

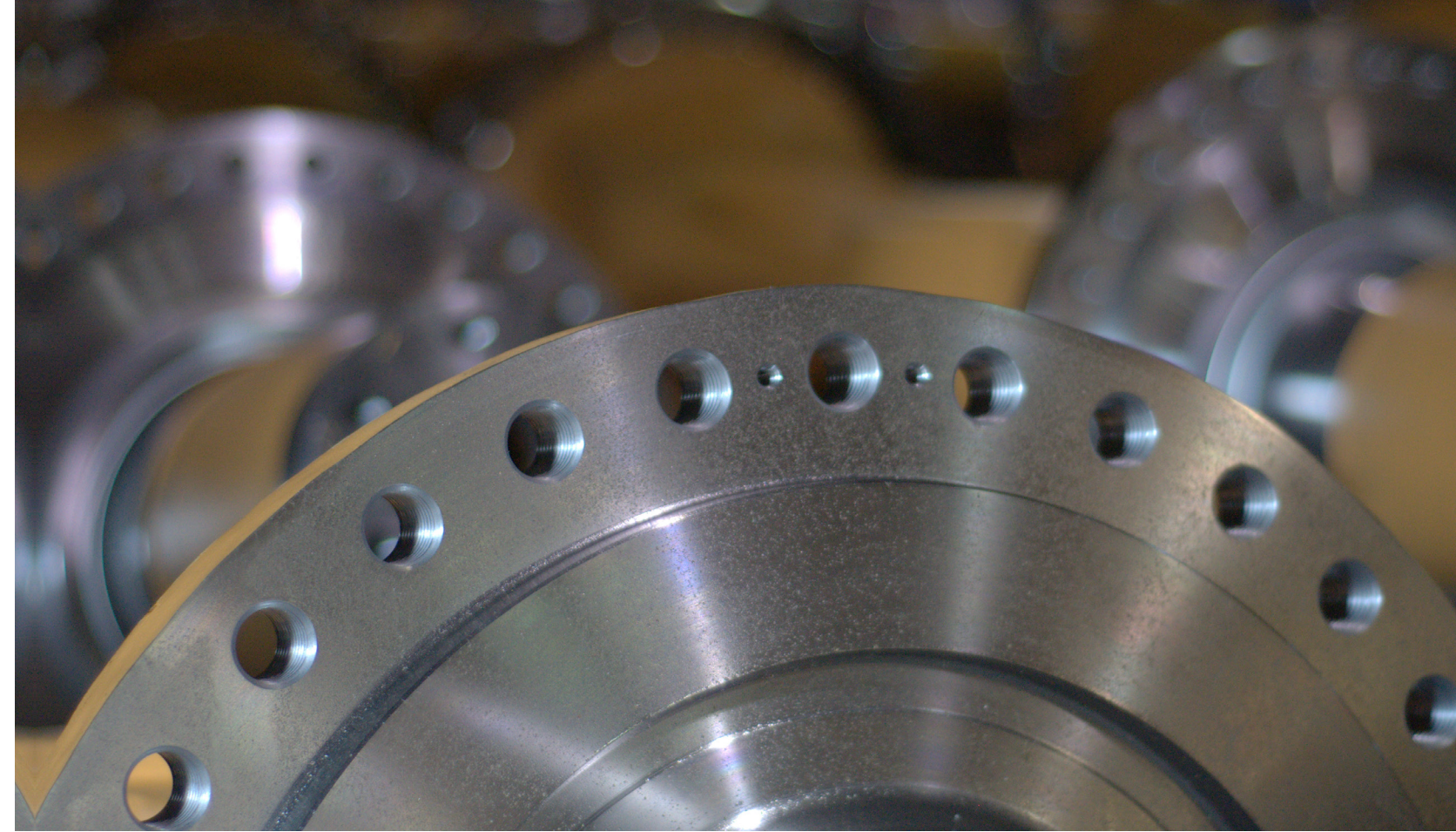
**ISO:9001:2008 Certified**  
**AS9100C Certified**

# **RMC**

**Richardson Manufacturing Company**



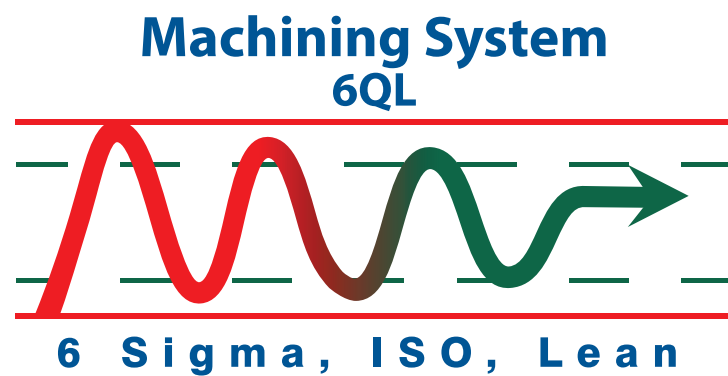
- LARGE CNC & SPECIALTY MACHINING
- CNC TURNING, MILLING & BORING
- GEAR SHAPING, HOBGING & GASHING
- METAL CLADDING, WELDING SERVICES
- METROLOGY LAB



## **QUALITY • SERVICE • DELIVERY • VALUE**

**Richardson Manufacturing Company (RMC)** - Your trusted source for quality high precision CNC Machining and Gear Cutting of mid to large size components.

For 7 decades, Richardson Manufacturing Company has gained the experience and knowledge needed to achieve the goal of total quality and reliable service. The Company is wholly committed to continuous improvement while providing the best possible products and services to its customers at all levels within its organization. Our repeated success of completing numerous jobs for world-wide leaders since our beginning is a testament to our achievement in the large machining industry. Richardson Manufacturing Company has a solid and well-deserved reputation for being a reliable source for high precision tight tolerance machining with exceptional quality for any type of part, large or small.



