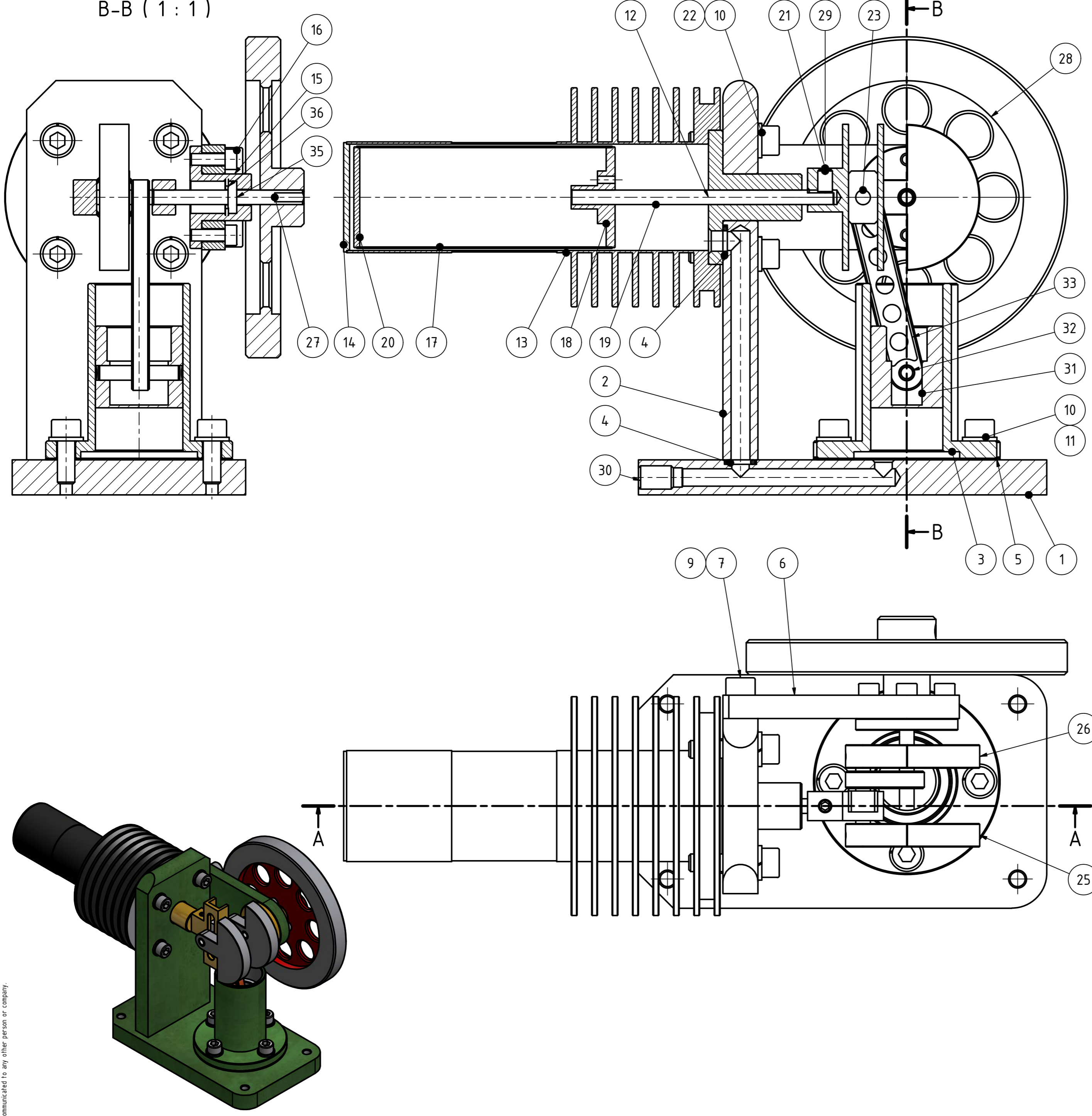


B-B ( 1 : 1 )

A-A ( 1 : 1 )



PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	Base		Stainless Steel
2	1	Standard		Steel, Mild
3	1	Cylinder		Steel, Mild
4	2	Air Channel Packing		Rubber
5	1	Cylinder Packing		Rubber
6	1	Support		Steel, Mild
7	4	DIN 912 - M6 x 20	Cylinder Head Cap Screw	Steel, Mild
8	2	ISO 8734 - 5 x 20 - A	Parallel pins	Steel
9	2	ISO 8734 - 3 x 16 - A	Parallel pins	Steel
10	8	DIN 128 - A6	Spring Washer	Steel, Mild
11	4	DIN 912 - M6 x 16	Cylinder Head Cap Screw	Steel, Mild
12	1	Cylinder Cover		Brass, Soft Yellow
13	1	Heat Exchange Cylinder		Stainless Steel
14	1	Heat Exchange Cylinderhead		Stainless Steel
15	1	Bearing Support		Brass, Soft Yellow
16	4	DIN 912 - M4 x 12	Cylinder Head Cap Screw	Steel, Mild
17	1	Heat Exchange Piston Tube		Copper
18	1	Heat Exchange Piston Exhaust		Copper
19	1	Heat Exchange Piston Shaft		Copper
20	1	Heat Exchange Piston Head		Copper
21	1	Crosshead		Brass, Soft Yellow
22	4	DIN 912 - M6 x 25	Cylinder Head Cap Screw	Steel, Mild
23	1	Slide		PVC-U
24	1	Crankshaft		Stainless Steel
25	1	Counterweight B		Steel, Mild
26	1	Counterweight A		Steel, Mild
27	1	Flywheelshaft		Stainless Steel
28	1	Flywheel		Steel, Mild
29	2	DIN 913 - M5 x 8	Hexagon Socket Screw	Steel, Mild
30	1	DIN 913 - M8 x 12	Hexagon Socket Screw	Steel, Mild
31	1	Piston		Steel, Mild
32	1	Piston Pin		Stainless Steel
33	1	Crankrod		Copper
35	1	DIN 625 SKF - SKF 618/5	Single row ball bearings	Steel, Mild
36	1	DIN 472 - 12x1	Retaining rings for bores	Steel, Mild
37	2	DIN 913 - M3 x 4	Hexagon Socket Set Screw	Steel, Mild

Revision	Date	Description

Engineered by:	Name:	Date:	Scale: 1:1	
	Designer: Galba, J.	17/07/2010	SheetSize: A2	
	Approved: Galba, J.	17/07/2010		

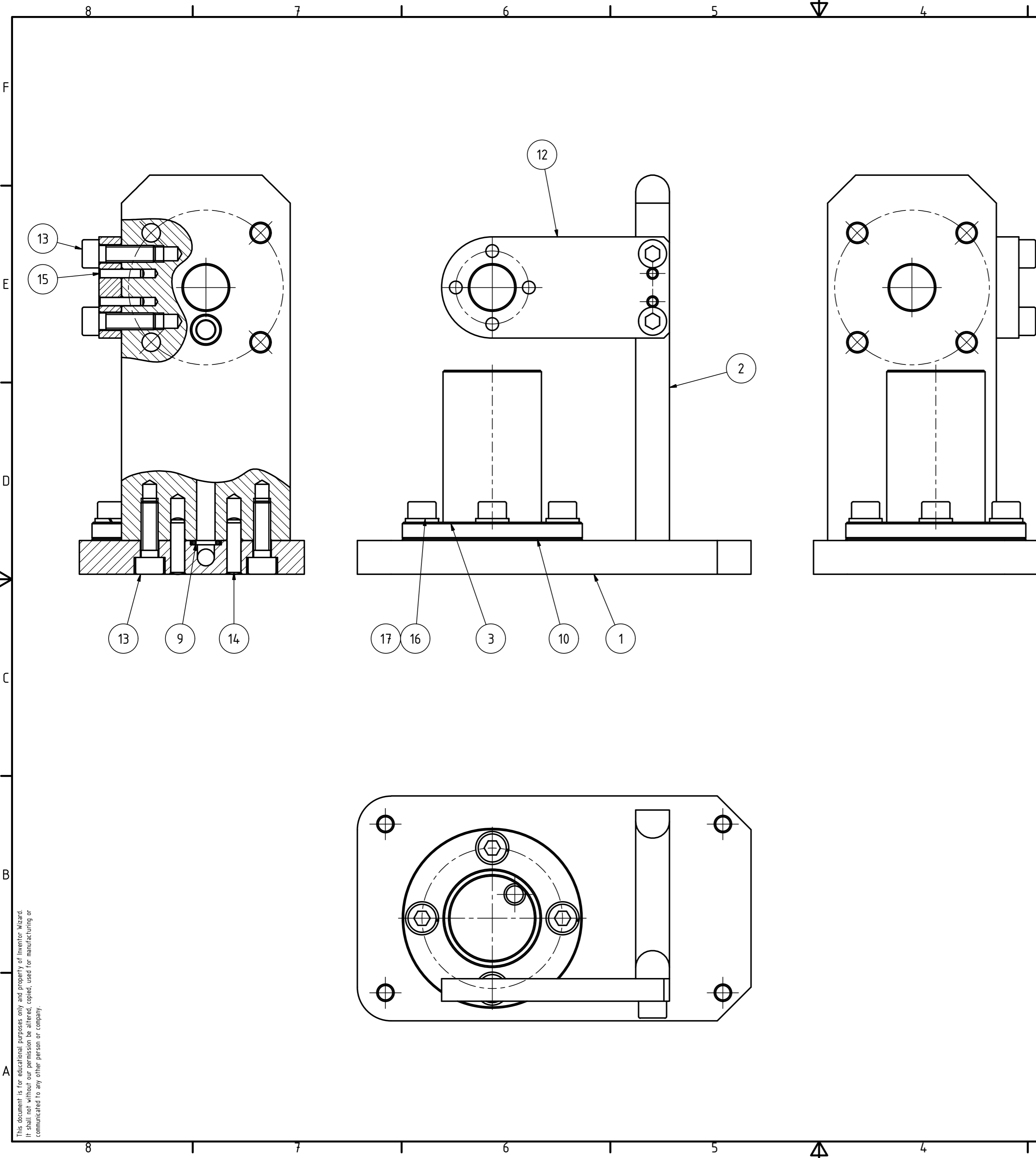
  

Project:	Material:
Miniature Model Hot Air Engine	Total Mass: N/A

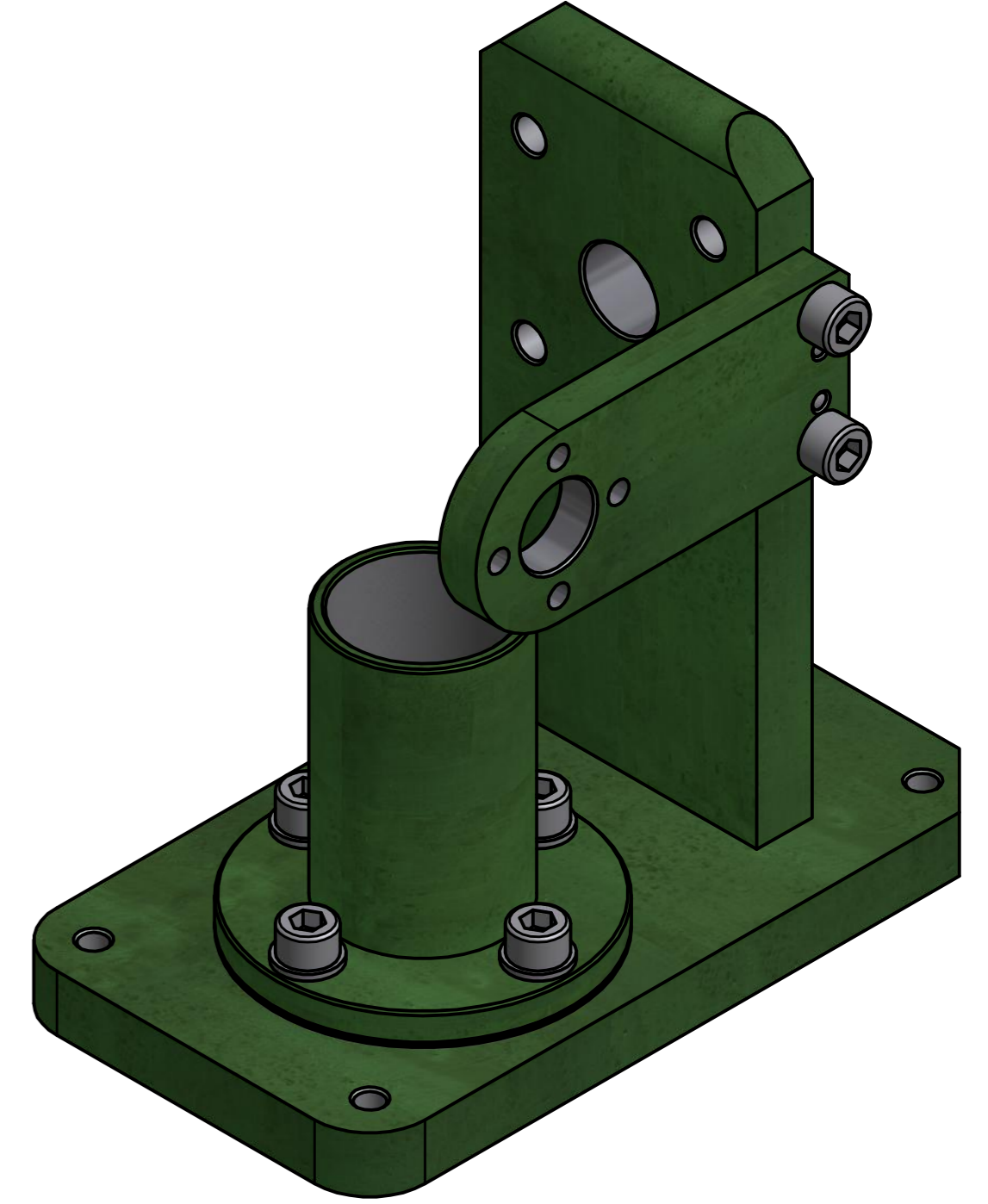
  

Title:	Drawingnumber:	Sheet:
Horizontal Stirling Engine Assembly		0001
	Design State:	Drawing made with autodesk inventor Revisions only permitted by CAD
	Released	

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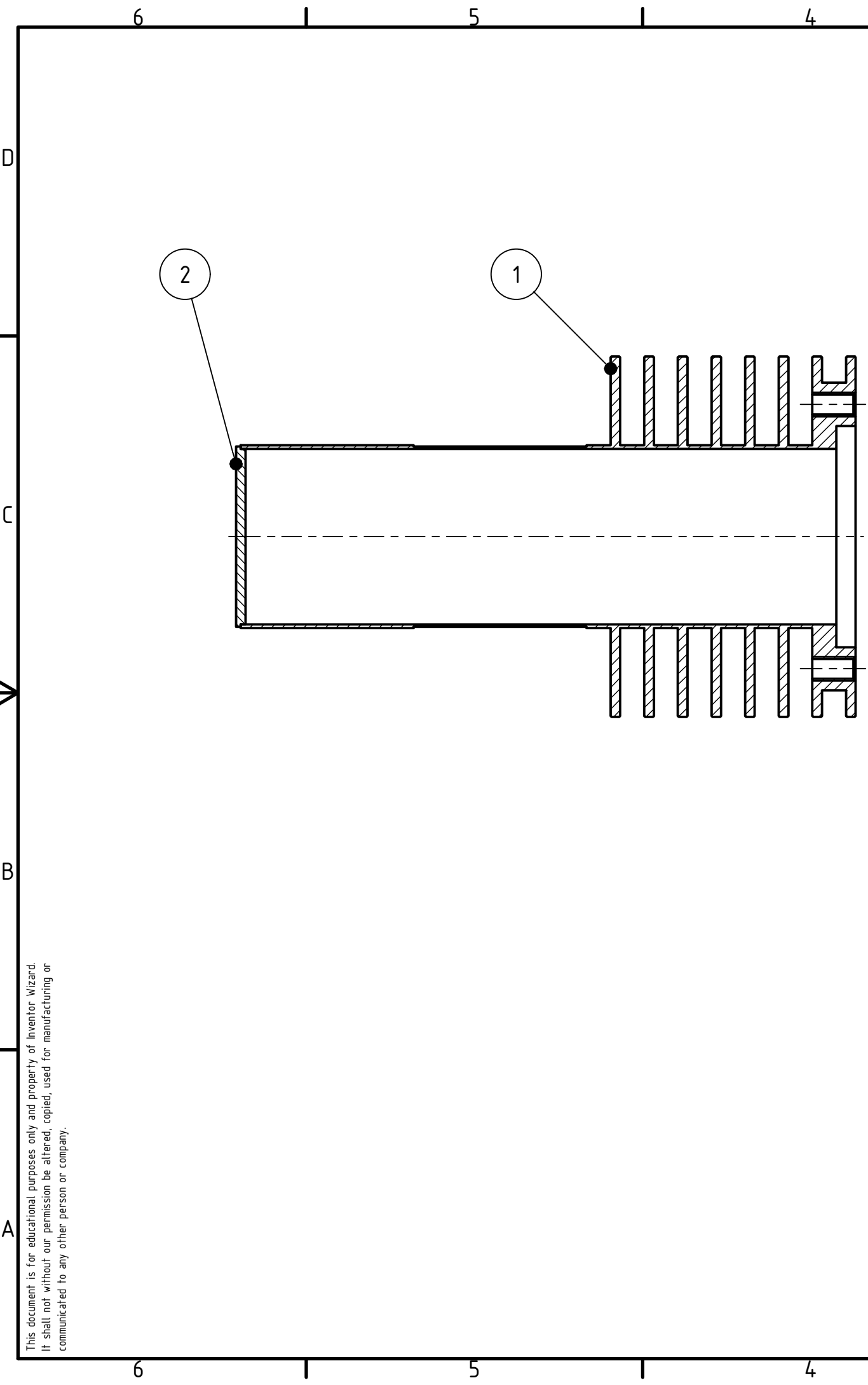


PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	Base		Stainless Steel
2	1	Standard		Steel, Mild
3	1	Cylinder		Steel, Mild
9	2	Air Channel Packing		Rubber
10	1	Cylinder Packing		Rubber
12	1	Support		Steel, Mild
13	4	DIN 912 - M6 x 20	Cylinder Head Cap Screw	Steel, Mild
14	2	ISO 8734 - 5 x 20 - A	Parallel pins of hardened steel and martensitic stainless steel (Dowel pins)	Steel
15	2	ISO 8734 - 3 x 16 - A	Parallel pins of hardened steel and martensitic stainless steel (Dowel pins)	Steel
16	4	DIN 128 - A6	Spring Washer	Steel, Mild
17	4	DIN 912 - M6 x 16	Cylinder Head Cap Screw	Steel, Mild



Revision	Date	Description				
Engineered by:			Name:	Date:	Scale: 1:1	
			Designer: Galba, J.	17/07/2010	SheetSize: A2	
			Approved: Galba, J.	17/07/2010		
Project: Miniature Model Hot Air Engine					Material:	
					Total Mass: N/A	
Title: Horizontal Stirling Engine Assembly Base						
			Drawingnumber:		Sheet: 0001	
			Design State: Released		Drawing made with Autodesk Inventor. Revisions only permitted by CAD.	

