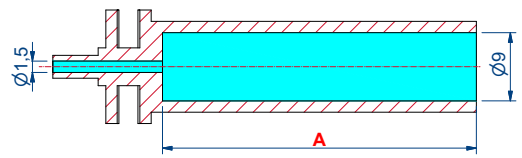
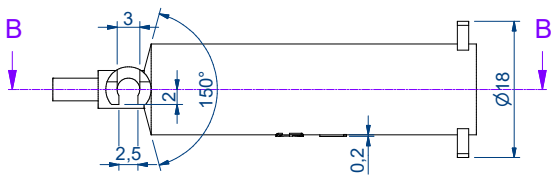
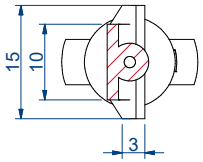
B-B (2 : 1)

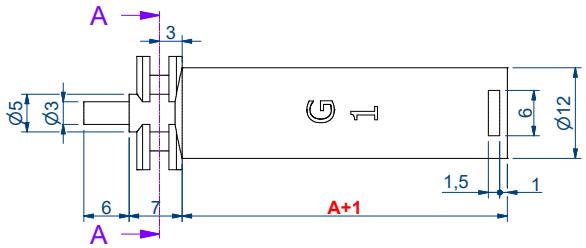




NOTES:
1. The total volume of the blue chamber: 2.666 mL.
2. Calculated result of dimension A shall be accurate to one decimal place.

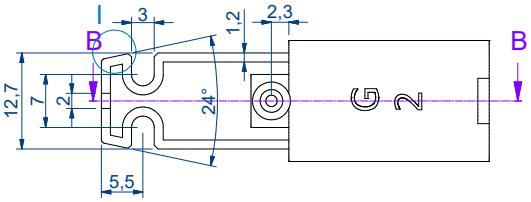
A-A (2 : 1)

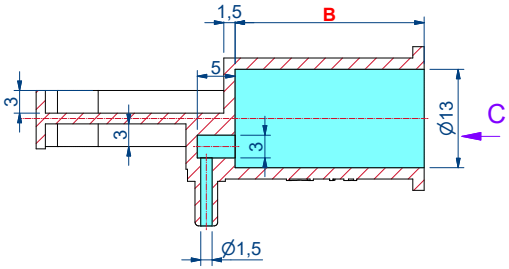


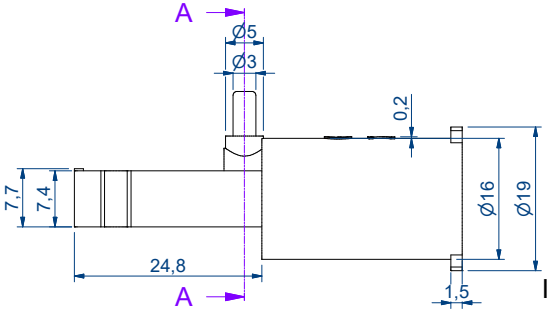


G1	ABS Plastic
PART NUMBER	MATERIAL

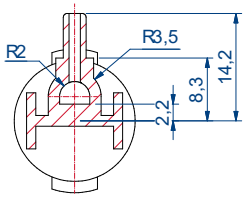
B-B (2: 1)



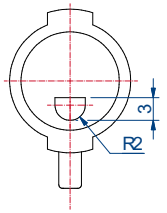




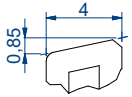
A-A (2: 1)



C (2: 1)



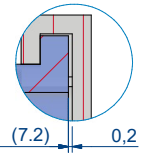
I (5 : 1)



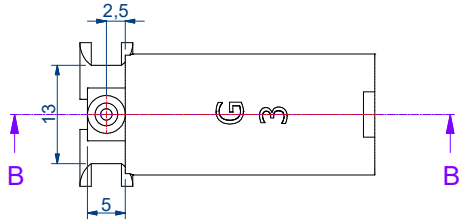
NOTES:
1. The total volume of the blue chamber: 3.386 mL.
2. Calculated result of dimension B shall be accurate to one decimal place.

G2	ABS Plastic
PART NUMBER	MATERIAL

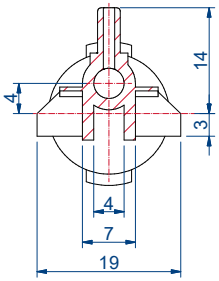
I (5 : 1)



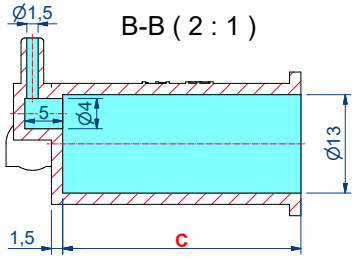
G3 Installation Diagram

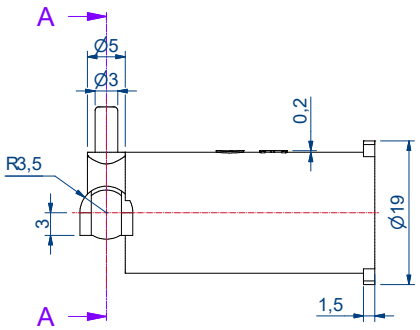


A-A (2 : 1)



B-B (2 : 1)





NOTES:
1. Calculated result of dimension C shall be accurate to one decimal place.