### **RMC Quality Statement**

Richardson Manufacturing Company is committed to meeting customer requirements and increasing customer satisfaction through continuous improvement of its products, services, and the Quality Management System.



# ENGINEERING

RMC utilizes the latest technology in 3D CAD/CAM Software to ensure fast and accurate processing of your parts. Our engineering staff is highly trained, with over 65 years of experience in developing the best and most efficient process routing possible for your products. We can import your engineering models or drawings from virtually any CAD platform to ensure quality and speed of processing. In addition, we offer technical assistance to guarantee that your products are designed for cost-effective manufacturing. We will help generate and increase manufacturing efficiencies and improve upon cost reduction. This capability simplifies and accelerates the development process.

- Full Manufacturing Engineering Capabilities
- Design of prototypes, jigs, custom tooling, and fixtures
- 3D CAD/CAM
- Solutions for many of the industry leaders
- Fast Turnaround
- Cost Reduction Planning

## CAPABILITIES FOR DIFFERENT JOBS

<b>Materials (Metals)</b>	<ul style="list-style-type: none"> <li>• Cast Iron</li> <li>• Stainless Steel</li> </ul>	<ul style="list-style-type: none"> <li>• Ductile Iron</li> <li>• Steel</li> </ul>	<ul style="list-style-type: none"> <li>• Aluminum</li> <li>• Titanium</li> </ul>	
	<b>We work with a wide range of materials. Please inquire if yours is not listed.</b>			
<b>Intended Applications</b>	<ul style="list-style-type: none"> <li>• Large Grey and Ductile Iron Castings</li> </ul>	<ul style="list-style-type: none"> <li>• Large Steel Castings/Forgings</li> </ul>	<ul style="list-style-type: none"> <li>• Large Part Machining and Repair</li> </ul>	
<b>Industry Focus</b>	<ul style="list-style-type: none"> <li>• Agricultural</li> <li>• Industrial</li> <li>• Railroad</li> </ul>	<ul style="list-style-type: none"> <li>• Heavy Equipment</li> <li>• Mining</li> <li>• Aerospace</li> </ul>	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Oil and Gas</li> <li>• Wind Energy</li> </ul>	
<b>Production Volume</b>	From prototype to production			
<b>Industry Standards</b>	<ul style="list-style-type: none"> <li>• ASTM</li> <li>• ANSI</li> </ul>	<ul style="list-style-type: none"> <li>• AGMA</li> <li>• API Q1 9th Edition</li> </ul>	<ul style="list-style-type: none"> <li>• DIN</li> <li>• ISO 9001</li> </ul>	<ul style="list-style-type: none"> <li>• NIST</li> <li>• AS9100C</li> </ul>
<b>File Formats</b>	<ul style="list-style-type: none"> <li>• AutoCAD (DWG)</li> <li>• GIF</li> <li>• BMP</li> <li>• DXF</li> </ul>	<ul style="list-style-type: none"> <li>• Inventor (IDW, IPT)</li> <li>• PDF</li> <li>• IGES, ANSI</li> </ul>	<ul style="list-style-type: none"> <li>• GibbsCam</li> <li>• JPG, JPEG</li> <li>• STEP</li> </ul>	
<b>Equipment Capabilities</b>	<b>CNC Control Capabilities:</b> <ul style="list-style-type: none"> <li>• Parametric Programming</li> <li>• Polar Coordinate Interpolation</li> <li>• Multi-Axis Milling</li> <li>• Live Tooling Lathe</li> </ul>	<b>CAD Design Services:</b> <ul style="list-style-type: none"> <li>• AutoCAD</li> <li>• Autodesk Inventor</li> </ul>	<b>Parametric Programming:</b> <ul style="list-style-type: none"> <li>• Fanuc</li> <li>• Okuma</li> <li>• Siemens</li> <li>• Heidenhain</li> </ul>	<b>CAM Programming:</b> <ul style="list-style-type: none"> <li>• GibbsCAM</li> </ul>
<b>Efficiency</b>	<ul style="list-style-type: none"> <li>• <b>Six Sigma</b> <ul style="list-style-type: none"> <li>• Black Belts</li> <li>• Yellow Belts</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Lean Manufacturing Practices</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>5S + 1</b></li> <li>• <b>Kaizen</b></li> </ul>	

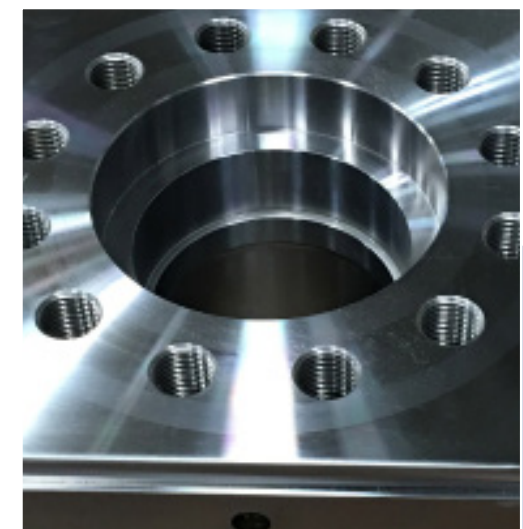


## CNC HORIZONTAL & VERTICAL MILLING

Richardson Manufacturing Company specializes in high-precision horizontal and vertical milling and boring operations. We routinely hold tolerances of +/- .0005" in addition to rough machining at high metal removal rates. Richardson Manufacturing utilizes milling centers with up to 4,000mm of X-Axis travel and 3,000mm of Y-Axis travel. These machines are equipped with pallet changers that allow us to maximize productivity and reduce downtime for setup. Touch probe technology is utilized on the machines to align workpieces as well as for on-machine inspection. 5-axis mill-turn and 5-axis machining centers allow us to complete parts in one operation that might normally require two or three. We also have the capability of contour boring of profiles and tapers. We pride ourselves on our creativity in workholding, cutting tool application, and process development. We work diligently with our customers to meet cost, quality, and delivery requirements. Common applications include machining of ductile iron castings and steel forgings and castings.