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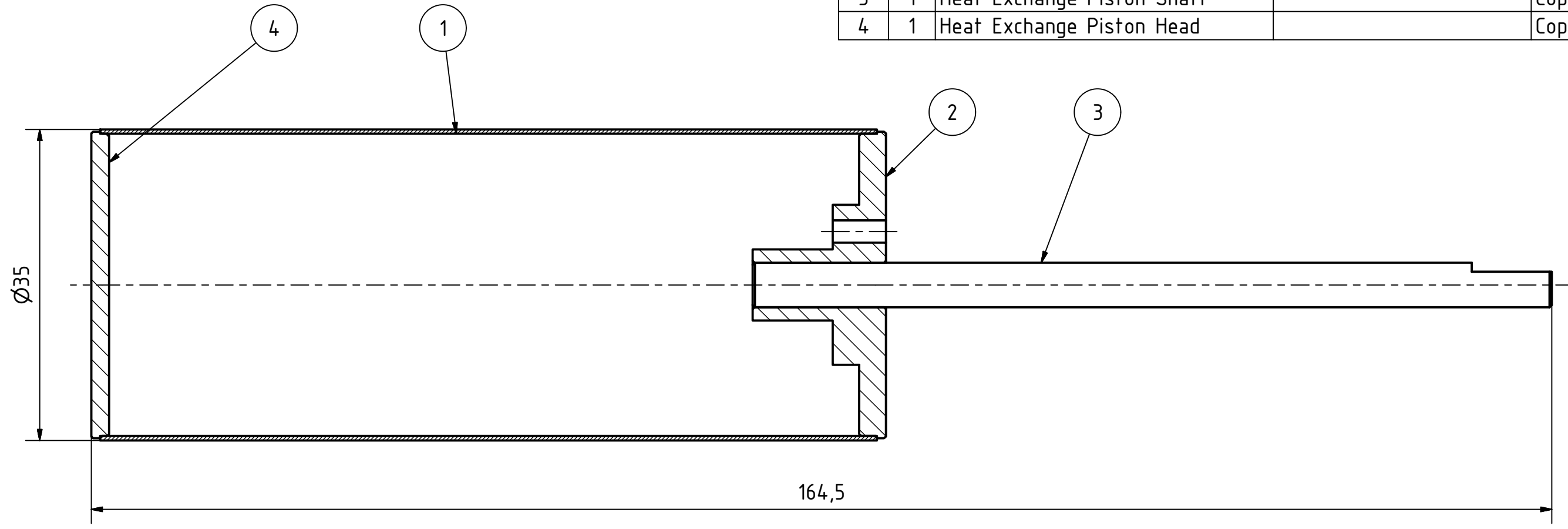
PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1		Heat Exchange Cylinder	Stainless Steel
2	1		Heat Exchange Cylinderhead	Stainless Steel



Revision	Date	Description			
Engineered by:		Name: Galba, J.	Date: 17/07/2010	Scale: 1:1	
		Designer: Galba, J.	Date: 17/07/2010	SheetSize: A3	
Project: Miniature Model Hot Air Engine				Material: Total Mass: 0,584 kg	
Title: Horizontal Stirling Engine Assembly Heat Exchange Cylinder					
		Drawingnumber:		Sheet: 0001	
		Design State: Released		Drawing made with Autodesk Inventor Revisions only permitted by CAD	

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PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	Heat Exchange Piston Tube		Copper
2	1	Heat Exchange Piston Exhaust		Copper
3	1	Heat Exchange Piston Shaft		Copper
4	1	Heat Exchange Piston Head		Copper



Revision	Date	Description

Engineered by:	Name:	Date:	Scale: 2:1	
Designer:	Galba, J.	17/07/2010	SheetSize: A3	
Approved:	Galba, J.	17/07/2010		

Project:	Material:
Miniature Model Hot Air Engine	Total Mass: 0.107 kg

Title:  
**Horizontal Stirling Engine  
 Assembly Heat Exchange Piston**

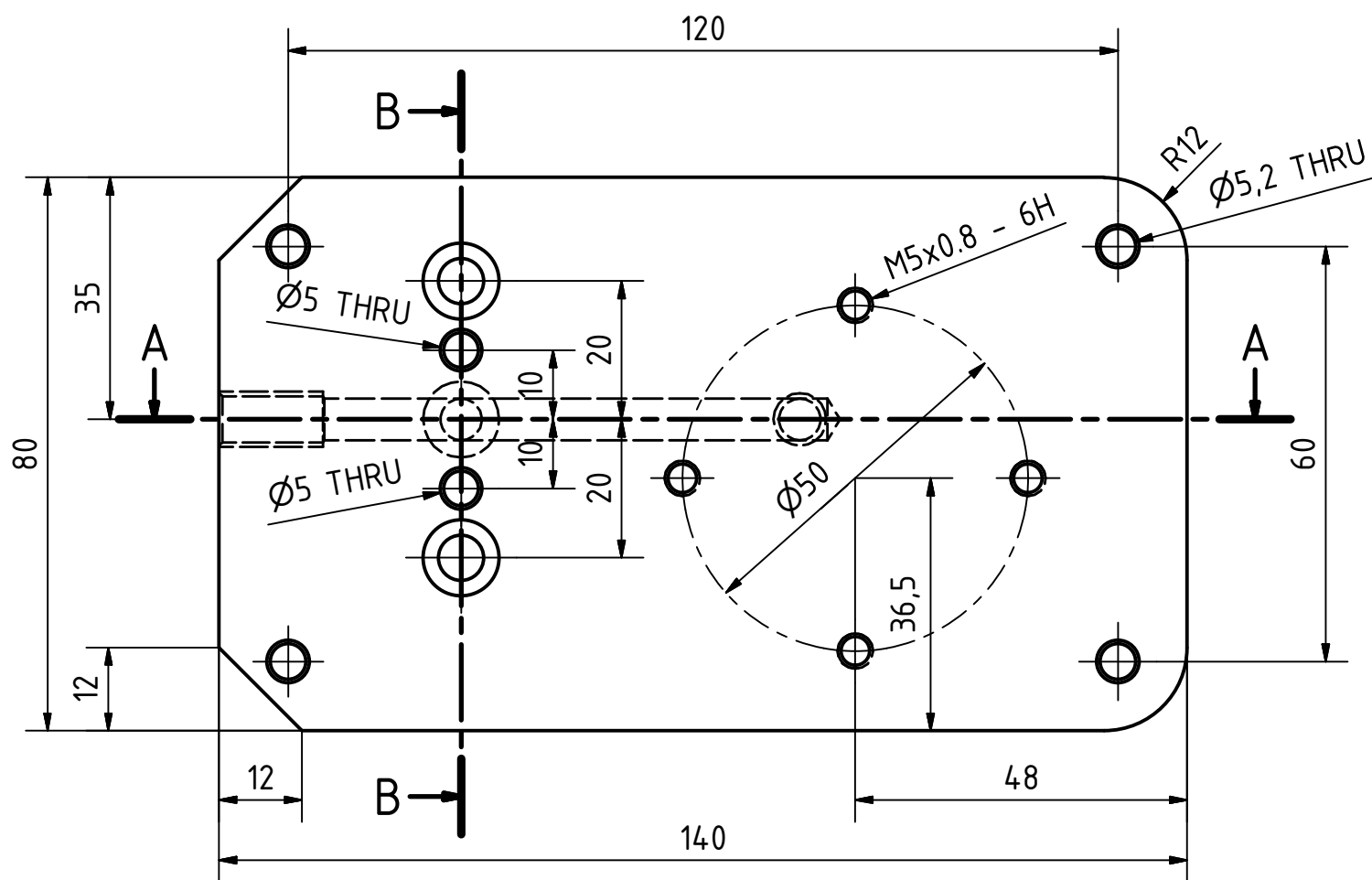
Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼		
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2

Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Fillet and chamfers				Angles ( in ° and ' )					
	Dimensions in mm								Dimensions in mm				Length of the shortest leg					
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30'	±20'

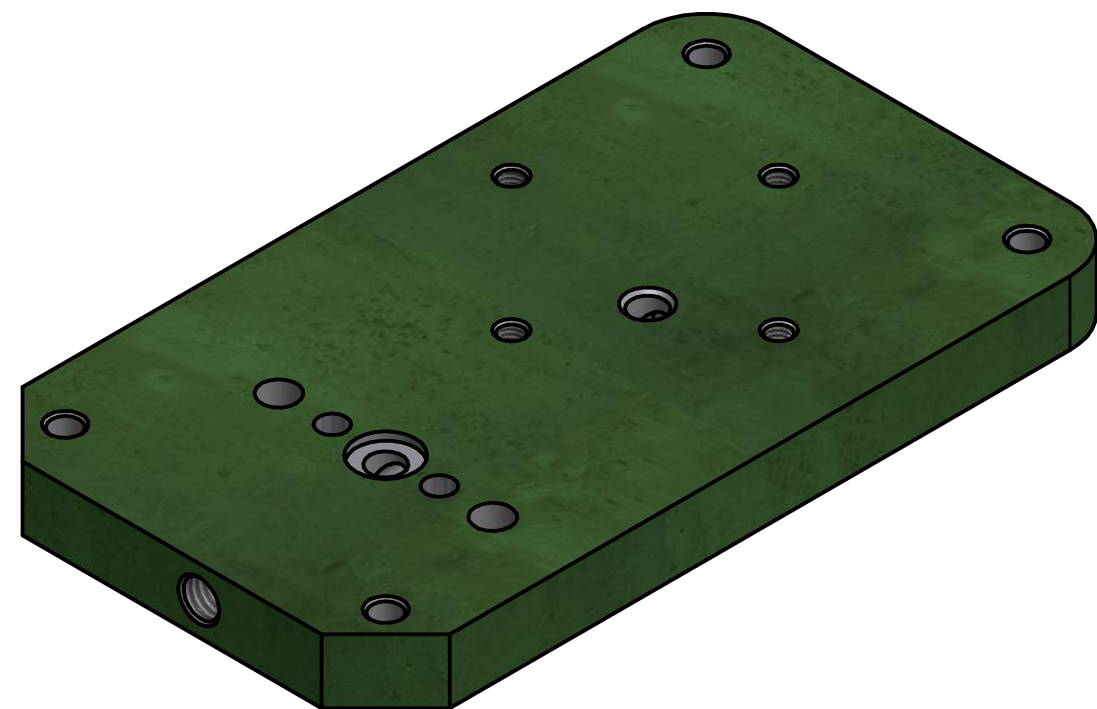
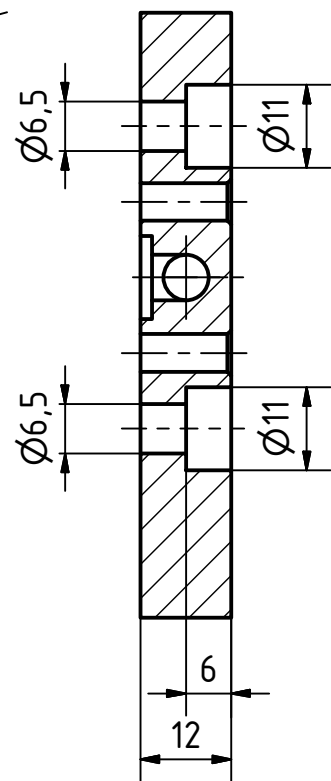
	Drawingnumber:	Sheet:
	Design State:	0001
Released		Drawing made with autodesk inventor Revisions only permitted by CAD

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6,3 (✓) (✓)

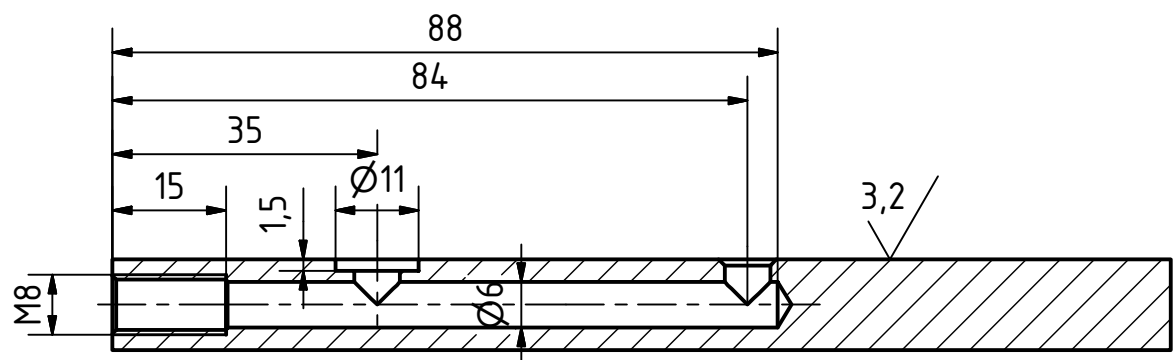


B-B ( 1 : 1 )



Break Sharp Edges: 0,1 mm

A-A ( 1 : 1 )



Revision	Date	Description
Engineered by:	Name:	Date:
Designer: Galba, J.	Galba, J.	17/07/2010
Approved: Galba, J.	Galba, J.	17/07/2010
Project: Miniature Model Hot Air Engine		Scale: 1:1
Material: Stainless Steel		Sheet Size: A3
Total Mass: 1.013 kg		

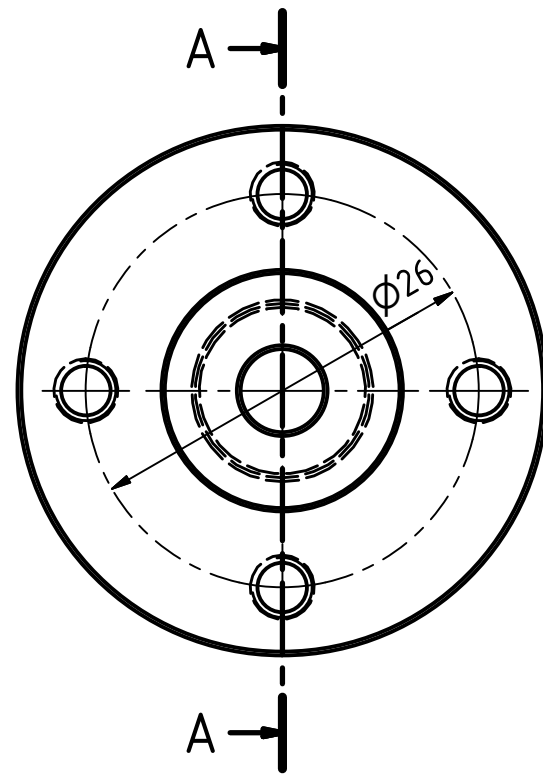
Title: Horizontal Stirling Engine Base	
Drawingnumber:	Sheet: 0001
Design State: Released	Drawing made with Autodesk Inventor Revisions only permitted by CAD

Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼											
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6											
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8											
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
For measurements ( deviations in mm )				Fillet and chamfers			Angles ( in ° and ' )											
Accuracyclass (ISO 2768.1)	Dimensions in mm							Dimensions in mm		Length of the shortest leg								
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30'	±20'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30'	±20'

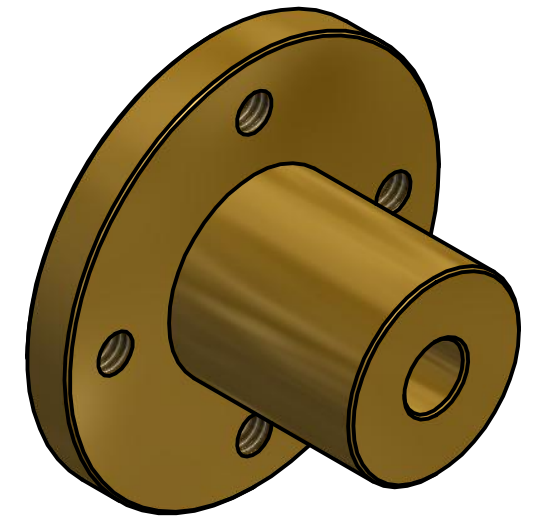
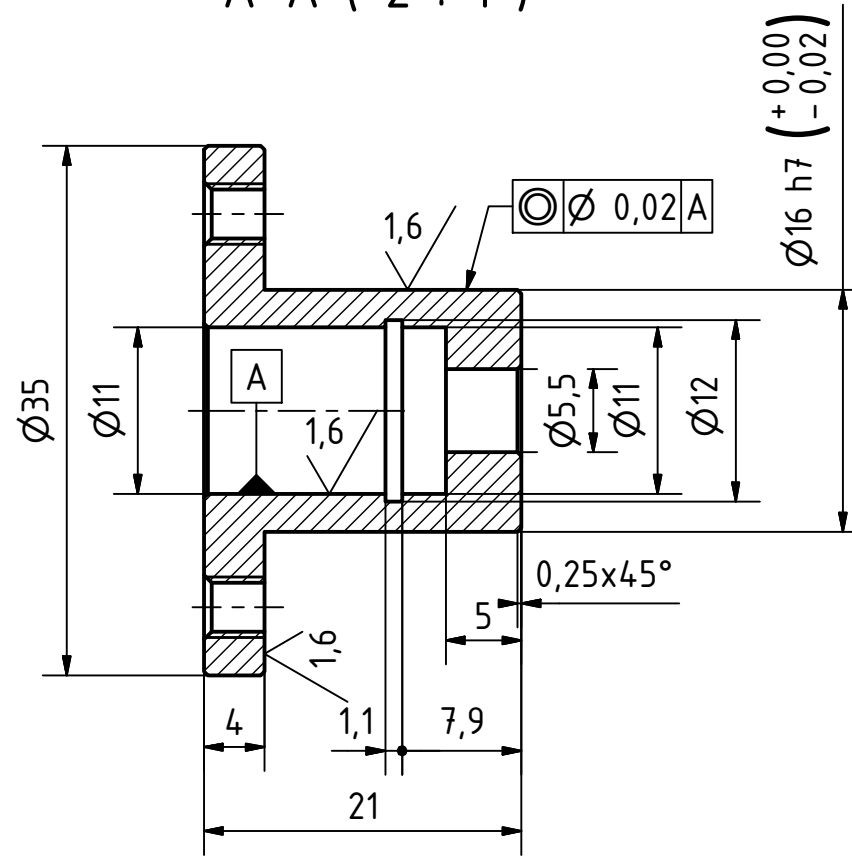
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3,2 (✓)



A-A ( 2 : 1 )



Break Sharp Edges: 0,1 mm

Revision		Date	Description	
Engineered by:			Name:	Date:
			Designer: Galba, J.	17/07/2010
			Approved: Galba, J.	17/07/2010
Project:				Scale: 2:1
Miniature Model Hot Air Engine				SheetSize: A3
				Material: Brass, Soft Yellow
				Total Mass: 0.046 kg

Title:	
Horizontal Stirling Engine	
Bearing Support	

Corresponding symbols	▽	▼	▽▽	▼▼	▽▽▽	▼▼▼		
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )	N11	N10	N9	N8	N7	N6	N5	N4
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )	25	12,5	6,3	3,2	1,6	0,8	0,4	0,2

