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WORKS PORTFOLIO

Machining of metals and engineering plastics to customer drawings and 3D models

Real completed orders, not visualisations.

2026

CHONGQING TPA CO., LTD

MANUFACTURING CAPABILITIES

We manufacture parts to customer documentation — from a single position to a production batch, with dimensions checked at every stage.

The following pages show real completed orders: parts produced to customer drawings and 3D models, with the machining difficulties and the solutions applied.

01 **CNC machining**

3, 4 and 5 axes: milling, turning, boring

02 **Moulds**

Design and manufacture of tooling

03 **Plastic moulding**

Thermoplastics, production parts and housings

04 **Metal casting**

Die casting and stamping

MATERIALS

Aluminium, steel, stainless steel, brass, copper, engineering plastics. Tolerances and finishes are set for the specific part.

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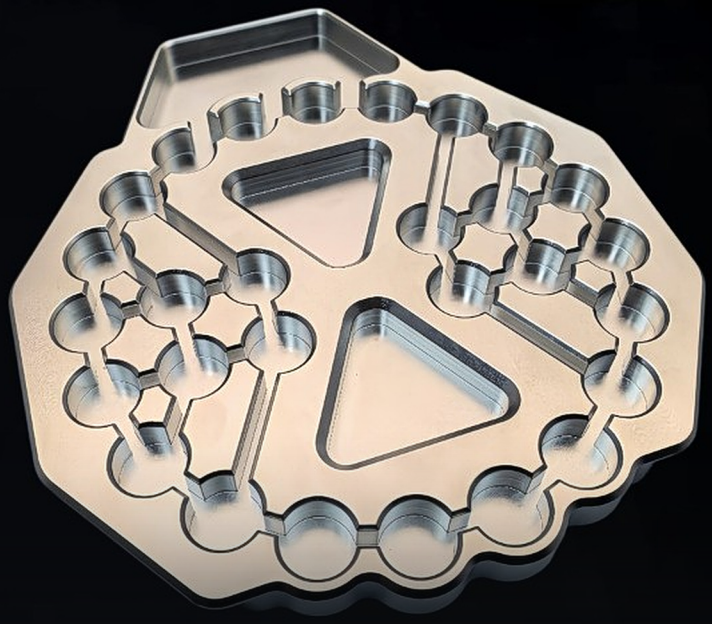


Enclosure

Housing made of food-grade stainless steel. After machining the part is electropolished, producing a hygienic surface without stagnant areas.

Machining method:

One-piece machining on a 3-axis CNC machining centre

Dimensions: 184.0 × 206.1 × 21.3

Material grade: SS 316L

Machining tolerance: General tolerances ISO 2768-mK

Surface treatment: Electropolishing

MACHINING DIFFICULTIES

316L stainless steel tends to stick to the cutting edge and to distort during machining.

Field of application:

Food processing and handling equipment.



Shaft

Shaft in heat-treated 4140 steel. Turning and milling are carried out in a single set-up, preserving the alignment of the seating surfaces.

Machining method:

Combined CNC turning and milling

Dimensions: Ø103 × 348

Material grade: 4140

Machining tolerance: General tolerances ISO 2768-mK

Surface treatment: Nickel plating

Field of application:

Drives and torque transmission assemblies.



Block

Brass block with pockets and precise locating holes. Batch of 40 with centre distances inspected to the customer drawing.

