

**ISO 9001**

**ISO 13485**

**AS9100**

**ITAR Certified**

## **CAPABILITIES SUMMARY**

National Manufacturing Co., Inc. is a contract manufacturer of engineered, custom designed, precision, made-to-print, metal parts that meet the highest quality standards. We have been meeting the needs of aerospace, defense, medical and various industrial markets worldwide since 1944. We would like to be considered as a manufacturing source to meet your organization's need for any existing or new requirements for these types of metal components and parts.

### **CNC Machined Metal Parts**



### **Deep / Shallow Drawn Metal Stampings**



# PRECISION, HIGH-SPEED 5-AXIS CNC MILLING & TURNING CAPABILITIES

National offers 3-axis and 5-axis CNC milling and CNC dual spindle turning with live tooling. With our state-of-the-art technologies we can machine at higher speeds and feeds, with reduced setups, achieve high precision and superior finishes to provide you a high quality and cost-effective solution to your machining challenges.

Materials include various types of irons, steels, stainless steels, hardened steels, tool steels, special/super/high temperature alloys such as Hastelloy®, Inconel®, Waspaloy®, Rene®, Incoloy®, Nitronic®, and non-ferrous metals such as aluminum, copper, brass.

## CNC MILLING CAPABILITIES

- 3-Axis Vertical Machining with Bolt on Dual-Axis Trunnion - Permits fast cycle time by allowing access to the part from 5 sides. Accuracy achieved by minimizing setups. Simultaneous 5-axis machining capable.
- 5-Axis High-Precision Vertical Machining - Specializes in machining hardened material to an extremely fine surface finish by eliminating thermal distortion on all levels. Equipped with 80 position Robotic Workpiece changer that utilizes Zero-Point Fixturing for highly repeatable lights out machining.
- 3-Axis Vertical Machining with Bolt on Rotary – It's versatility and easy adaptability lends itself to short run, fast-turnaround to mass productions. Simultaneous 4-axis machining capable.

	3-Axis with Trunnion	5-Axis High-Precision	3-Axis with Rotary
3 Axis Work Envelope (in)	64" x 32" x 30" (X, Y, Z)	N/A	19.68" x 15.74" x 12.9" (X, Y, Z)
Max Part Weight (lb.)	2,000	N/A	660
5 Axis Work Envelope (in.)	19" x 18" (Dia, Length)	7.87" x 6.2" (Dia, Length)	11" x 14" (Dia, Length)
Max Part Weight (lb.)	200	33	220
Spindle RPM (min <sup>-1</sup> )	12,000	40,000	10,000
Spindle Power (HP)	30 (Cont.)	10 (Cont.)	15, 5 (Peak, Cont.)
Spindle Torque (ft-lb)	22.4 (Cont.)	1.3 (Cont.)	39 (Peak)
Surface Finish Min (Ra)	12	<1	2
Accuracy (in.)	0.0001	0.00002	0.0002
Repeatability (in.)	0.0001	0.00002	0.000078

## CNC TURNING CAPABILITIES

- Dual Spindle Turning with Live Tooling – High precision/rigidity lathe. Up to 3.5" diameter feed through bar stock for continuous operation.

Work Envelope (in.)	14.17" x 23.6" (Dia, Length)
Main Spindle RPM (min <sup>-1</sup> )	3,500
Main Spindle Power (HP)	30, 25 (Peak, Cont.)
Main Spindle Torque (ft-lb)	369, 310 (Peak, Cont.)
Sub Spindle RPM (min <sup>-1</sup> )	5,000
Sub Spindle Power (HP)	20, 15 (Peak, Cont.)
Sub Spindle Torque (ft-lb)	92, 51 (Peak, Cont.)
Live Tool Spindle RPM (min <sup>-1</sup> )	6,000
Live Tool Spindle Power (HP)	10, 5 (Peak, Cont.)
Live Tool Spindle Torque (ft-lb)	30, 13 (Peak, Cont.)