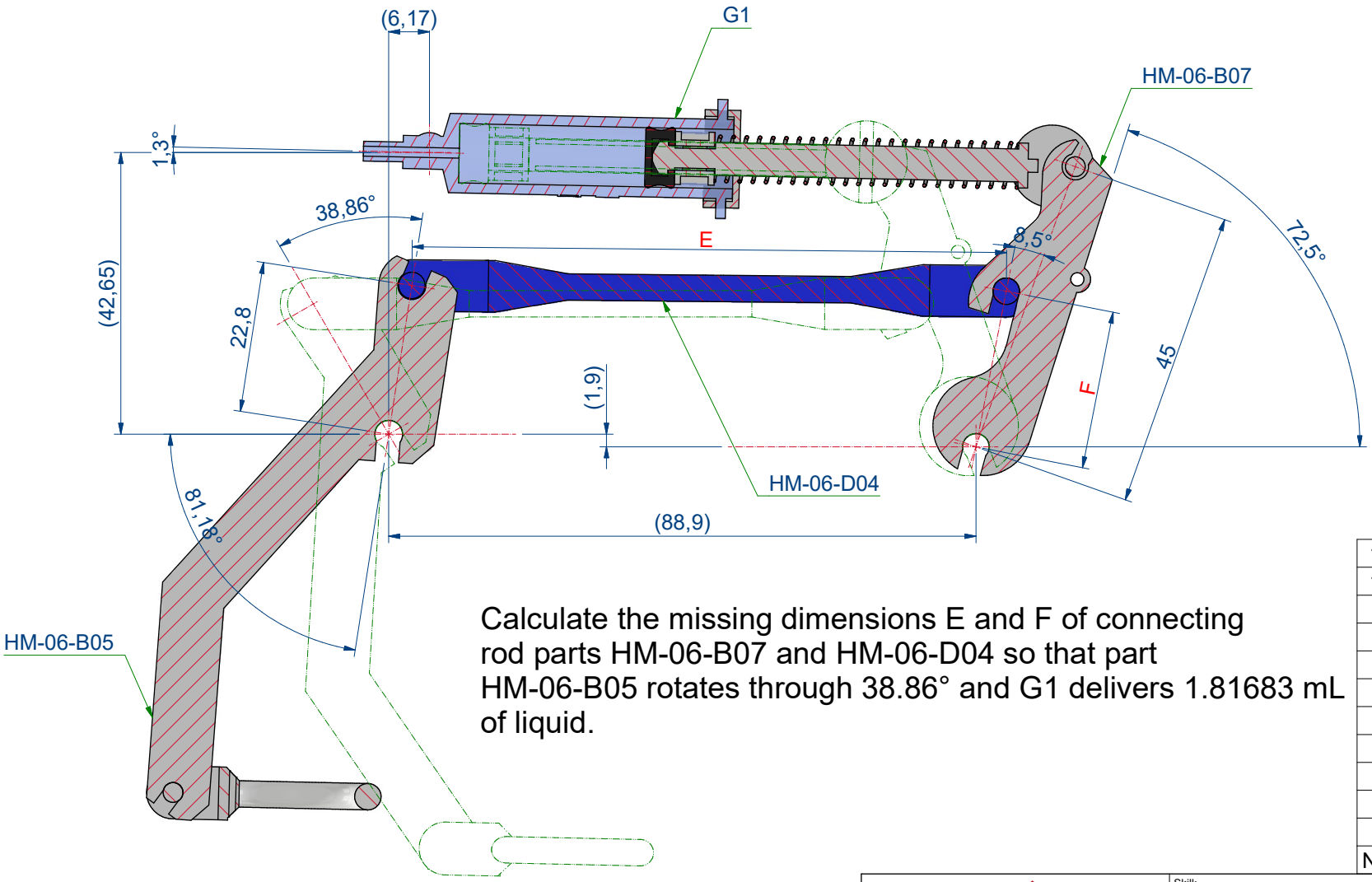
G3	ABS Plastic
PART NUMBER	MATERIAL

worldskills Shanghai2026

Test Project for the 48th WorldSkills Competition in Shanghai, China 2026

Copyright 2026 © WorldSkills International All Rights Reserved

Skill: #05 - Mechanical Engineering CAD				
Design by:				
Last Update: 23/04/2026	Scale: 2 : 1	Paper: A2	Page: 1/10	
Drawing Number: WSC2026_TP05_M2				Rev:
Description: G				Projection:



Calculate the missing dimensions E and F of connecting rod parts HM-06-B07 and HM-06-D04 so that part HM-06-B05 rotates through 38.86° and G1 delivers 1.81683 mL of liquid.

NO.	QTY.	PART NUMBER
11	1	HM-06-D17
10	1	HM-06-B05
9	1	HM-06-D04
8	1	HM-06-P06
7	1	HM-06-F12
6	1	HM-06-F11
5	1	HM-06-P03
4	1	HM-06-F03
3	1	HM-06-F01
2	1	HM-06-B07
1	1	G1

worldskills Shanghai2026

Test Project for the 48th WorldSkills Competition in Shanghai, China 2026

Copyright 2026 © WorldSkills International
All Rights Reserved

Skill: #05 – Mechanical Engineering CAD

Design by:

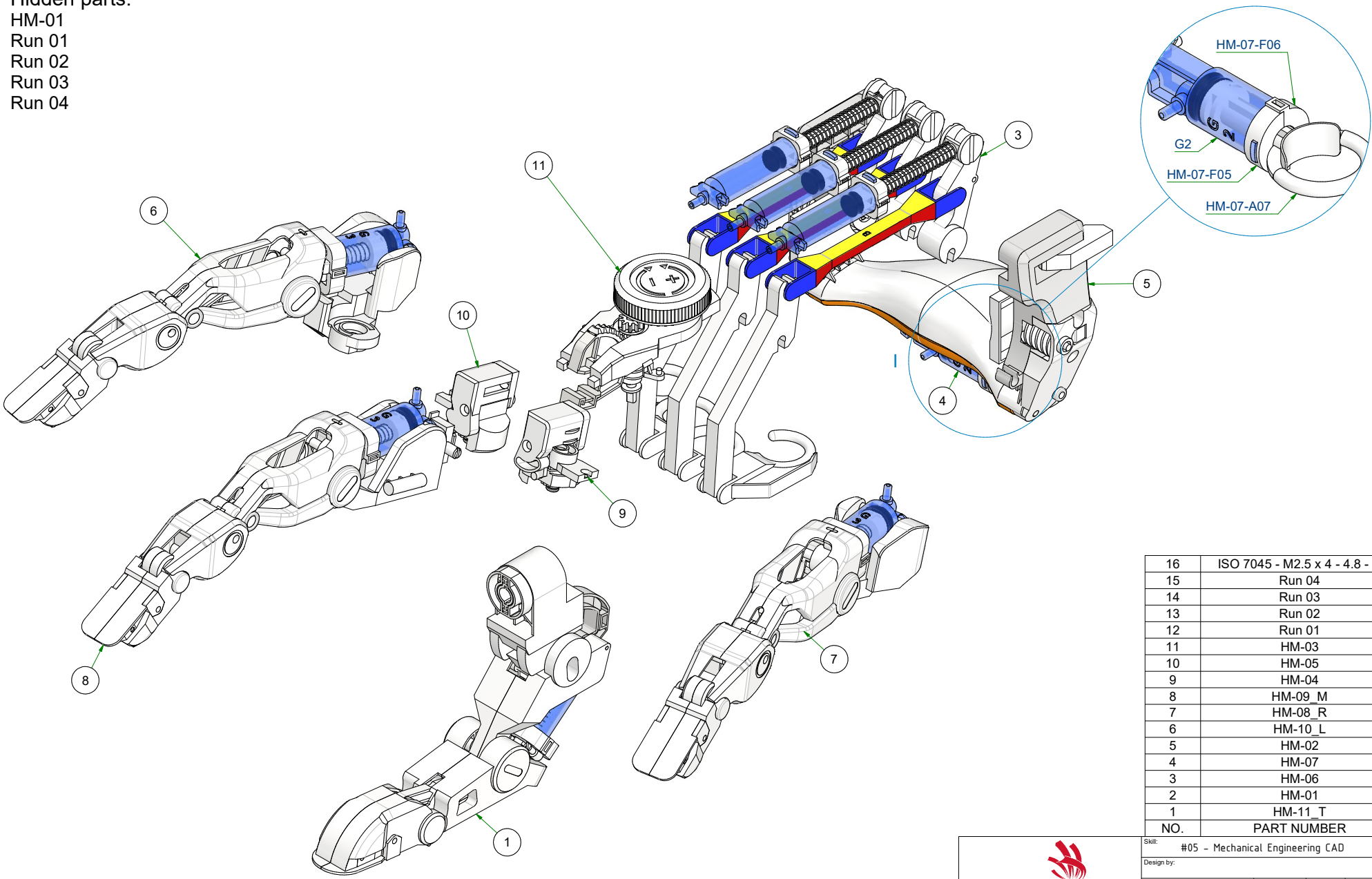
Last Update: 23/04/2026 | Scale: 2 : 1 | Paper: A3 | Page: 2/10

