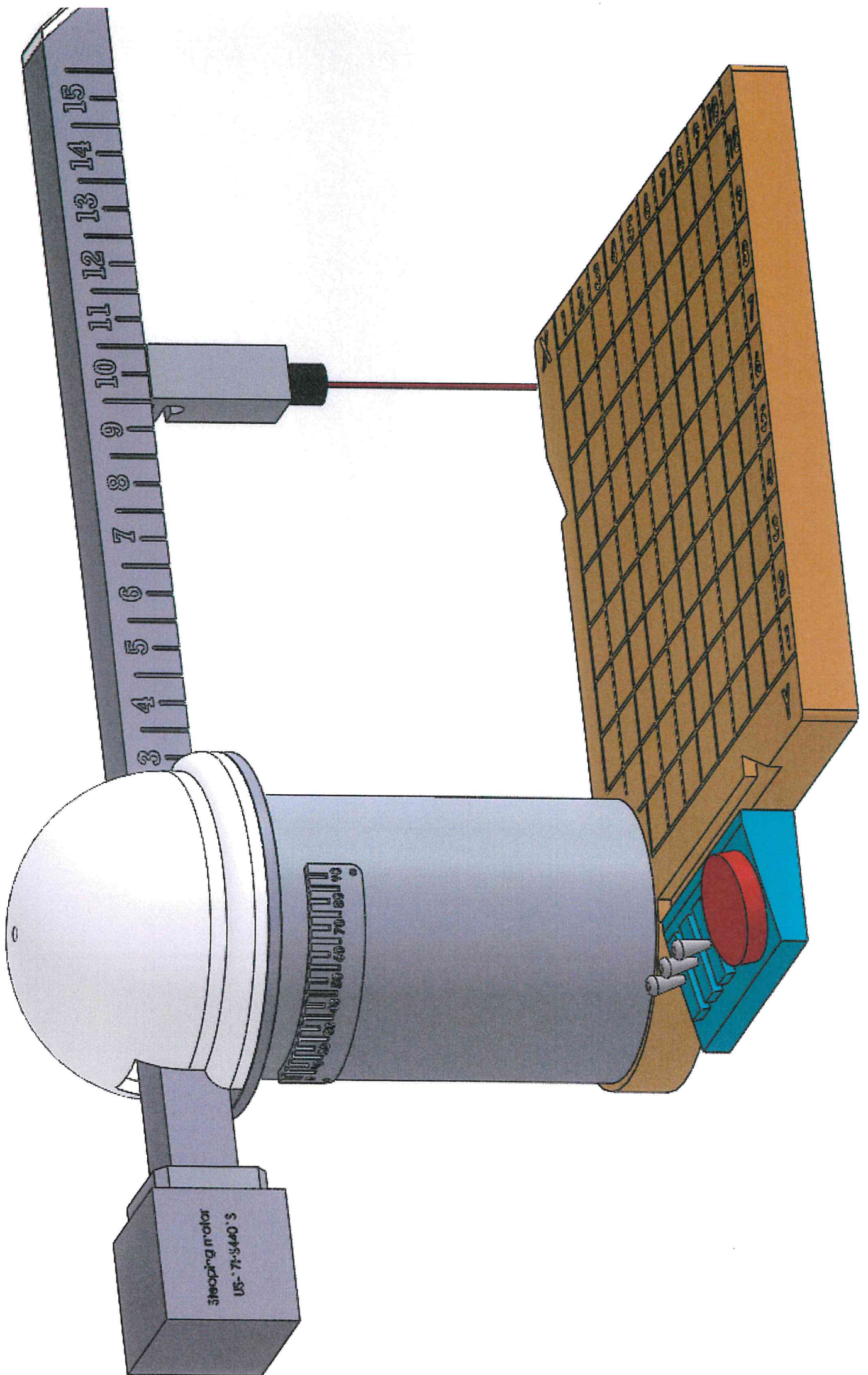
A4

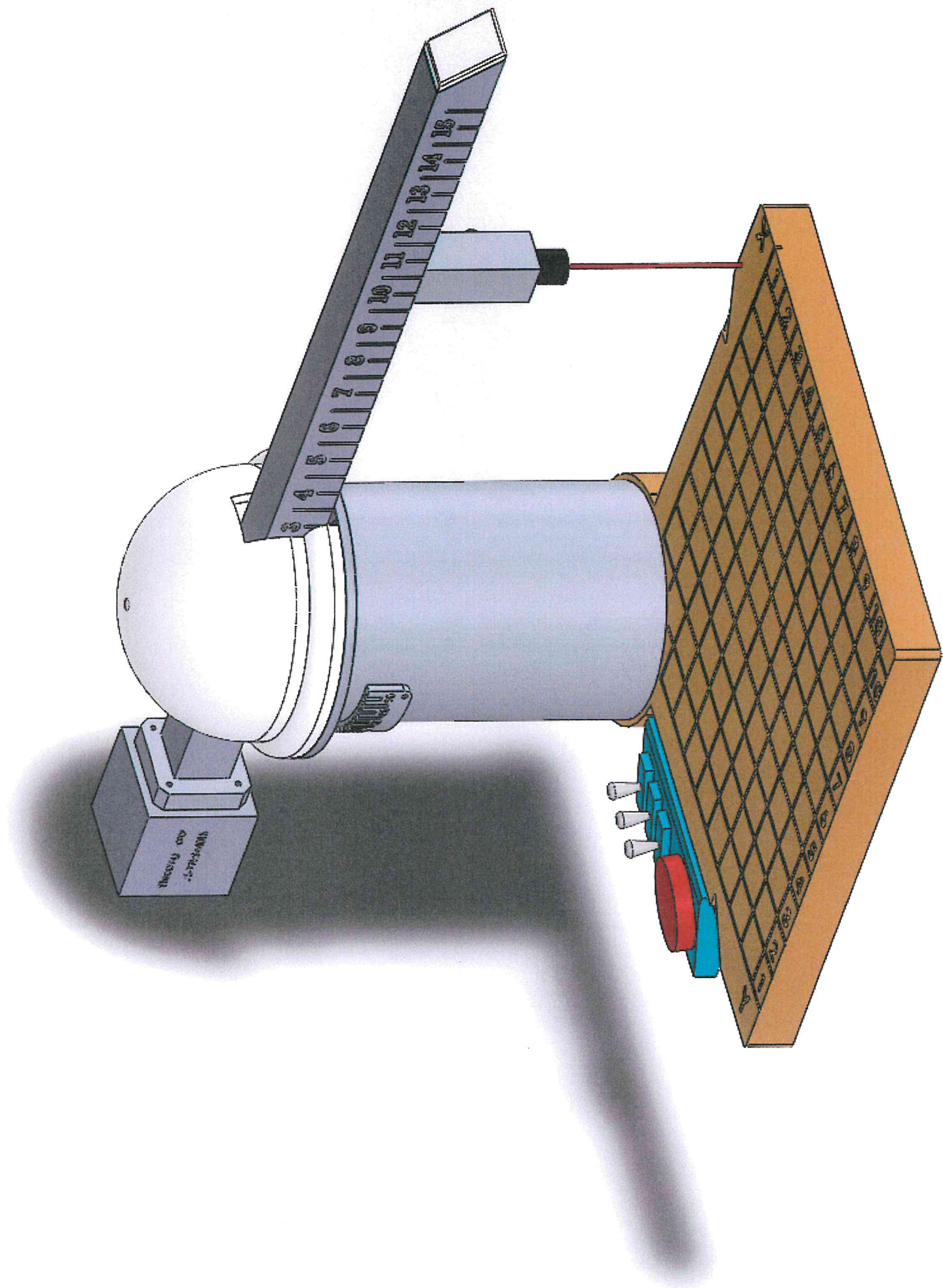
SCALE: 2:1

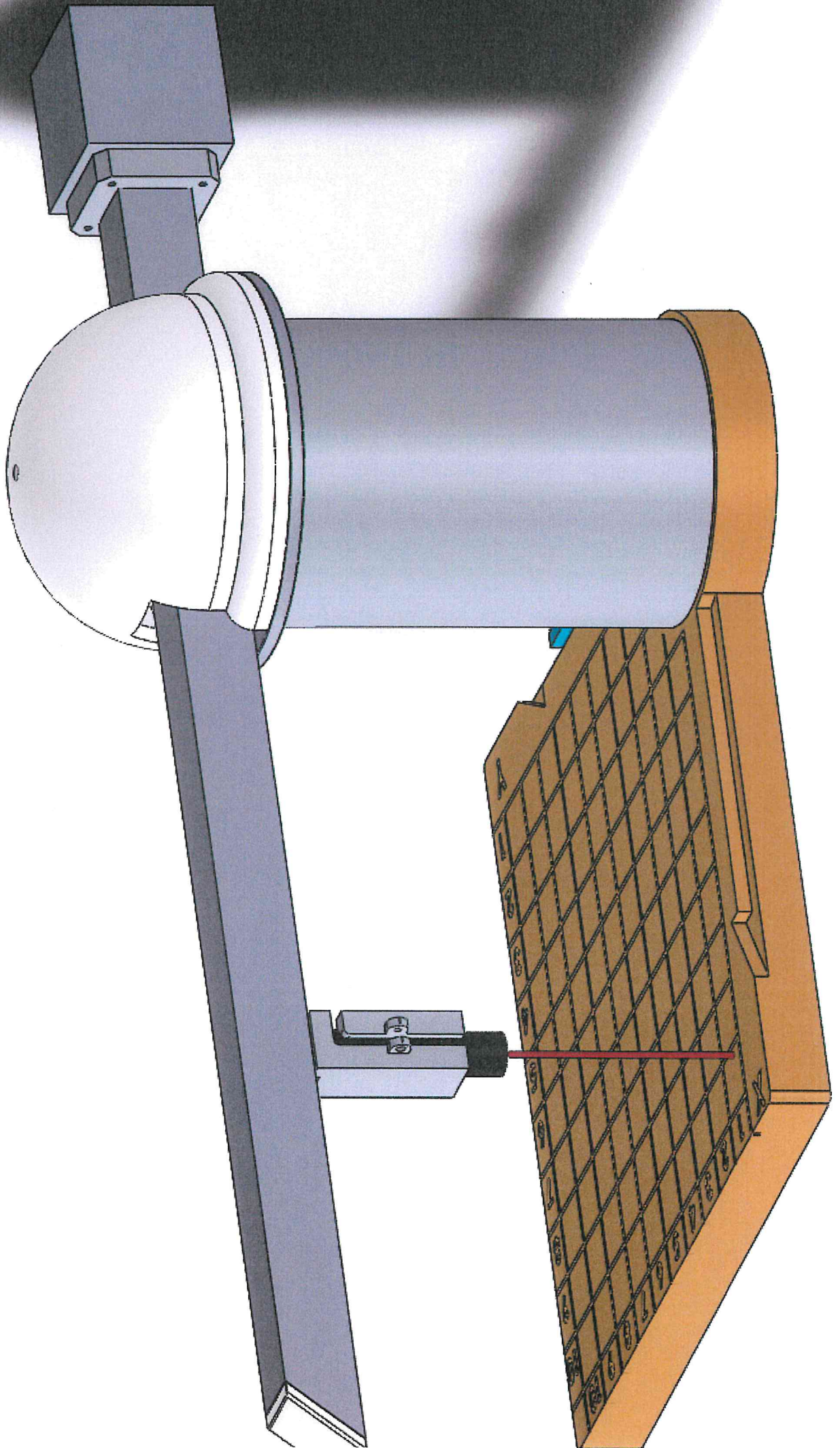
