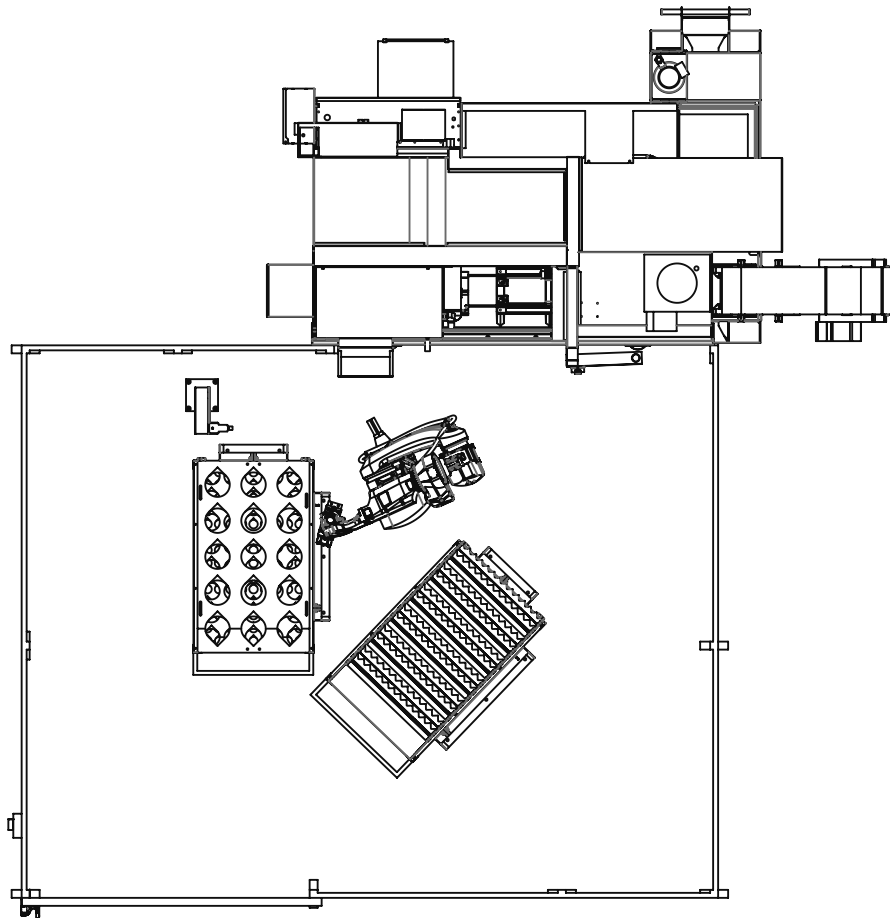
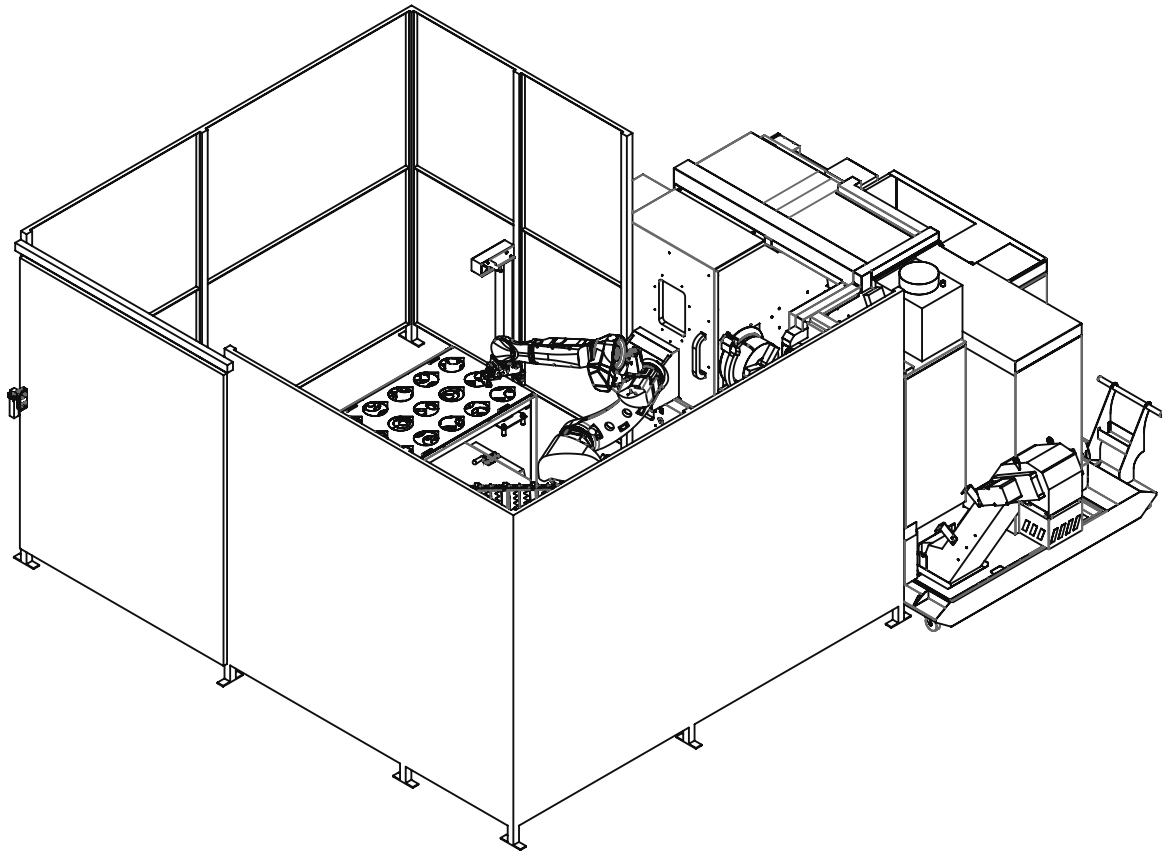
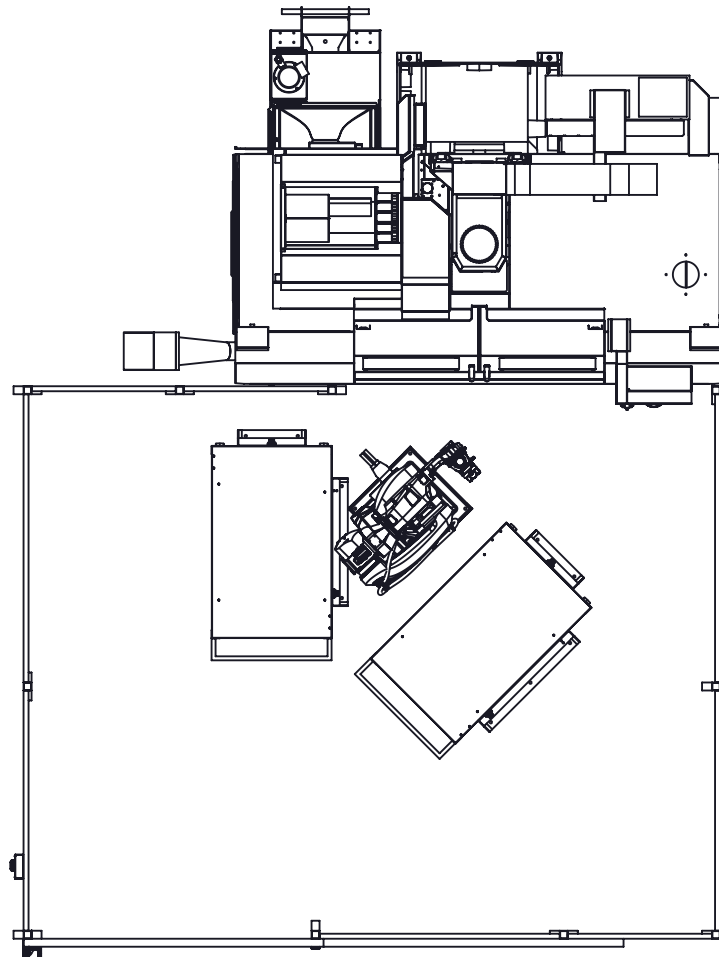
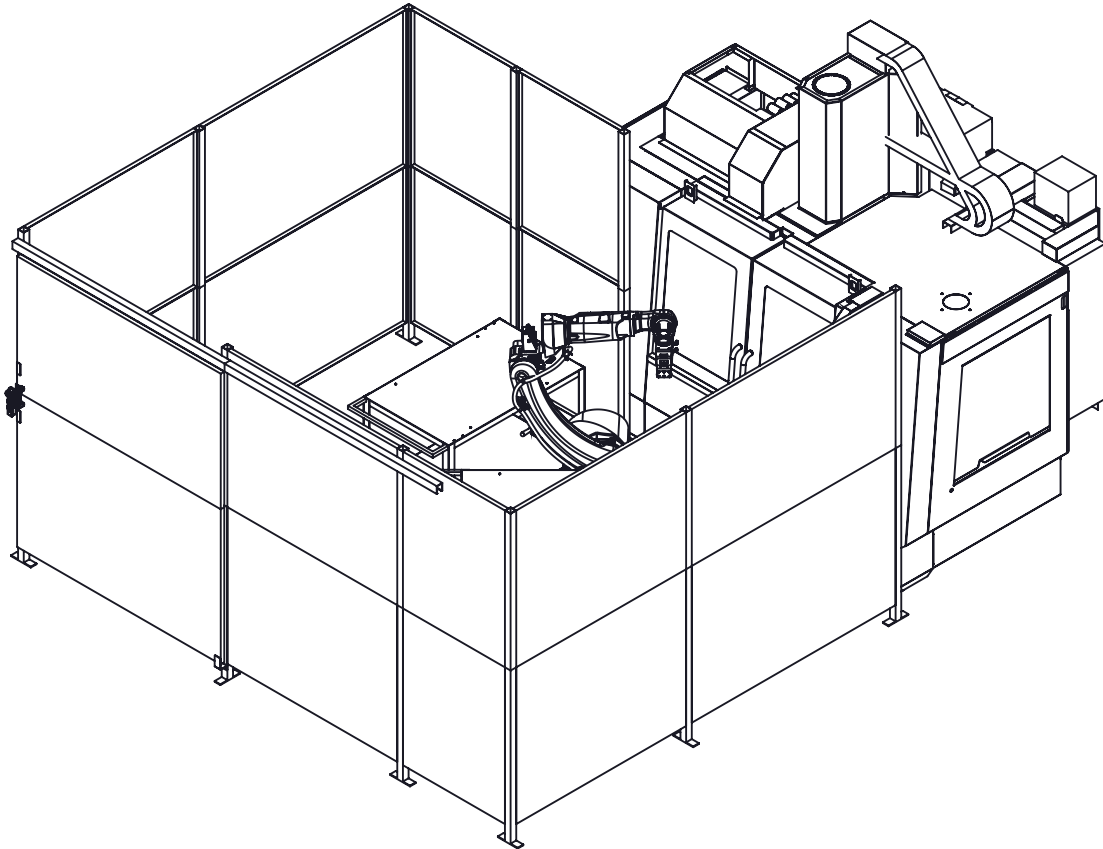