Drawing Number: WSC2026_TP05_M2 | Rev:

Description: HM-06 | Projection:

Hidden parts:
HM-01
Run 01
Run 02
Run 03
Run 04

I (3 : 2)



NO.	PART NUMBER	QTY.
16	ISO 7045 - M2.5 x 4 - 4.8 - H	3
15	Run 04	1
14	Run 03	1
13	Run 02	1
12	Run 01	1
11	HM-03	1
10	HM-05	1
9	HM-04	1
8	HM-09_M	1
7	HM-08_R	1
6	HM-10_L	1
5	HM-02	1
4	HM-07	1
3	HM-06	3
2	HM-01	1
1	HM-11_T	1

worldskills Shanghai2026

Test Project for the 48th WorldSkills Competition in Shanghai, China 2026

Copyright 2026 © WorldSkills International
All Rights Reserved

Skill: #05 - Mechanical Engineering CAD
Design by:
Last Update: 23/04/2026 | Scale: 1 : 1 | Paper: A2 | Page: 3/10
Drawing Number: WSC2026_TP05_M2 | Rev:
Description: HM-00 | Projection:

HM-03-D16

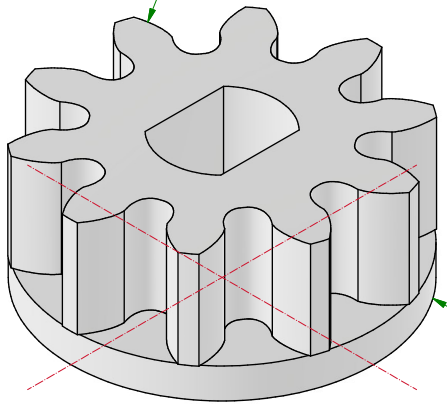
Rotate HM-03-D16 to drive the upper three-finger assembly through the worm and worm gear transmission, causing it to synchronously rotate and move vertically for position adjustment.

HM-03-B02
Use the Export Tooth Shape tool to create the spur gear tooth feature.
No. of Teeth: 30
Export tolerance: 0.00765 mm

HM-03-B01

HM-03-A08

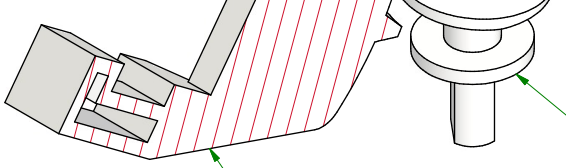
HM-03-F04
No. of Teeth: 10



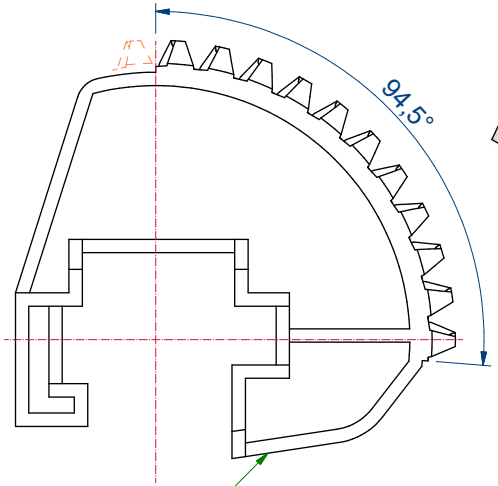
Use the Export Tooth Shape tool to create the spur gear tooth feature.
Export tolerance: 0.00765 mm

HM-03-F04

HM-03-B04
No. of starts: 1



HM-03-D15
Transmission ratio: 1:42
Center distance: 25



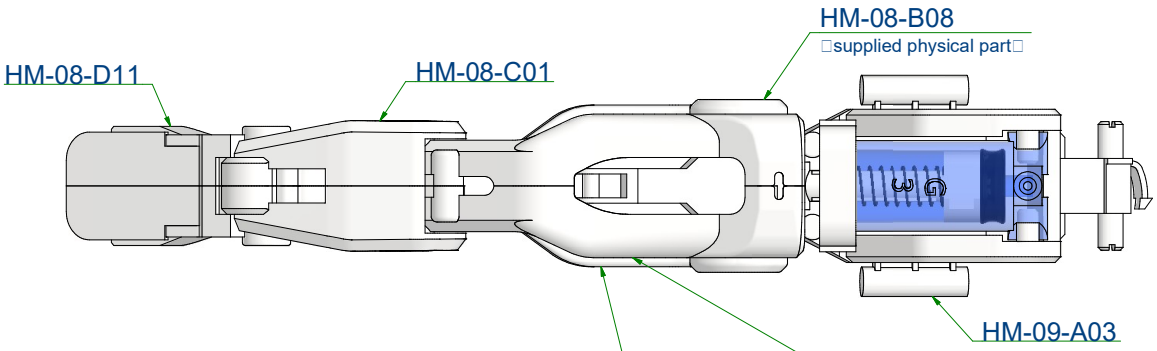
HM-03-D15

worldskills Shanghai2026

Test Project for the 48th WorldSkills Competition in Shanghai, China 2026

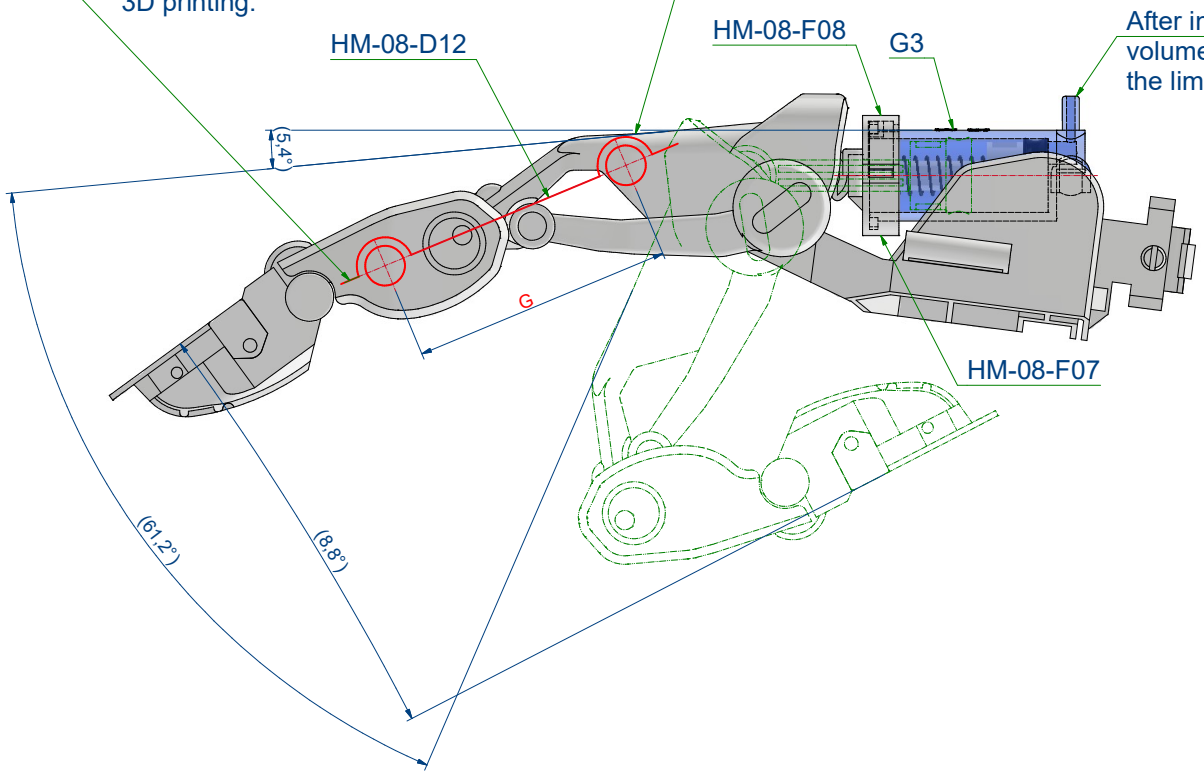
Copyright 2026 © WorldSkills International
All Rights Reserved