SHEET 1 of 1

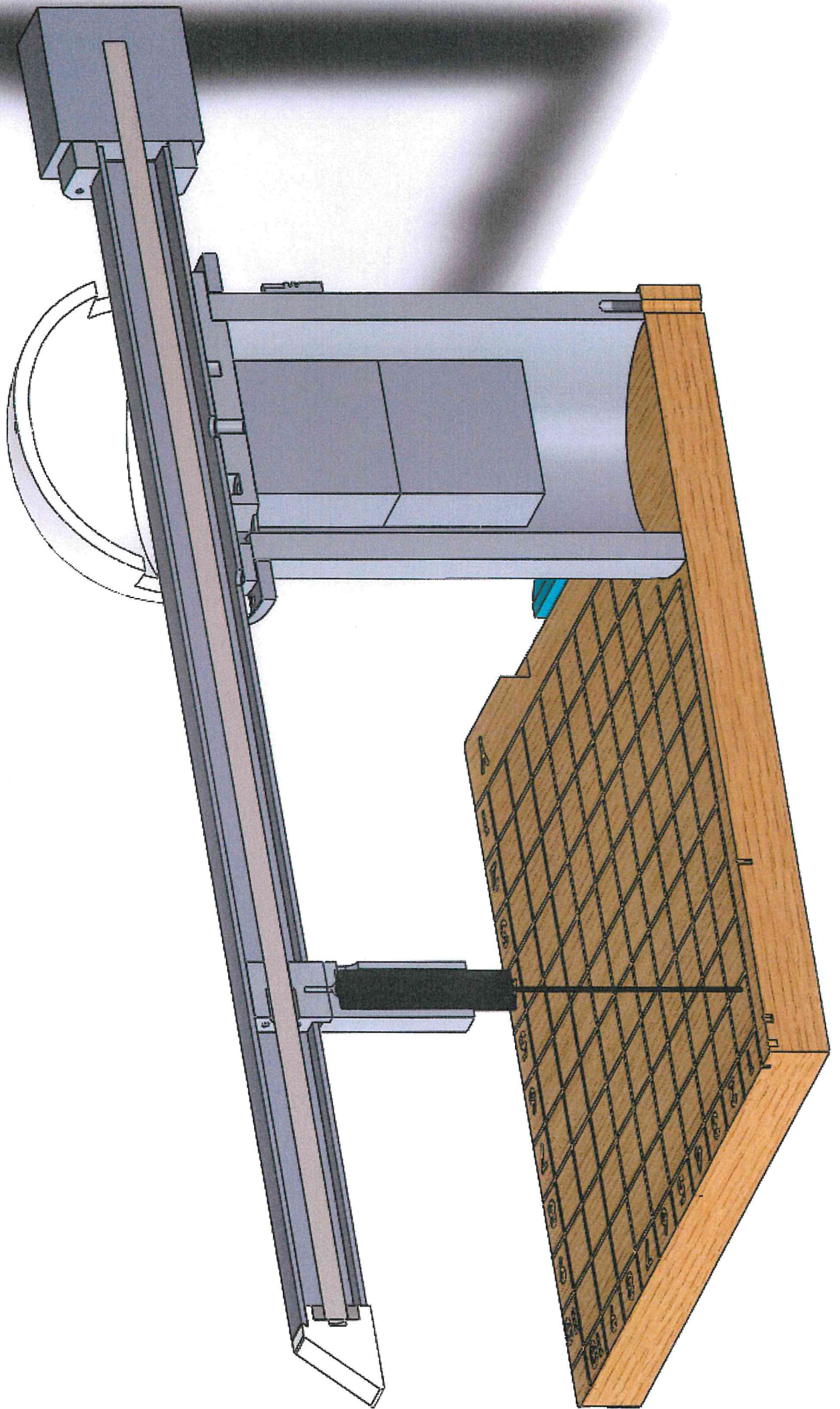


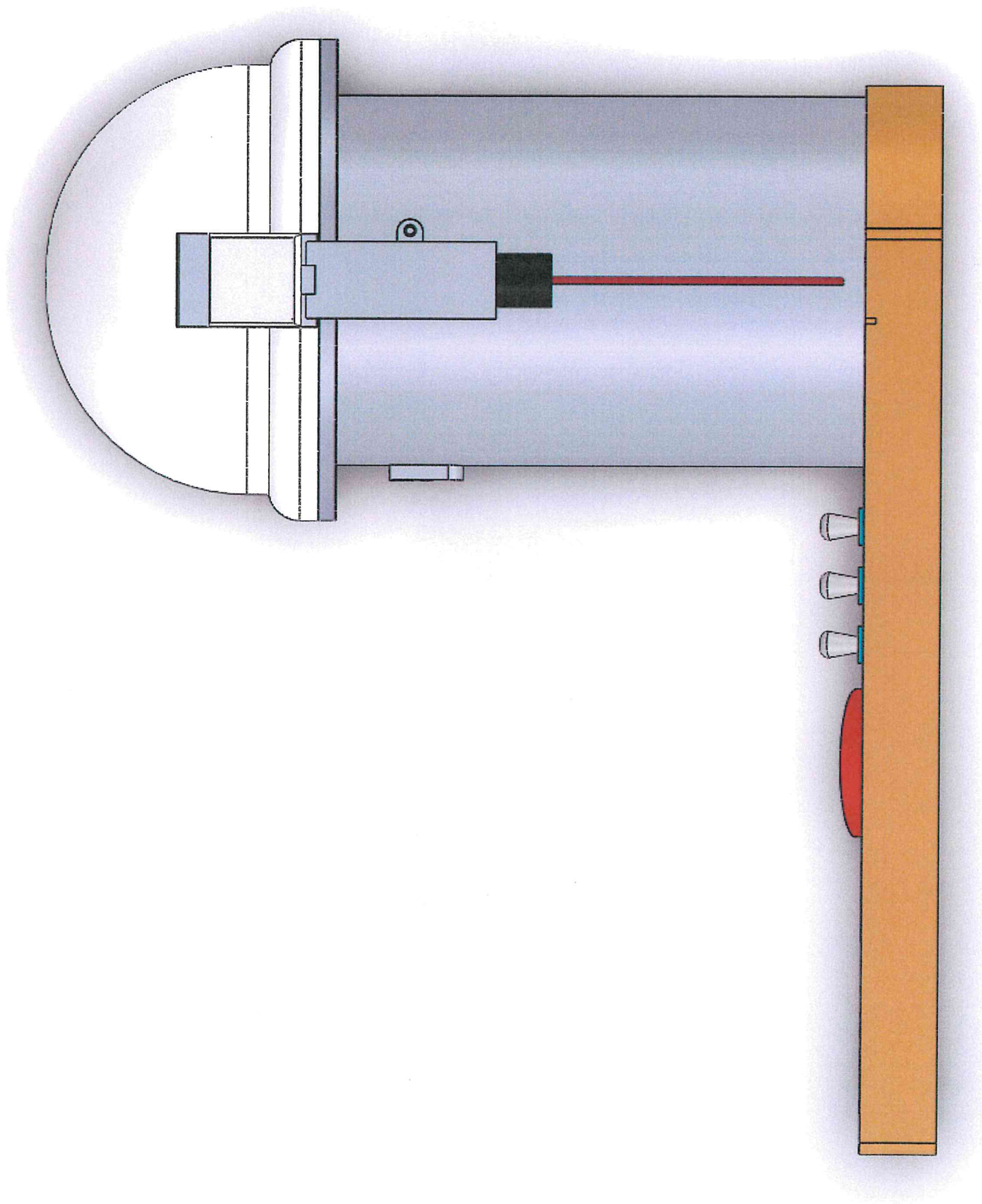
Material	Tolerances +/- 1% unless specified
American projection	Scale
	2:1
	File:
	mm
Measurements	Y:\werkmap\elektor\Arduino poster\resources\arduino-uno-
Date	28-8-2013
	Arduino.sldrw
Project	
Gregor van Egdom	
Creative technical problem solver	
www.gregorvanegdom.nl	
Sheet name (page)	Sheet1 (1/1)
	A3