## NON-CONVENTIONAL MACHINING CAPABILITIES

- We offer wire EDM and sinker capabilities that can be integrated with our conventional machining capabilities listed above to produce a more cost-effective component in certain cases.

## QUALITY ASSURANCE

ISO 9001/ AS9100/ ISO 13485/ ITAR Registered	Process validation studies (IQ, OQ, PQ)
ASQ Certified Quality personnel	In-process SPC with visual trend analysis
CMM and Smartscope	APQP (Advanced Product Quality Planning)
Statistical Process Capability analysis	Root Cause Analysis and Corrective Action
Process Failure Modes Effect Analysis (PFMEA)	Kanban, Dock-to-Stock, VMI Programs
Measurement Systems Analysis (MSA)	Lot tracing/ Record Retention/ Document Control

## DEEP / SHALLOW DRAWN PRECISION METAL STAMPINGS CAPABILITIES

Custom deep and shallow drawn metal stampings and assemblies are made from hard-to-draw materials such as stainless steels, Inconel®, titanium, and Hastelloy® that meet the precision, tolerance, quality and specifications required by our customers.

Our company also provides additional value-added services such as the manufacture of brackets and standoffs, assembly, welding, plating, coatings, and non-destructive testing to reduce the multiple tiers in your supply chain.

We will collaborate with your design team to help develop your product and to ensure a cost effective, robust drawn component. Our engineering team can help provide you with solutions to the changing needs of your industry.

### Capacity:

- Single run, progressive and transfer operations
- 5-axis machining centers
- Low to high volume – 50 to 5,000,000 pieces
- Multi-shift production

### Typical Size Ranges and Specifications:

- Diameters: 1/16" to 18" (1.6 mm to 457 mm)
- Lengths: up to 18" (457 mm)
- Thickness: .002" to .250" (0.05 mm to 6.4 mm)
- Tolerances: +/- .0005" (0.013 mm)
- Drawn corner radii: as small as .002" (0.05 mm)
- Complex shapes, sharp corners

### Materials:

- Stainless steel
- Cold rolled steel
- Titanium
- Nickel
- Tantalum
- Monel ®
- Hastelloy ®
- Kovar ®
- Inconel ®
- Mumetal ®
- Aluminum
- Copper
- Brass
- Exotic materials
- Difficult-to-draw materials
- Many others

### Engineering and Tool Design:

- Collaboration with your design team to ensure a cost effective, robust component
- In-house tooling design and fabrication, in conjunction with concurrent engineering, ensures precision tolerances, unsurpassed quality, short lead times and low costs
- Utilize our extensive library of tools to minimize start-up costs and lead times
- Auto-CAD, PRO/ENGINEER and SolidWorks/LogoPress
- Tooling design verification through Finite Element analysis and 3D simulation
- Validation of tooling production through 3D laser or CMM scanning

**Equipment:**

- Hydraulic, mechanical, pneumatic, transfer
- Up to 300 Tons
- 5-axis machining centers

**Finishing Processes:**

- Heat treating, passivating, anodizing, polishing, painting, powder coating, plating
- Degreasing, deburring, bead blasting
- Piercing, extruding, bulging, coining, tapping, machining
- Resistance spot welding, TIG welding, laser welding, brazing to MIL specifications
- Assembly of components and brackets to deep drawn components
- PEM ®, stud and standoff insertions

**Quality Assurance:**

- ISO 9001 Certified
- AS9100 Certified
- ISO 14385 Certified
- ITAR Registered
- ASQ Certified Quality personnel
- Black/Green Belts driving continuous improvement
- Empowered work teams operating with Six-Sigma and Lean processes
- Root Cause Analysis and Corrective Action
- Process Failure Modes Effect Analysis (PFMEA)
- Measurement Systems Analysis (MSA)
- Process validation studies (IQ, OQ, PQ)
- APQP (Advanced Product Quality Planning) evaluation
- In-process SPC with visual trend analysis
- Statistical Process Capability analysis
- Kanban, Dock-to-Stock, VMI Programs

**Accountability:**

- Dock-to-Stock, Lot traceability, Record Retention, Document Control