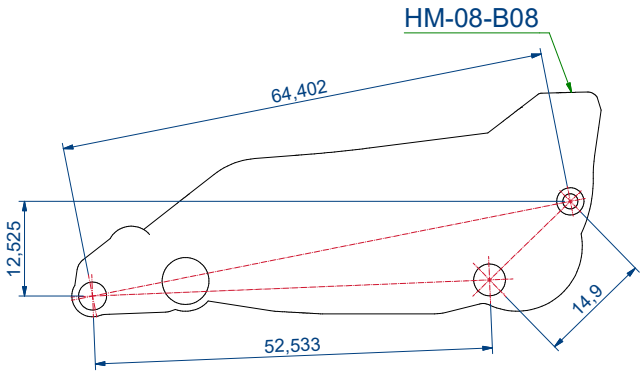
Skill: #05 – Mechanical Engineering CAD				
Design by:				
Last Update: 23/04/2026	Scale: 3 : 1	Paper: A3	Page: 4/10	
Drawing Number: WSC2026_TP05_M2				Rev:
Description: HM-03				Projection:



Reverse Engineering and 3D Printing:
1. Reverse engineer the physical model and create the 3D model. Save it as HM-08-B08.
2. Design the mating part and save it as HM-08-B09.
3. Generate the 3D printing file for HM-08-B09.

Design requirement:
1. Design the connecting rod part "HM-08-D12" and manufacture it by 3D printing.





worldskills Shanghai2026

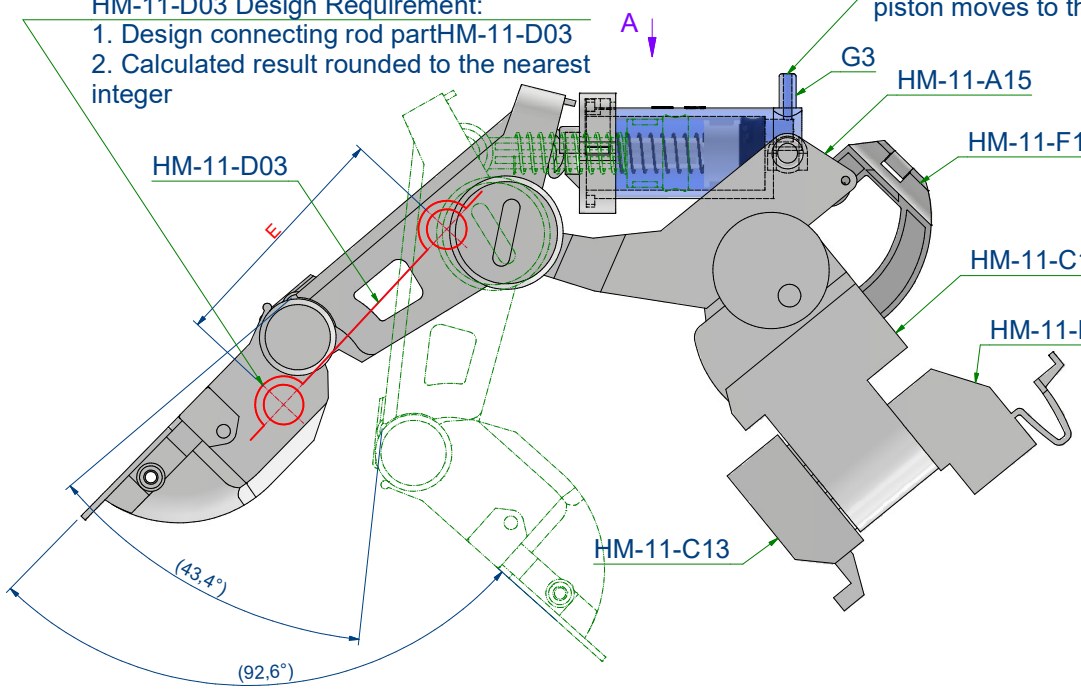
Test Project for the 48th WorldSkills Competition in Shanghai, China 2026

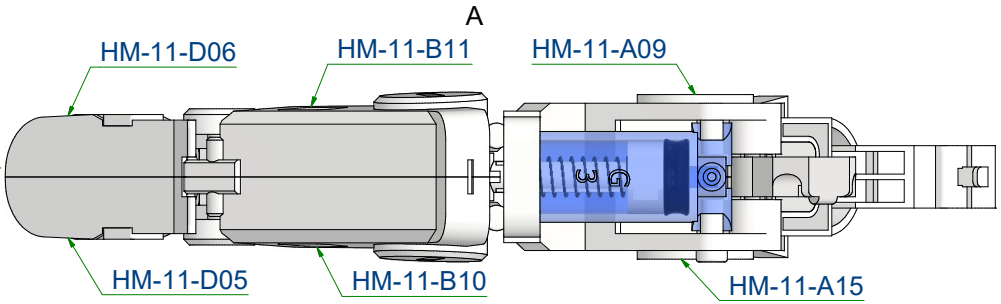
Copyright 2026 © WorldSkills International
All Rights Reserved

Skill:	#05 - Mechanical Engineering CAD
Design by:	
Last Update:	23/04/2026
Scale:	1.5 : 1
Paper:	A2
Page:	5/10
Drawing Number:	WSC2026_TP05_M2
Rev:	
Description:	HM-09_M
Projection:	