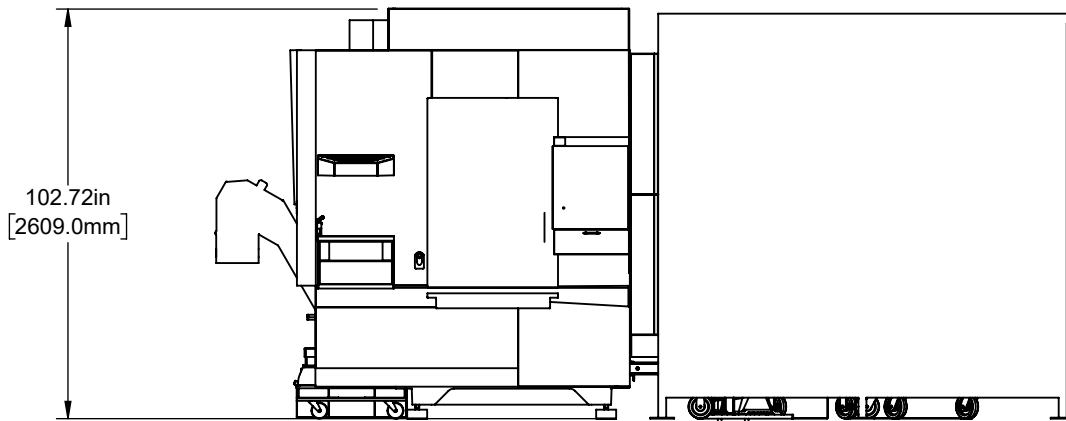
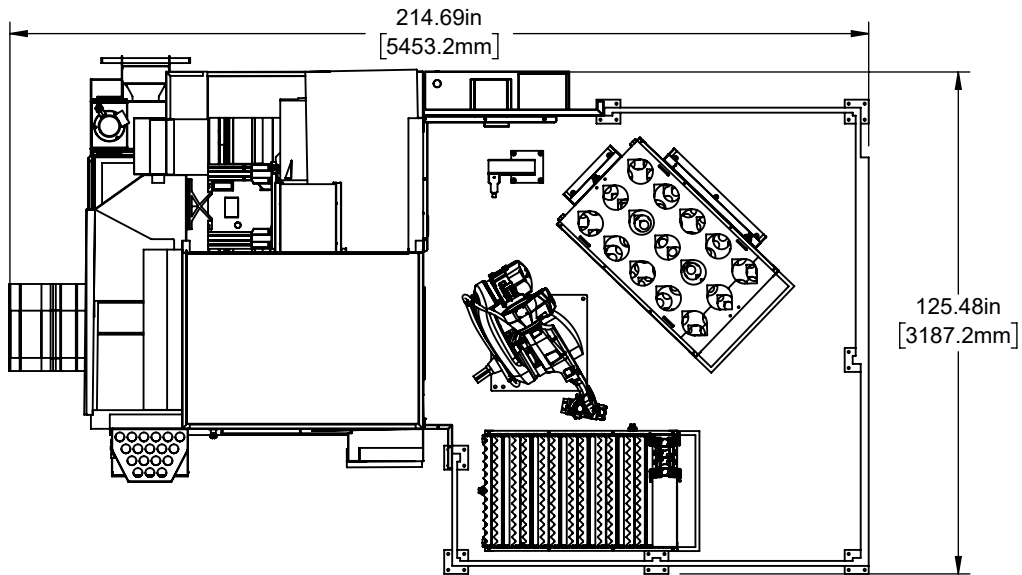
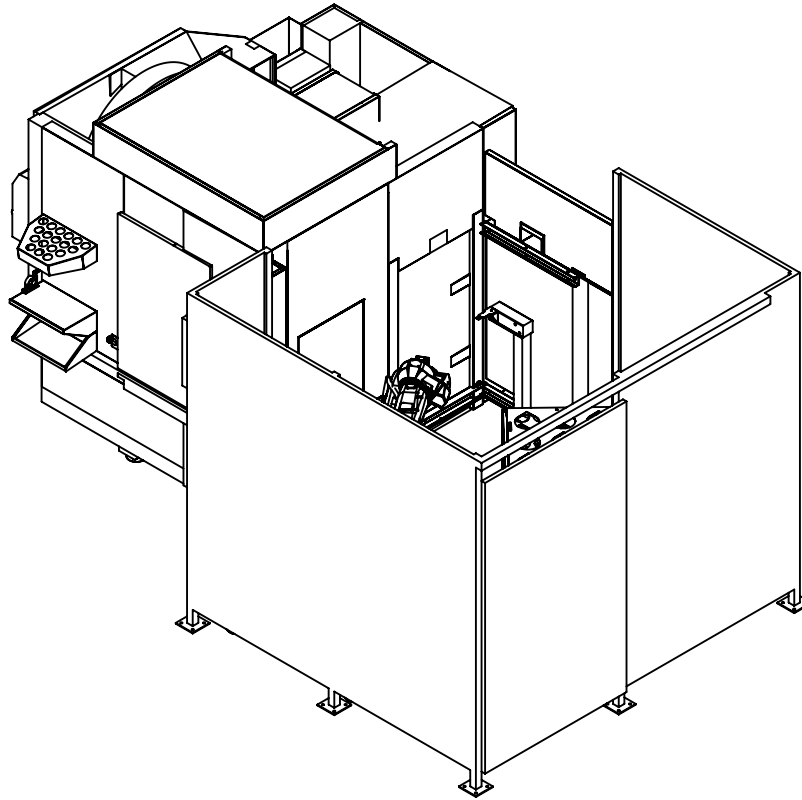
Robot model is FANUC M-20iD/25