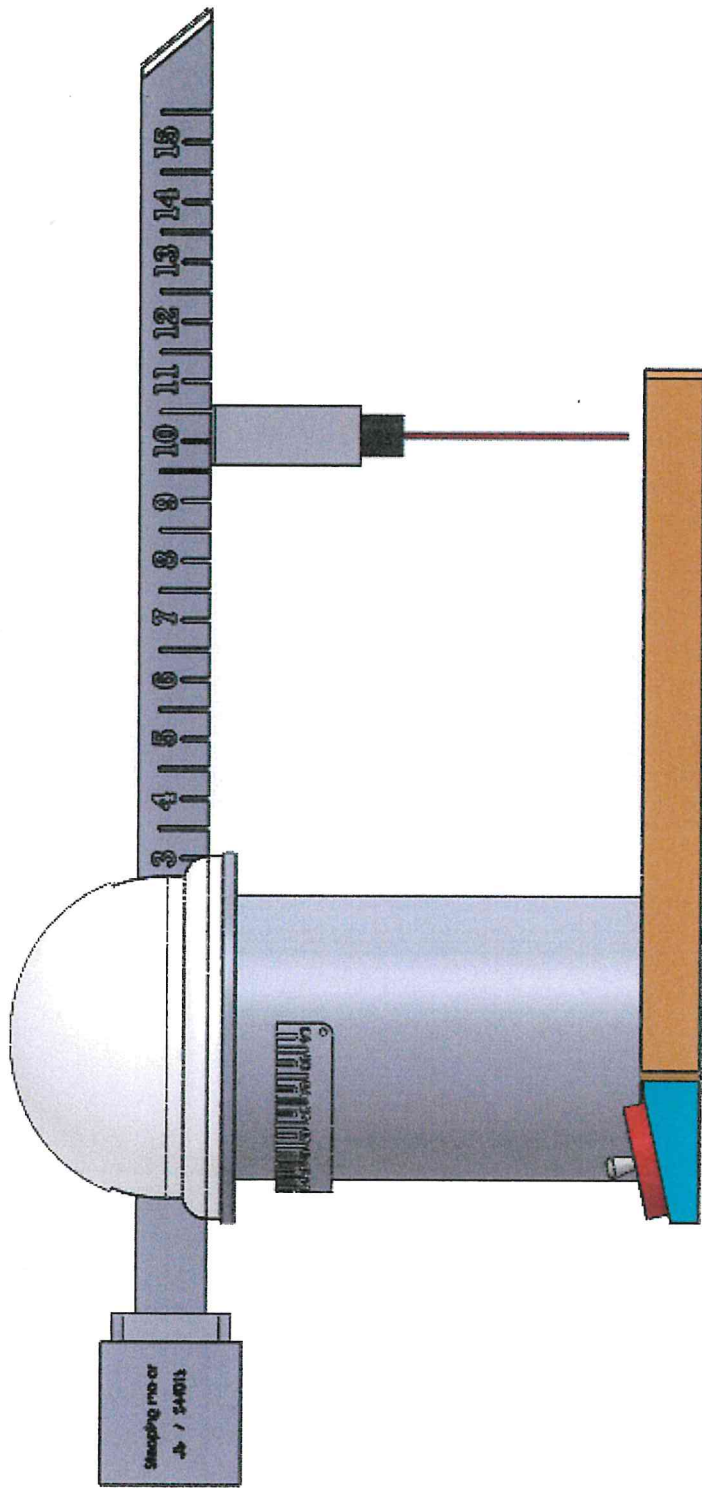


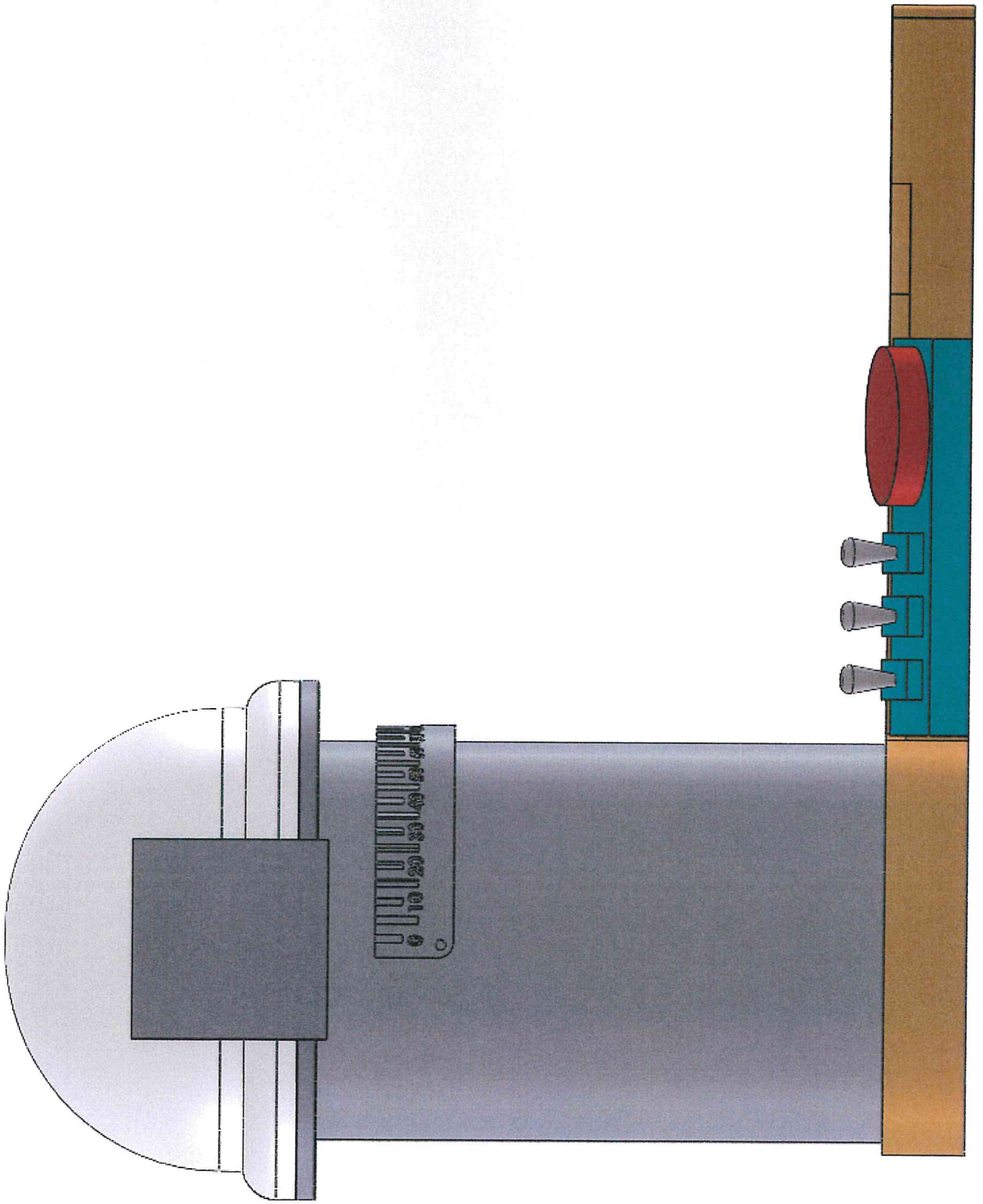


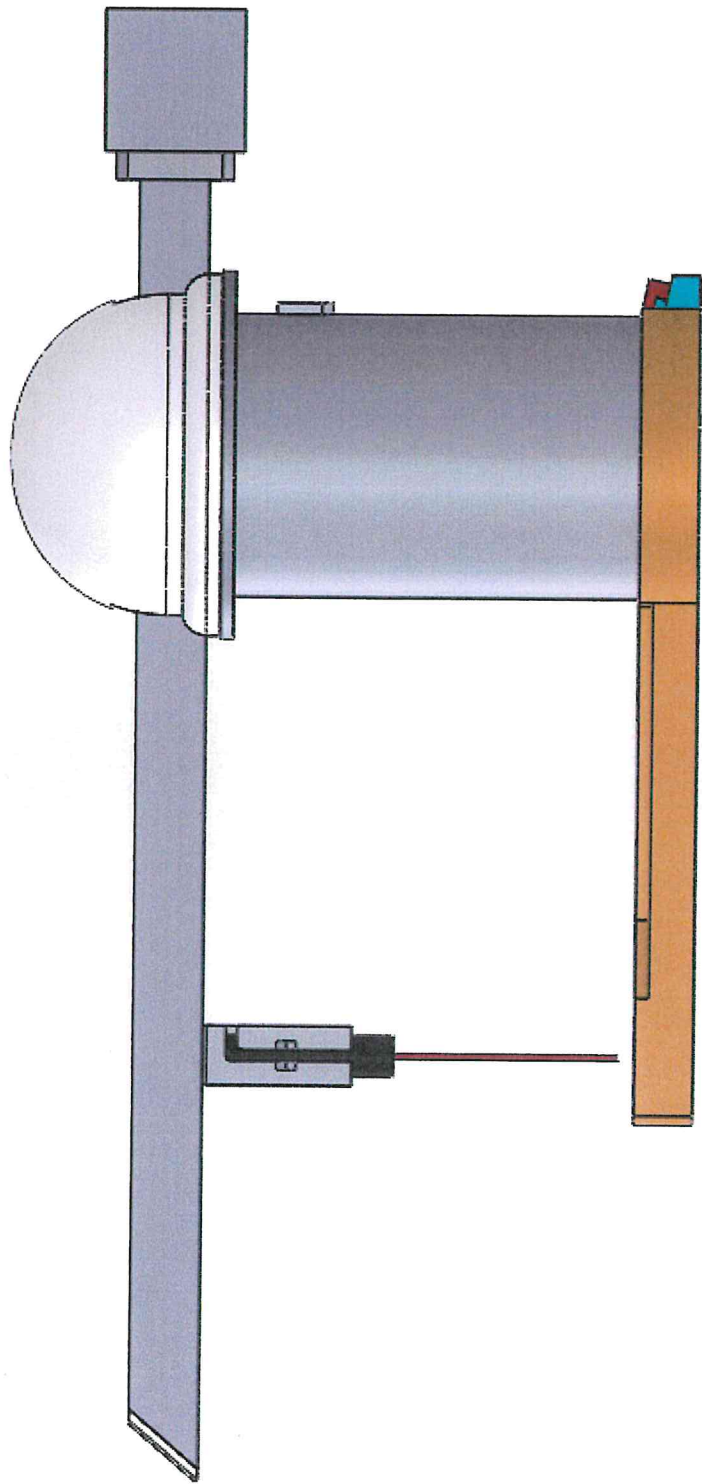


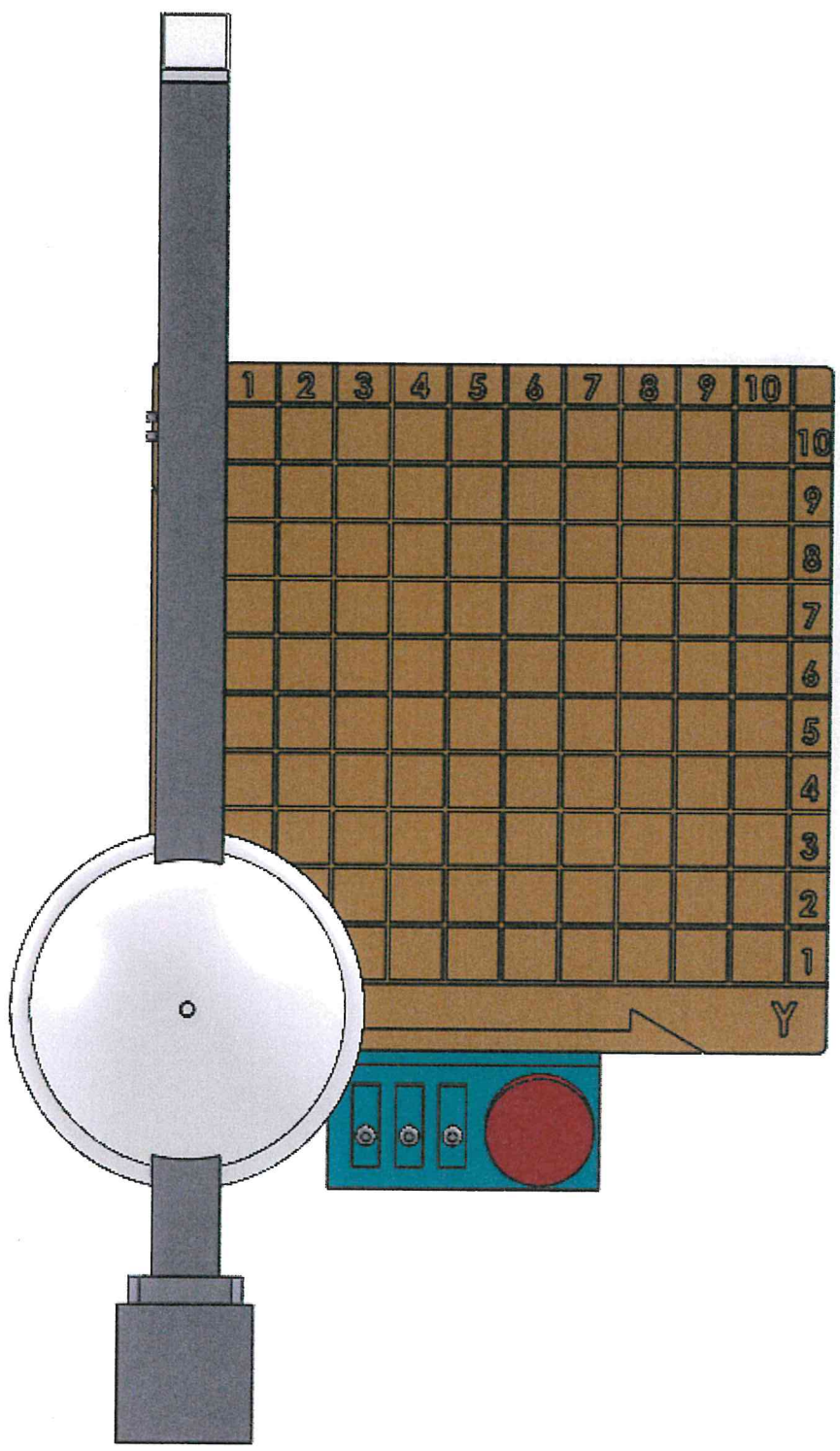