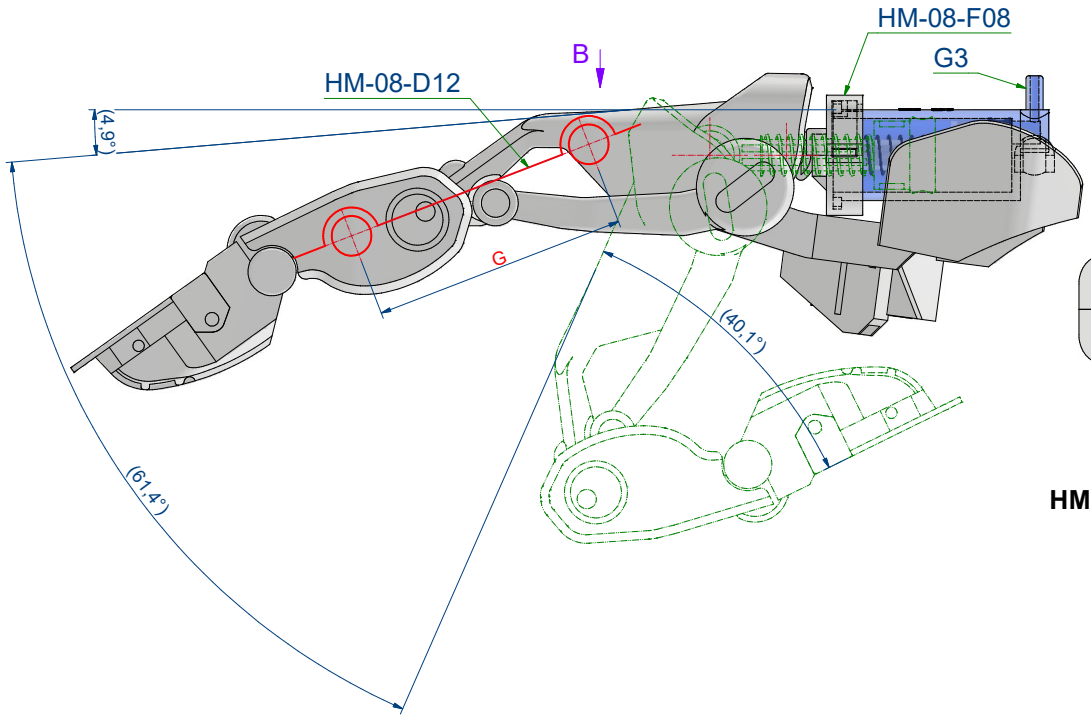
HM-11-D03 Design Requirement:
1. Design connecting rod partHM-11-D03
2. Calculated result rounded to the nearest integer

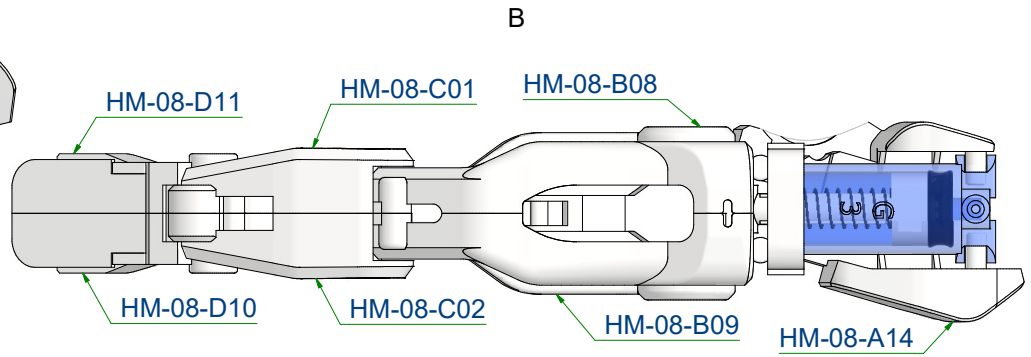
After injecting a volume of liquid equal to the G3 output volume, the piston moves to the limit position shown in the figure.





HM-11_T.iam





HM-08_R.iam

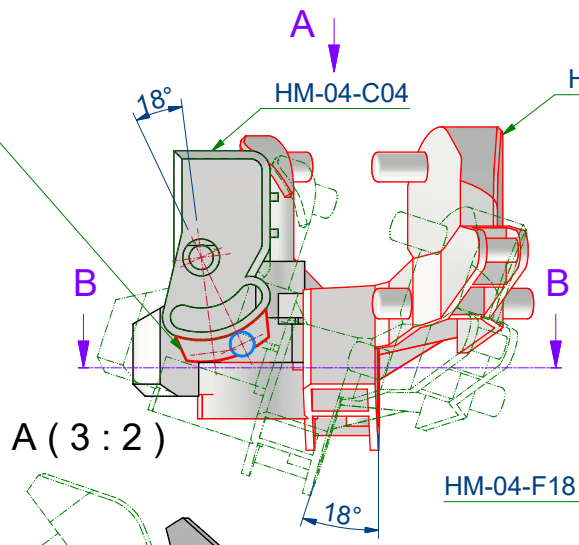
worldskills Shanghai2026

Test Project for the 48th WorldSkills Competition in Shanghai, China 2026

Copyright 2026 © WorldSkills International
All Rights Reserved

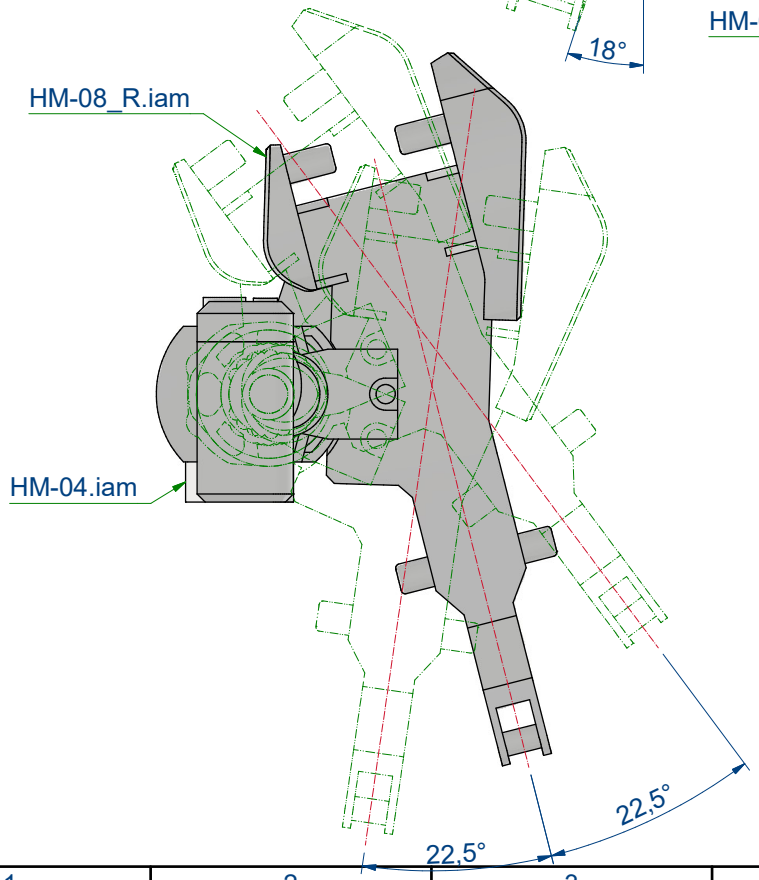
Skill: #05 – Mechanical Engineering CAD				
Design by:				
Last Update: 23/04/2026	Scale: 1.5 : 1	Paper: A2	Page: 6/10	
Drawing Number: WSC2026_TP05_M2				Rev:
Description: HM-11_T & HM-08_R				Projection:

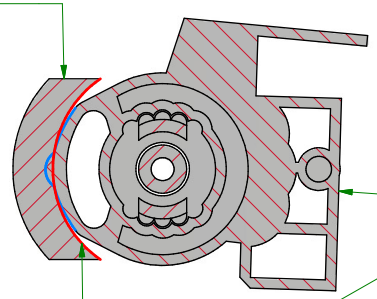
Design the missing limit features on part HM-04-C04, so that part HM-04-F18 has a travel range of 18° and remains relatively fixed at both end limit positions with reduced risk of unintended movement.