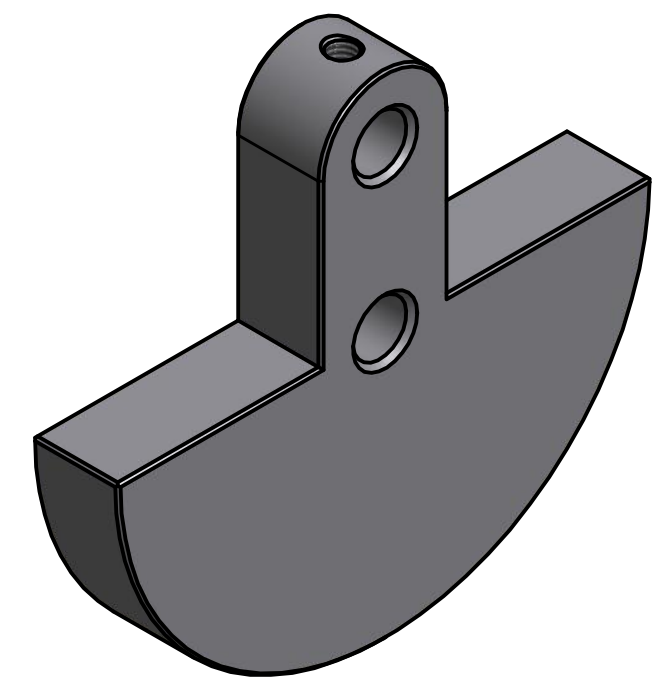
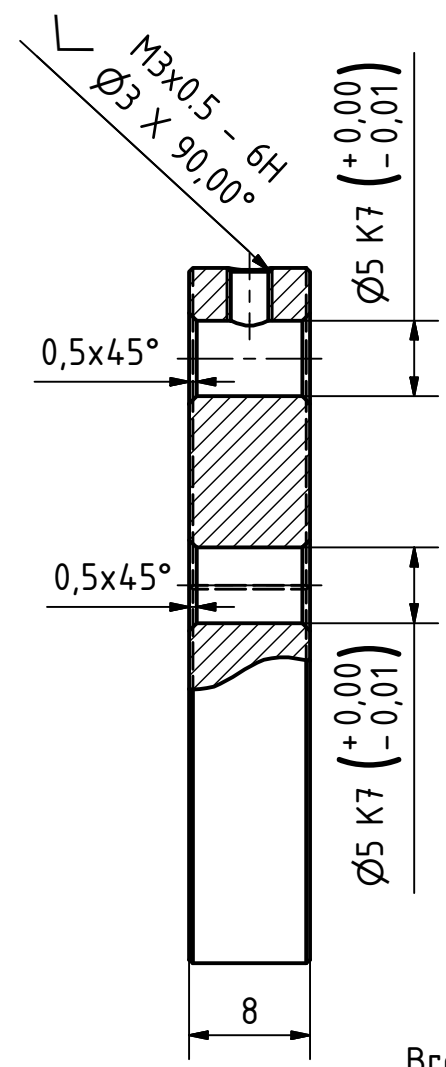
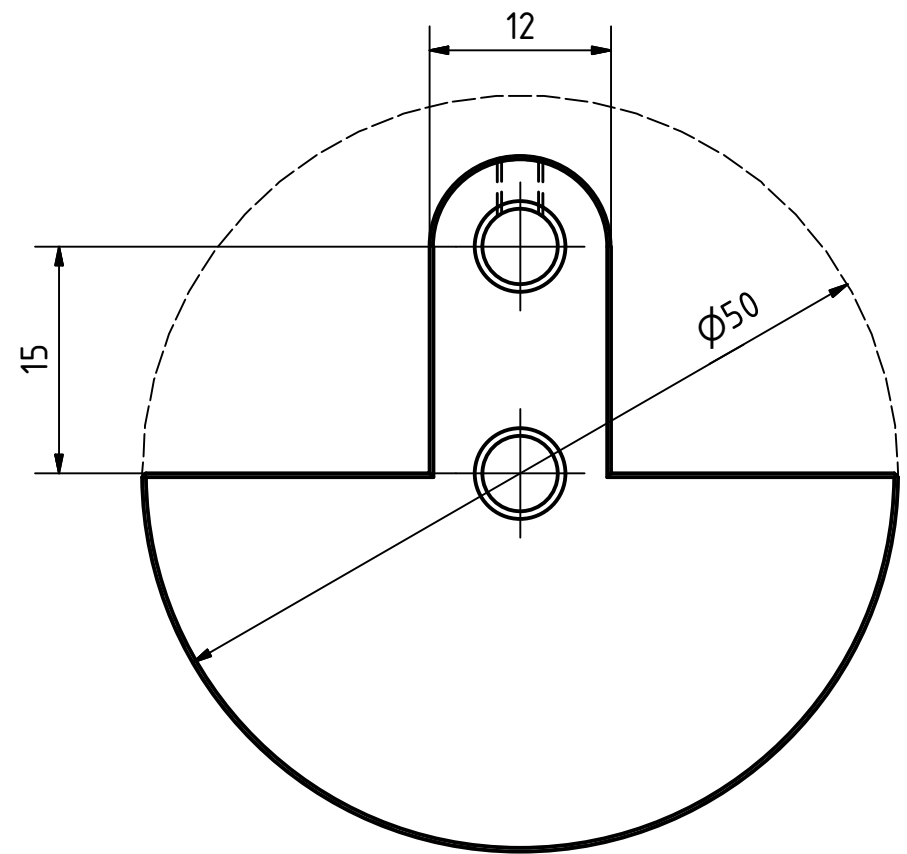
Allowable deviations for dimensions without tolerance indication (machined surfaces)

Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Fillet and chamfers					Angles ( in ° and ' )				
	Dimensions in mm								Dimensions in mm					Length of the shortest leg				
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'

Drawingnumber:	Sheet: 0001
Design State: Released	Drawing made with autodesk Inventor Revisions only permitted by CAD

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Break Sharp Edges: 0,1 mm

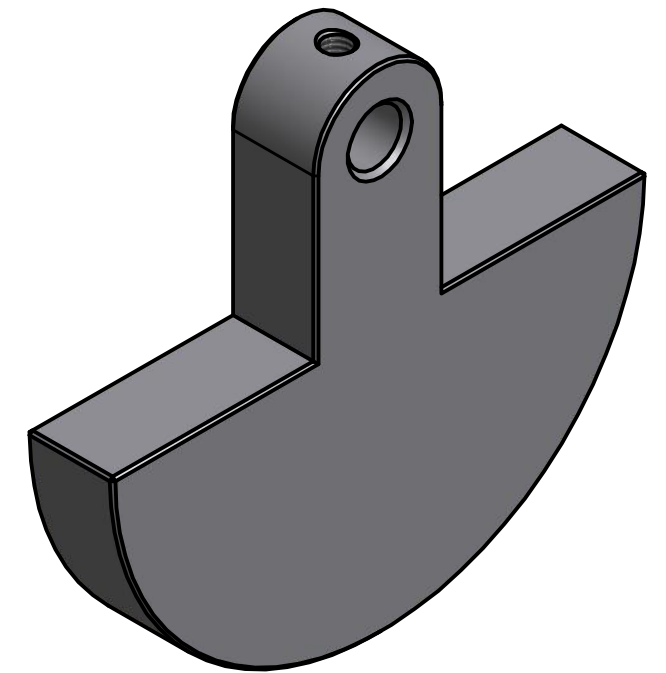
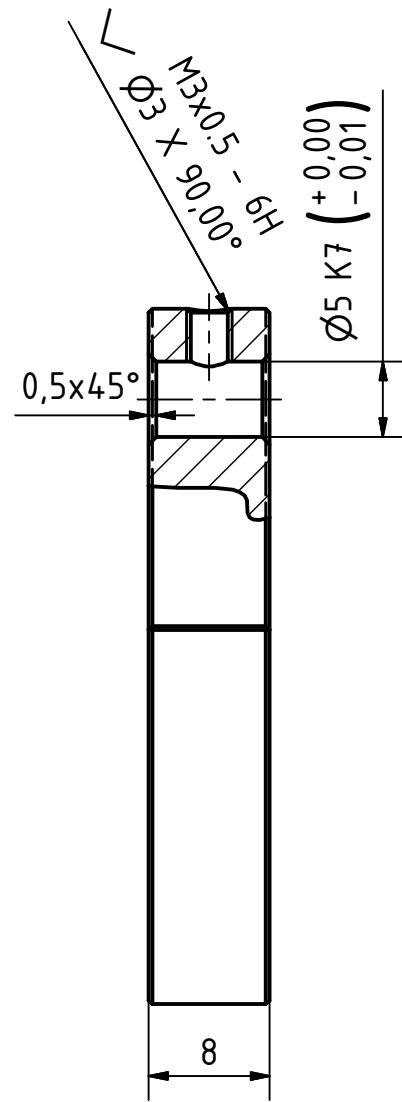
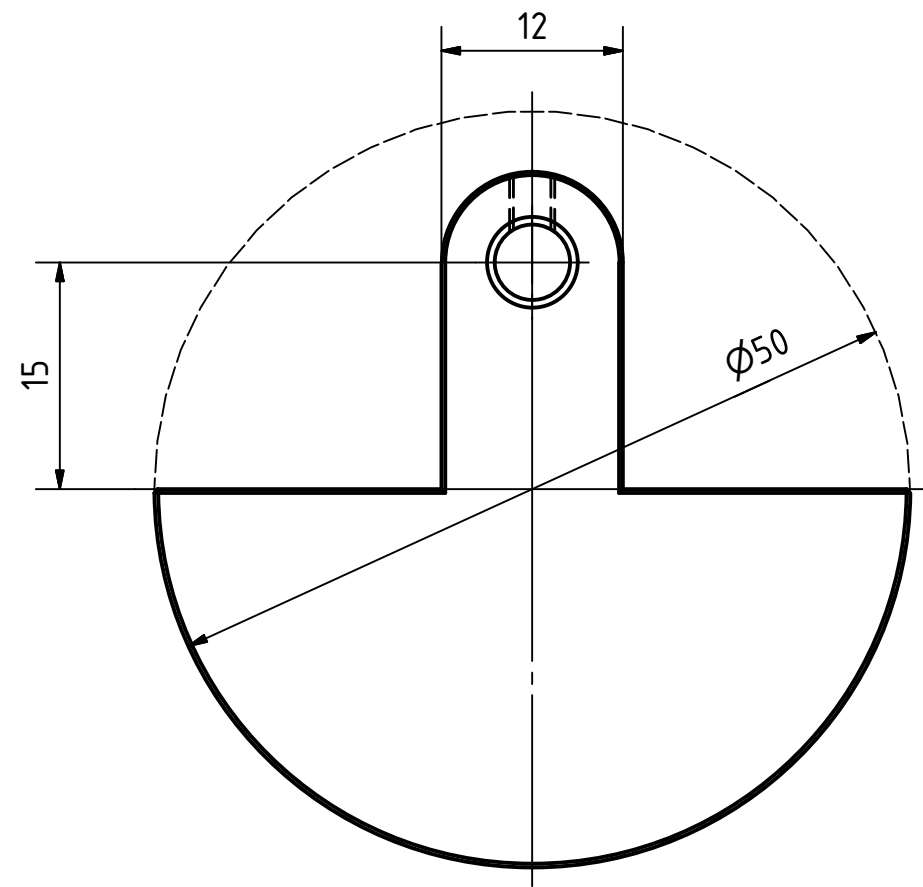
Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼											
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4									
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2									
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Fillet and chamfers				Angles ( in ° and ' )					
	Dimensions in mm								Dimensions in mm				Length of the shortest leg					
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30'	±20'

Revision	Date	Description			
Engineered by:		Name: Galba, J.	Date: 17/07/2010	Scale: 2:1	
Designer: Galba, J.		Approved: Galba, J.		SheetSize: A3	
Project: Miniature Model Hot Air Engine				Material: Steel, Mild	
Title: Horizontal Stirling Engine Counterweight A				Total Mass: 0.074 kg	
Drawingnumber:			Sheet: 0001		
Design State: Released			Drawing made with Autodesk Inventor Revisions only permitted by CAD		

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3,2 (✓)



Break Sharp Edges: 0,1 mm

Revision	Date	Description	Engineered by:		Name:	Date:	Scale: 2:1	
			Designer:	Galba, J.	17/07/2010	SheetSize: A3		
			Approved:	Galba, J.	17/07/2010			
Project: Miniature Model Hot Air Engine							Material: Steel, Mild	
							Total Mass: 0.075 kg	

Title: Horizontal Stirling Engine Counterweight B	
Drawingnumber:	Sheet: 0001

Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼											
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4									
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2									
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Fillet and chamfers				Angles ( in ° and ' )					
	Dimensions in mm								Dimensions in mm				Length of the shortest leg					
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2										
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8						±3°	±2°	±1°	±30'	±20'

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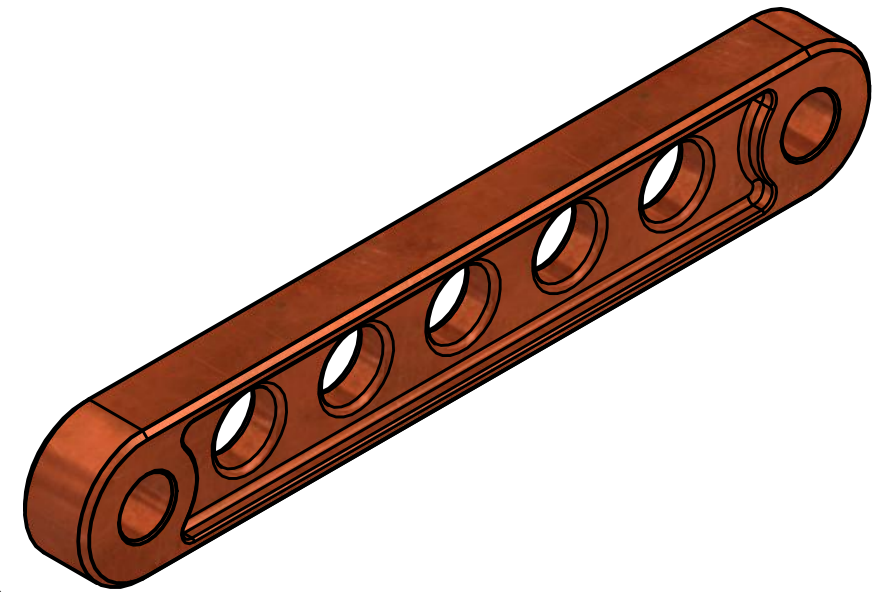
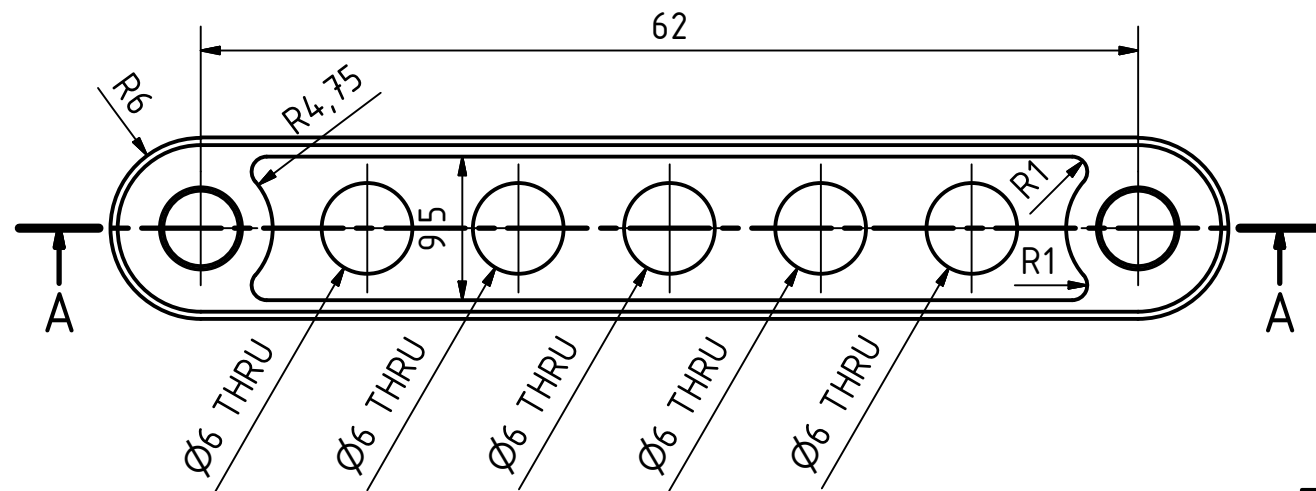
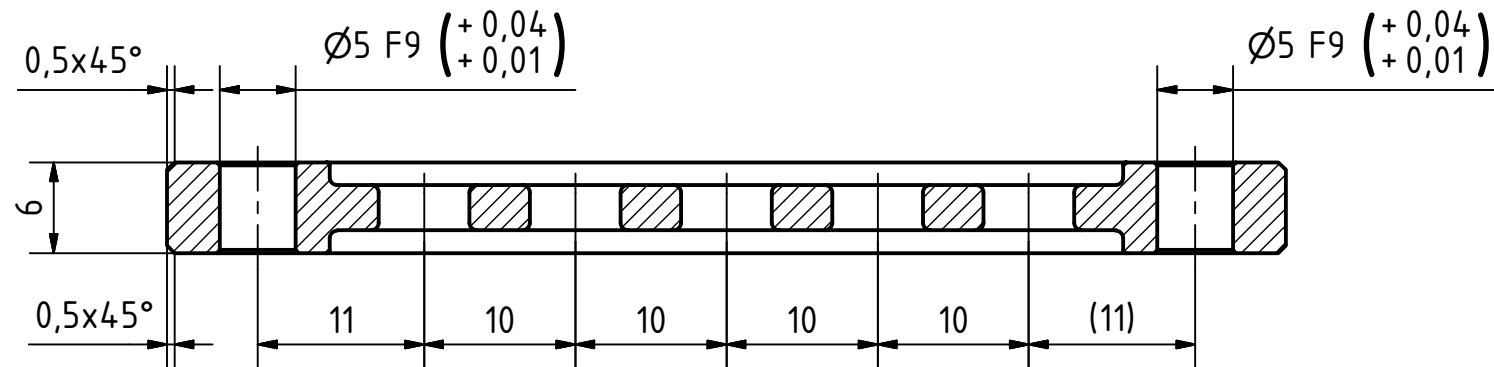


Design State: Released

Drawing made with Autodesk Inventor. Revisions only permitted by CAD.