## CNC MILLING CAPACITY

	CNC Horizontal Milling Capacity	CNC Vertical Milling Capacity
<b>Tolerances</b>	±.0005" / ± 0.0127 mm	±.0005" / ± 0.0127 mm
<b>Workholding</b>	Custom fixtures and chucks designed and built in house as needed.	Custom fixtures and chucks designed and built in house as needed.
<b>Max Part Weight</b>	44,000 lbs (20,000 kg)	8,800 lbs (4,000 kg)
<b>X Axis Travel</b>	160 in / 4,064 mm	78.74 in / 2,000 mm
<b>Y Axis Travel</b>	120 in / 3,048 mm	55.12 in / 1,400 mm
<b>Z Axis Travel</b>	60 in / 1,254 mm	29.53 in / 750 mm
<b>Axes</b>	X, Y, Z, W, and contouring B axis	5 axis Mill turn
<b>Pallet Range</b>	600 mm x 600 mm to 1,800 mm x 2,500 mm	1,000 mm x 1,000 mm to 1,250 mm x 2,240 mm



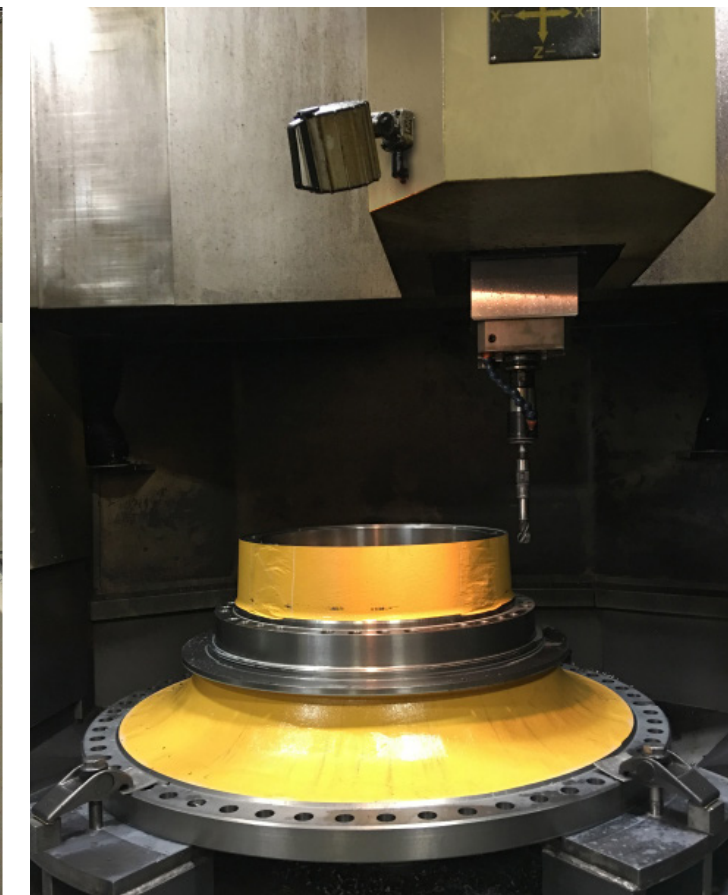
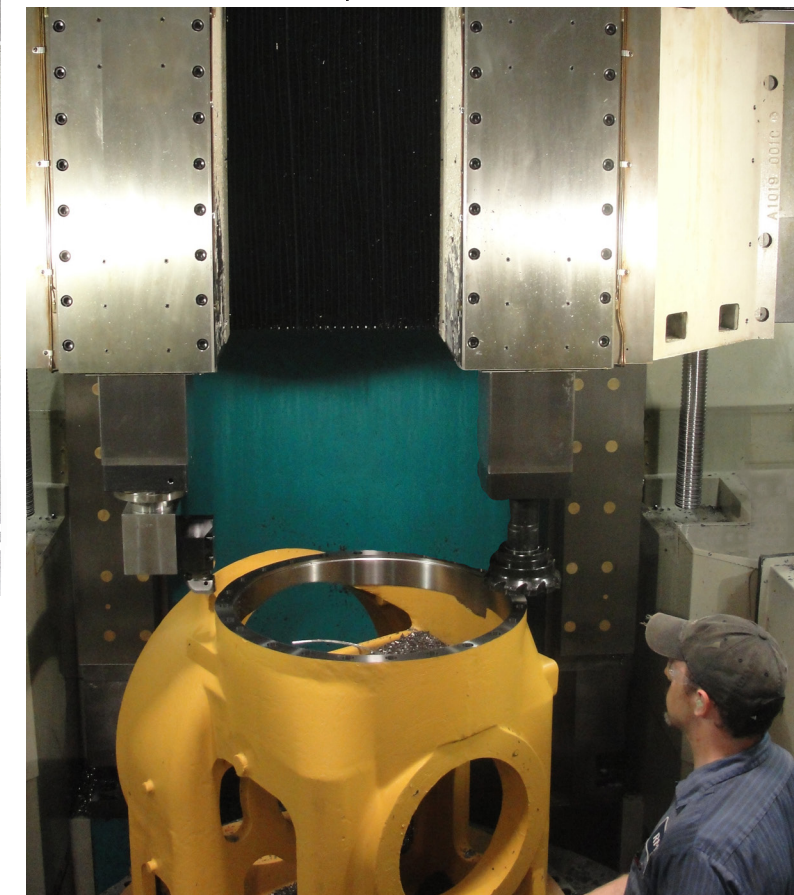