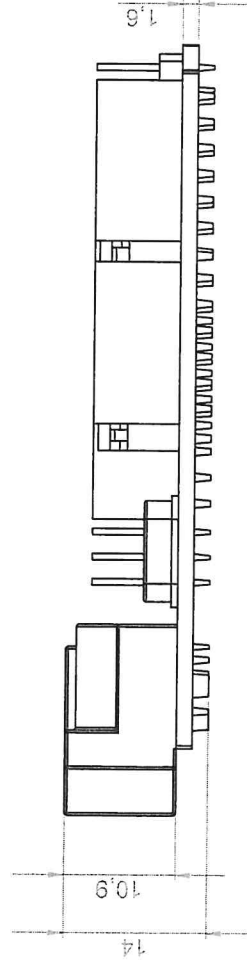
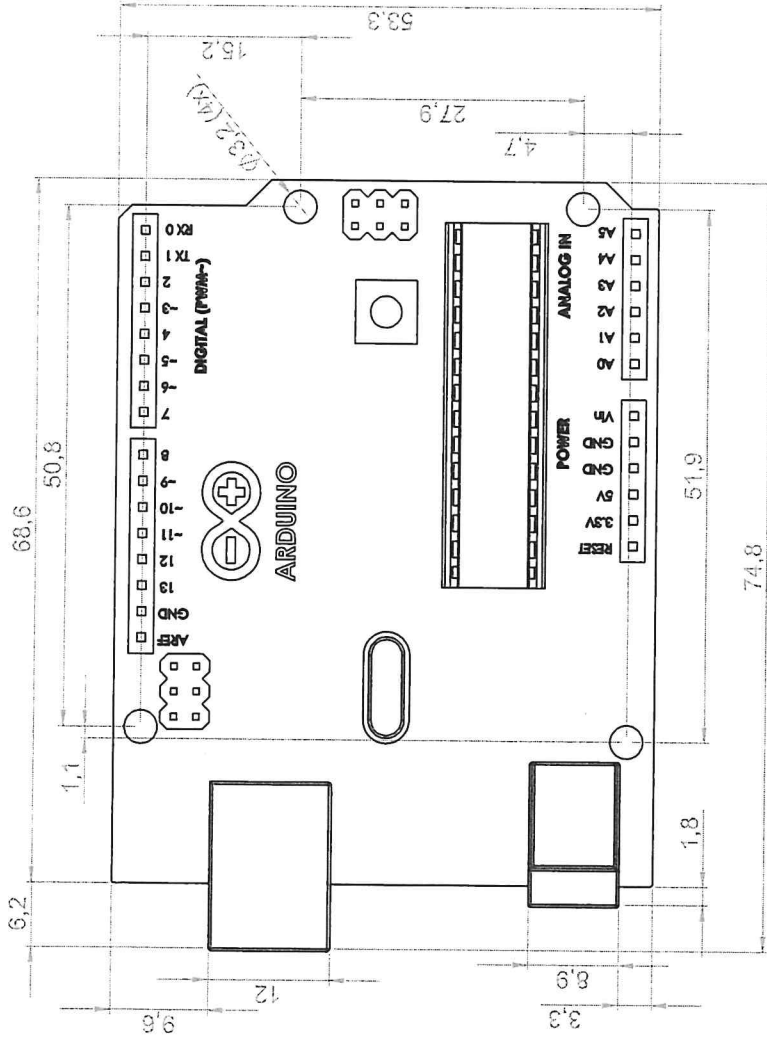
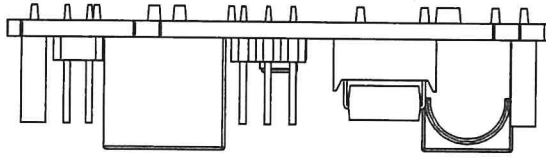
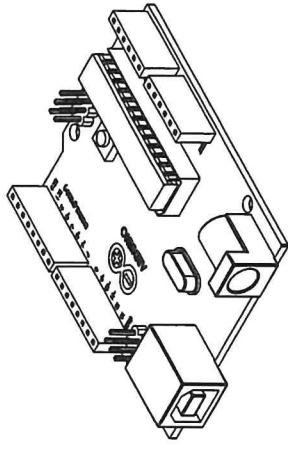












Material American projection Scale Tolerances +/- 1% unless specified

File: 2:1

Measurements mm

Date 28-8-2013

Project Arduino.sldprt

Project

Gregor van Egdorn

Creative technical problem solver
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Arduino

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