1,6

A-A ( 2 : 1 )



Break Sharp Edges: 0,1 mm

Revision	Date	Description	Engineered by:		Name:	Date:	Scale: 2:1	
			Designer:	Galba, J.	17/07/2010	SheetSize: A3		
			Approved:	Galba, J.	17/07/2010			
Project: Miniature Model Hot Air Engine							Material: Copper	
Title: Horizontal Stirling Engine Crankrod							Total Mass: 0.026 kg	

Corresponding symbols	▽	▼	▽▽	▼▼	▽▽▽	▼▼▼	
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )	N11	N10	N9	N8	N7	N6	N5
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )	25	12,5	6,3	3,2	1,6	0,8	0,4

Allowable deviations for dimensions without tolerance indication (machined surfaces)

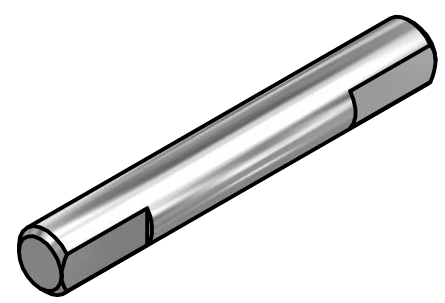
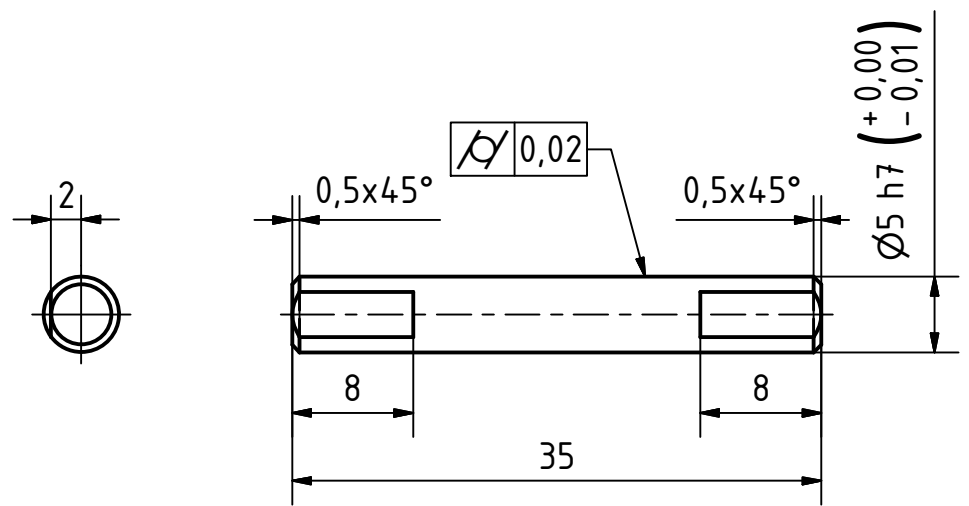
Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Filletes and chamfers					Angles ( in ° and ' )				
	Dimensions in mm								Dimensions in mm					Length of the shortest leg				
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4										
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8										



Drawingnumber:	Sheet: 0001
Design State: Released	Drawing made with Autodesk Inventor Revisions only permitted by CAD

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1,6



Break Sharp Edges: 0,1 mm

Revision	Date	Description	Engineered by:		Name:	Date:	Scale: 2:1	
			Designer:	Galba, J.	17/07/2010	SheetSize: A3		
			Approved:	Galba, J.	17/07/2010			
Project: Miniature Model Hot Air Engine							Material: Stainless Steel	
							Total Mass: N/A	

Title: Horizontal Stirling Engine Crankshaft	
Drawingnumber:	Sheet: 0001

Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼												
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4										
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2										
Allowable deviations for dimensions without tolerance indication (machined surfaces)																			
Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Filletes and chamfers				Angles ( in ° and ' )						
	Dimensions in mm								Dimensions in mm				Length of the shortest leg						
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400	
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'	
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'	
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30'	±20'	
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8											

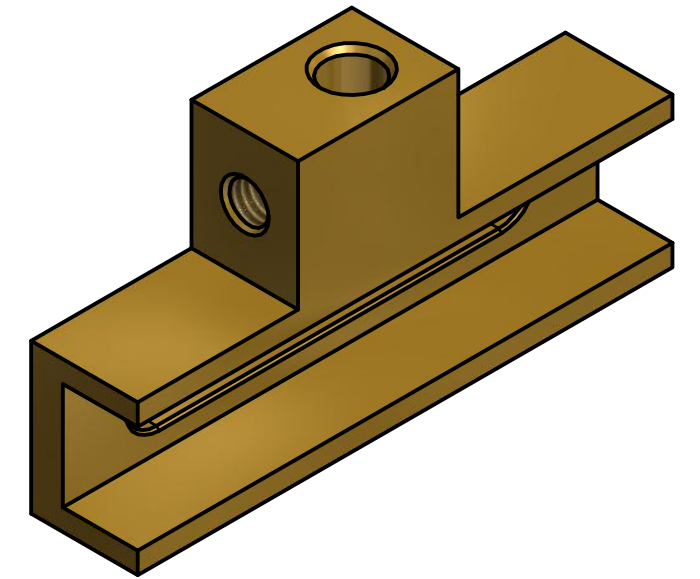
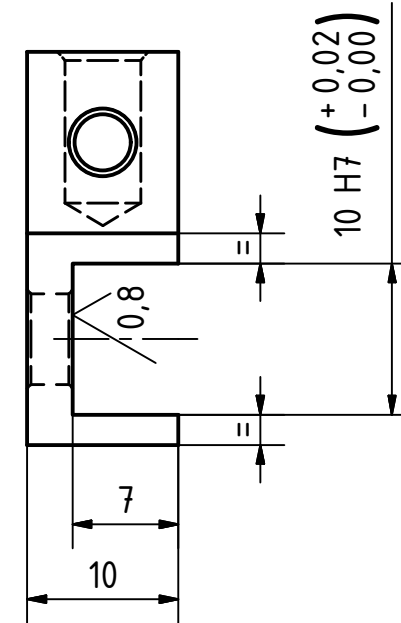
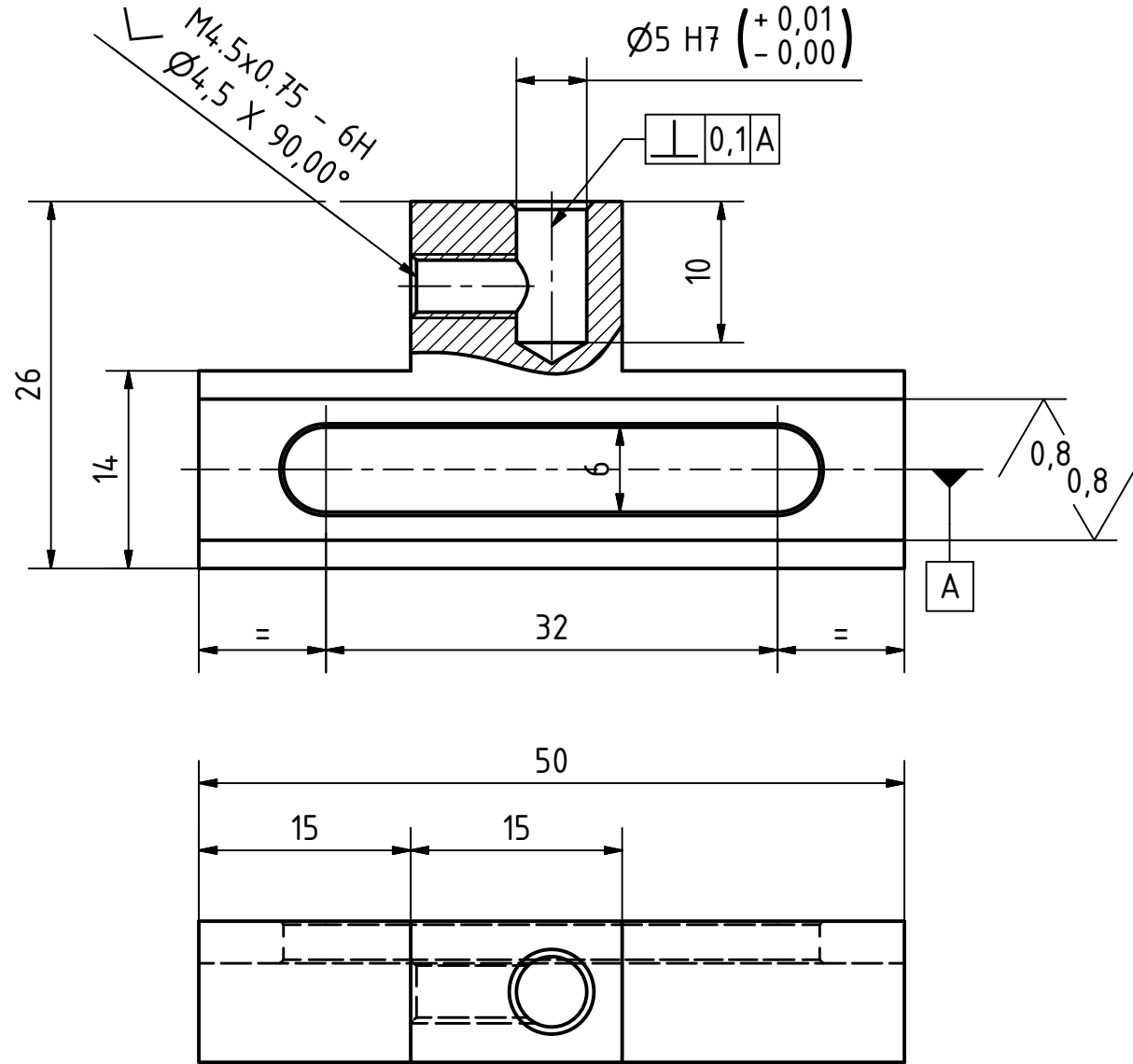


Design State: Released

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1,6



Break Sharp Edges: 0,1 mm

Revision	Date	Description	Engineered by:		Name:	Date:	Scale: 2:1	
			Designer:	Galba, J.	17/07/2010	SheetSize: A3		
			Approved:	Galba, J.	17/07/2010			
Project: Miniature Model Hot Air Engine							Material: Brass, Soft Yellow	Total Mass: 0.037 kg

Title:  
Horizontal Stirling Engine  
Crosshead

Corresponding symbols		$\nabla$	$\blacktriangledown$	$\nabla\nabla$	$\blacktriangledown\blacktriangledown$	$\nabla\nabla\nabla$	$\blacktriangledown\blacktriangledown\blacktriangledown$											
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4									
Roughness Value "Ra" in $\mu m$ ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2									
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Filletes and chamfers				Angles ( in ° and ' )					
	Dimensions in mm								Dimensions in mm				Length of the shortest leg					
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	$\pm 0,05$	$\pm 0,05$	$\pm 0,1$	$\pm 0,15$	$\pm 0,2$	$\pm 0,3$	$\pm 0,5$	$\pm 0,8$	$\pm 0,2$	$\pm 0,5$	$\pm 1$	$\pm 2$	$\pm 4$	$\pm 1^\circ$	$\pm 30'$	$\pm 20'$	$\pm 10'$	$\pm 5'$
m Medium	$\pm 0,1$	$\pm 0,1$	$\pm 0,2$	$\pm 0,3$	$\pm 0,5$	$\pm 0,8$	$\pm 1,2$	$\pm 2$	$\pm 0,2$	$\pm 0,5$	$\pm 1$	$\pm 2$	$\pm 4$	$\pm 1^\circ$	$\pm 30'$	$\pm 20'$	$\pm 10'$	$\pm 5'$
c Rough	$\pm 0,2$	$\pm 0,3$	$\pm 0,5$	$\pm 0,8$	$\pm 1,2$	$\pm 2$	$\pm 3$	$\pm 4$	$\pm 0,4$	$\pm 1$	$\pm 2$	$\pm 4$	$\pm 8$	$\pm 1^\circ 30'$	$\pm 1^\circ$	$\pm 30'$	$\pm 15'$	$\pm 10'$
v Very Rough	-	$\pm 0,5$	$\pm 1$	$\pm 1,5$	$\pm 2,5$	$\pm 4$	$\pm 6$	$\pm 8$	$\pm 0,4$	$\pm 1$	$\pm 2$	$\pm 4$	$\pm 8$	$\pm 3^\circ$	$\pm 2^\circ$	$\pm 1^\circ$	$\pm 30'$	$\pm 20'$

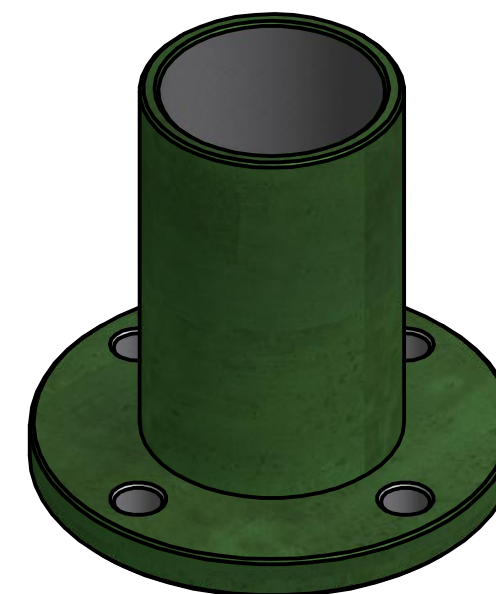
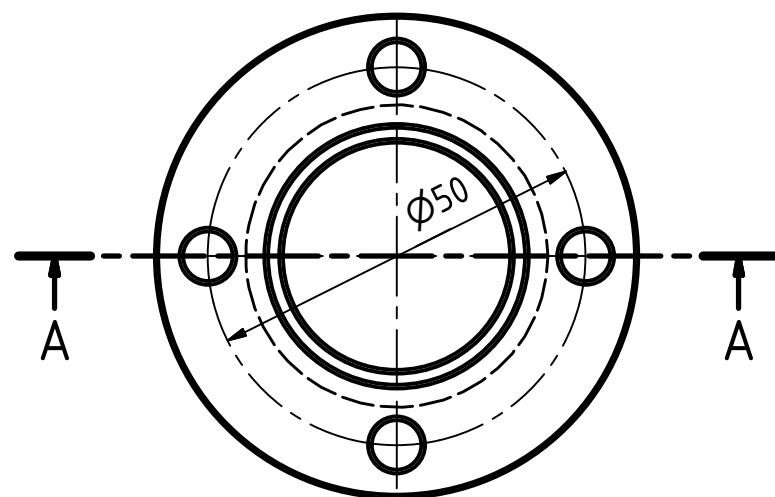
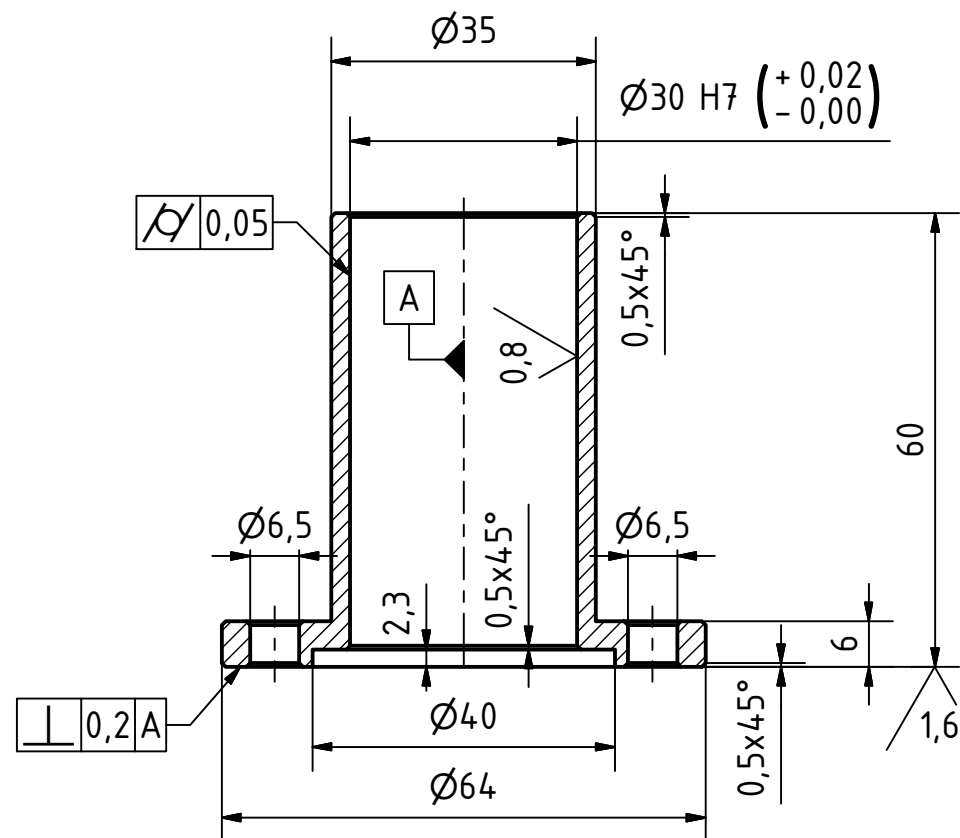


Drawingnumber: \_\_\_\_\_ Sheet: 0001  
Design State: Released  
Drawing made with Autodesk Inventor Revisions only permitted by CAD

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3,2 (✓)

A-A ( 1 : 1 )



Break Sharp Edges: 0,1 mm

Revision		Date	Description	
Engineered by:			Name:	Date:
			Designer: Galba, J.	17/07/2010
			Approved: Galba, J.	17/07/2010
Project:				Scale: 1:1
Miniature Model Hot Air Engine				SheetSize: A3
				Material: Steel, Mild
				Total Mass: 0.210 kg

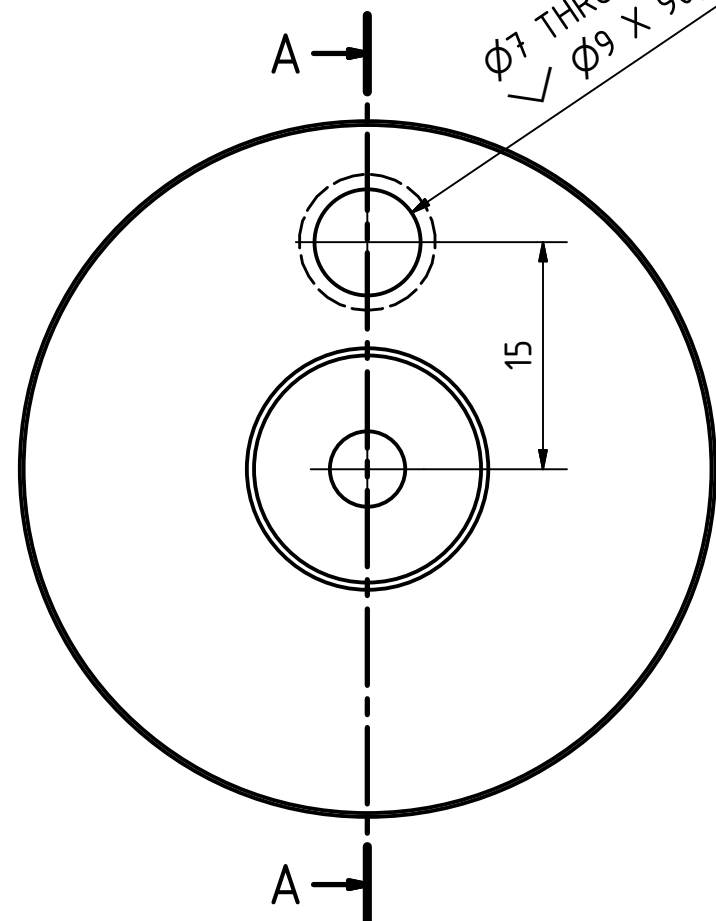
Title:	
Horizontal Stirling Engine Cylinder	

Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼											
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5										
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4										
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
For measurements ( deviations in mm )				Filletes and chamfers			Angles ( in ° and ' )											
Accuracyclass (ISO 2768.1)	Dimensions in mm								Dimensions in mm			Length of the shortest leg						
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2										
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8						±3°	±2°	±1°	±30'	±20'

Drawingnumber:		Sheet:
		0001
Design State:		Drawing made with autodesk Inventor Revisions only permitted by CAD
Released		