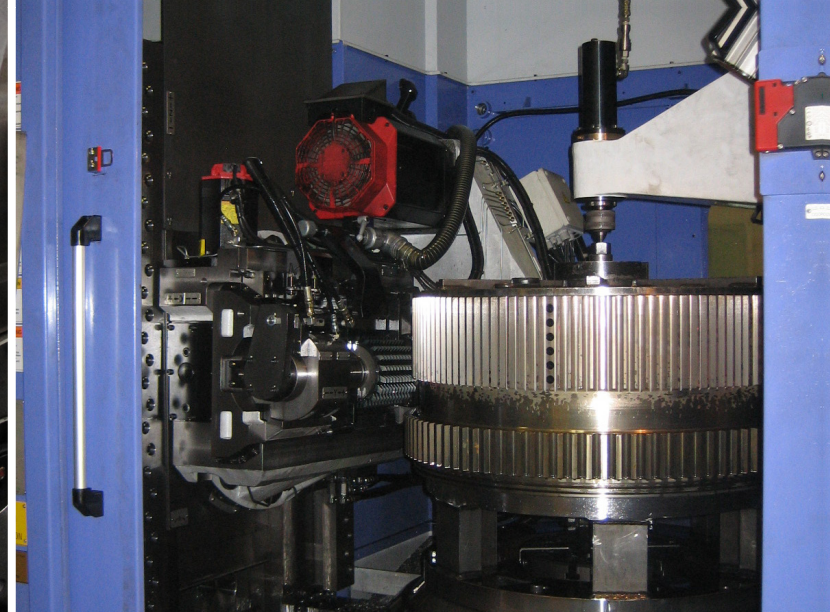
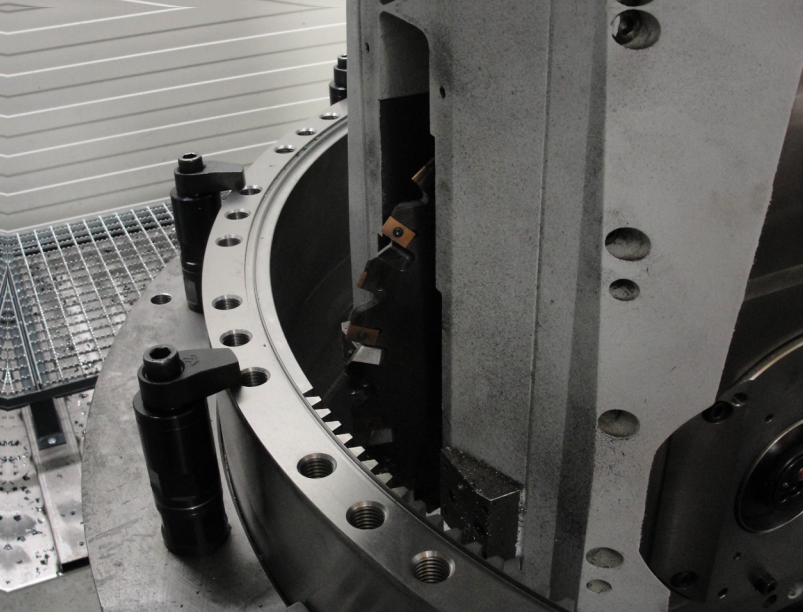
## CNC HORIZONTAL & VERTICAL TURNING

Richardson Manufacturing Company specializes in high-precision horizontal and vertical turning operations. We routinely hold tolerances of +/- .0005" with the capability to handle workpieces up to 128" diameter and weighing up to 20,000 lbs. We pride ourselves on our ingenuity in workholding, cutting tool application, and process development. Our engineers utilize state-of-the-art equipment to produce parts efficiently with consistent quality. We work diligently with our customers to meet cost, quality, and delivery requirements. Common applications include machining of ductile iron castings and steel forgings and castings.

## CNC TURNING CAPACITY

	CNC Horizontal Turning Capacity	CNC Vertical Turning Capacity
<b>Tolerances</b>	±.0005" / ± 0.0127 mm	±.0005" / ± 0.0127 mm
<b>Workholding</b>	<ul style="list-style-type: none"> <li>• Three and Four-jaw Hydraulic chucks</li> </ul>	<ul style="list-style-type: none"> <li>• Custom fixtures and chucks designed and built in house as needed</li> <li>• Custom soft jaws and workholding components</li> </ul>
<b>Max Part Weight</b>	20,000 lbs	20,000 lbs
<b>Table/Chuck Diameter</b>	48 in / 1,219.2 mm	120 in / 3,048 mm
<b>X Axis Travel</b>	27 in / 685.8 mm	90 in / 2,286 mm
<b>Z Axis Travel</b>	150 in / 3,810 mm	59 in / 1,498.6 mm
<b>Distance Between Centers</b>	156 in / 3,962.4 mm	
<b>Work Height</b>		110 in / 2,794 mm
<b>Swing</b>	58.27 in / 1,480 mm	128 in / 3,251.2 mm