Machining method:

One-piece milling on a CNC machining centre

Dimensions: 40.004 × 120.002 × 63.000

Material grade: H62

Machining tolerance: ±0.05 mm

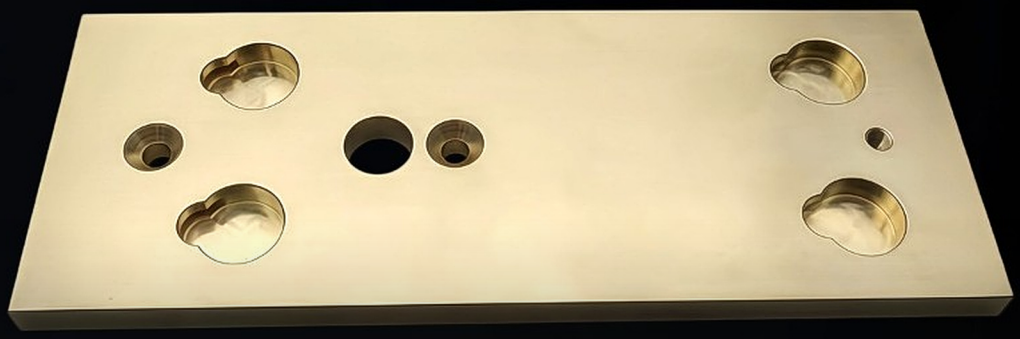
Surface treatment: None

MACHINING DIFFICULTIES

Appearance requirement: no scratches or dents are allowed on the surface.

Field of application:

Tooling and assemblies for industrial equipment.



Plate

Plate milled from a single brass blank. There are no joints, and hole positions remain stable across the whole batch.

Machining method:

One-piece milling on a CNC machining centre

Dimensions: 50.000 × 6.304 × 132.500

Material grade: H62

Machining tolerance: ±0.05 mm

Surface treatment: None

Field of application:

Guideways and support elements.



Frame

Lightened frame with pockets and counterbores for standard fasteners. The batch of 43 is checked for flatness after machining.

Machining method:

One-piece milling on a CNC machining centre

Dimensions: 40.000 × 6.300 × 122.500

Material grade: H62

Machining tolerance: ±0.05 mm

Surface treatment: None

Field of application:

Housings for instruments and modules.



Manifold body

Manifold body with internal cavities and threaded ports. Turning and milling are completed in one cycle without re-fixturing.

Machining method:

Combined CNC turning and milling

Dimensions: 95.000 × 32.000 × 94.496

Material grade: H62

Machining tolerance: ±0.05 mm

Surface treatment: None

Field of application:

Hydraulic and pneumatic systems.

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Knob

Streamlined knob milled from solid aluminium instead of an assembly or a casting. Anodising provides wear resistance.

Machining method:

One-piece milling on a CNC machining centre

Dimensions: 180 × 36 × 50

Material grade: AL 5083

Machining tolerance: ±0.05 mm

Surface treatment: Black anodising

MACHINING DIFFICULTIES

The lightening windows leave thin walls that are prone to distortion.

Field of application:

Equipment controls.

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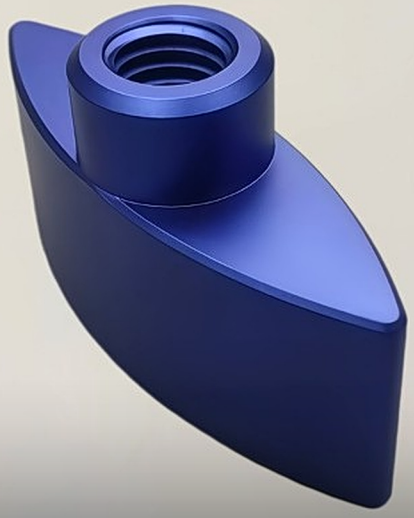

Housing component

Production position, 1000 pcs. Blue anodising is applied evenly, and dimensions are sampled in every batch.

Machining method:

One-piece milling on a CNC machining centre

Dimensions: 54 × 29 × 16.5

Material grade: AL 6061-T6

Machining tolerance: ±0.05 mm

Surface treatment: Blue anodising

MACHINING DIFFICULTIES

The surface is a continuous curved form: the tool path has to be planned, and the visible face accepts no marks from the cutter, step-over joints or chatter.

Field of application:

Housings for production equipment.