Maximum Payload: 55lbs [25kg]

Maximum Reach: 72in [1831mm]





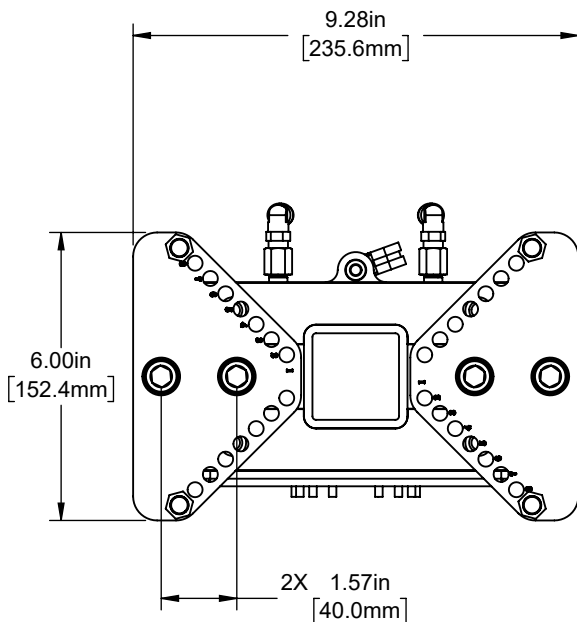
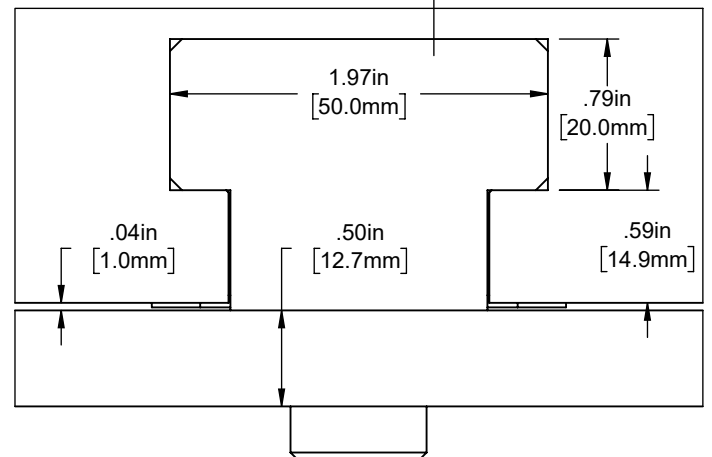
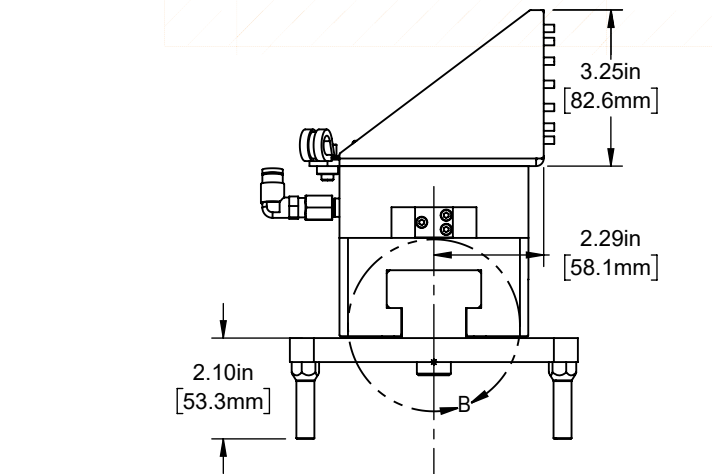
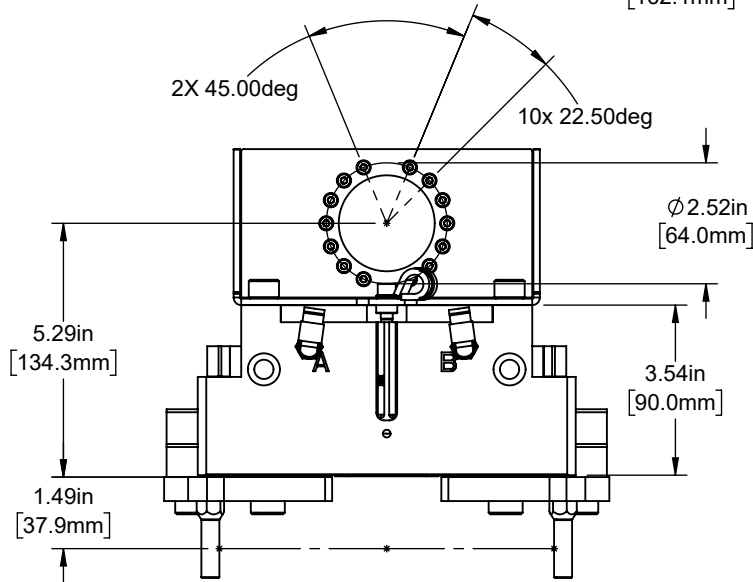
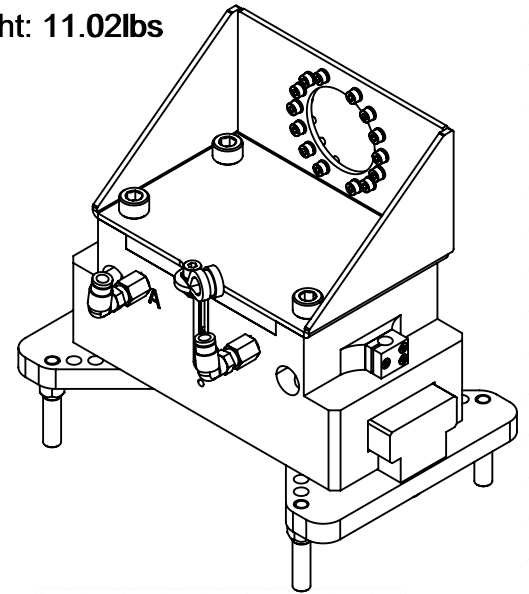
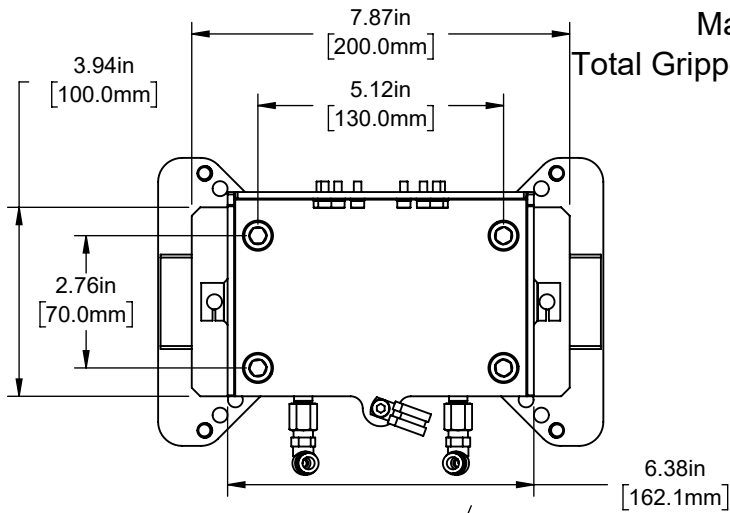