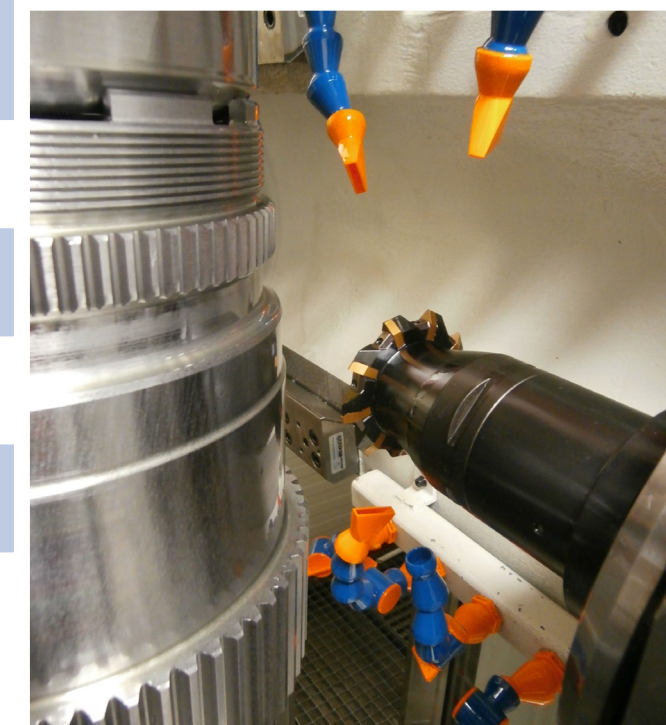




# GEAR CUTTING

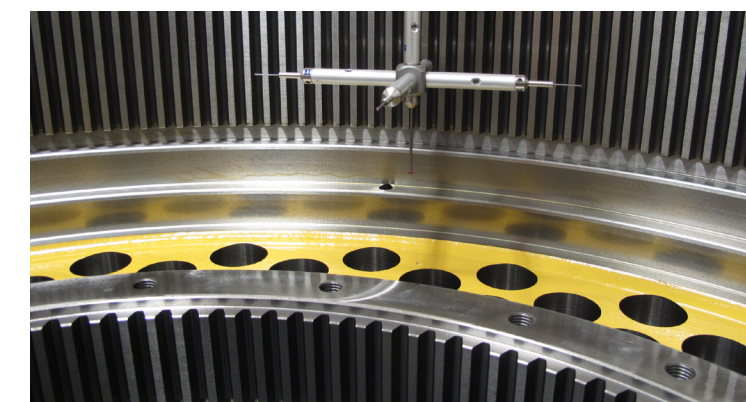
## GEAR CUTTING CAPACITY

<b>Gear Cutting Processes</b>	Hobbing, Shaping, Spline Milling, Gashing (Internal and External)		
<b>Gear Types</b>	<ul style="list-style-type: none"> <li>• Internal Spur</li> <li>• Splines</li> </ul>	<ul style="list-style-type: none"> <li>• External Spur</li> <li>• Rough and Finish Gashing</li> </ul>	<ul style="list-style-type: none"> <li>• Helical</li> <li>• Pre-grind finishing</li> </ul>
<b>Material Pre-processing</b>	All gear blanks and material can be turned/milled in-house before gear cutting.		
<b>Workholding</b>	Custom fixturing and chunks designed and built in-house as needed.		
<b>Applications</b>	<ul style="list-style-type: none"> <li>• Ring gears</li> <li>• Shafts</li> </ul>	<ul style="list-style-type: none"> <li>• Wheel hubs</li> <li>• Spindles</li> </ul>	<ul style="list-style-type: none"> <li>• Axles</li> <li>• Anchor brakes</li> </ul>
<b>Gashing Workpiece Diameter</b>	<b>Max Internal</b> 94.5" / 2,400mm	<b>Max External</b> 78.7" / 2,000 mm	
<b>Gashing Workpiece Height</b>	<b>Max Internal</b> 57.7" / 1,460mm	<b>Max External</b> 129.9" / 3,300 mm	
<b>Gashing Tooth Size</b>	< 1 D.P./> 25.4 Mod		
<b>Shaping Workpiece Diameter</b>	<b>Max</b> Ø86" / 2,184 mm		
<b>Shaping Tooth Size</b>	<b>Max</b> 1 D.P. / 25.4 Mod		
<b>Shaping Stroke Length</b>	<b>Max</b> 12.6" / 320 mm		
<b>Shaping Workpiece Height</b>	<b>Max</b> 55" / 1,397 mm		
<b>Hobbing Workpiece Diameter</b>	<b>Max</b> 78.7" / 2,000 mm		
<b>Hobbing Tooth Size</b>	<b>Max</b> < 1 D.P./> 25.4 Mod		



Richardson Manufacturing Company is pleased to offer precision gear cutting capabilities for a variety of industries which include industrial equipment, mining, oil & gas, and heavy construction. These capabilities include CNC hobbing, shaping, gear milling, and gashing machines that can cut spur gears with crowning or taper as well as helical gears. The Hobbing machines can accommodate parts with a diameter of up to 78.7" (2,000 mm), a **max axial face width** of up to 46" (1,168mm), and gear teeth as large as 1.6 D.P. (15.88 module). RMC also has heavy-duty CNC gear shapers that can accommodate parts up to 86" (2,184mm) in diameter, 55" (1,397mm) tall, and cut gear teeth as large as 1 D.P. (25.4 module) with up to 12.6" (320mm) of stroke length.

A recent addition of our gear cutting capacity includes a new 2,400 size hob/gashing machine. This gives RMC the capability to perform either external hobbing, gear-milling, or gashing to rough or finish quality levels for spur, helical, or double helical gears up to 78.7" (2000mm) in diameter with an axial face width of about 69" (1,760mm). In addition, this machine is also configured with an internal gashing head that can perform either rough or finish quality gear gashing operations to parts up to 94.5" (2,400mm) in diameter. We can work with a wide range of materials depending on customer needs, from prototype to production. Our state-of-the-art gear inspection equipment can perform full analytical gear inspection to verify the quality of the gears produced to ensure meeting the specifications required by the customer, to any gear quality standard including AGMA2015. **Whether its a tall shaft, large diameter ring gear, wheel hub, or axle, RMC can find a solution for your gear and spline cutting needs.**





