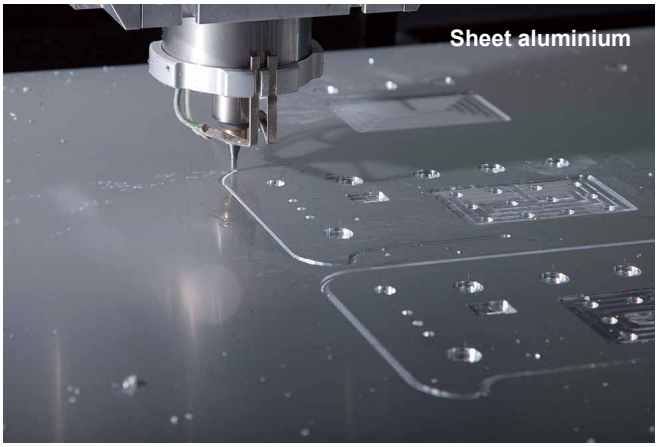
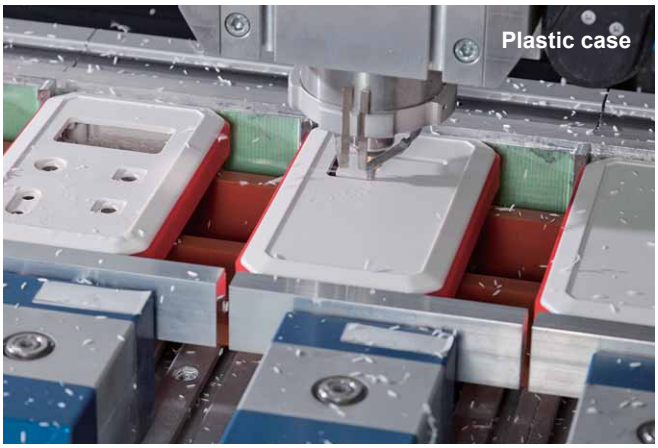
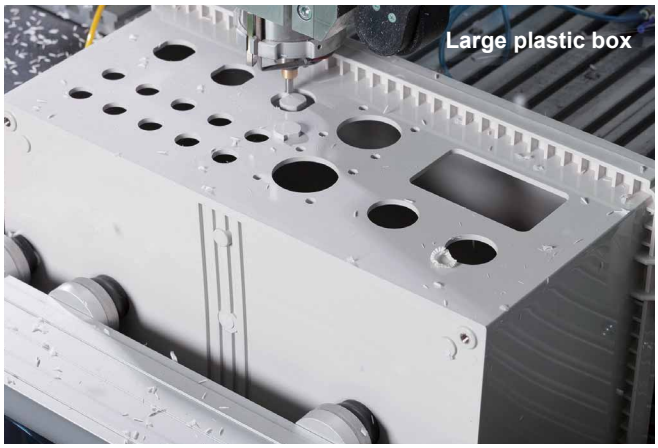
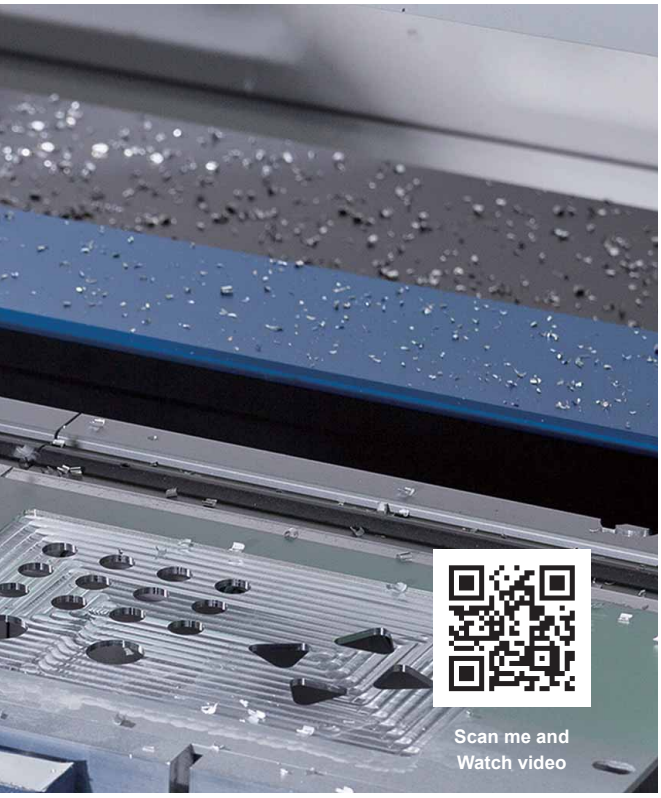
CNC Machining

CNC milling is a form of computer controlled machining. Similar in operation to drilling and cutting, it is able to create various hole styles and shapes by using a rotating cutting tool to bore into the object.









Feature

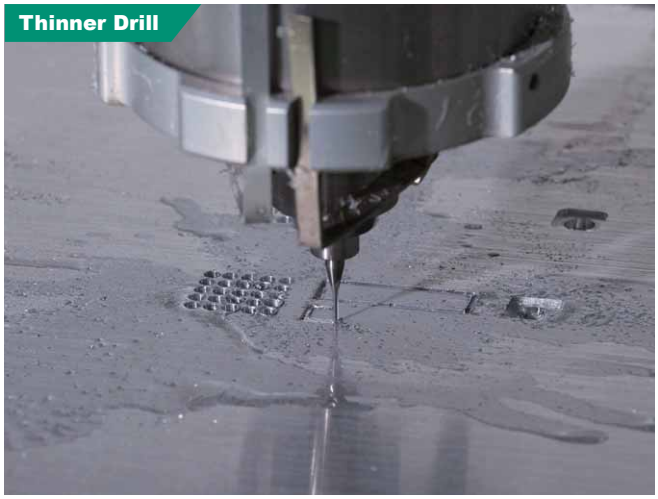
- Mainly used for plastic, aluminium die-cast, and aluminium extrusion material.
- Able to perform milling for various shapes and sizes. No mold is required for processing.
- Able to perform text engraving and/or hole threading.

Milling Radius and Milling Speed

Smaller milling radius requires a finer tool.
A finer tool requires slower milling speed to prevent tool breakage.
R0.5 (Φ1.0mm tool) requires very slow milling speed, hence increasing costs.
Larger milling radius is recommended for less expensive machining cost.

Radius	Tool Diameter	Milling Speed
0.5	1.0	Very Slow
1.0	2.0	Slow
1.5	3.0	Fair
2.0	4.0	Fast
3.0	6.0	Fast

Thinner Drill



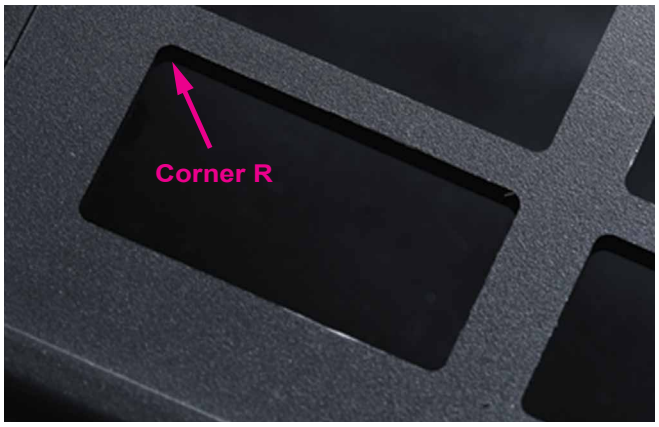
Thicker drill

Details of Machine Cut

Circular milling

Circular hole milling is possible from Φ1.0mm.

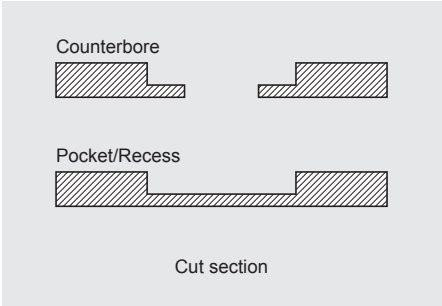
Rectangular milling (Regular R1.0)



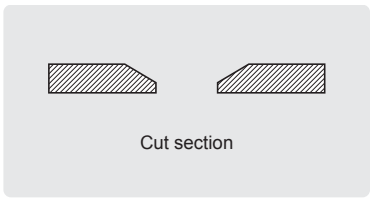
All milling with corners / edges shall have a standard R1.0 radius (smallest R0.5 radius possible).

Recess / Counterbore milling

Recess milling is where the milling goes only part way and does not create a through-hole.
Useful for when installing connectors on thick material, making a recess for attaching stickers,overlays or acrylic panels, peeling off the surface for conductivity, etc.
Recess milling without creating a through-hole is often called

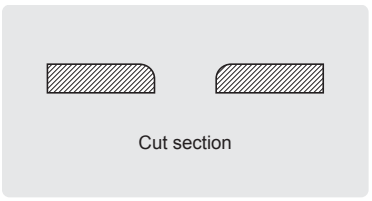


Tapered edges / Countersunk



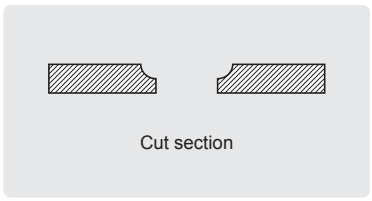
Tapered edges / countersunk can be milled on request.

Rounded edges



Rounded edges can be milled on request.

Milling with Ball-nose tool



Using ball nose tool for 3 dimensional contoured shapes.

Flattening

Flattening unwanted protrusion. (eg; back of frame et cetera.).

Standoff modification

Lowering or eliminating standoffs on inner side of an enclosure.

Technical Data

Countersunk hole processing

When the thickness of the countersunk part of the screw is thicker than the material, the screw head will protrude outwards. In this case, please advise on how to handle this on your drawings.

All dimensions are in mm

Thread size	Countersunk height	Minimum thickness
M2	1.2	1.2mm
M2.5	1.45	1.45mm
M2.6	1.5	1.5mm
M3	1.75	1.75mm
M3.5	2.0	2.0mm
M4	2.3	2.3mm
M4.5	2.55	2.55mm
M5	2.8	2.8mm
M6	3.4	3.4mm
M8	4.4	4.4mm

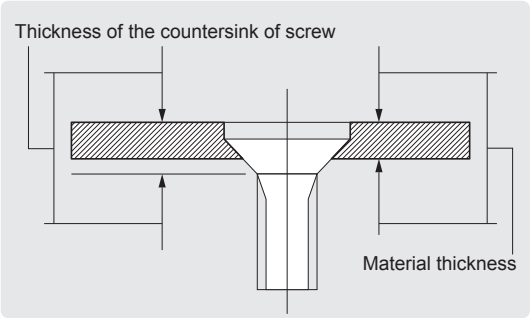


Fig.01

■Should you encounter problems with protruding screw head/s, you could:

- Slightly deepen the head depth size to allow full insertion. (See Fig.01)
- Switch to having a standard circular hole.
- Consider switching to a smaller head screw.
- Change to using smaller screws.
- Or to let the protruding screw head remain protruded from the surface. (See Fig.02)

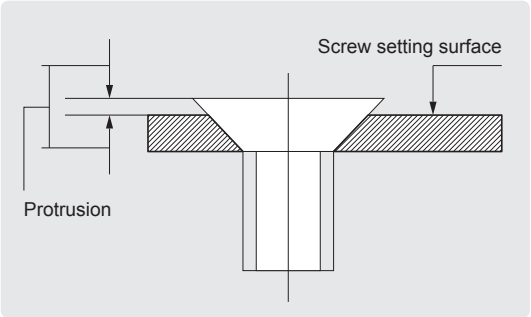


Fig.02

Threading

We can process thread holes from M1.7 to M32 and from PG7 to PG21 as per the chart below. Both plastic and metallic material types can be processed.

●Metric Thread

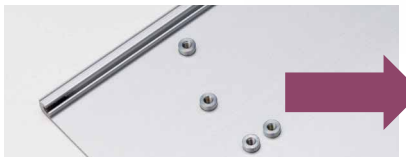
Size	Pitch	Size	Pitch
M1.7	0.35	M11	0.75
M2	0.4	M12	1
M2.3	0.4		1.25
M2.5	0.45		1.5
M2.6	0.45	M13	1
M3	0.5	M16	1.5
M4	0.7	M18	1
M5	0.8	M20	1.5
M6	1	M25	1.5
M7	0.5	M32	1.5
M8	0.75		
	1.25		
M9	0.5		
	0.75		
M10	0.75		
	1		

●PG Thread

Size	Pitch
PG7	1.27
PG9	1.41
PG11	
PG13.5	
PG16	
PG21	1.588

See Clinching-1, Self-clinching standoff / stud / nut

See Clinching-6, Inserts for plastic



Threading on plastic bosses ➡ Inserts for plastic

Threading on thin metal ➡ Self-clinching standoff / stud / nut

TAKACHI

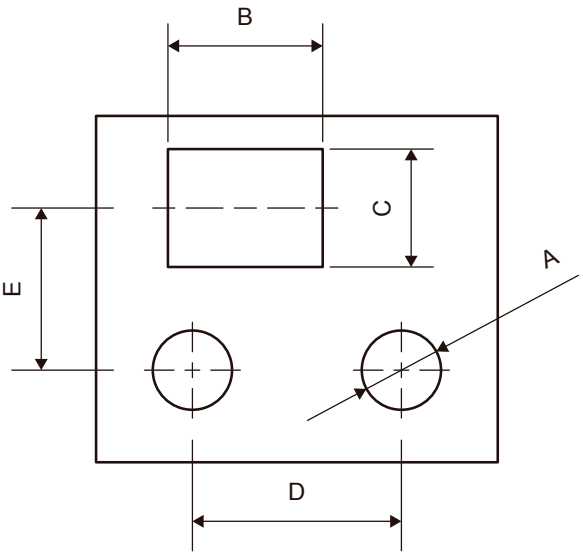
STANDARD TOLERANCE for MACHINING SERVICES

Our standard tolerance for machining services.

Hole/Cut Size • Hole/Cut Distance

Hole/Cut Size (A · B · C)

Dimension	Tolerance
0.5 ~ 3.0	±0.2
3.1 ~ 6.0	±0.2
6.1 ~ 30.0	±0.2
30.1 ~ 120.0	±0.3
120.1 ~ 400.0	±0.5
400.1 ~ 1,000.0	±0.8



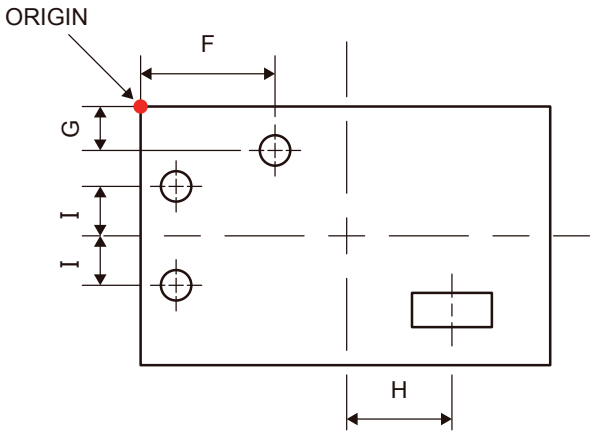
Hole/Cut Distance (D · E)

Dimension	Tolerance
0.5 ~ 3.0	±0.2
3.1 ~ 6.0	±0.2
6.1 ~ 30.0	±0.2
30.1 ~ 120.0	±0.4
120.1 ~ 400.0	±0.6
400.1 ~ 1,000.0	±0.8

Distance on Panel - F and G from ORIGIN • H and I from centerline

Punch Press · Laser Cutting (F · G · H · I)

Dimension	Tolerance
0. ~ 3.0	±0.2
3.1 ~ 6.0	±0.2
6.1 ~ 30.0	±0.2
30.1 ~ 400.0	±0.5
400.1 ~ 1,000.0	±0.6



CNC Machining (F · G)

Dimension	Tolerance
0.5 ~ 3.0	±0.3
3.1 ~ 6.0	±0.3
6.1 ~ 30.0	±0.4
30.1 ~ 120.0	±0.6
120.1 ~ 400.0	±0.8
400.1 ~ 1,000.0	±1.0

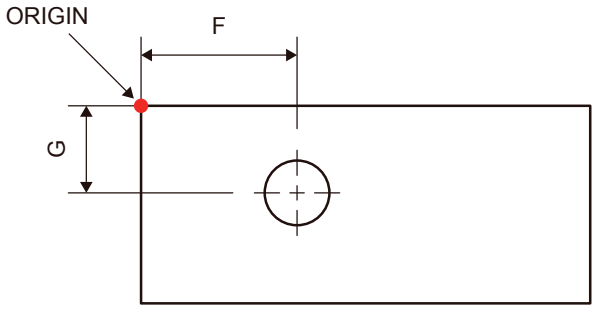
CNC Machining (H · I)

Dimension	Tolerance
0.5 ~ 3.0	±0.5
3.1 ~ 6.0	±0.5
6.1 ~ 30.0	±0.6
30.1 ~ 120.0	±0.8
120.1 ~ 400.0	±1.0
400.1 ~ 1,000.0	±1.2

Distance on Enclosure - F and G from ORIGIN

Material : Extruded Aluminum (F · G)

Dimension	Tolerance
0.5 ~ 3.0	±0.5
3.1 ~ 6.0	±0.5
6.1 ~ 30.0	±0.6
30.1 ~ 120.0	±0.8
120.1 ~ 400.0	±1.0
400.1 ~ 1,000.0	±1.2



Material : Aluminum Diecast (F · G)

Dimension	Tolerance
0.5 ~ 3.0	±1.3
3.1 ~ 6.0	±1.3
6.1 ~ 30.0	±1.4
30.1 ~ 120.0	±1.6
120.1 ~ 400.0	±1.8
400.1 ~ 1,000.0	±2.0

Material : Plastic (F · G)

Dimension	Tolerance
0.5 ~ 3.0	±0.5
3.1 ~ 6.0	±0.5
6.1 ~ 30.0	±0.6
30.1 ~ 120.0	±0.8
120.1 ~ 400.0	±1.0
400.1 ~ 1,000.0	±1.2

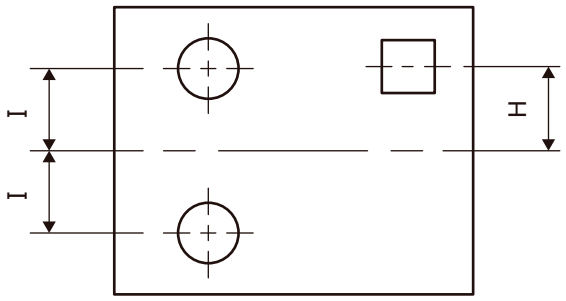
Material : Plastic on BCAP, BCPC, BCAR, BCPR and BCPK series (F · G)

Dimension	Tolerance
0.5 ~ 3.0	±1.1
3.1 ~ 6.0	±1.1
6.1 ~ 30.0	±1.2
30.1 ~ 120.0	±1.4
120.1 ~ 400.0	±1.6
400.1 ~ 1,000.0	±1.8

Distance on Enclosure - H and I from Centerline

Material : Extruded Aluminum (H · I)

Dimension	Tolerance
0.5 ~ 3.0	±0.8
3.1 ~ 6.0	±0.8
6.1 ~ 30.0	±0.9
30.1 ~ 120.0	±1.1
120.1 ~ 400.0	±1.3
400.1 ~ 1,000.0	±1.5



Material : Aluminum Diecast (H · I)

Dimension	Tolerance
0.5 ~ 3.0	±2.4
3.1 ~ 6.0	±2.4
6.1 ~ 30.0	±2.5
30.1 ~ 120.0	±2.7
120.1 ~ 400.0	±2.9
400.1 ~ 1,000.0	±3.1

Material : Plastic (H · I)

Dimension	Tolerance
0.5 ~ 3.0	±0.9
3.1 ~ 6.0	±0.9
6.1 ~ 30.0	±1.0
30.1 ~ 120.0	±1.2
120.1 ~ 400.0	±1.4
400.1 ~ 1,000.0	±1.6

Material : Plastic on BCAP, BCPC, BCAR, BCPR and BCPK series (H · I)

Dimension	Tolerance
0.5 ~ 3.0	±2.1
3.1 ~ 6.0	±2.1
6.1 ~ 30.0	±2.2
30.1 ~ 120.0	±2.3
120.1 ~ 400.0	±2.5
400.1 ~ 1,000.0	±2.8