Stroke per jaw: 25 mm

Min Part Size: 1.25in

Max Part Size: 8.125in

Total Gripper Assembly Weight: 11.02lbs



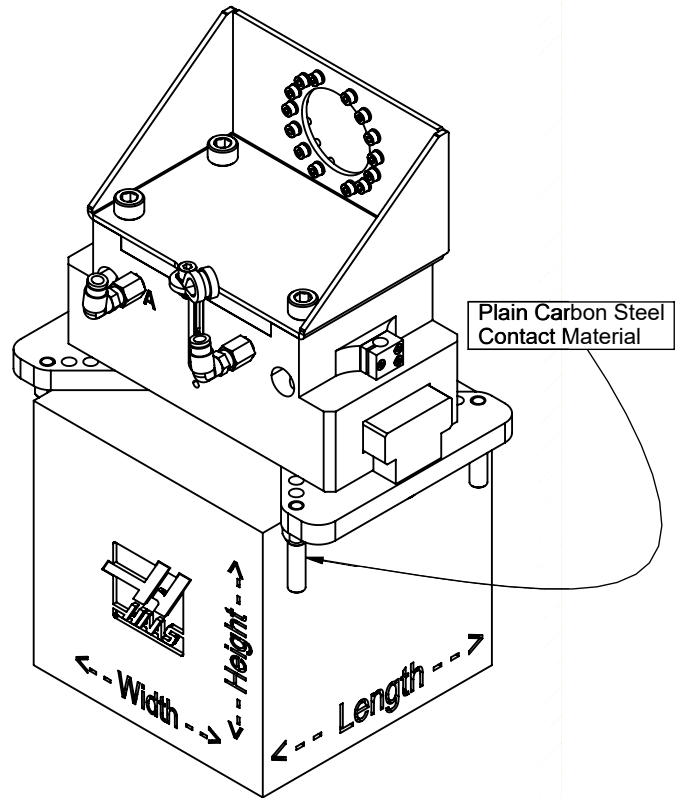
**DETAIL B**  
**SCALE 1 : 1**

Note:  
Hardware and all necessary equipment for standard gripper is included with base robot package.

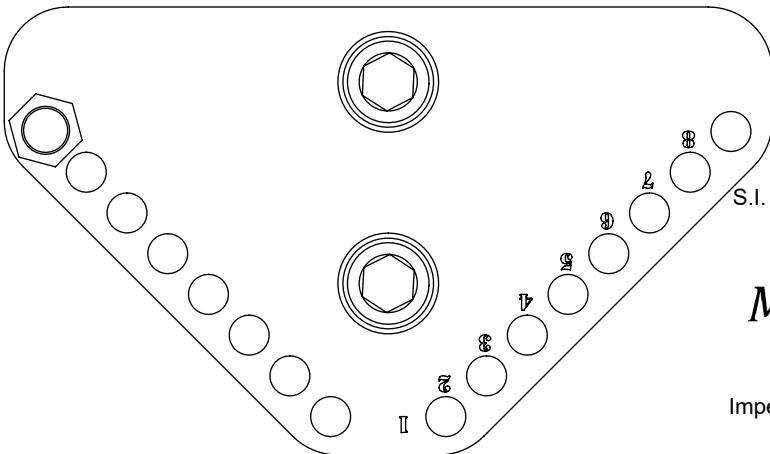
Square Part Size (inch)		
Dimension Position	Min	Max
1	1.25	2.25
2	1.75	3.00
3	2.50	3.50
4	3.00	4.25
5	3.75	4.75
6	4.25	5.50
7	5.00	6.25
8	5.50	6.75

Square Part Size (mm)		
Dimension Position	Min	Max
1	31.8	57.2
2	44.5	76.2
3	63.5	88.9
4	76.2	108.0
5	95.3	120.7
6	108.0	139.7
7	127.0	158.8
8	139.7	171.5



- Notes:
1. Approximate 300lbs (1332N) grip force.
  2. Assume  $\mu = 0.1$ , will vary depending on material being gripped.

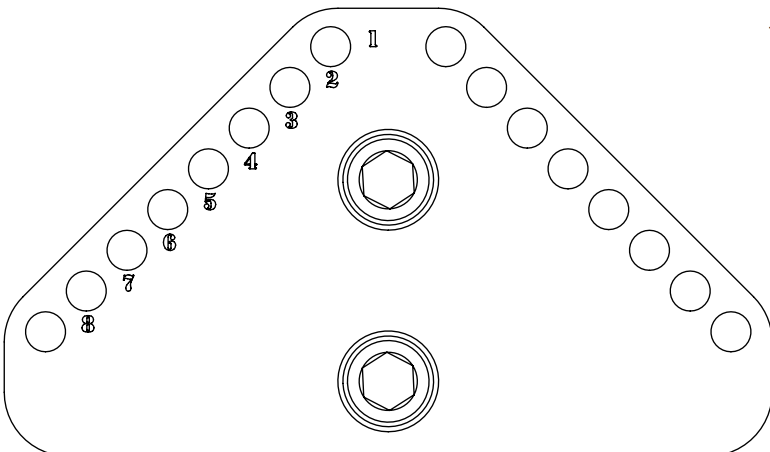


S.I. Equation

$$M_{workpiece} = \frac{(F_{force-fit}) (\mu)}{(g)(F.O.S.)}$$

Imperial Equation

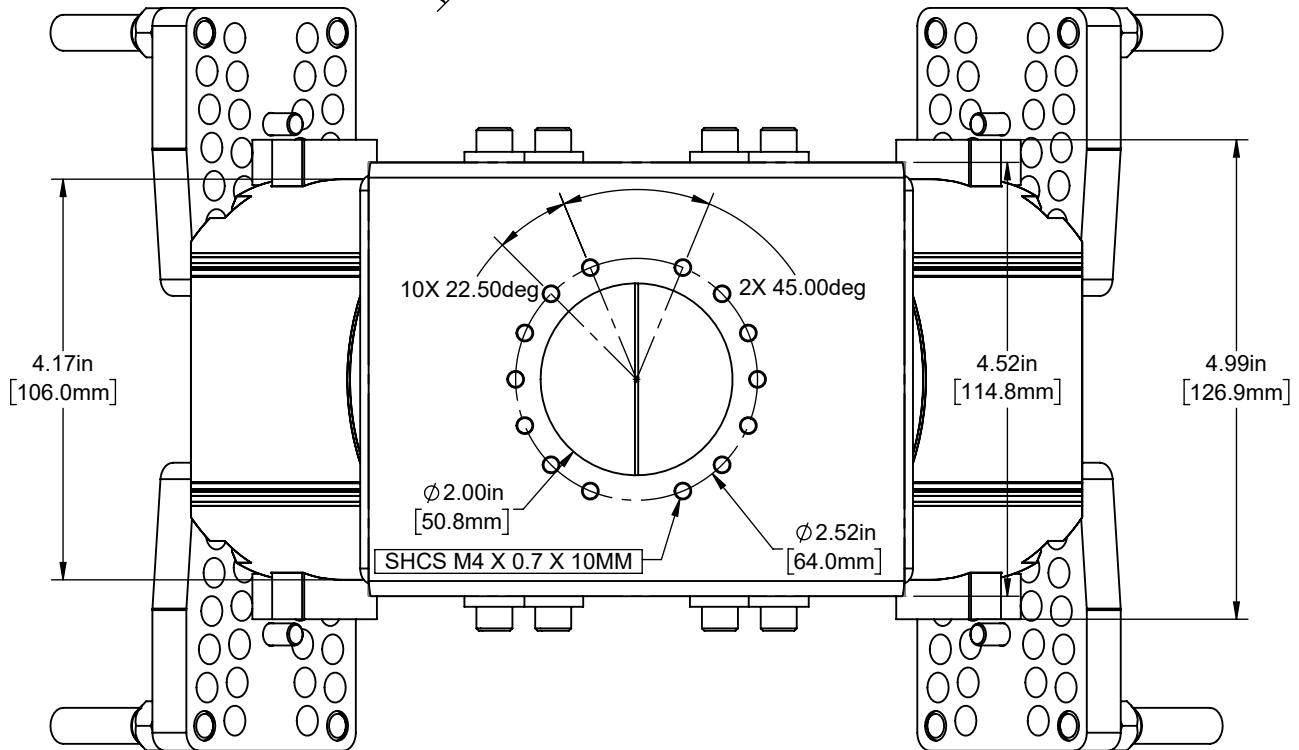
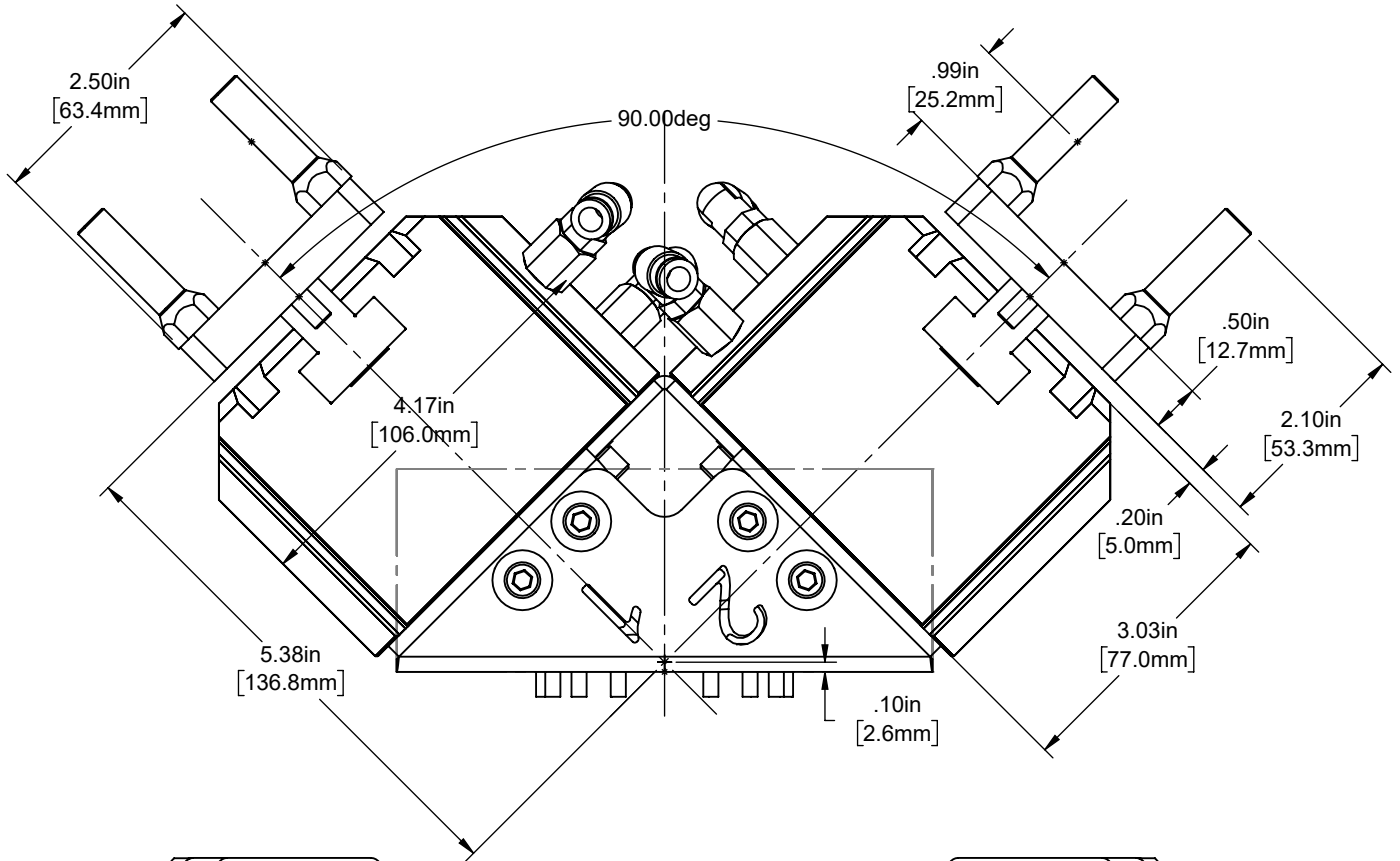
$$W_{workpiece} = \frac{(F_{force-fit})(\mu)}{F.O.S.}$$



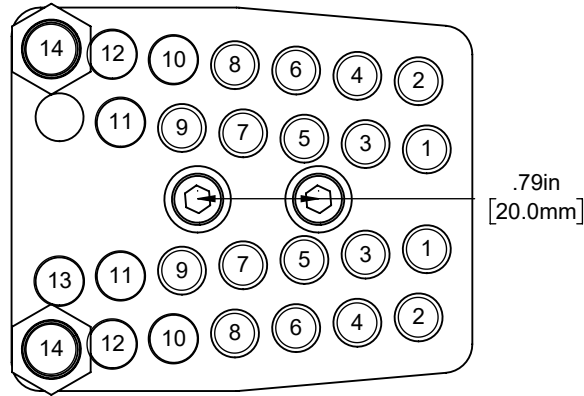
Approximate $\mu$ Values	
Material Contacting Steel	Static Coefficient of Friction
Aluminum	1.1–1.35
Brass	0.5
Cadmium	0.46
Cast Iron	0.40
Copper	0.53
Steel	0.8
Tungsten Carbide	0.4–0.6

Values are approximates and should be taken as a rule of thumb

Model: Chelic HDQ2 80  
 Stroke Per Jaw: 20 mm  
 Closing Force: 710 N @ 71 psi  
 Opening Force: 748 N @ 71 psi  
 Min Part Size: 0.50 inch  
 Max Part Size: 6.50 inch  
 Max Part Weight Per Gripper: 10lb  
 Total Gripper Assembly Weight: 15 lbs.







## MAXIMUM/MINIMUM PART SIZE TO GRIP BY FINGER POSITION

POSITION	INCH		METRIC	
	MIN	MAX	MIN	MAX
1	0.40	1.90	9.50	49.40
2	0.50	2.00	12.20	52.10
3	1.20	2.70	29.80	69.70
4	1.30	2.80	32.50	72.40
5	2.00	3.50	50.00	89.90
6	2.10	3.60	52.70	92.60
7	2.80	4.30	70.30	110.20
8	2.90	4.40	73.00	112.90
9	3.60	5.10	90.50	130.40
10	3.70	5.20	93.20	133.10
11	4.40	5.90	110.70	150.60
12	4.50	6.00	113.50	153.40
13	5.20	6.70	131.00	170.90
14	5.30	6.80	133.80	173.70

## RECOMMENDED PART SIZE PER FINGER POSITION

POSITION	INCH		METRIC	
	MIN	MAX	MIN	MAX
1	0.50	1.50	13.00	38.00
2	0.75	1.75	20.00	44.00
3	1.50	2.25	39.00	57.00
4	1.75	2.50	45.00	63.00
5	2.25	3.00	58.00	76.00
6	2.50	3.25	64.00	82.00
7	3.00	4.00	77.00	101.00
8	3.25	4.25	83.00	107.00
9	3.75	4.75	96.00	120.00
10	4.00	5.00	102.00	127.00
11	4.75	5.50	121.00	139.00
12	5.00	5.75	127.00	146.00
13	5.50	6.25	140.00	158.00
14	5.75	6.50	147.00	165.00

## OPTIMIZED RECOMMENDED FINGER POSITION PER PART SIZE

POSITION	INCH		METRIC	
	MIN	MAX	MIN	MAX
1	0.50	1.25	13	32
2	1.25	1.75	32	45
3	1.75	2.25	45	57
4	2.25	2.50	57	64
5	2.50	3.00	64	76
6	3.00	3.25	76	83
7	3.25	3.75	83	95
8	3.75	4.25	95	108
9	4.25	4.75	108	121
10	4.75	5.00	121	127
11	5.00	5.50	127	140
12	5.50	5.75	140	146
13	5.75	6.25	146	159
14	6.25	6.50	159	165

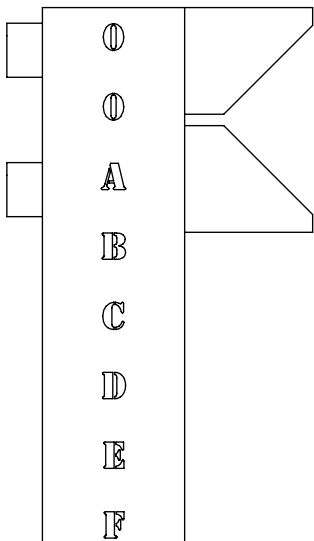


Table 1

MAX/MIN	0	0	1	2	3	4	5	6
0								
0								
A			1.00–1.75	1.75–2.75	2.50–3.75	3.5–4.75	4.50–5.75	5.50–6.75
B			1.50–1.75	2.25–2.75	2.75–3.75	3.75–4.75	4.75–5.75	5.50–6.75
C				2.50–2.75	3.25–3.75	4.00–4.75	4.75–5.75	5.75–6.75
D					3.50–3.75	4.25–4.75	5.00–5.75	6.00–6.75
E						4.5–4.75	5.50–5.75	6.25–6.75
F							5.75	6.50–6.75

Table 2

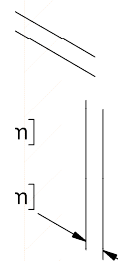
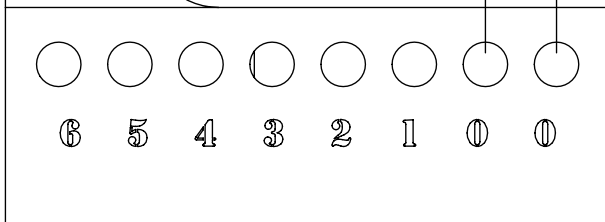
OPTIMAL	0	0	1	2	3	4	5	6
0								
0								
A			$1.00 \leq 1A \leq 1.50$	$1.85 \leq 2A \leq 2.25$	$2.75 \leq 3A \leq 3.0$			
B			$1.50 \leq 1B \leq 1.85$	$2.25 \leq 2B \leq 2.50$	$3.00 \leq 3B \leq 3.25$	$3.75 \leq 4B \leq 4.00$	$4.75 \leq 5B \leq 5.00$	
C				$2.50 \leq 2C \leq 2.75$	$3.25 \leq 3C \leq 3.50$	$4.00 \leq 4C \leq 4.25$	$5.00 \leq 5C \leq 5.25$	$5.75 \leq 6C \leq 6.00$
D					$3.00 \leq 3D \leq 3.75$	$4.25 \leq 4D \leq 4.50$	$5.25 \leq 5D \leq 5.50$	$6.00 \leq 6D \leq 6.25$
E						$4.50 \leq 4E \leq 4.75$	$5.50 \leq 5E \leq 5.75$	$6.250 \leq 6E \leq 6.50$
F								$6.00 \leq 6F \leq 6.75$



Notes:

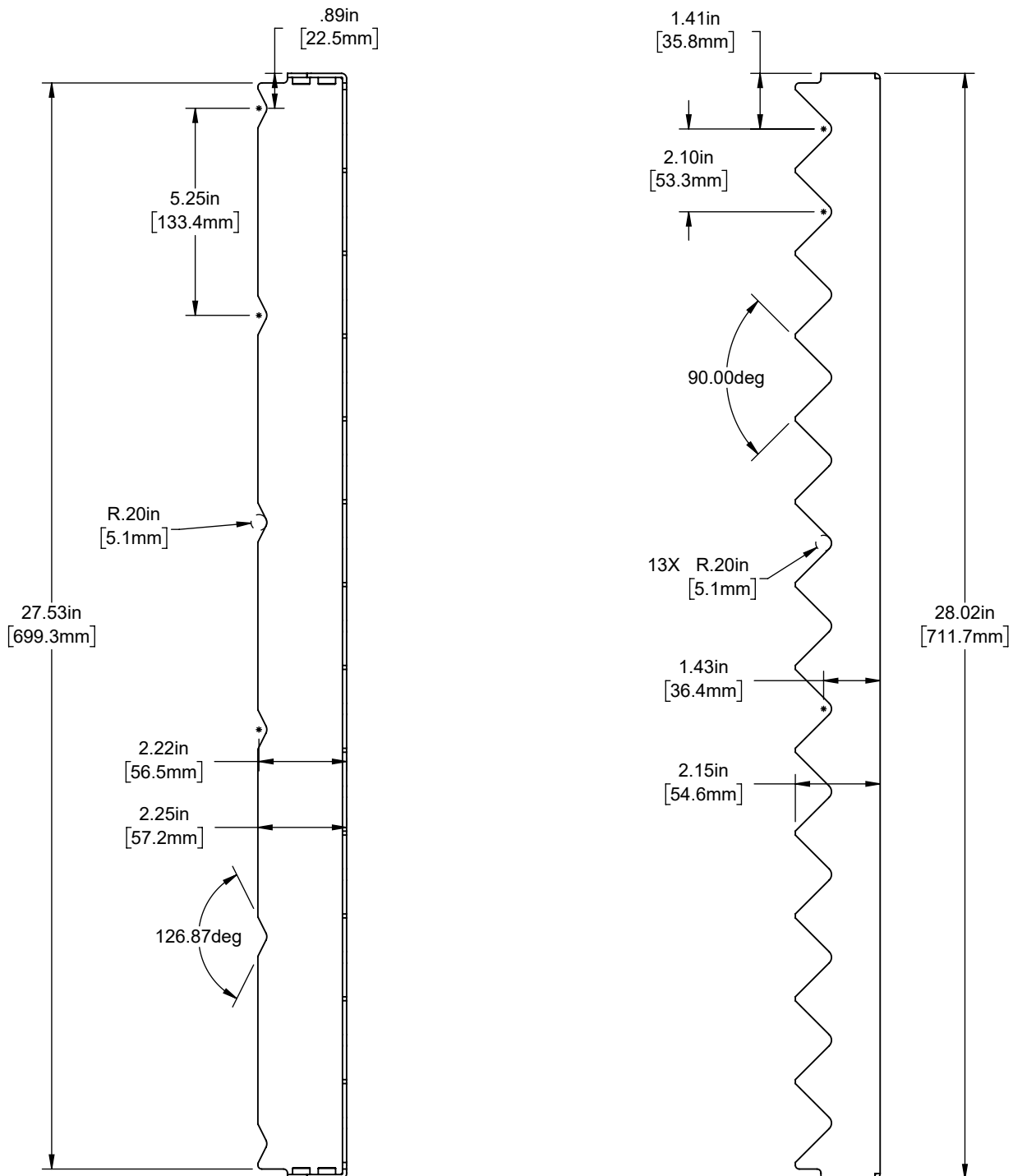
1. A set of metal templates should be used to position shafts to be loaded by robot.
2. A set of 6 shaft positioning templates are included in the kit.
3. While using the provided templates, for parts with diameters ranging from 1.00” to 2.75”, up to 36 shafts can be positioned; for diameters ranging from 5.75” to 6.75”, up to 18 parts can be positioned
4. In *table 1*, position 1A has a max/min gripping range between 1.00” to 1.75”, position C5 has a max/min gripping range between 4.75” to 5.75”, etc.
5. *Table 2* should be used as the recommended **finger position** for customers loading shafts into a machine.

.50in  
[12.7mm]



Note:  
Gripper 3 is only included with the HAAS Robot-2 Shaft Loading Kit; Single Gripper and 1/2 Table

## Shaft Loading Templates and Guidelines



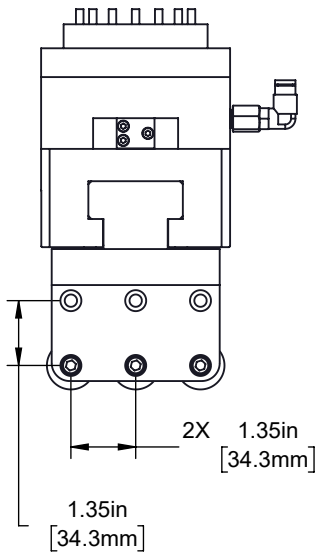
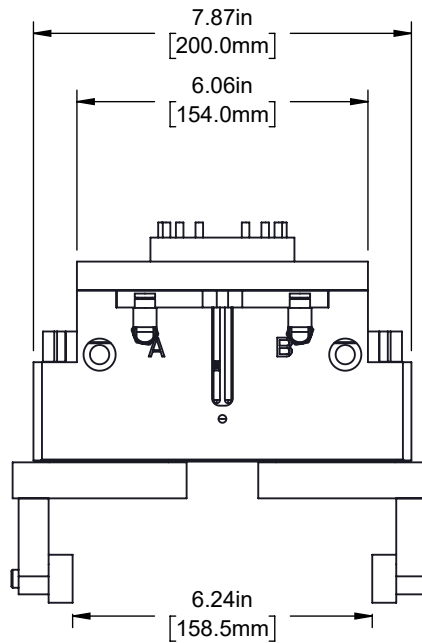
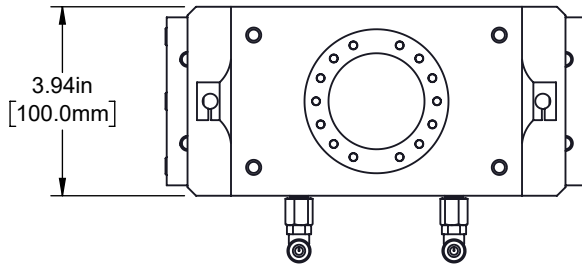
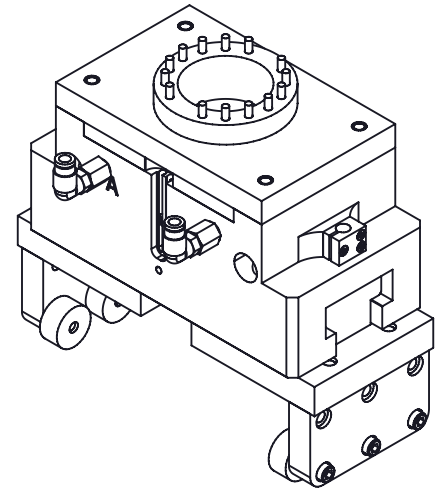
## Note:

Number of parts that can be loaded depends on the diameter of the shafts.  
There should be a set of 6 shaft positioning templates included with the kit.

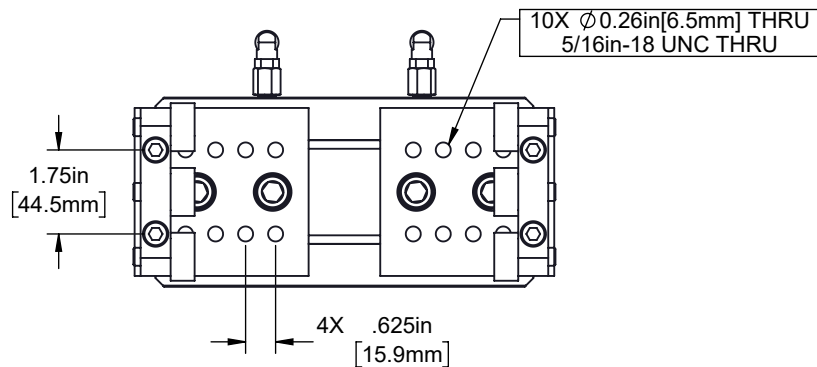
Templates can handle;  
36 Shafts with  $\phi$  1.00"-2.75"  
18 Shafts with  $\phi$  5.75"-6.75"

OPTIMAL table found in previous page should be used as guide to load parts into machine.  
MAX/MIN table found in previous page would be useful for unloading finished parts.