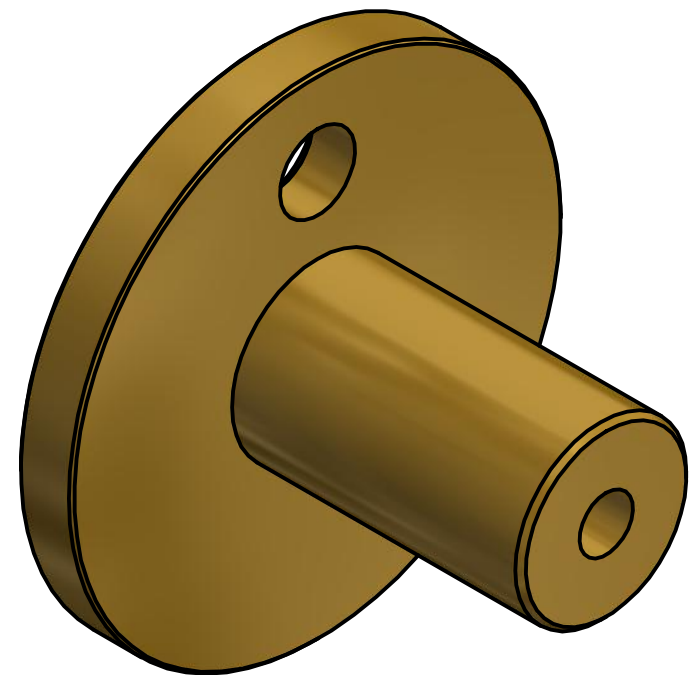
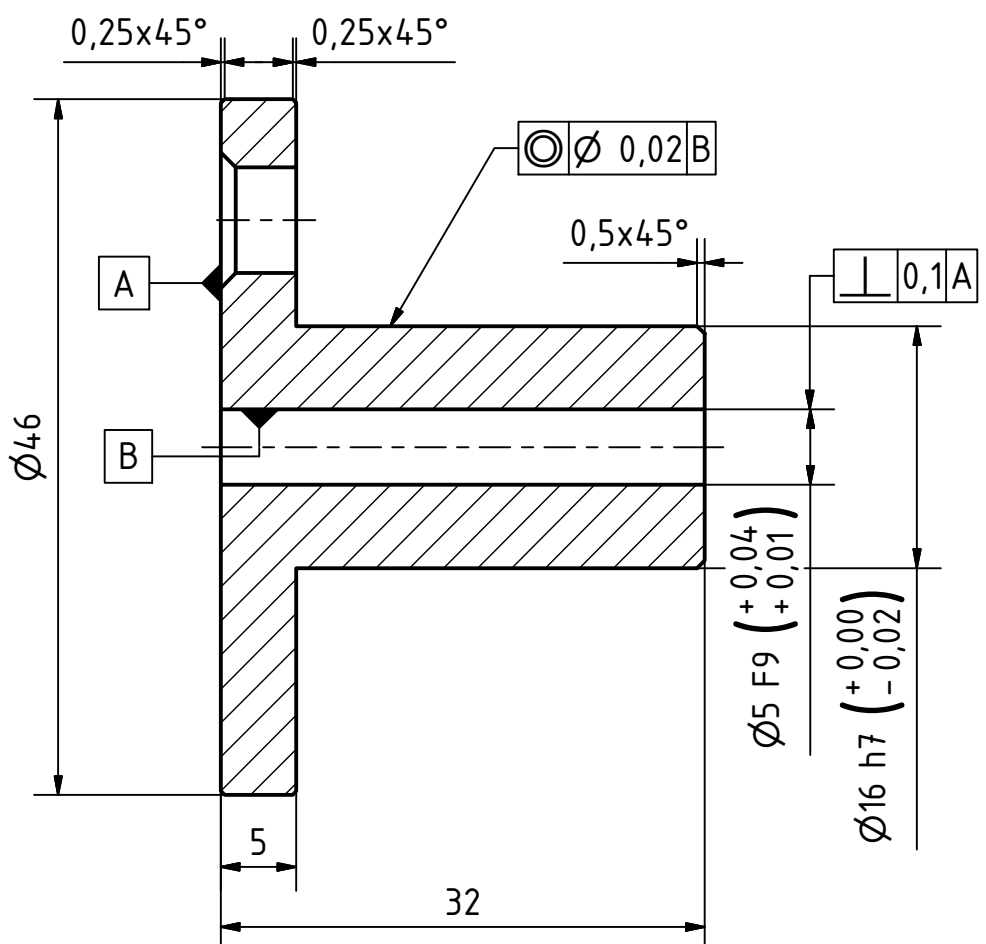
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1,6



Ø7 THRU  
Ø9 X 90,00°

A-A ( 2 : 1 )



Break Sharp Edges: 0,1 mm

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Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼		
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2

Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Fillet and chamfers				Angles ( in ° and ' )					
	Dimensions in mm								Dimensions in mm				Length of the shortest leg					
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8	±0,4	±1	±2	±4	±8	±1°30'	±2°	±1°	±30'	±20'

Revision	Date	Description

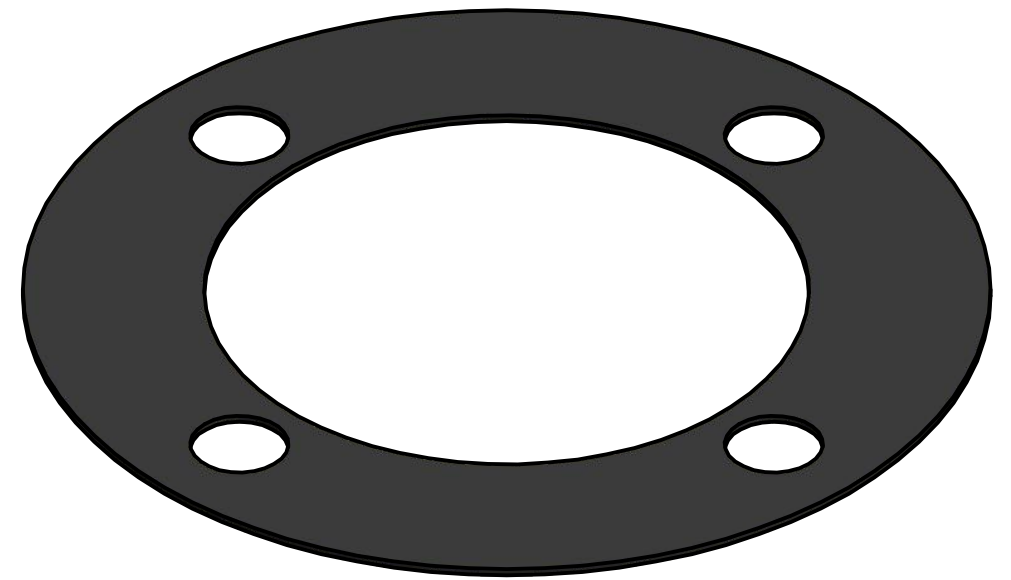
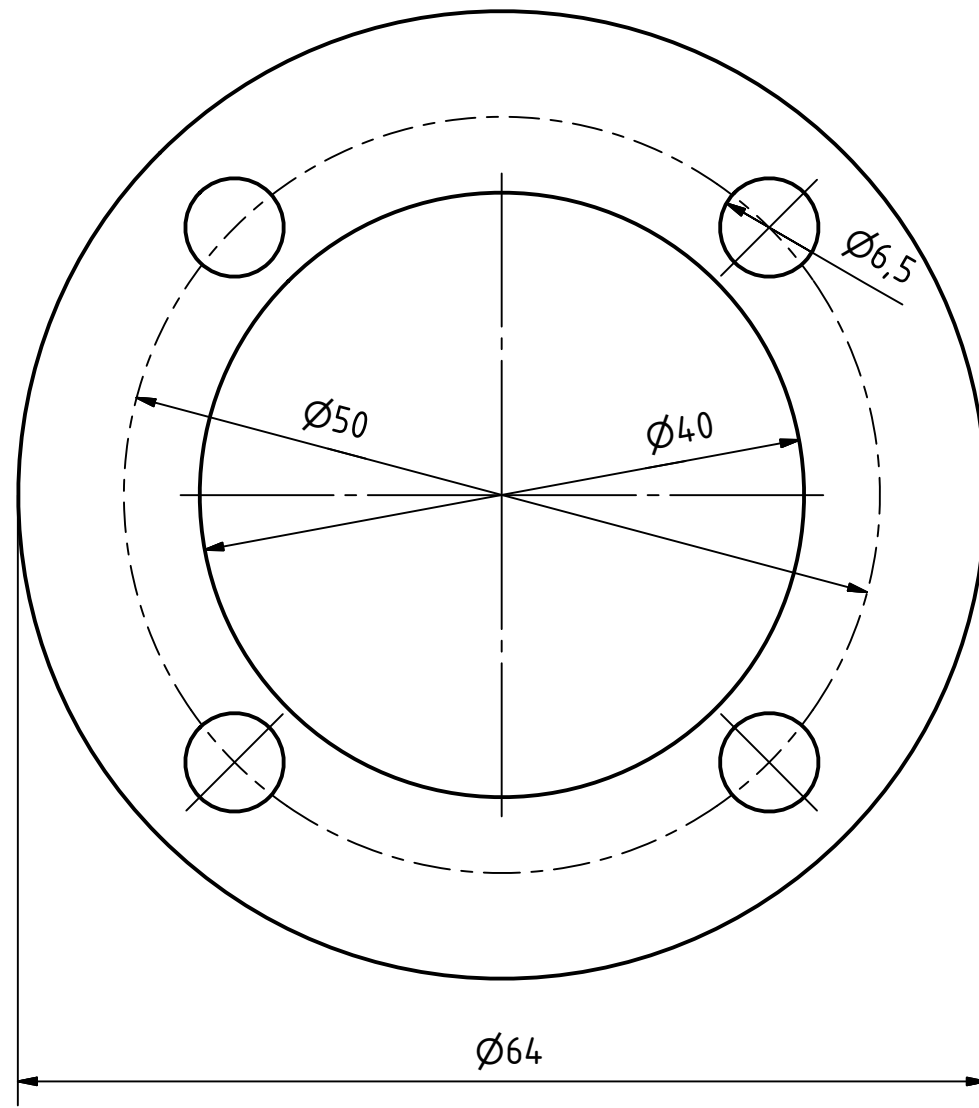
Engineered by:	Name:	Date:	Scale: 2:1	
Designer: Galba, J.	Galba, J.	17/07/2010	SheetSize: A3	
Approved: Galba, J.	Galba, J.	17/07/2010	Material: Brass, Soft Yellow	
Project: Miniature Model Hot Air Engine			Total Mass: 0.109 kg	

Title:  
**Horizontal Stirling Engine  
Cylinder Cover**

Drawingnumber:	Sheet: <b>0001</b>
Design State: <b>Released</b>	Drawing made with autodesk Inventor Revisions only permitted by CAD



THICKNESS: 0,5mm



Revision	Date	Description	Engineered by:		Name:	Date:	Scale: 2:1	
			Designer:	Galba, J.	17/07/2010	SheetSize: A3		
			Approved:	Galba, J.	17/07/2010			
Project: Miniature Model Hot Air Engine							Material: Rubber	
							Total Mass: 0.001 kg	

Title: Horizontal Stirling Engine Cylinder Packing	
--	--

Corresponding symbols	▽	▼	▽▽	▼▼	▽▽▽	▼▼▼		
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )	N11	N10	N9	N8	N7	N6	N5	N4
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )	25	12,5	6,3	3,2	1,6	0,8	0,4	0,2

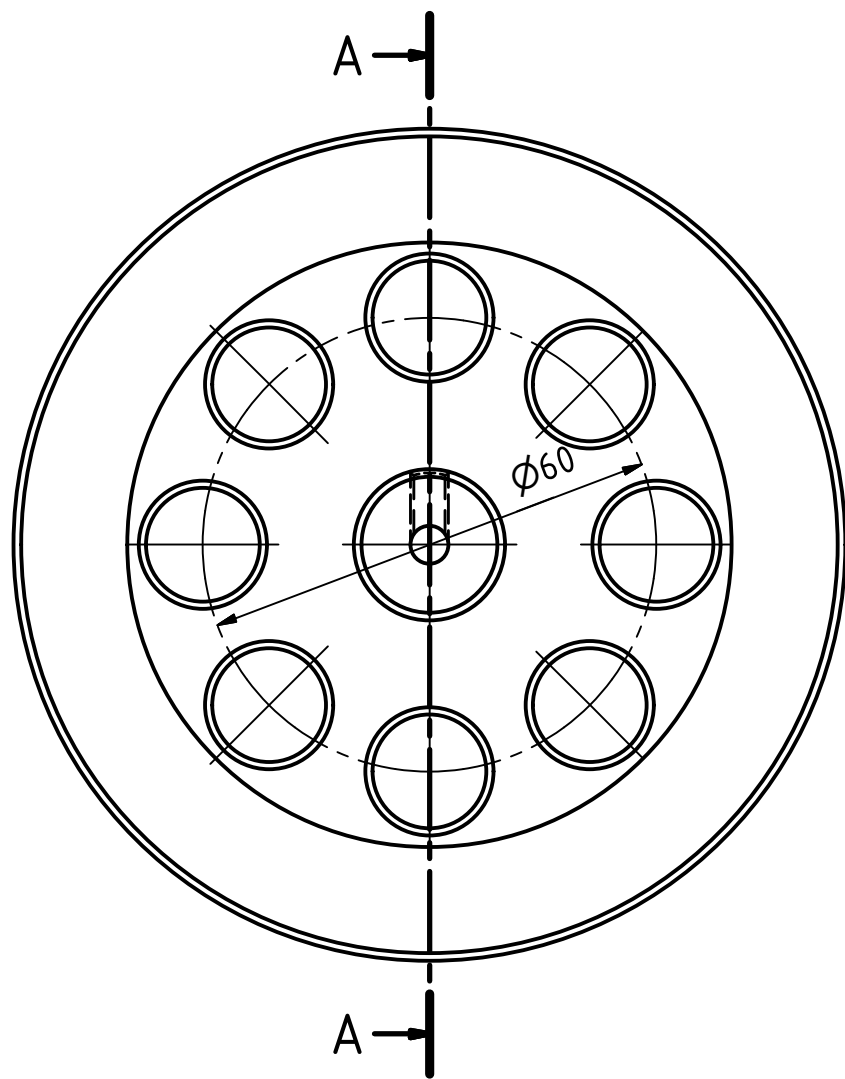
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Filletes and chamfers				Angles ( in ° and ' )					
	Dimensions in mm								Dimensions in mm				Length of the shortest leg					
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2										
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8						±3°	±2°	±1°	±30'	±20'



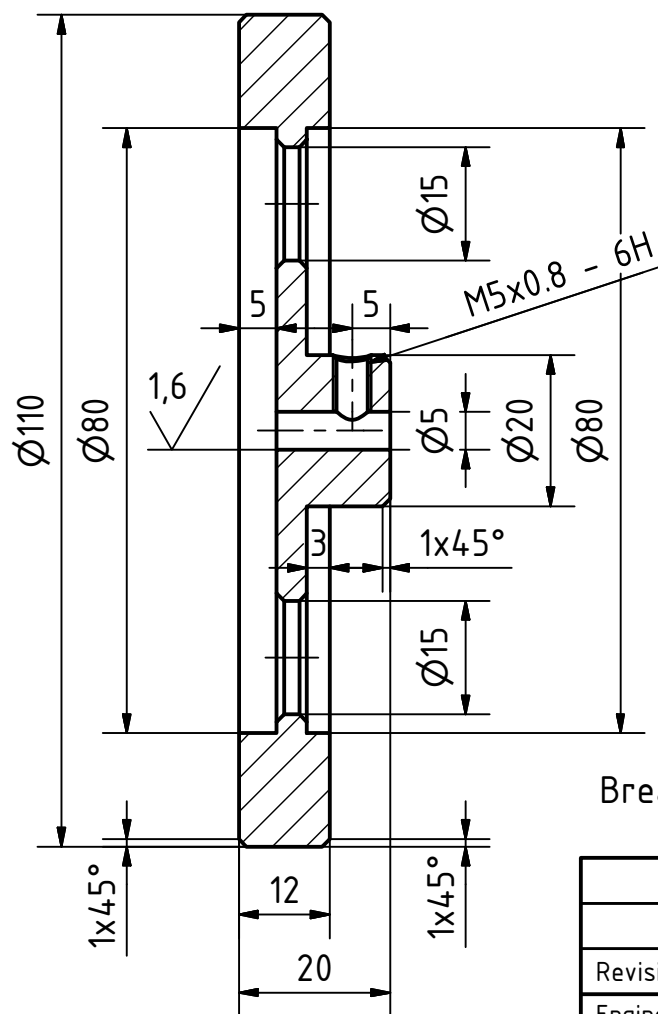
Drawingnumber:	Sheet: 0001
Design State: Released	Drawing made with Autodesk Inventor Revisions only permitted by CAD

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3,2 (✓)



A-A ( 1 : 1 )



Break Sharp Edges: 0,1 mm



Revision	Date	Description

Engineered by:	Name:	Date:	Scale: 1:1	
Designer: Galba, J.	Galba, J.	17/07/2010	SheetSize: A3	
Approved: Galba, J.	Galba, J.	17/07/2010		
Project: Miniature Model Hot Air Engine			Material: Steel, Mild	
			Total Mass: 0.554 kg	

Title: Horizontal Stirling Engine Flywheel	
Drawingnumber:	Sheet: 0001

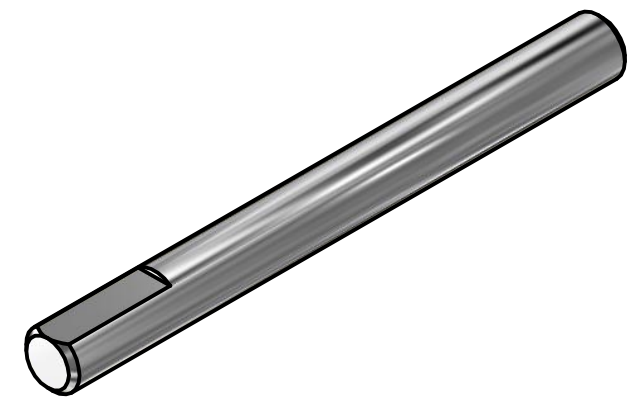
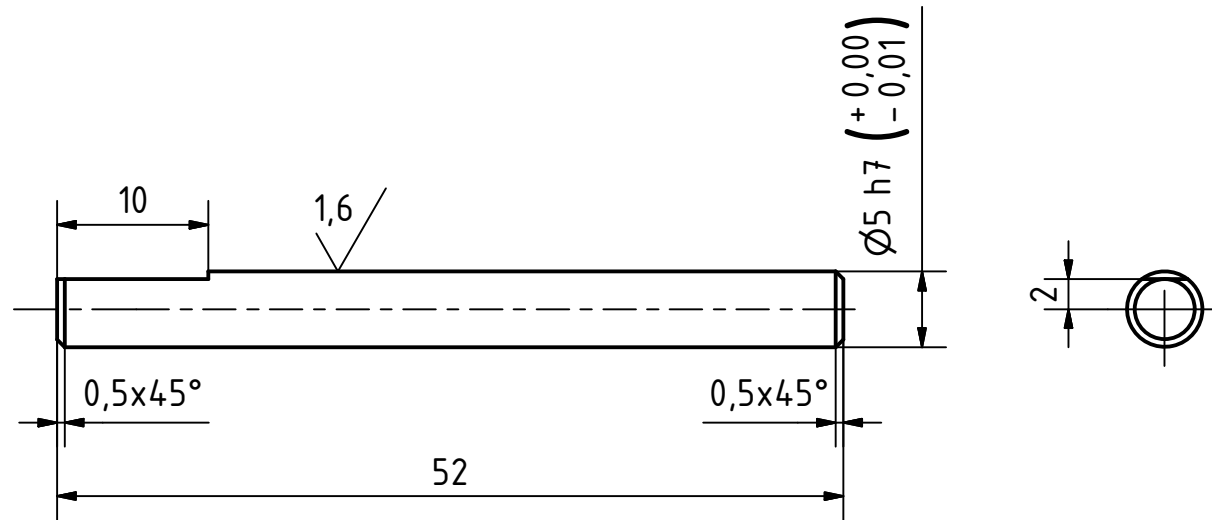
Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼											
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4									
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2									
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
For measurements ( deviations in mm )		Filletts and chamfers				Angles ( in ° and ' )												
Accuracyclass (ISO 2768.1)	Dimensions in mm								Dimensions in mm		Length of the shortest leg							
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30'	±20'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30'	±20'

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Design State: Released  
Drawing made with Autodesk Inventor Revisions only permitted by CAD

3,2



Break Sharp Edges: 0,1 mm

Revision		Date	Description	
Engineered by:			Name:	Date:
			Designer: Galba, J.	17/07/2010
			Approved: Galba, J.	17/07/2010
Project:				Scale: 2:1
Miniature Model Hot Air Engine				Sheet Size: A3
				Material: Stainless Steel
				Total Mass: 0.008 kg

Title:	
Horizontal Stirling Engine Flywheelshaft	

Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼												
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4										
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2										
Allowable deviations for dimensions without tolerance indication (machined surfaces)																			
		For measurements ( deviations in mm )							Filletes and chamfers			Angles ( in ° and ' )							
Accuracyclass (ISO 2768.1)	Dimensions in mm								Dimensions in mm					Length of the shortest leg					
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400	
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20°	±10°	±5'	
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±0,2	±0,5	±1	±2	±4	±1°30'	±1°	±30°	±15°	±10°	
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30°	±20°	
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8											