# INSPECTION/QUALITY SERVICES

Richardson Manufacturing Company has a highly skilled team who specialize in inspection and quality services. We perform these services in an environmentally-controlled metrology lab with both DEA and Zeiss Coordinate Measuring Machine (CMM) equipment. RMC has also invested in several portable Articulating Arm (AA) CMM's which allow us to perform these services directly at the machines and on the shop floor. Although these services support our current production needs, we offer inspection and data analyzing services separately to meet customers' quality needs. Richardson Manufacturing will also sub-contract CMM Services on an as needed basis. Our newest CMM machine, a Zeiss Accura is equipped with the VAST scanning probe and Gear-pro software which allow us to perform full analytical gear inspection to the AGMA 2015 standard as well as generate quality reports as may be required by customers. Richardson Manufacturing Company is proud to have several Six-Sigma certified employees with black and yellow belts, as well as a full team trained in Geometric Dimensioning and Tolerancing (GD&T) to help in continually improving our quality and efficiency in all areas of the company.



# INSPECTION/QUALITY SERVICES

## General Capabilities

### CMM Inspection Services

- Environmentally Controlled Metrology Lab CMM inspection
- On-machine/shopfloor CMM inspection
- Multi-Point Inspection System

### Non-Destructive Testing (NDT)

- ASNT Certified Inspectors
- Dye Penetrant
- Magnetic Particle Inspection
- Hardness testing
- Surface Finish Inspection



## Certifications

- ISO 9001
- API Q1 9th Edition
- AS9100C

## Inspection Methods/ Equipment

### CMM

#### • ZEISS ACCURA

- 1,600mm x 3,000mm x 1,300mm
- VAST Scanning Probe System
- Calypso Inspection Software
- Gear-Pro Gear Inspection Software (AGMA 2015 inspection standard now available)

#### • DEA EPSILON

- 1,300mm x 2,500mm x 1,300mm
- Camio Inspection Software

#### • ARTICULATING ARM (AA) - PORTABLE FARO ARM

- 4ft (2)
- 8ft
- 10ft

#### • INSPECTION METHODS

- Bore Gages
- Calipers
- Digital Height Gages
- Gage Pins, Balls & Blocks
- Hardness Testers
- Inspection Microscopes
- Micrometers
- Profilometer
- Surface Plates
- Geometric Dimensioning and Tolerancing (GD&T)



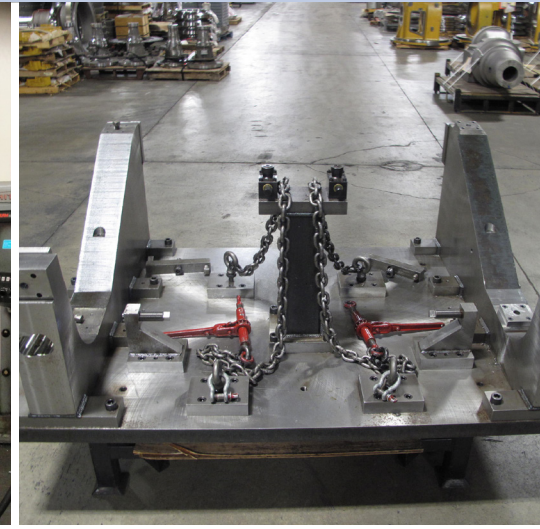


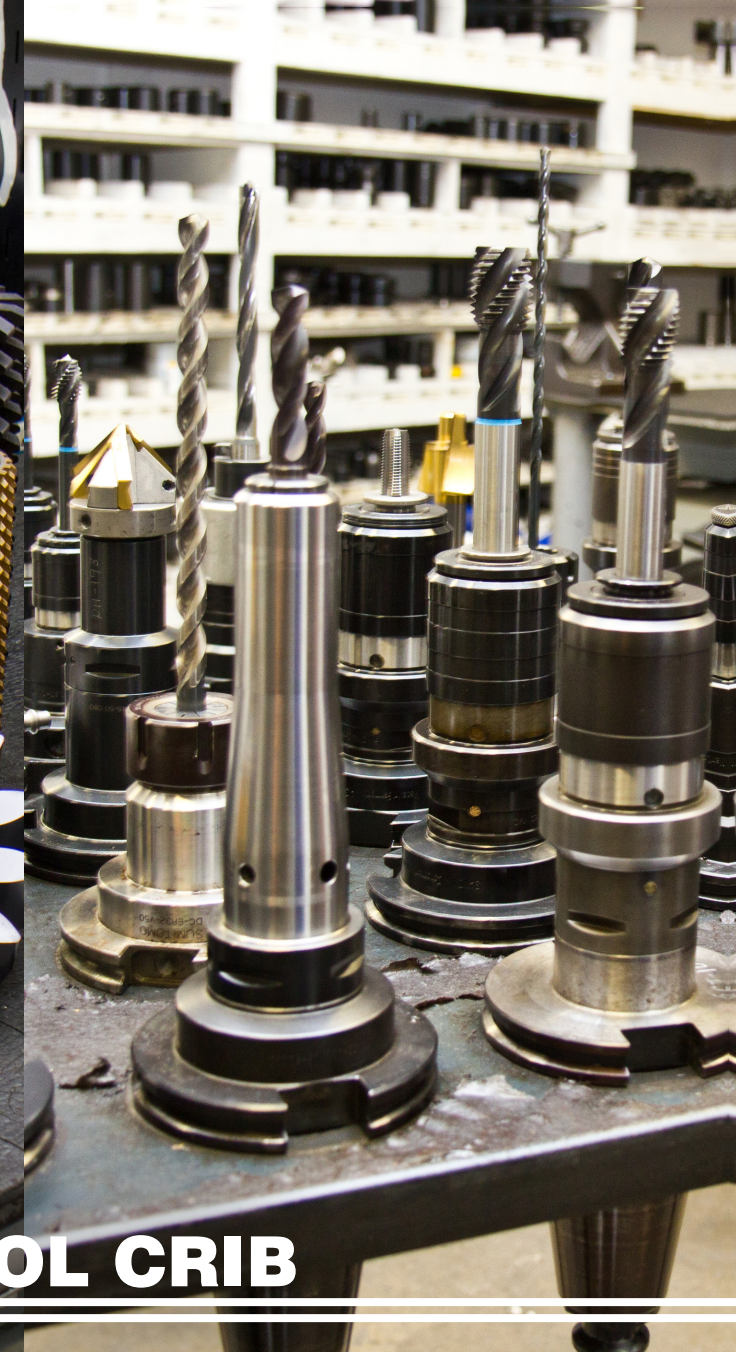
# SPECIALTY MACHINING (RMC TOOL ROOM)