Stroke per jaw: 25 mm  
Min Part Size: 1.25in  
Max Part Size: 8.125in  
Total Gripper Assembly Weight: 20lbs

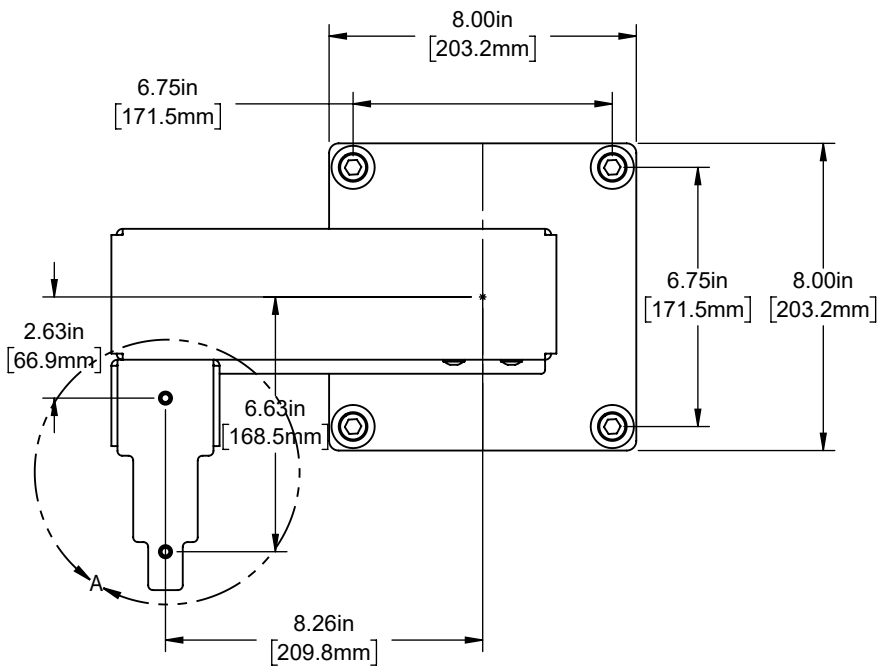


6X  $\varnothing 0.26$ [6.5mm] THRU  
 $\square \varnothing 0.44$ [11.1mm]  $\nabla 0.10$ [2.5mm]

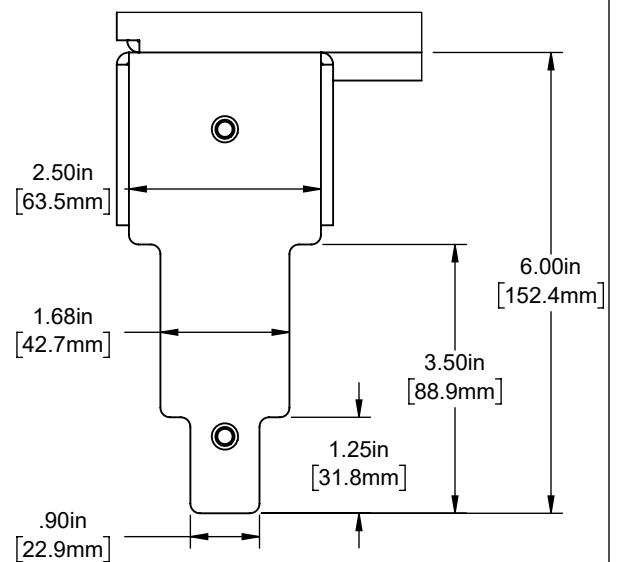
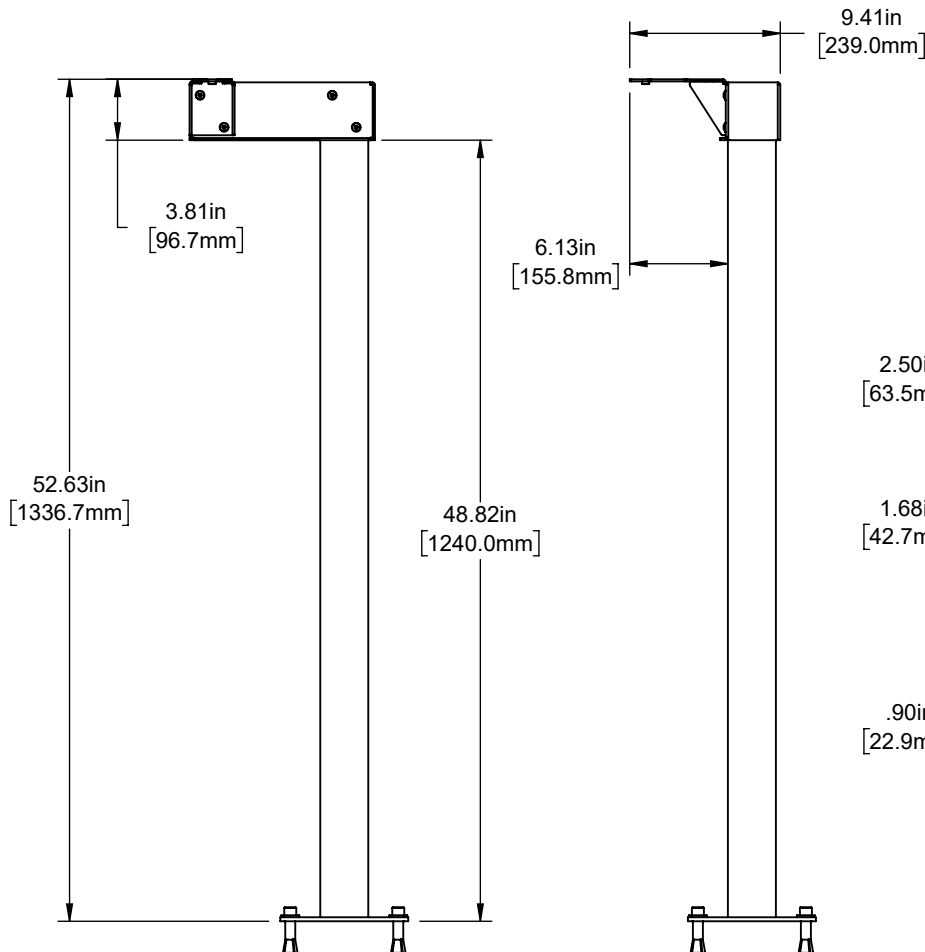
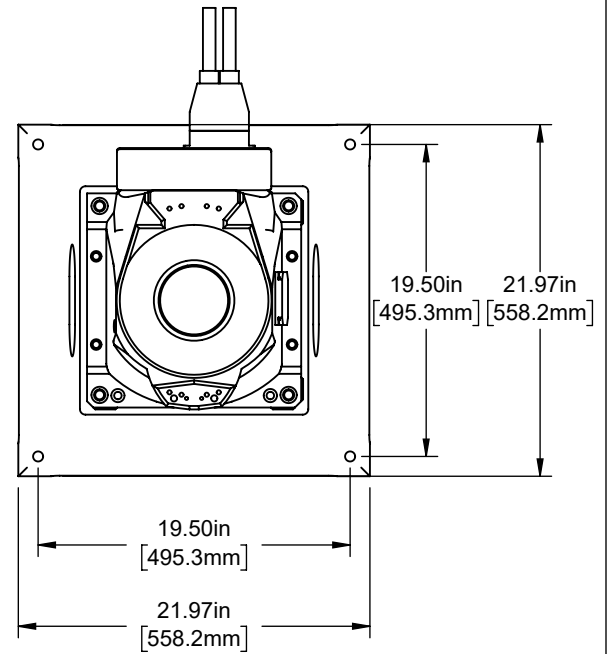




Part Flipping Station



Base Anchoring Dimensions



DETAIL A  
SCALE 2 : 5