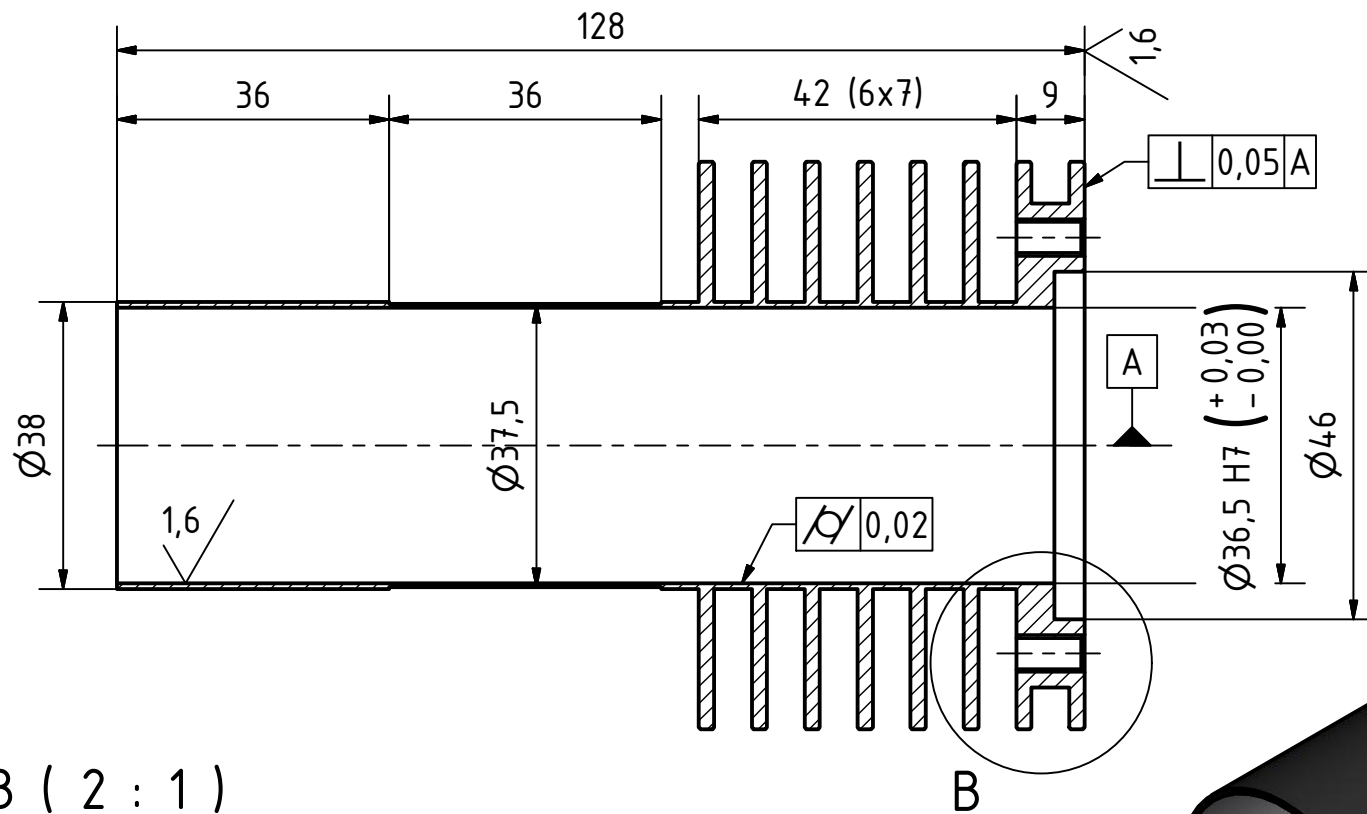
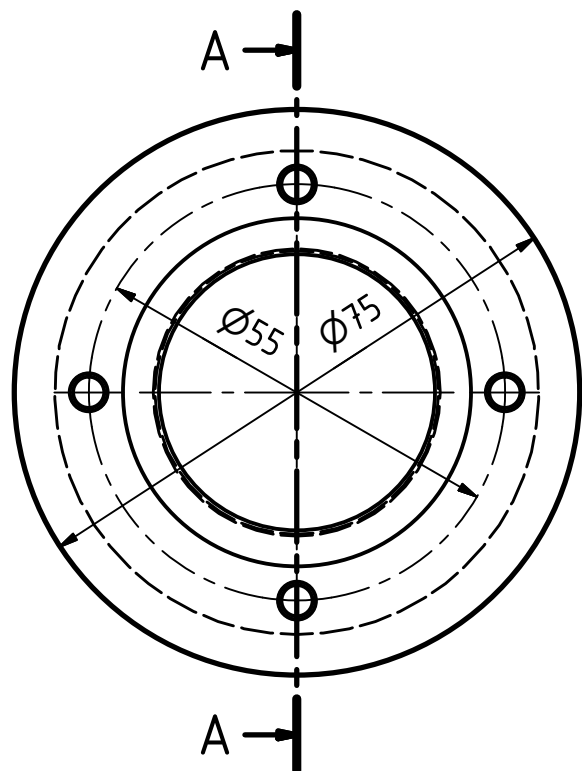
Drawingnumber:		Sheet:	
		0001	
Design State:		Drawing made with autodesk Inventor Revisions only permitted by CAD	
Released			

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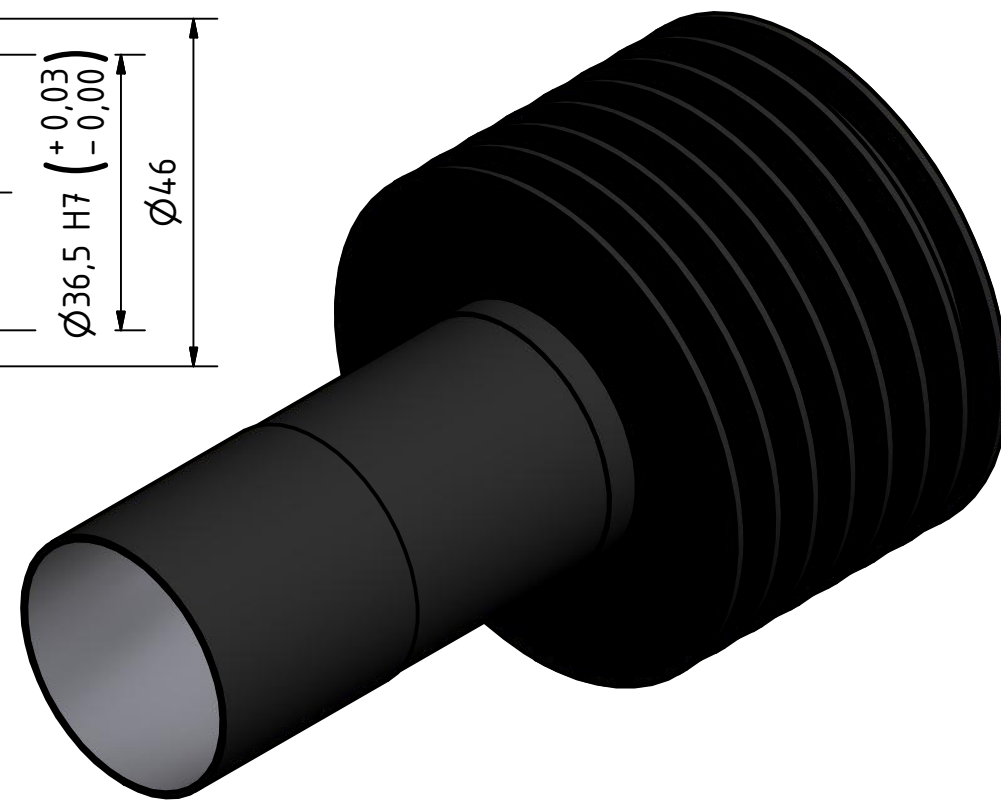
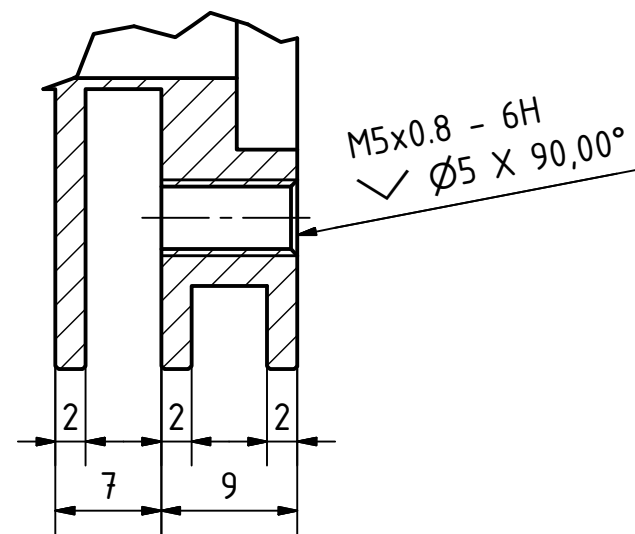


3,2 (✓)

A-A (1:1)



B (2:1)



Break Sharp Edges: 0,1 mm

Revision	Date	Description				
Engineered by:			Name:	Date:	Scale: 1:1	
			Designer: Galba, J.	17/07/2010	Sheet Size: A3	
			Approved: Galba, J.	17/07/2010		
Project: Miniature Model Hot Air Engine					Material: Stainless Steel	
					Total Mass: 0.566 kg	

Title:  
Horizontal Stirling Engine  
Heat Exchange Cylinder

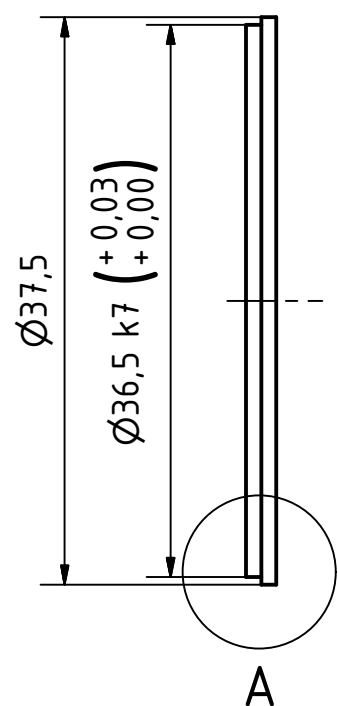
Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼											
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4									
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2									
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
For measurements ( deviations in mm )																		
Accuracy class (ISO 2768.1)	Dimensions in mm								Fillet and chamfers				Angles ( in ° and ' )					
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±15'	±10'
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30'	±20'



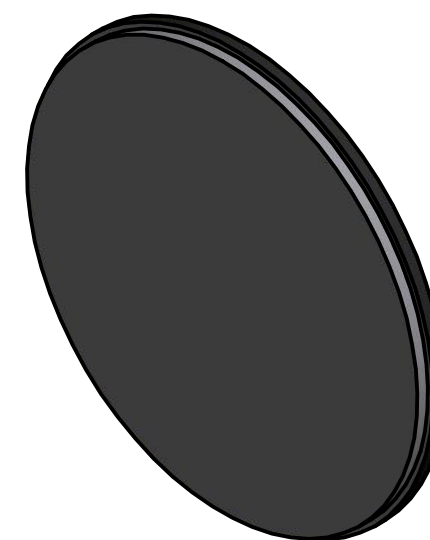
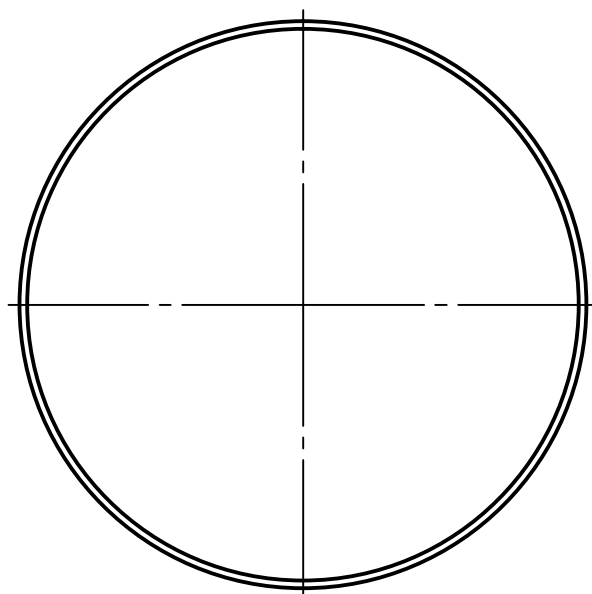
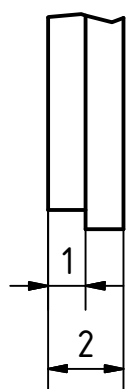
Drawing number:	Sheet: 0001
Design State: Released	Drawing made with Autodesk Inventor Revisions only permitted by CAD

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A ( 5 : 1 )



Break Sharp Edges: 0,1 mm

Revision		Date	Description		Name:		Date:	Scale: 2:1	
Engineered by:		Designer:	Galba, J.	17/07/2010	Approved:	Galba, J.	17/07/2010	SheetSize: A3	
Project:							Material:		Stainless Steel
Miniature Model Hot Air Engine							Total Mass:		0.017 kg

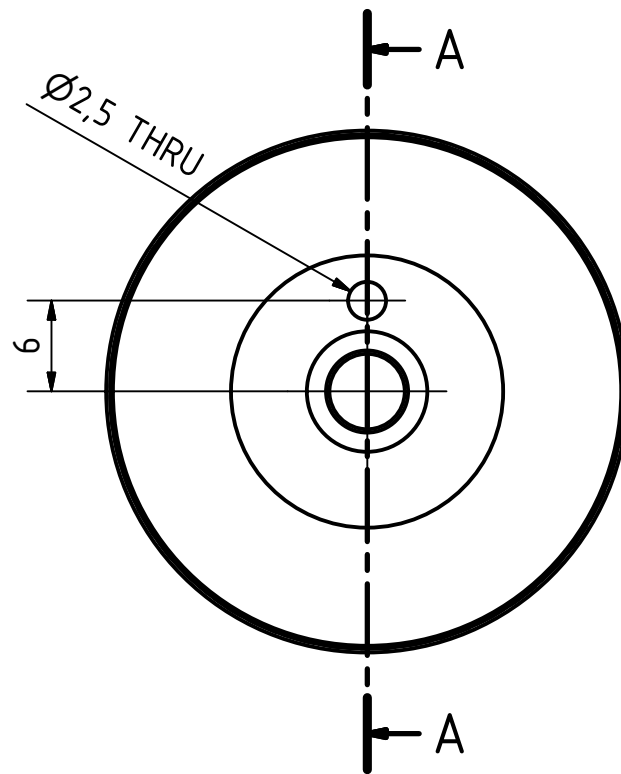
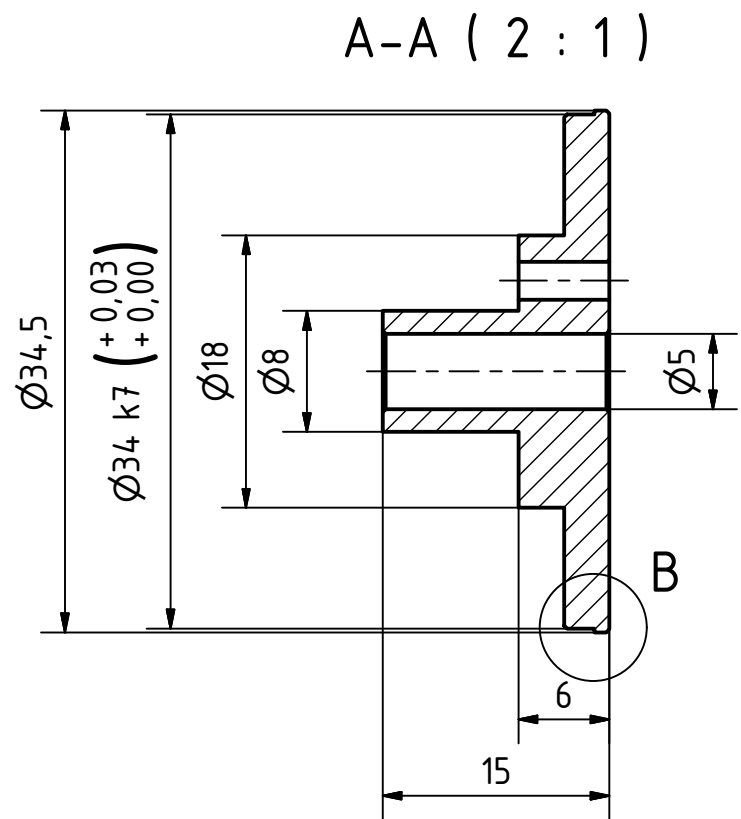
Title:  
Horizontal Stirling Engine  
Heat Exchange Cylinderhead

Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼											
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4									
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2									
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Fillet and chamfers				Angles ( in ° and ' )					
	Dimensions in mm								Dimensions in mm				Length of the shortest leg					
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2										
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4						±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30'	±20'

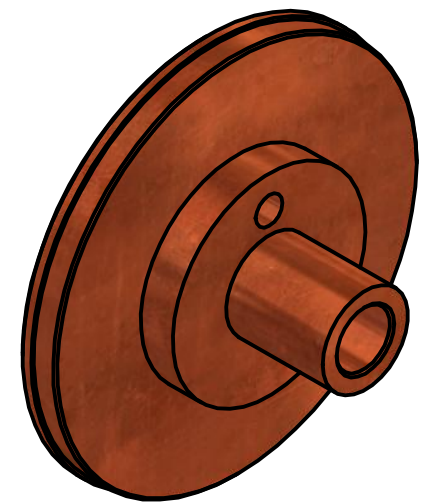
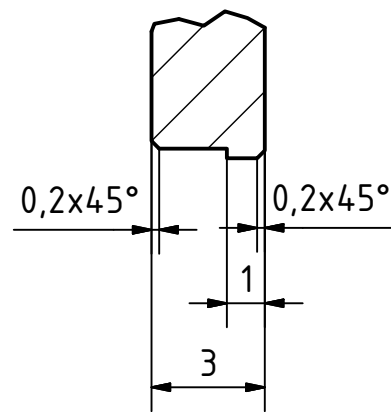
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	Design State:	0001
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B ( 5 : 1 )



Break Sharp Edges: 0,1 mm

Revision	Date	Description	Engineered by:		Name:	Date:	Scale: 2:1	
			Designer:	Galba, J.	17/07/2010	SheetSize: A3		
			Approved:	Galba, J.	17/07/2010			
Project: Miniature Model Hot Air Engine							Material: Copper	
							Total Mass: 0.033 kg	

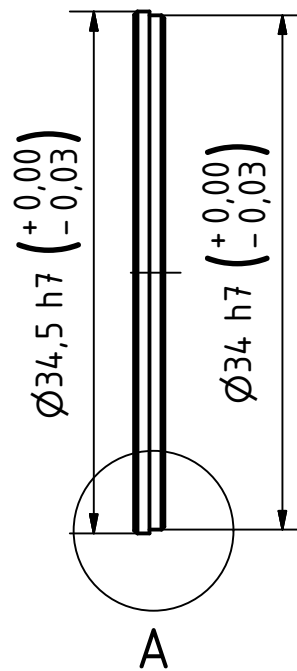
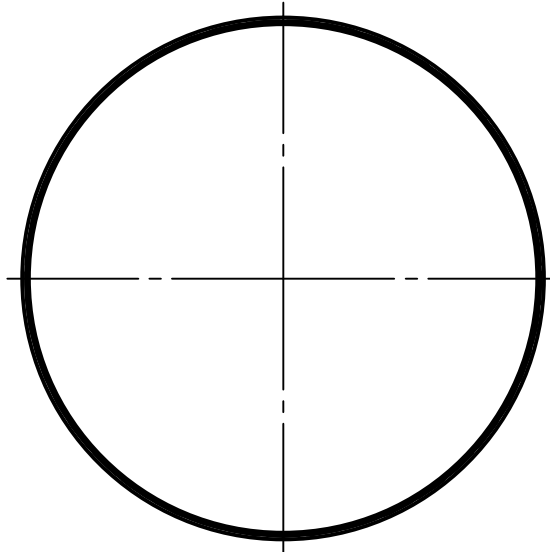
Title:  
Horizontal Stirling Engine  
Heat Exchange Piston Exhaust

Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼											
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5										
Roughness Value "Ra" in μm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4										
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Filletes and chamfers					Angles ( in ° and ' )				
	Dimensions in mm								Dimensions in mm					Length of the shortest leg				
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2										
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4						±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30'	±20'

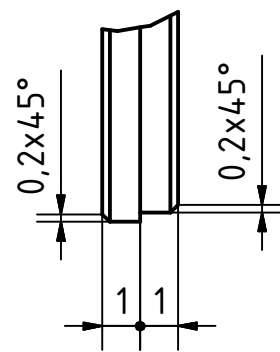
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A ( 5 : 1 )



Break Sharp Edges: 0,1 mm

Revision		Date	Description		Name:		Date:	Scale: 2:1	
Engineered by:		Designer:	Galba, J.	17/07/2010	Approved:	Galba, J.	17/07/2010	SheetSize: A3	
Project: Miniature Model Hot Air Engine							Material: Copper		
Title: Horizontal Stirling Engine Heat Exchange Piston Head							Total Mass: 0.016 kg		

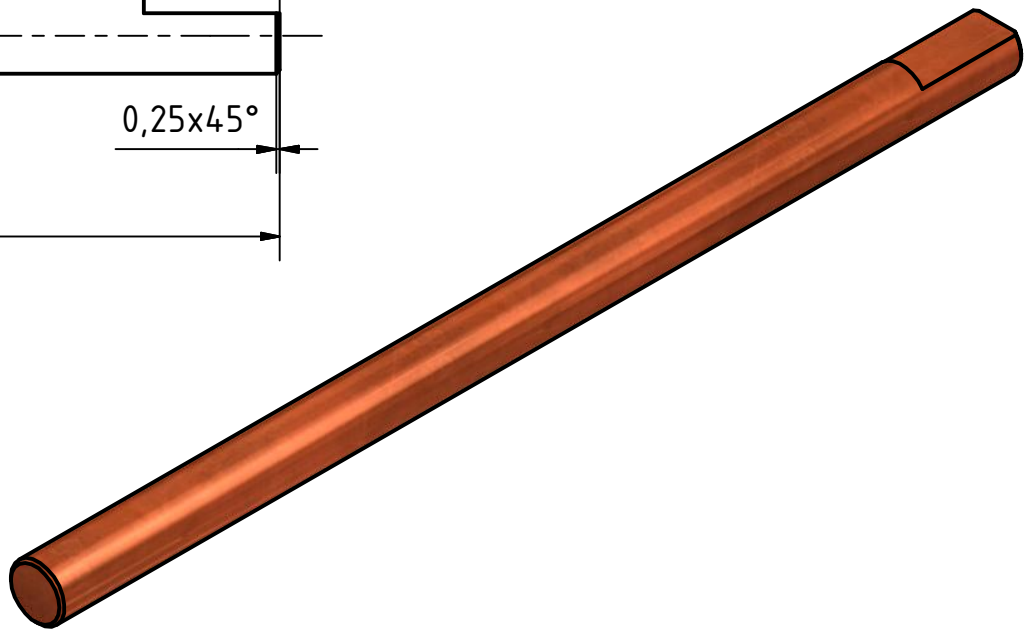
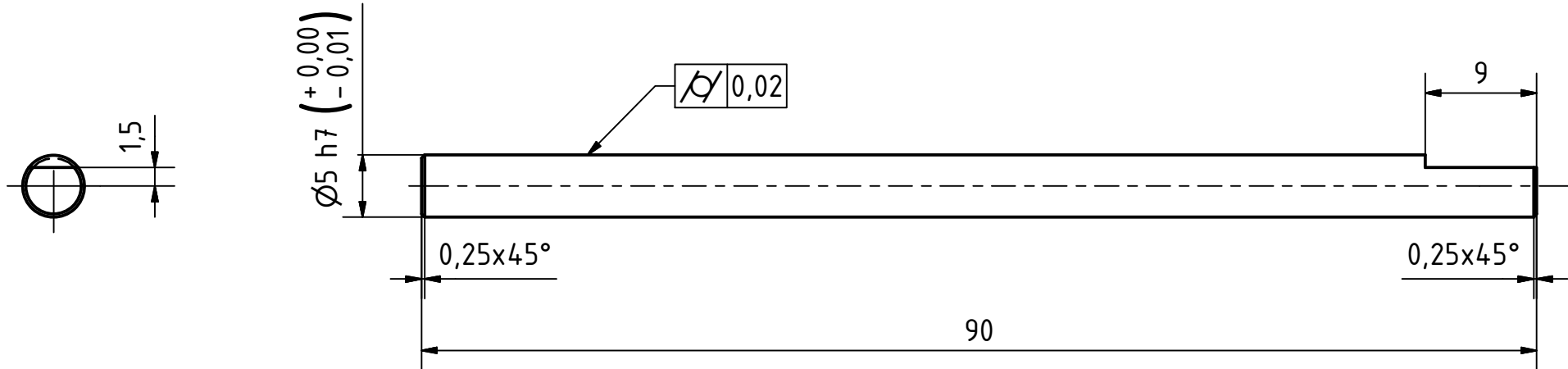
Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼											
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4									
Roughness Value "Ra" in μm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2									
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Filletes and chamfers			Angles ( in ° and ' )						
	Dimensions in mm								Dimensions in mm			Length of the shortest leg						
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2										
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8						±3°	±2°	±1°	±30'	±20'

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Drawingnumber:	Sheet: 0001
Design State: Released	Drawing made with Autodesk Inventor. Revisions only permitted by CAD.

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Break Sharp Edges: 0,1 mm

Revision		Date	Description	
Engineered by:			Name:	Date:
			Designer: Galba, J.	17/07/2010
			Approved: Galba, J.	17/07/2010
Project:				Material: Copper
Miniature Model Hot Air Engine				Total Mass: 0.016 kg

Title:	
Horizontal Stirling Engine Heat Exchange Piston Shaft	

Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼											
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4									
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2									
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
		For measurements ( deviations in mm )							Fillet and chamfers			Angles ( in ° and ' )						
Accuracyclass (ISO 2768.1)	Dimensions in mm								Dimensions in mm					Length of the shortest leg				
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30'	±20'



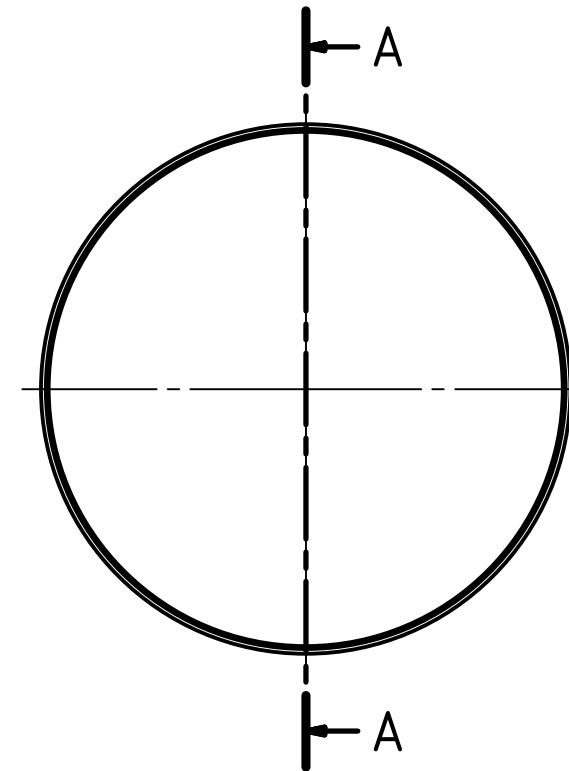
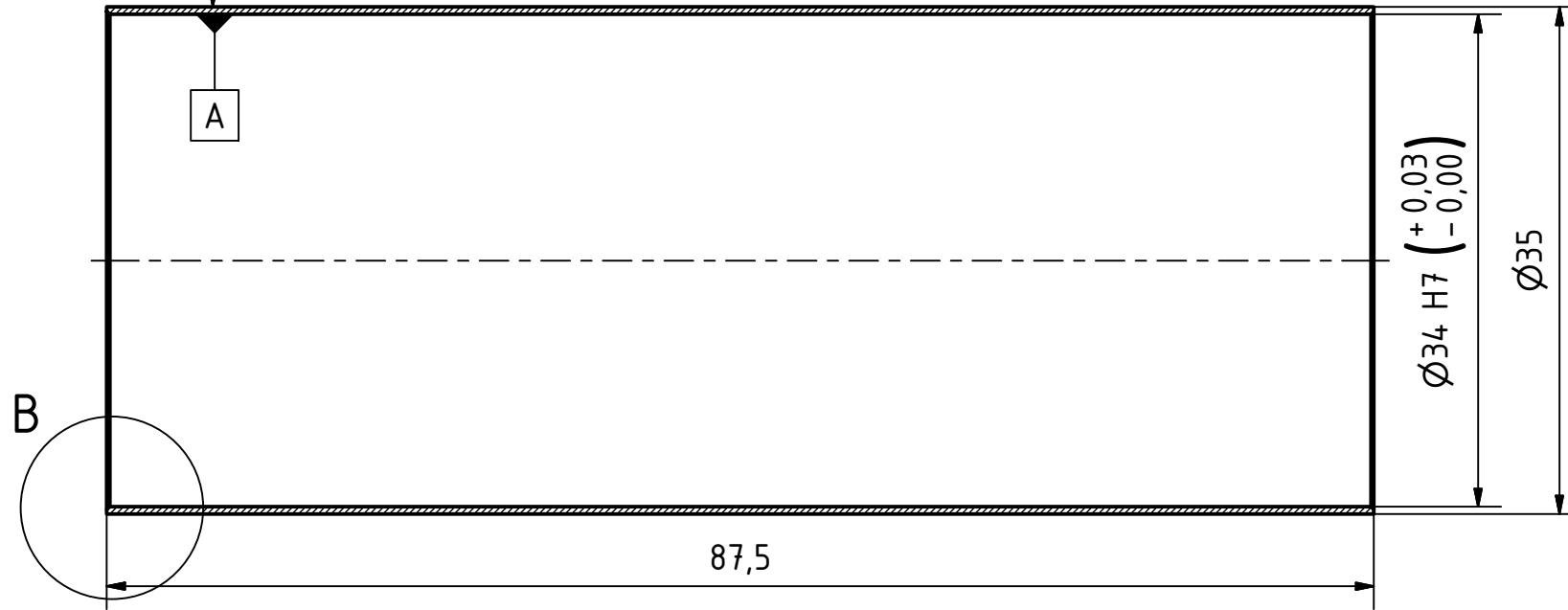
Drawingnumber:	Sheet: 0001
Design State: Released	Drawing made with Autodesk Inventor Revisions only permitted by CAD

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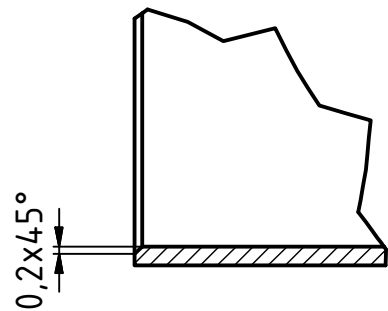
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⊙ ∅ 0,02 A

A-A ( 2 : 1 )



B ( 5 : 1 )



Break Sharp Edges: 0,1 mm

Revision		Date	Description	Engineered by:		Name:	Date:	Scale: 2:1	
				Designer:	Galba, J.	17/07/2010	SheetSize: A3		
				Approved:	Galba, J.	17/07/2010			
Project:							Material: Copper		
Miniature Model Hot Air Engine							Total Mass: 0.042 kg		

Title:		Horizontal Stirling Engine	
		Heat Exchange Piston Tube	
Drawingnumber:		Sheet: 0001	
Design State:		Released	

Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼											
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4									
Roughness Value "Ra" in μm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2									
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Fillet and chamfers				Angles ( in ° and ' )					
	Dimensions in mm								Dimensions in mm				Length of the shortest leg					
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2										
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8						±3°	±2°	±1°	±30'	±20'

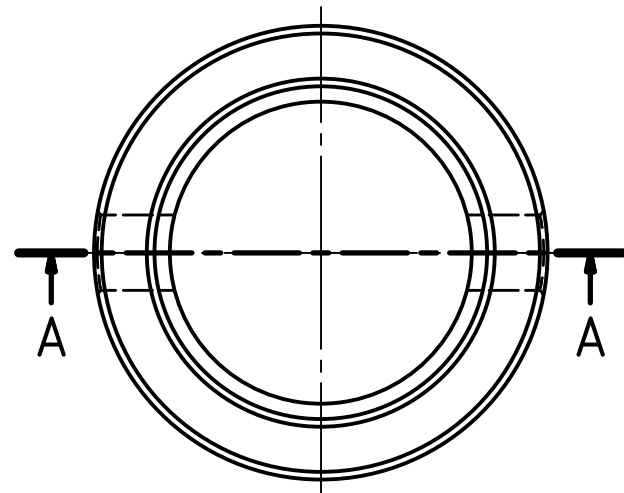
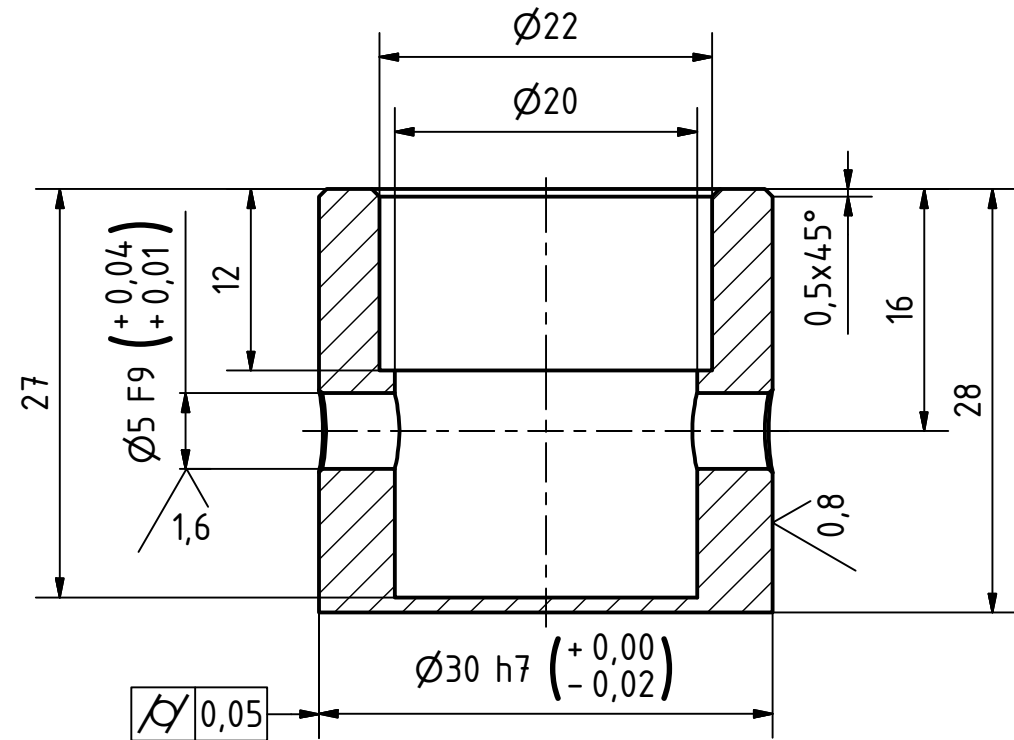
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3,2 (✓)

A-A ( 2 : 1 )



Break Sharp Edges: 0,1 mm

Revision	Date	Description

Engineered by:	Name:	Date:	Scale: 2:1	
Designer: Galba, J.	Galba, J.	17/07/2010	SheetSize: A3	
Approved: Galba, J.	Galba, J.	17/07/2010		
Project: Miniature Model Hot Air Engine			Material: Steel, Mild	
Title: Horizontal Stirling Engine Piston			Total Mass: 0.081 kg	

Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼		
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2

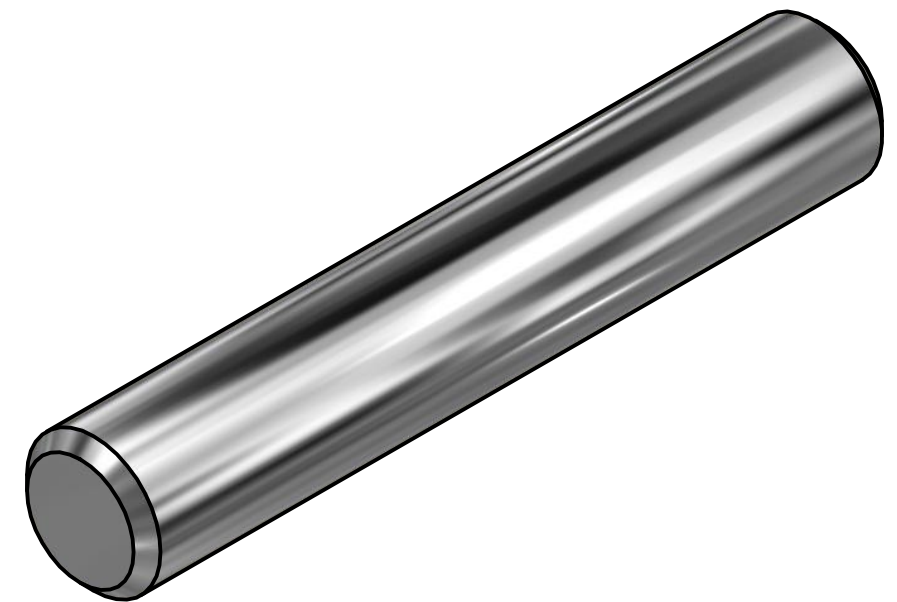
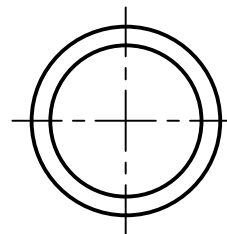
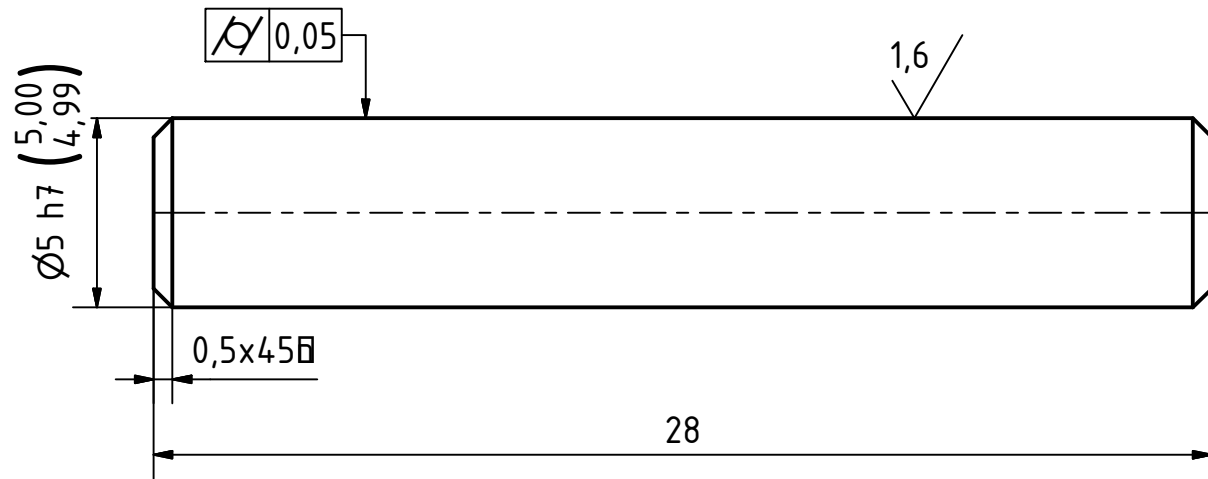
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Filletes and chamfers				Angles ( in ° and ' )					
	Dimensions in mm								Dimensions in mm				Length of the shortest leg					
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30'	±20'