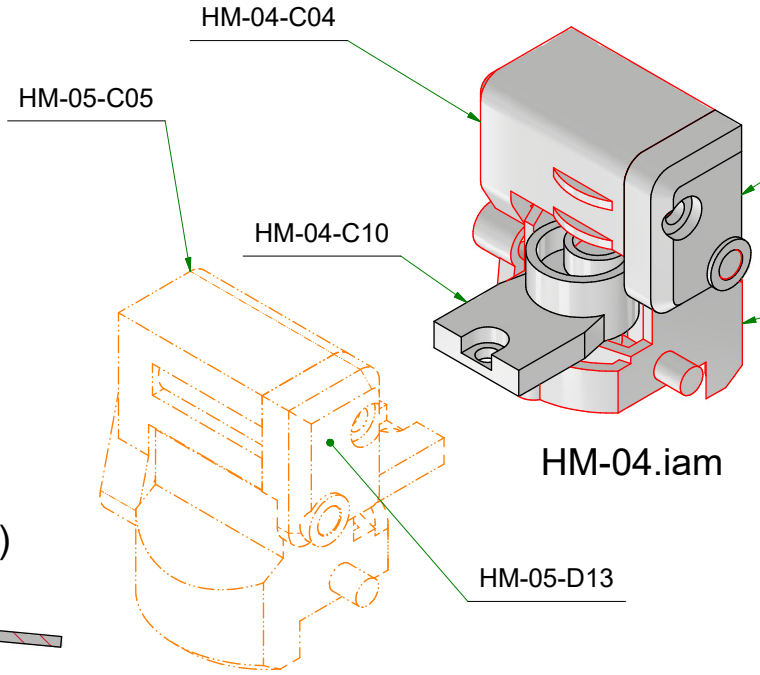


A (3 : 2)

B-B (2 : 1)







HM-04.iam

HM-05.iam

Design the missing limit features on part HM-04-F18 so that part HM-08-A14 has a travel range of 45° and three relatively fixed positions with reduced risk of unintended movement. The angular difference between two adjacent positions shall be 22.5°.

NO.	QTY.	PART NUMBER
4	1	HM-04-C10
3	1	HM-04-F18
2	1	HM-04-D14
1	1	HM-04-C04

worldskills Shanghai2026

Test Project for the 48th WorldSkills Competition in Shanghai, China 2026

Copyright 2026 © WorldSkills International
All Rights Reserved

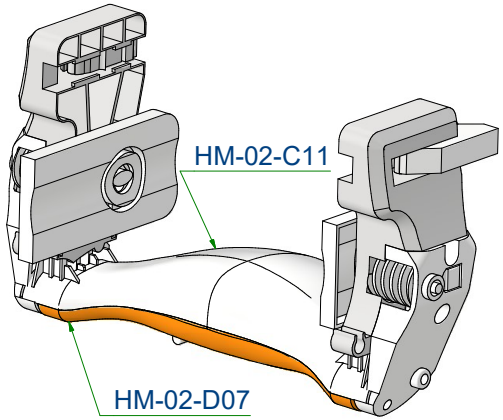
Skill: #05 – Mechanical Engineering CAD

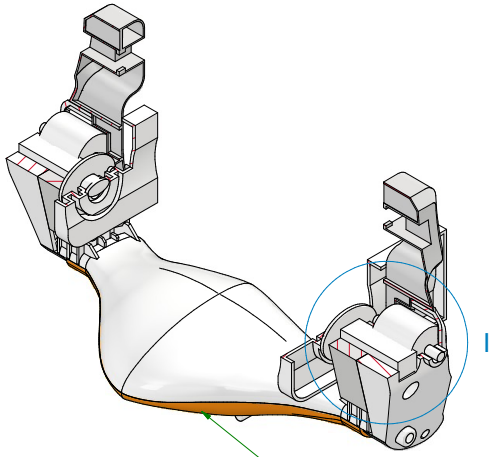
Design by:

Last Update: 23/04/2026 | Scale: 2 : 1 | Paper: A3 | Page: 7/10

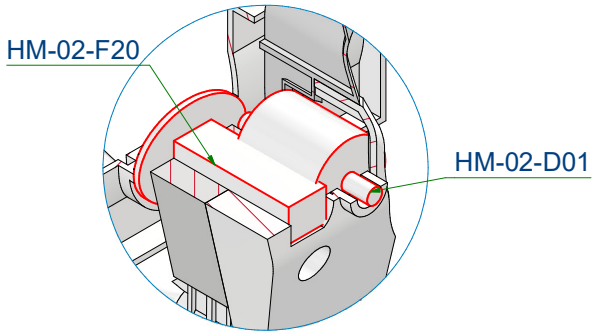
Drawing Number: WSC2026_TP05_M2 | Rev:

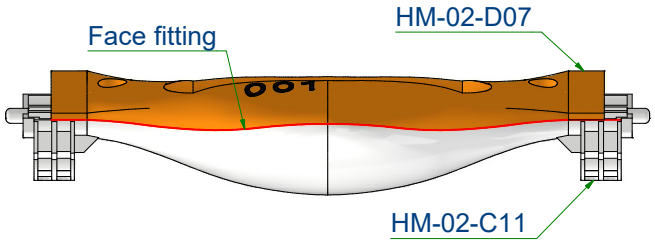
Description: HM-04 & HM-05 | Projection:





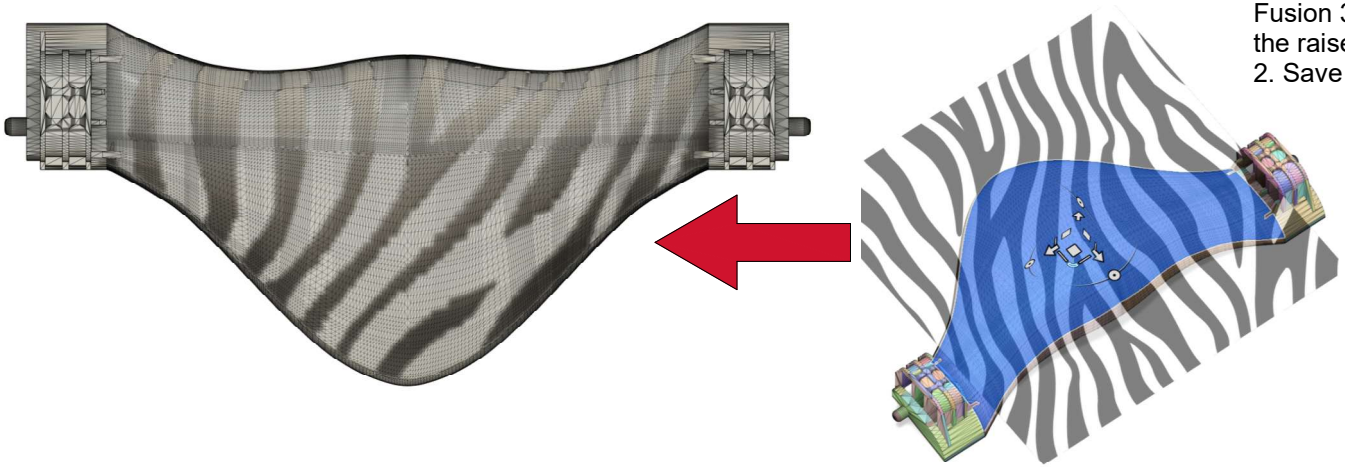
I (2 : 1)