Richardson Manufacturing Company features a one-stop job shop for all of your custom machining needs called *RMC Specialty Machining*. RMC Specialty Machining not only supports our custom tooling and fixture needs, but also serves the local communities' low volume machining needs, with a focus on repair, prototype, and work-holdings. This shop has a very skilled and competent staff to help you with any of your custom needs, from design and engineering to machining and fabrication. We offer a large range of processes, such as manual and CNC machining, plasma and waterjet cutting, welding, grinding, fixture design, and oxy burning. We can accommodate part sizes less than one inch and up to three meters. Applications in the past have included projects like shaft/arbor repair, custom component machining, welding services, engineering design, and many others. Comfortable with a wide range of materials and processes, our staff will always find a way to coordinate with the customers' needed lead times in order to meet deadlines. Please give us a call to learn how we can accommodate you.

# SPECIALTY MACHINING CAPACITY/CAPABILITIES

<b>General Capabilities</b>	<ul style="list-style-type: none"> <li>Manual Milling &amp; Turning</li> <li>Honing</li> <li>Metal Fabrication</li> <li>ARC Metal Cladding</li> </ul>	<ul style="list-style-type: none"> <li>CNC Milling &amp; Turning</li> <li>Grinding</li> <li>Oxy Burning</li> <li>CNC Waterjet Cutting</li> </ul>	<ul style="list-style-type: none"> <li>CNC Plasma Cutting</li> <li>CAM Programming</li> <li>CAD Modeling (2-D, 3-D) (GibbsCam)</li> </ul>
	<b>Welding</b> <ul style="list-style-type: none"> <li>TIG</li> <li>MIG</li> </ul>	<b>Design</b> <ul style="list-style-type: none"> <li>Prototypes</li> <li>Jigs &amp; Fixtures</li> <li>Tooling</li> </ul>	
<b>Tolerances</b>	± .0001"		
<b>Length</b>	<b>Max</b> 9.84 ft / 3m		
<b>Width</b>	<b>Max</b> 9.84 ft / 3m		
<b>Thickness</b>	<b>Max (Oxy Burning-Steel)</b> 2 in 50.8 mm	<b>Max (Plasma Cutting-Steel)</b> .750 in 19.05 mm	<b>Max (Waterjet)</b> 8 in 70 in x 190 in (length & width)
<b>Production Volume</b>	<ul style="list-style-type: none"> <li>Custom Products</li> </ul>	<ul style="list-style-type: none"> <li>Prototypes</li> </ul>	<ul style="list-style-type: none"> <li>Repairs</li> </ul>
<b>Intended Application</b>	<ul style="list-style-type: none"> <li>Shafts &amp; Arbors Build and Repair</li> <li>Tool Repair</li> <li>Custom Industrial Workbenches</li> </ul>	<ul style="list-style-type: none"> <li>Custom Metal Signs</li> <li>Sheet Metal Cutting</li> <li>Extrusion Die Repair</li> </ul>	<ul style="list-style-type: none"> <li>Non-Standard Thread Cutting</li> <li>Precision Gauge and Master Design and Build</li> <li>Custom Design &amp; Build Fixtures and Chucks</li> </ul>





## WATER JET CUTTING

## STATE-OF-THE-ART TOOL CRIB

In 2013 RMC Specialty Machining added a water jet cutting machine to our long list of capabilities. Water jet cutting is an established method of producing cost effective and precise parts from almost any type of material. Water jet cutting can machine almost any material to include aluminum, stainless steels, hardened and tool steels, plastics, laminates, rubbers, forgings, heat sensitive materials, granite, marble, tile, glass, wood, cork and many more.

Our state-of-the-art Tool Crib is responsible for building toolkits for every job, and providing production supplies to the entire plant. This enables accurate, efficient, and orderly distribution of tooling components to ensure we are minimizing machine downtime and optimizing machine capacity. We maintain an accurate inventory for thousands of items to reduce and eliminate machine idle time to boost efficiency and increase throughput.

We offer a large working table of 70" x 190" and can cut up to 8" thick steel. The machine is equipped with the OMAX A-Jet 5-axis water jet head for cutting intricate geometry and complex profiling.

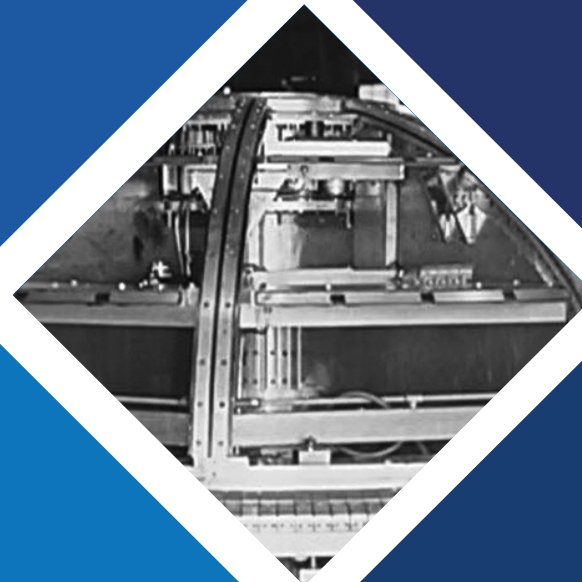
Any size project is welcome, from the one part prototype to the large production run. We are able to work from your precise CAD file to your hand drawing you bring in. Contact us today to discuss your project or for more information.