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Bearing support

Bearing support held to ±0.005 mm. The design targets rigidity rather than minimum weight.

Machining method:

One-piece milling on a CNC machining centre

Dimensions: 74 × 34 × 19

Material grade: AL 7075-T6

Machining tolerance: ±0.005 mm

Surface treatment: Black anodising

MACHINING DIFFICULTIES

The locating bore is a precision fit; anodising can take the size out of tolerance.

Field of application:

Shaft and drive supports.



Enclosure

Deep thin-wall enclosure. Roughing and finishing are separated to release internal stress and hold the flatness of the mating face.

Machining method:

One-piece milling on a CNC machining centre

Dimensions: 120 × 106.4 × 31

Material grade: AL 6061-T6

Machining tolerance: ±0.05 mm

Surface treatment: Bead blasting, black anodising, laser marking

MACHINING DIFFICULTIES

Deep thin-wall enclosure: after the bulk of the metal is removed the walls warp and the flatness of the sealing face drifts out of tolerance; burrs are hard to remove in the internal corners.

SOLUTION

Roughing and finishing are separated, cutting load is limited and support points are planned; the main holes are machined in a single set-up.

Field of application:

Instrument and electronic module housings.



Ribbed plate

Load-bearing plate with thin ribs. Layered cutting and planned support points prevent warping after the bulk of the material is removed.

Machining method:

One-piece milling on a CNC machining centre

Dimensions: По чертежу

Material grade: AL 6061-T6

Machining tolerance: ±0.05 mm

Surface treatment: Bead blasting, black anodising, Ra 1.6

MACHINING DIFFICULTIES

The load-bearing ribs are thin: the plate warps after material removal, and the internal corners need a small-diameter tool.

SOLUTION

Layered milling, optimised support points and limited depth of cut; feed is set to avoid rib chatter.

Field of application:

Datums and base plates.

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Lever

Two-arm lever with lightening windows. Inertia is reduced while bending strength is retained, which matters for fast movements.

Machining method:

One-piece milling on a CNC machining centre

Dimensions: 67.132 × 12.7 × 166.217

Material grade: AL 6061-T6

Machining tolerance: ±0.05 mm

Surface treatment: Red anodising

MACHINING DIFFICULTIES

Two-arm lever with thin walls: material removal can distort the part, the tool radius limits the long slots, and the end holes must keep their position relative to the pivot axis.

SOLUTION

Layered cutting with a planned fixturing scheme; the main volume is removed in one set-up and the corners are finished with a small tool.

Field of application:

Slewing and transfer mechanisms.

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Bracket

Elongated thin-wall bracket. Batch of 60; geometry is checked after anodising to rule out distortion of the thin sections.

Machining method:

One-piece milling on a CNC machining centre

Dimensions: 15.875 × 179.222 × 112.572

Material grade: AL 6061-T6

Machining tolerance: ±0.05 mm

Surface treatment: Red anodising

Field of application:

Mounting assemblies on frames and panels.



Ring plate

Finish machining of the datum face limits warping and meets the flatness requirement. The blank is left to settle between roughing and finishing.

Machining method:

One-piece machining on a 3-axis CNC machining centre

Dimensions: Ø133 × 21

Material grade: SS 304

Machining tolerance: ±0.04 mm

Surface treatment: None

MACHINING DIFFICULTIES

Large thin plate with a big U-shaped cut-out: it warps after machining, the cut-out lacks rigidity, and the flatness and the dense hole pattern are hard to hold.

SOLUTION

The blank is left to settle after roughing; clamping uses a multi-point vacuum table; finishing runs at low stock removal and high speed, followed by a final face pass.

Field of application:

Automated equipment, components for hydraulic systems and the chemical industry.



Plate

Plate with a cut-out and a dense hole pattern. After roughing the blank is left to settle, and the finishing pass removes minimal stock.

Machining method:

One-piece machining on a 3-axis CNC machining centre

Dimensions: 285 × 10 × 171

Material grade: AL 5083

Machining tolerance: ±0.05 mm

Surface treatment: Black anodising

MACHINING DIFFICULTIES

Large thin plate with a big U-shaped cut-out: it warps after machining, the cut-out lacks rigidity, and the flatness and the dense hole pattern are hard to hold.

SOLUTION

The blank is left to settle after roughing; clamping uses a multi-point vacuum table; finishing runs at low stock removal and high speed, followed by a final face pass.

Field of application:

Datums and manufacturing tooling.



Bracket

The outline and all holes are cut before bending, so the holes do not shift relative to the datum surfaces. Bending uses dedicated tooling.

Machining method:

Laser cutting followed by bending

Dimensions: 15 × 462 × 234

Material grade: AL 6061-T6

Machining tolerance: ±0.05 mm

Surface treatment: Black anodising

MACHINING DIFFICULTIES

The long cantilever loses stiffness after bending: consecutive bends bring spring-back and twist, and hole positions relative to the bend datums are hard to keep stable.

SOLUTION

The outline, holes and relief slots are laser cut in one pass; bending is staged on dedicated tooling with spring-back control, followed by straightening.

Field of application:

Fastening elements for frames and enclosures.



Panel

Sheet panel with powder coating. Bending follows a programme with spring-back compensation, and the holes and cut-outs are cut before forming.

Machining method:

Laser cutting followed by bending

Dimensions: 79X70X80

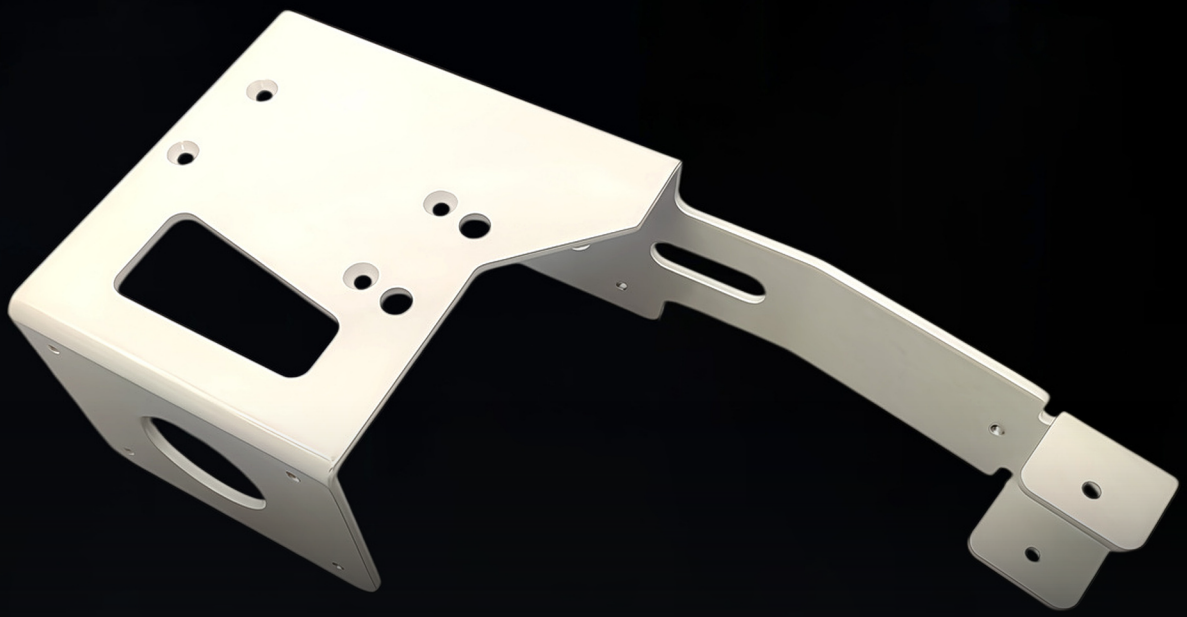
Material grade: AL 5052

Machining tolerance: ±0.1 mm

Surface treatment: Powder coating, white

Field of application:

Equipment enclosures and panels.



Three-dimensional bracket

Three-dimensional bracket with several bends. The bending sequence is set to avoid accumulation of angular error.

Machining method:

Laser cutting followed by bending

Dimensions: 81.000 × 270.598 × 152.967

Material grade: AL 5052

Machining tolerance: ±0.1 mm

Surface treatment: Powder coating, white

MACHINING DIFFICULTIES

The long cantilever loses stiffness after bending: consecutive bends bring spring-back and twist, and hole positions relative to the bend datums are hard to keep stable.

SOLUTION

The outline, holes and relief slots are laser cut in one pass; bending is staged on dedicated tooling with spring-back control, followed by straightening.

Field of application:

Mounting of sensors and functional modules.

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Connecting bracket

Laser cutting of the outline and windows, followed by bending and deburring. Edge treatment is completed before anodising.

Machining method:

Laser cutting followed by bending

Dimensions: 31 × 203 × 99

Material grade: AL 6061-T6

Machining tolerance: ±0.05 mm

Surface treatment: Natural anodising

MACHINING DIFFICULTIES

Thin plate with several feet: it springs back after bending and overall flatness is hard to hold; the holes sit both before and after the bend, so they can shift; edges and cut-outs burr.

SOLUTION

Holes and outline are made before bending; the programme carries spring-back compensation and positioning tooling; cutting parameters reduce burr, and the finish is deburring plus brushing.

Field of application:

Connecting elements for structures.

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Toothed disc

Disc with evenly spaced slots. Indexing is carried out on the fourth axis in a single set-up, which keeps the pitch uniform.

Machining method:

Combined CNC turning and milling

Dimensions: По чертежу

Material grade: SS 304

Machining tolerance: ±0.1 mm

Surface treatment: Brushed finish

MACHINING DIFFICULTIES

Strict uniformity of the slot indexing; the slot exit tends to chip; re-fixturing between turning and milling introduces a coaxiality error.

SOLUTION

The datum is machined in one set-up and indexing runs on the fourth axis; sharp tool geometry and a radiused slot bottom are used; turning and milling passes are balanced to limit re-datuming error.

Field of application:

Drive and indexing mechanisms.

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Enclosure bracket

Cutting, several bends and welding. Welds are made with controlled heat input, and the geometry is checked after cooling.

Machining method:

Laser cutting, bending and welding

Dimensions: По чертежу

Material grade: AL 6061-T6

Machining tolerance: +0.05 / 0 mm

Surface treatment: None

MACHINING DIFFICULTIES

Multi-face bending: spring-back error accumulates; the large hole and the small holes sit on different flanges and shift after bending; sharp corners tend to tear.

SOLUTION

All holes and the outline are cut before bending; the bending programme carries spring-back compensation with positioning tooling; relief cuts are provided at the corners, followed by deburring.

Field of application:

Instrument enclosures and bases.

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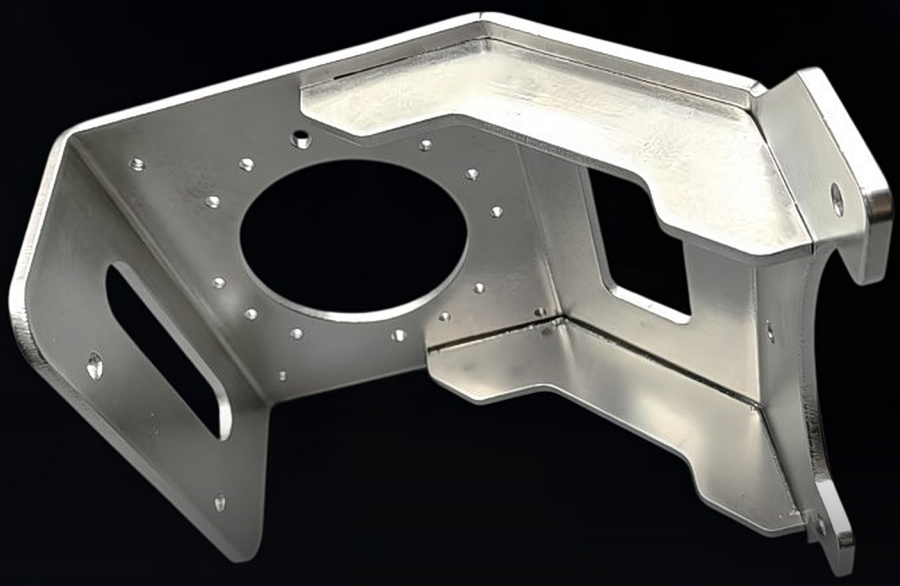

Enclosure

Box enclosure with multi-face bending and welding. The assembly sequence is set to preserve perpendicularity of the walls.

Machining method:

Laser cutting, bending and welding

Dimensions: 300 × 200 × 150

Material grade: AL 6061-T6

Machining tolerance: ±0.1 mm

Surface treatment: None

MACHINING DIFFICULTIES

Multi-face bending: spring-back error accumulates; the large hole and the small holes sit on different flanges and shift after bending; sharp corners tend to tear.

SOLUTION

All holes and the outline are cut before bending; the bending programme carries spring-back compensation with positioning tooling; relief cuts are provided at the corners, followed by deburring.

Field of application:

Industrial equipment housings.

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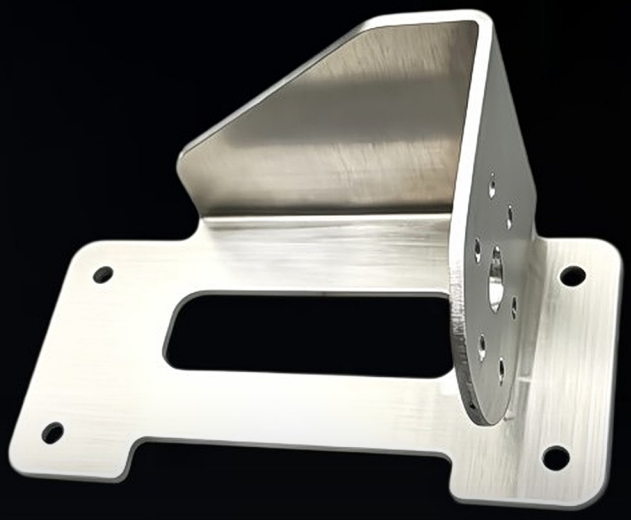

Thin-wall body

Small thin-wall body. Thin sheet bending and edge welding are carried out without burn-through, with distortion limited by local cooling.

Machining method:

Laser cutting, bending and welding

Dimensions: 30 × 120 × 60

Material grade: AL 6061-T6

Machining tolerance: ±0.1 mm

Surface treatment: None

Field of application:

Compact modules and sensors.

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Sheet part

Copper sheet 0.5 mm thick. The laser parameters are tuned to avoid edge melting and to preserve the geometry of the thin material.

Machining method:

Sheet metal laser cutting

Dimensions: 277 × 159 × 0.5

Material grade: Copper

Machining tolerance: ±0.1 mm

Surface treatment: None

MACHINING DIFFICULTIES

Sheet only 0.5 mm thick: laser cutting tends to burn the edge and distort the part; copper is soft, so bending brings marks and strong spring-back; thin-wall welding burns through easily.

SOLUTION

Laser parameters limit heat input; bending uses soft tooling with spring-back compensation; welding runs at low heat with controlled current, followed by straightening to hold ±0.1 mm.

Field of application:

Shielding and conductive elements.

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