Reverse Engineering and 3D Printing:

1. Scan the physical model and complete the reverse engineering modeling. Save the model as HM-02-C11.
2. Design the mating part and save it as HM-02-D07.
3. The edge contours of parts HM-02-D07 and HM-02-C11 shall fit together accurately without uneven gaps.
4. Generate the 3D printing file for HM-02-D07 and verify the assembly of the parts.



Add texture features to part HM-02-C11 as follows:

1. Based on the provided image file, use the Extrude Texture tool in Fusion 360 to add bump features to part HM-02-C11-TE. The height of the raised features shall be greater than 0.1 mm.
2. Save the part as HM-02-C11-TE.

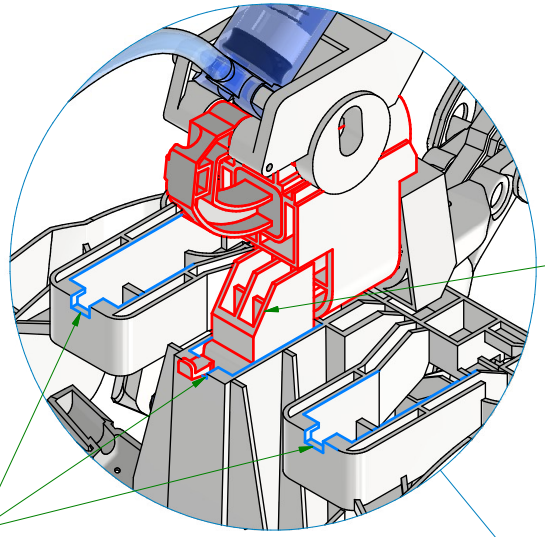
worldskills Shanghai2026

Test Project for the 48th WorldSkills Competition in Shanghai, China 2026

Copyright 2026 © WorldSkills International
All Rights Reserved

Skill: #05 - Mechanical Engineering CAD				
Design by:				
Last Update: 23/04/2026	Scale: 1 : 1	Paper: A2	Page: 8/10	
Drawing Number: WSC2026_TP05_M2				Rev:
Description: HM-02				Projection:

I (1 : 1)



HM-11_T

ASTM A 269 3/16 - Type L(Blue)

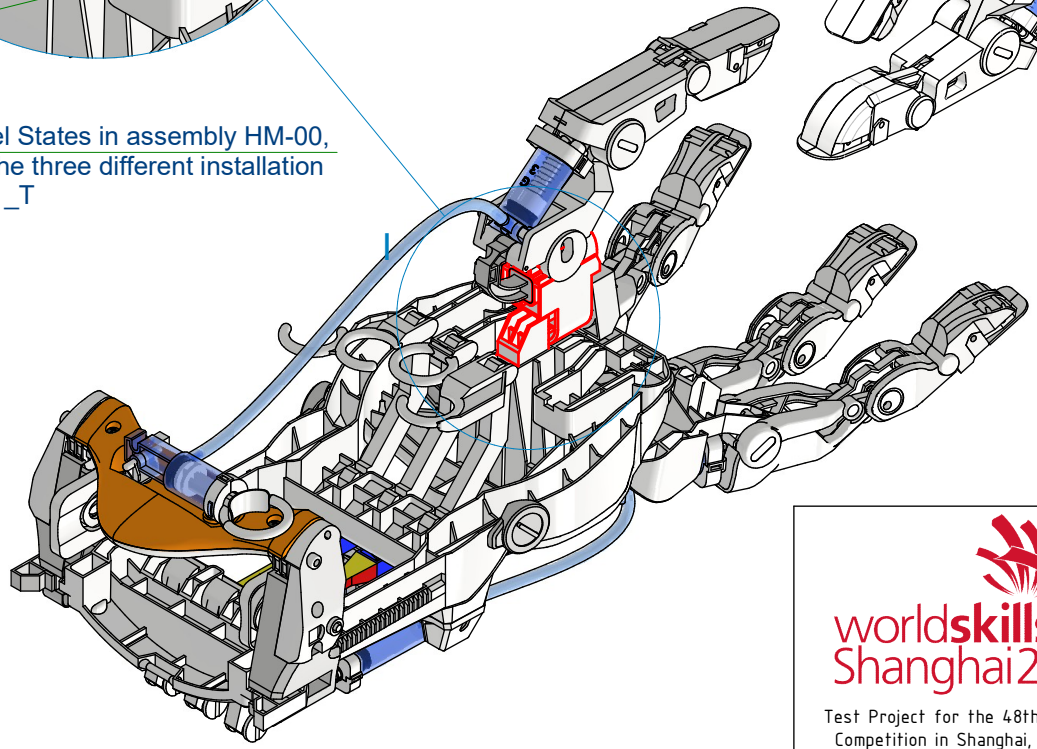
ASTM A 269 3/16 - Type L(Blue)

ASTM A 269 3/16 - Type L(Blue)

ASTM A 269 3/16 - Type L(Blue)

Create three Model States in assembly HM-00, corresponding to the three different installation positions of HM-11_T

I



worldskills Shanghai2026

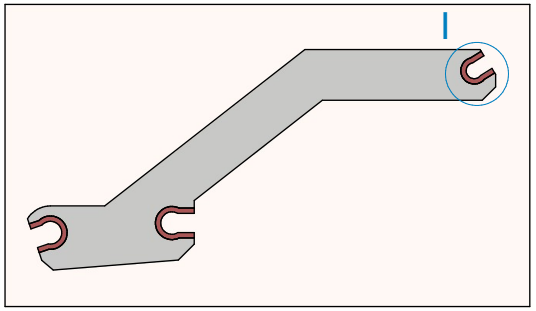
Test Project for the 48th WorldSkills Competition in Shanghai, China 2026

Copyright 2026 © WorldSkills International
All Rights Reserved

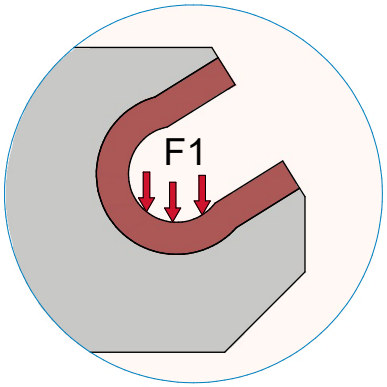
Skill: #05 – Mechanical Engineering CAD				
Design by:				
Last Update: 23/04/2026	Scale: 1 : 2	Paper: A3	Page: 9/10	
Drawing Number: WSC2026_TP05_M2				Rev:
Description: HM-00				Projection:

Generative Design Requirements:

1. Material: ABS.
2. Safety factor: 1.5.
3. Use the XY plane as the symmetry condition.
4. Generate one optimized design result.
5. Overall shape and size remain approximately consistent with the original design.
6. The generated design shall not interfere with other components during operation.
7. Volume of the design result controlled within 1200–1400 mm^3

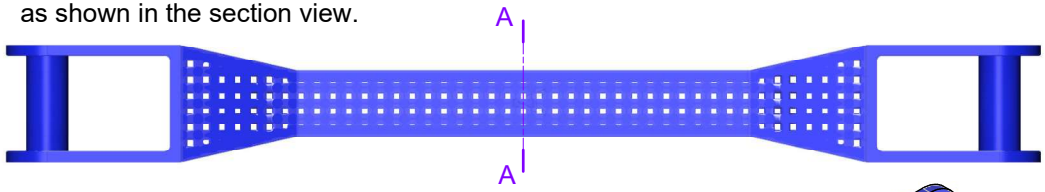


I (6 : 1)

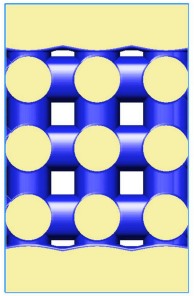


Lattice Design Requirements:

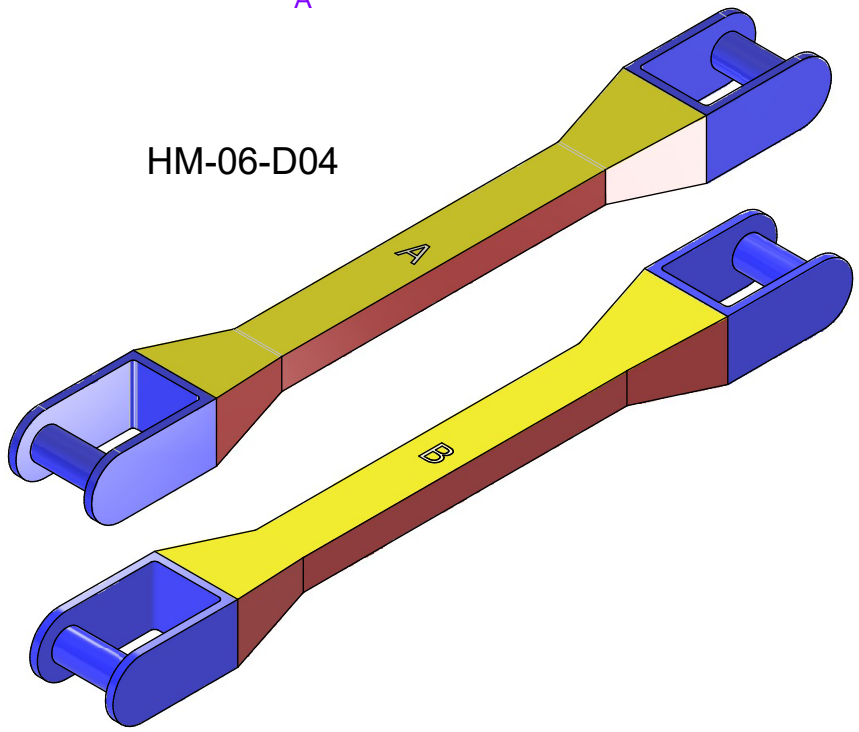
1. Cell Shape: Cross
2. Size: 1.5mm
3. Blue part remains solid and not lattice-processed
4. Red surfaces keep a 1 mm thick solid layer
5. Apply lattice structures to all other regions. Lattice features on surfaces A and B shall be approximately identical, and the crosssection as shown in the section view.



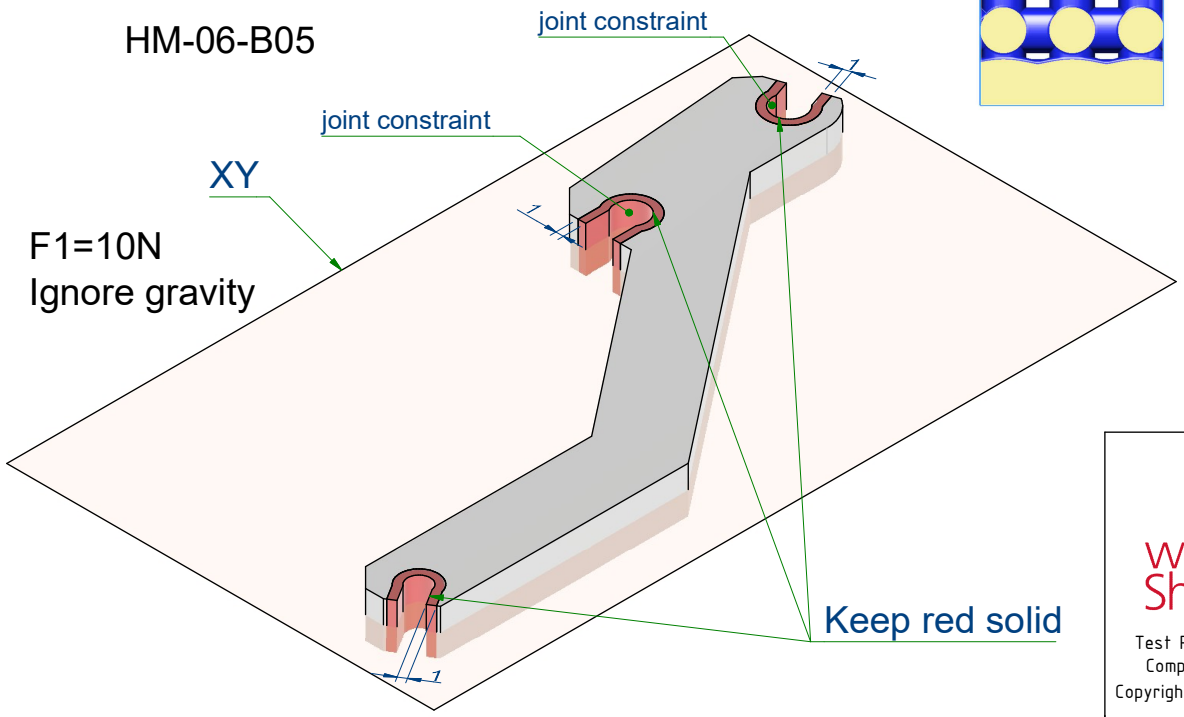
A-A



HM-06-D04



HM-06-B05



worldskills Shanghai2026

Test Project for the 48th WorldSkills Competition in Shanghai, China 2026

Copyright 2026 © WorldSkills International
All Rights Reserved

Skill: #05 – Mechanical Engineering CAD				
Design by:				
Last Update: 23/04/2026	Scale: 2 : 1	Paper: A3	Page: 10/10	
Drawing Number: WSC2026_TP05_M2				Rev:
Description: HM-06-D04 & HM-06-B05				Projection: