

Robot Precision Metal Components White Paper

CNC machining, stamping, shafts, brackets, inspection and RFQ guidance for robotics OEM buyers



Prepared by Zhengna Technology for robotics OEM sourcing, engineering and supplier-audit teams.

Executive Summary

Robot precision metal components are the CNC machined, stamped, formed, fastened and inspected hardware that gives robot joints, frames, grippers, sensors and motion modules stable physical performance.

For robotics OEM buyers, the manufacturing question is not only whether a supplier can machine a part. The higher-value question is whether the supplier can control weight, tolerance, burrs, surface treatment, inspection records and the transition from prototype to repeatable production.

Zhengna Technology supports made-to-drawing robot hardware across CNC machining, stamping, sheet metal fabrication, springs, fasteners, surface treatment and small assembly routes.

Common Robot Metal Components

Typical parts include joint housings, actuator brackets, bearing seats, pivot shafts, pins, bushings, sleeves, stamped brackets, sensor mounts, cable-retaining clips, grounding parts, fasteners and compact subassemblies.

The most important sourcing risk is fit drift across linked parts. A small bore, shaft, bracket or fastener variation can influence motion smoothness, sensor position, cable clearance or end-effector repeatability.

Component And Process Map

Component	Likely process	Key buyer checks
Joint housing / bracket	CNC milling, drilling, tapping	Bearing seat, flatness, thread depth, anodizing thickness
Shaft / pin / sleeve	CNC turning, Swiss machining	Diameter, roundness, surface finish, burrs, hardness
Sensor mount / retainer	Stamping, bending, sheet metal	Hole position, bend angle, burr direction, coating
Spring clip / fastener	Stamping, wire forming, cold heading	Spring force, thread fit, coating, fatigue risk
Small assembly	Multi-process assembly	Stack-up tolerance, function fit, lot traceability

Material Selection

Material family	Best-fit use	Manufacturing focus
Aluminum alloy	Lightweight housings, brackets, covers	Wall thickness, flatness, threads, anodizing fit
Stainless steel	Shafts, pins, bushings, exposed hardware	Passivation, surface finish, burr control
Carbon / alloy steel	Load-bearing shafts, pivots, brackets	Heat treatment, plating, hardness, wear surfaces
Brass / copper alloy	Contacts, grounding, inserts	Conductivity, plating, thread fit, contamination control
Spring steel	Clips, retainers, springs	Spring force, fatigue, stress relief, packaging



Tolerance And Inspection Checklist

- Bearing and shaft interfaces: bore diameter, shaft diameter, roundness, concentricity, chamfer and roughness.
- Threaded features: thread depth, pitch, go/no-go gauge, plating effect and pull-out risk.
- Stamped and bent brackets: bend angle, hole position, flatness, perpendicularity and burr direction.
- Sensor and cable features: hole alignment, edge protection, grounding surfaces and clearance.
- Small assemblies: stack-up tolerance, fastener fit, sliding feel, torque and packaging protection.



Prototype-To-Production Roadmap

Stage	Buyer goal	Manufacturing focus
Prototype	Verify geometry and motion fit	CNC machining, flexible fixtures, quick inspection
Pilot batch	Test repeatability and finish	Critical dimensions, inspection frequency, surface treatment
Pre-production	Reduce cost and stabilize process	Evaluate stamping, tooling, die casting, cold heading
Mass production	Hold traceability and delivery	Incoming checks, in-process inspection, packaging standard

Common Manufacturing Risks

- Thin aluminum walls can deform during machining, finishing or assembly.
- Burrs near moving interfaces can damage bearings, cables, sensors or sliding parts.
- Surface treatment thickness can change hole, thread and sliding dimensions.
- Weak datum strategy can create accumulated positioning error across joints.
- Prototype drawings often miss production inspection points and packaging needs.

RFQ Checklist For Robotics OEM Buyers

- 2D drawings, 3D files, revision level and critical-to-quality dimensions.
- Material grade, hardness or heat treatment, surface finish and coating target.
- Function notes: joint, gripper, actuator, sensor bracket, cable guide or end-effector.
- Motion interface details: bearing seats, shafts, pin holes, threads and clearance.
- Prototype quantity, pilot-batch quantity, annual volume and expected revision rhythm.
- Inspection requirements, functional fit checks, packaging protection and traceability needs.

Zhengna Technology Capability Fit

Zhengna Technology can support robot component projects that require cross-process manufacturing: CNC machining, stamping, sheet metal fabrication, springs, fasteners, surface treatment, assembly and inspection. The strongest fit is made-to-drawing OEM hardware where buyers need practical DFM review and repeatable production control.

Product page: <https://www.zenatc.com/custom-robot-precision-metal-components>

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