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Design State: Released	Drawing made with autodesk Inventor Revisions only permitted by CAD

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3,2 (✓)



Break Sharp Edges: 0,1 mm

Revision		Date	Description	
Engineered by:			Name:	Date:
			Designer: Galba, J.	17/07/2010
			Approved: Galba, J.	17/07/2010
Project:				Scale: 5:1
Miniature Model Hot Air Engine				SheetSize: A3
				Material: Stainless Steel
				Total Mass: 0.004 kg

Title:	
Horizontal Stirling Engine Piston Pin	

Corresponding symbols	▽	▼	▽▽	▼▼	▽▽▽	▼▼▼		
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )	N11	N10	N9	N8	N7	N6	N5	N4
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )	25	12,5	6,3	3,2	1,6	0,8	0,4	0,2

Allowable deviations for dimensions without tolerance indication (machined surfaces)																			
Accuracyclass (ISO 2768.1)	For measurements ( deviations in mm )								Fillet and chamfers					Angles ( in ° and ' )					
	Dimensions in mm								Dimensions in mm					Length of the shortest leg					
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400	
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'	
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±0,2	±0,5	±1	±2	±4	±1°30'	±1°	±30'	±15'	±10'	
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30'	±20'	
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8											

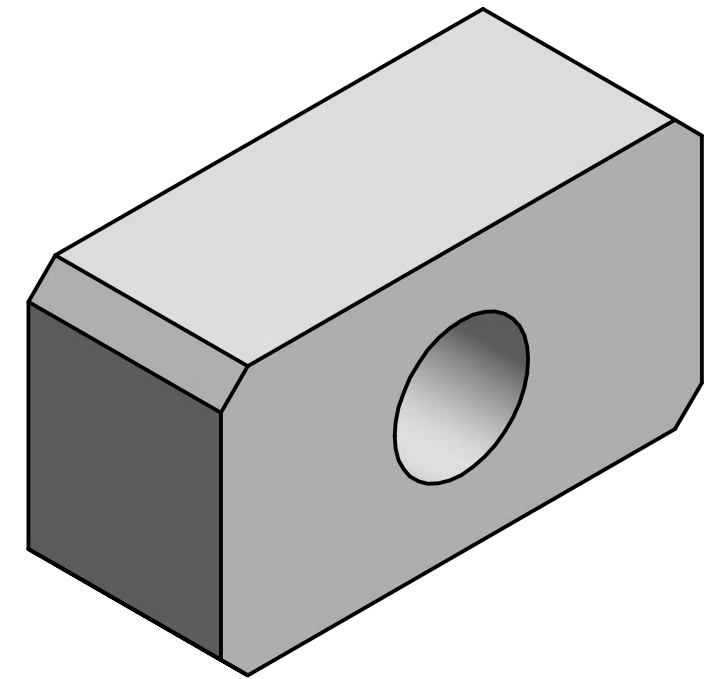
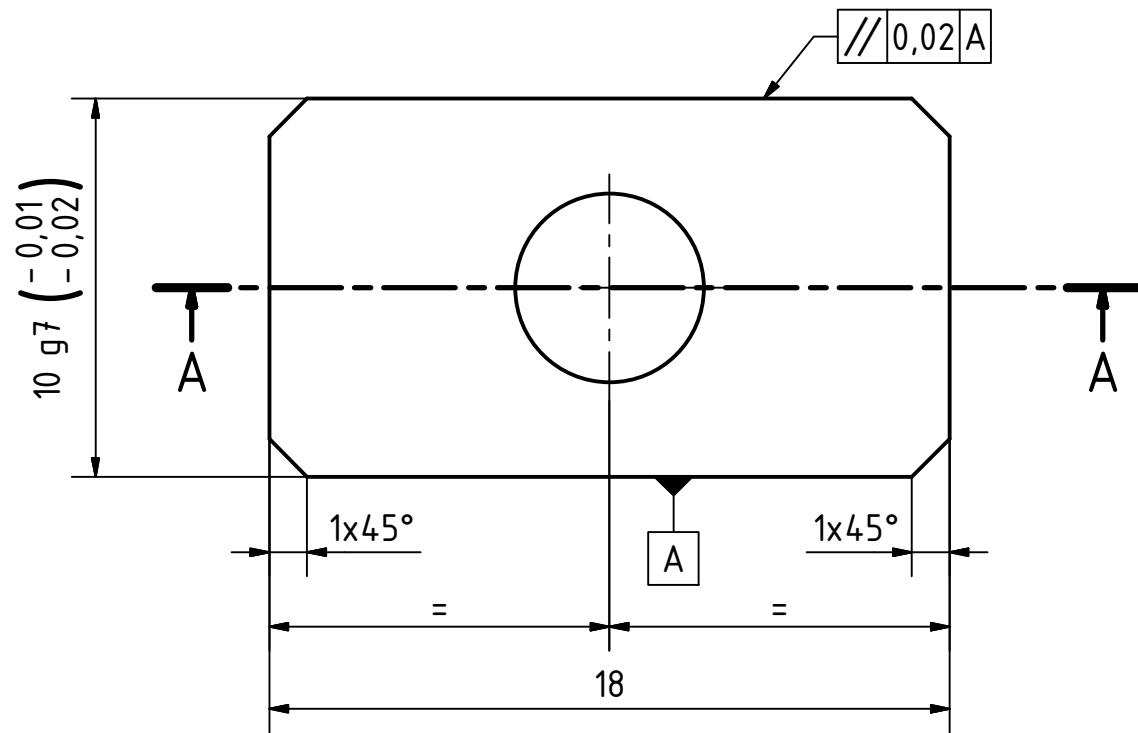
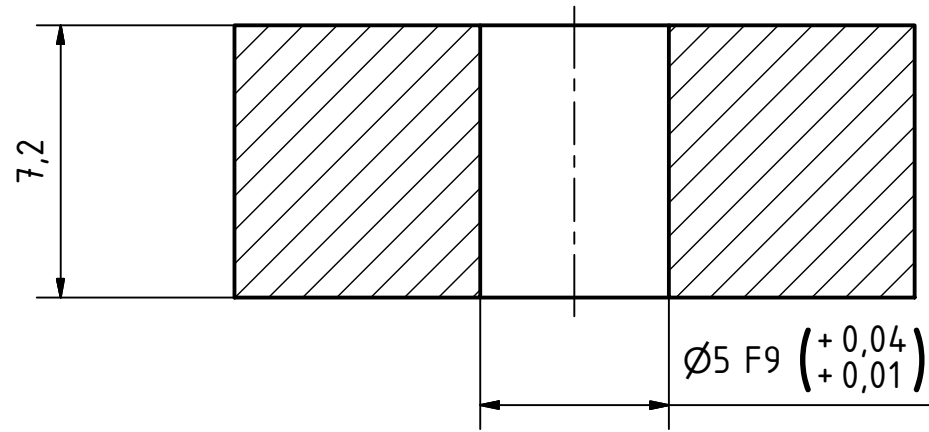
Drawingnumber:	Sheet: <b>0001</b>
Design State: <b>Released</b>	Drawing made with autodesk Inventor Revisions only permitted by CAD

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0,8

A-A ( 5 : 1 )



Break Sharp Edges: 0,1 mm

Revision	Date	Description
Engineered by:		Name: Galba, J.
		Date: 17/07/2010
		Scale: 5:1
		Sheet Size: A3
		Material: PVC-U
		Total Mass: 0.002 kg

Project:		Miniature Model Hot Air Engine	
Title:		Horizontal Stirling Engine Slide	

Corresponding symbols	▽	▼	▽▽	▼▼	▽▽▽	▼▼▼
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )	N11	N10	N9	N8	N7	N6
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )	25	12,5	6,3	3,2	1,6	0,8

Allowable deviations for dimensions without tolerance indication (machined surfaces)								
Accuracy class (ISO 2768.1)	For measurements ( deviations in mm )							
	Dimensions in mm				Fillet and chamfers			
f Fine	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	0,5 to 3	>3 to 6	>6 to 30	>30 to 120
	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2
	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4
	±0,4	±1	±2	±4	±8	±1	±2	±4
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8
	±1°30'	±1°	±30'	±15'	±10'	±5'	±1°30'	±1°

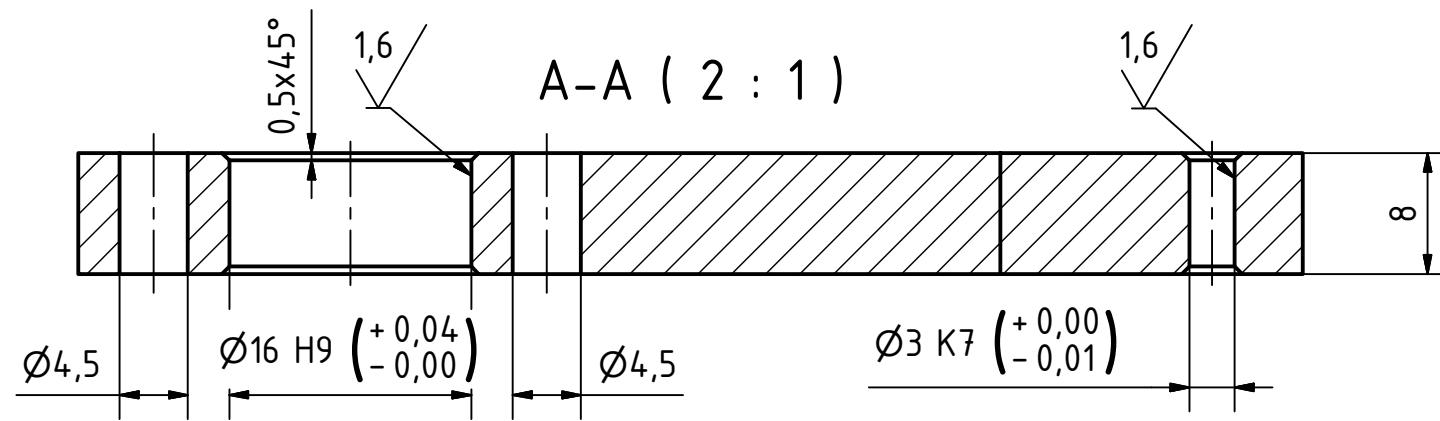
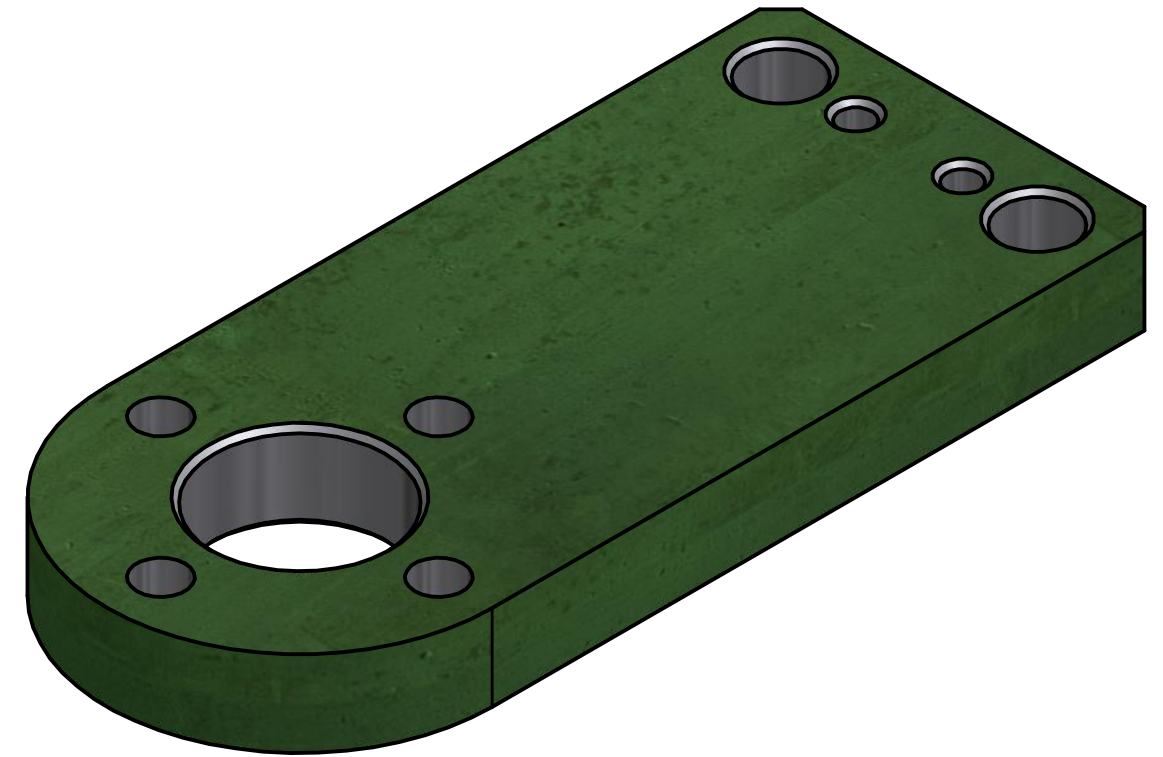
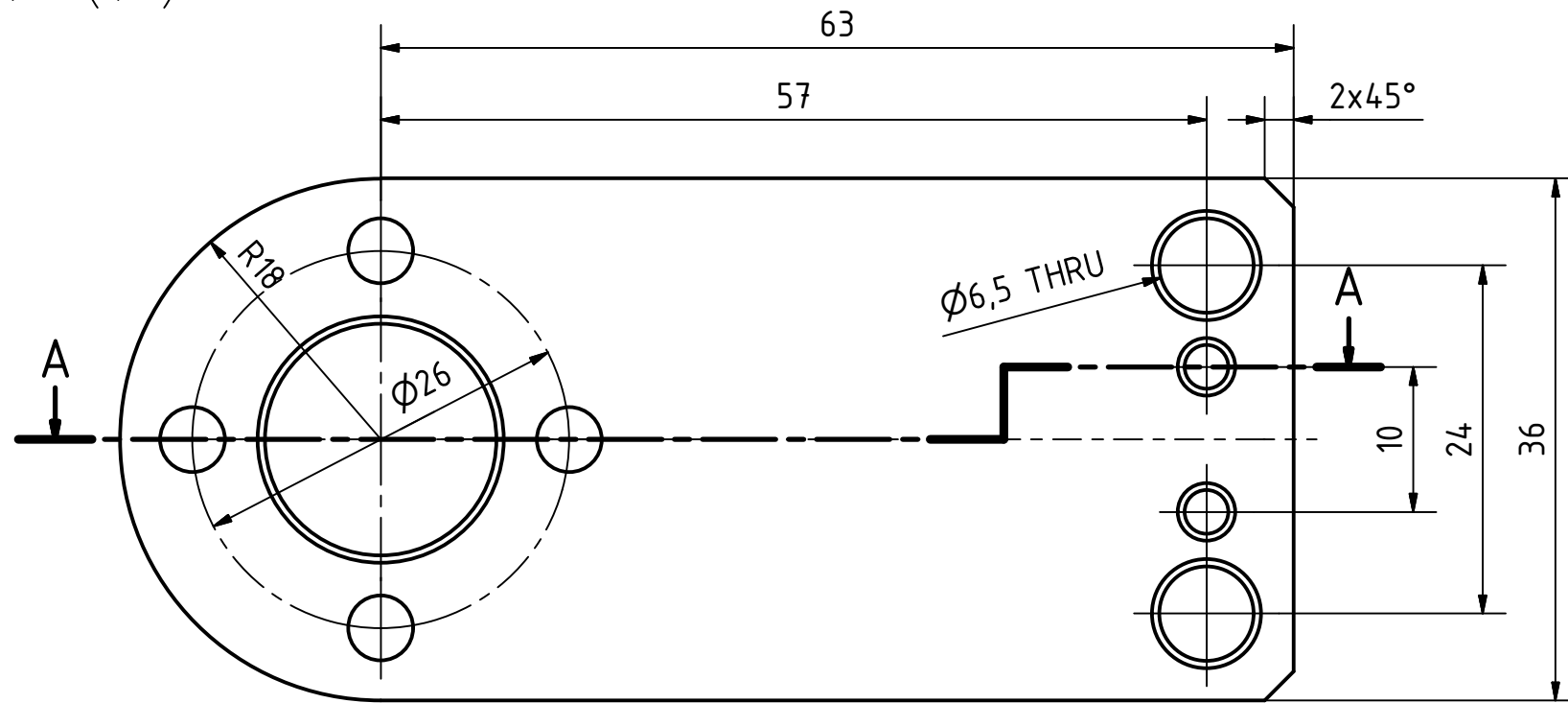
Drawing number:	Sheet: 0001
Design State: Released	Drawing made with Autodesk Inventor Revisions only permitted by CAD

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3,2 (✓)



Break Sharp Edges: 0,1 mm

Revision	Date	Description

Engineered by:	Name:	Date:	Scale: 2:1	
Designer: Galba, J.	Galba, J.	17/07/2010	SheetSize: A3	
Approved: Galba, J.	Galba, J.	17/07/2010		
Project: Miniature Model Hot Air Engine			Material: Steel, Mild	
			Total Mass: 0.152 kg	

Title: Horizontal Stirling Engine Support	
Drawingnumber:	Sheet: 0001
Design State: Released	Drawing made with Autodesk Inventor Revisions only permitted by CAD

Corresponding symbols		▽	▼	▽▽	▼▼	▽▽▽	▼▼▼											
Roughness Classes ( NBN 88-02 ) ( ISO 1302 )		N11	N10	N9	N8	N7	N6	N5	N4									
Roughness Value "Ra" in µm ( NBN 88-02 ) ( ISO 1302 )		25	12,5	6,3	3,2	1,6	0,8	0,4	0,2									
Allowable deviations for dimensions without tolerance indication (machined surfaces)																		
For measurements ( deviations in mm )		Filletts and chamfers				Angles ( in ° and ' )												
Accuracyclass (ISO 2768.1)	Dimensions in mm								Dimensions in mm		Length of the shortest leg							
	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	>400 to 1000	>1000 to 2000	>2000 to 4000	0,5 to 3	>3 to 6	>6 to 30	>30 to 120	>120 to 400	to 10	>10 to 50	>50 to 120	>120 to 400	above 400
f Fine	±0,05	±0,05	±0,1	±0,15	±0,2	±0,3	±0,5	±0,8	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±10'	±5'
m Medium	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±0,2	±0,5	±1	±2	±4	±1°	±30'	±20'	±15'	±10'
c Rough	±0,2	±0,3	±0,5	±0,8	±1,2	±2	±3	±4	±0,4	±1	±2	±4	±8	±1°30'	±1°	±30'	±15'	±10'
v Very Rough	-	±0,5	±1	±1,5	±2,5	±4	±6	±8	±0,4	±1	±2	±4	±8	±3°	±2°	±1°	±30'	±20'

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