### RMC Quality Statement

Richardson Manufacturing Company is committed to meeting customer requirements and increasing customer satisfaction through continuous improvement of its products, services, and the Quality Management System.

## HISTORY OF RICHARDSON MANUFACTURING COMPANY



As Richardson Manufacturing Company (RMC) approaches its 70th year, its capabilities and commitment to manufacturing have grown with the times. Flexibility within a highly skilled and motivated workforce and state of the art manufacturing techniques have been the cornerstone of meeting the demands of the industry. Currently Richardson Manufacturing Company's triad of services falls under three distinct categories: large component CNC machining, gear and spline cutting, and high precision prototype and tool room machining.

Richardson Manufacturing Company has always been a family owned enterprise. Four generations strong, the company officially started in the early 1930's as the Richardson Dairy. The dairy was located on the same location that the plant now occupies. It was decided in 1946 to transition from the production side of the dairy business to a manufacturer of dairy equipment which included pasteurizers, milk coolers, and chest- type freezers. It was at that point that the RMC story began.

Founded by Lloyd Richardson and his sons W.L. Richardson Sr. and L.F. Richardson Jr. in 1946, RMC added general machining to its capabilities as it grew its reputation in the dairy and refrigeration business. Soon thereafter, RMC became a subcontract source for machined and flame cut parts for Allis Chalmers and other various heavy construction equipment manufacturers in the local area.

In the early 1950's, the Korean War brought about a major copper shortage which caused RMC to suspend all refrigeration manufacturing and focus on building a high precision subcontract machining business. During the Cold War era of the 50's, RMC supplied precision machining and fabrication services for many defense and research programs which included the B47 Bomber for Boeing Aircraft, the Titan Missile for Glenn L. Martin Co., as well as work on components for the first inertial guidance system and nuclear cyclotron acceleration chambers for the University of Illinois and the University of Colorado. RMC has always maintained a high precision tool room job shop to support such activities and is now marketed as "Richardson Specialty Machining."

Throughout the 1960's and 70's, RMC's expansion was focused around the needs of the growing construction equipment industry. During this time period, RMC increased its capability to include progressively larger vertical turning. Our customer base expanded to include Firestone Tire and Rubber to support the tire industry for mold repair and construction, as well as Remington Arms and Olin Corp. for highly specialized EDM die work for the ammunition industry. Construction equipment machining also increased when Caterpillar became a major customer for RMC.

In 1979 RMC entered the "new" era of CNC manufacturing. Recognizing the fact that utilization of this new technology was necessary to be competitive in this market, RMC first introduced CNC lathes, CNC machining centers, and coordinate measuring machines (CMM) to its facility to meet customer needs in quality and productivity. However, even with the advent of these new technologies, RMC has always attributed its success, in the past and present, to its highly-skilled, motivated, and dedicated personnel. In conjunction with this, RMC has always invested heavily in continuous training and systems to put our workforce at the forefront of the competition.

The 1990's brought RMC's next opportunity for a major shift in both size and scope of the parts being manufactured. With the rapid growth of the mining industry and the birth of the mega-class mining trucks and support equipment, RMC was a major player in both the prototype and final production phases of many of these vehicles. RMC was intimately involved in the pre and post production of many of Caterpillar's large vehicles including but not limited to the 994 Wheel Loader, 24H Motor Grader, 5230 Hydraulic Excavator, as well as the world's largest mining truck: the 400 Ton 797.

During this time, RMC grew to be a world-class supplier for many of the lower powertrain components for these large vehicles. This includes not only the final milling and turning operations of these parts, but also the internal and external splining requirements -- all performed under one roof.

As the new millennium passed, RMC's reputation continued to grow for producing large quality powertrain components for the mining and construction industry. RMC was fortunate to add Komatsu to their customer list in supplying fully machined axles, wet brake parts, spindles, and other powertrain components. With that addition, RMC has supplied lower powertrain components for over 85% of the mega-class mining trucks produced in the world today.

As component designs developed in the 2000's, many started utilizing splines in replacement of other mating-part features. Because of that, RMC found a rise in the frequency of spline production. However, even though RMC had been a producer of splines for years up until this time, it wasn't until early 2009 a decision was made to expand into the large precision gear manufacturing business. This required an expansion in both CNC hobbing, shaping, and gashing capacity, as well as acquiring the necessary CMM gear checking equipment to certify gears to any gear standard including the AGMA2015, as has been required by newer customers. Along with that, an immense amount of training was pursued in order to gain the expertise and experience to confidently produce precision gears for their customers. With an eye on larger geared components to match these large power train components, RMC is well poised for the future as it becomes a member of the American Gear Manufacturers Association.

This triad of services: large component CNC machining, gear and spline cutting, and high precision prototype and tool room machining continues to be the foundation of our success. Expanding our customer base with these services is our ultimate goal. RMC is dedicated to providing quality machining and gear cutting services in a timely manner and at a fair price. Our past and future success is based on the following four-point philosophy:

**QUALITY – SERVICE – DELIVERY – VALUE**  
**Service to the customer is our only business!**

In the words of John F. Welch, former CEO of General Electric Company, *"The customer either rates us better or worse than someone else. It's not very scientific, but disastrous if you score low."*





**RMC**

**Richardson Manufacturing Company**

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