



Custom Capabilities

Powder Metal Services

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RPM Product Examples

Powder Metal Manufacturing of an Adjusting Nut

Powder Metal Manufacturing of Hammer Drill Gears

Powder Metal Manufacturing of a Pulley Hub

Powder Metal Manufacturing of a Clutch Shoe

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Custom Powder Metal Services



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Advantages of the PM process:

Ridgway Powdered Metals, Inc. is a true pioneer in this industry having aggressively invested in the technology and equipment which allows it to take full advantage of its many benefits.

Among PM's advantages are:

- Eliminates or minimizes machining by producing parts at - or close to - net shape
- Eliminates or minimizes scrap losses by typically using more than 97% of the starting raw material in the finished part
- Permits a wide variety of alloy systems – some brand-new, others RPM proprietary grades – for customers' items.
- Produces good surface finish – 32 RMS or better
- Provides heat-treatable materials for increased strength, wear resistance and durability
- Provides controlled porosity for self-lubrication or filtration
- Facilitates manufacture of complex or unique shapes which would be impractical or impossible with other metalworking processes
- Is suited to moderate to high volume component production requirements
- Offers long-term performance reliability in critical applications
- Is a "GREEN" and SUSTAINABLE industry
- Is cost-effective - minimal average cost advantage is 30% (others more than 100%) over other metal working technologies

Our modern facilities list includes:

- 30 presses whose compacting forces range from 4 through 550 tons, and whose large presses include 5 level capabilities;
- Sintering furnaces – both conventional and high-temperature units – with large volume production capacities and precise controls for each application;
- Ancillary deburring, impregnation and other secondary apparatus are on hand and available for customers' critical applications.
- RPM manufactures parts measuring from 0.06" to 4.0" long with diameters from 0.25" to 6.0" and weights from a few grams up to 8 lbs.,
- RPM consistently achieves net shape tolerances as low as ± .0003" on horizontal surfaces
- Production rates are rapid at RPM, and dimensional integrity is maintained from part to part, order to order.
- Applications are almost limitless, and prices are very reasonable.

[Contact Us](#) today to learn how our custom powder components can provide a cost effective option for your next project.

Materials:

RPM builds parts in all of the standard Metal Powder Industries Federation (MPIF) grades as well as RPM proprietary grades. (Information by request)

(See "Materials Standards for PM STRUCTURAL PARTS", and "Materials Standards for SELF-LUBRICATING BEARINGS" MPIF Standard 35)

Listed below are some of the more common grades and their possible applications:

(It is recommended that you discuss material selection with RPM Engineering prior to specifying one for your application.)

Material	MPIF CODE	Characteristics
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Iron	F-0000	Electro-Magnets
Iron/Carbon	F-0003/F-0008	Moderate Strength, Heat treatable
Iron/Copper/Carbon	FC-0200 to FC-0208	Good strength and wear resistance, Heat treatable
Iron/Nickel/Carbon	FN-0200 to FN-0408	Good impact strength and wear properties, Heat treatable
Alloy Steels	FLNzC-4005 to FLDN4C2-4905	A wide variety of materials with specific properties to match the critical requirements of the application – all are Heat treatable
Copper Infiltrated Steel	FX-1005 to FX-2008	Good strength, improved machinability, gas tight Heat treatable
Stainless Steel	SS-303, SS-304, SS-316, SS-409, SS-410, SS-430, SS-434, 17-4PH	Select the stainless grade that will satisfy your requirements for corrosion resistance, ductility, machinability, etc.
Copper	C-0000	Electrical applications
Bronze	CT-1000	Self-Lubricating Bearings
Brass	CZ-1000, CZ-2000	Mechanical components and Hardware
Aluminum*	201AB, 601AB	Light weight, good strength, solution heat treatable

* - No MPIF designation at this time.

Tolerances

Below are shown the typical tolerances for PM parts having uniform cross-sections.

Characteristic	As Sintered		As Sized or Coined	
	Decimal	Metric	Decimal	Metric
Length	± 0.005"	±0.126	± 0.002"	±0.051
Inside Diameter	± 0.002"	±0.051	± 0.0003"	±0.008
Outside Diameter	± 0.002"	±0.051	± 0.001"	±0.0025
Concentricity	0.003	0.076	0.003	0.076
Flatness	0.002	0.051	0.002	0.051
Parallelism	0.002	0.051	0.002	0.051
Perpendicularity	0.002	0.051	0.002	0.051

Some dimensional and feature tolerances may be reduced with secondary machining and grinding operations.

Discuss those possibilities with RPM Engineering.

Industries served

Automotive	The largest market for PM parts
Home Appliances	Virtually every appliance in use today contains some PM parts
Power Tools	PM parts have helped to make them available and inexpensive
Fluid Power	High-density and copper infiltration produce pressure retaining components
Lawn & Garden	That lawn mower, hedge clipper and others are full of PM parts
Agriculture	See that big green or yellow or orange machine in the grain fields - they are all using many PM parts
Construction	Even the mighty bull-dozer must rely on certain PM parts
Motors	Self lubricating bearings and PM magnets (electro and permanent)

	keep the motors running
Off-Road	Both for utility and sport
Recreation	Fishing reels and skate boards, outboard motors and bicycles, guns and golf clubs, and many more use PM parts
Hardware	Fasteners, washers, bushings, connectors, spacers, and all sorts of necessary products
Business	Computers, shredders, printers, recorders, fax machines happily find PM parts just what they need
Vending	Multiple applications
Conveyors	Rollers, cams, sprockets, gears
Materials handling	Connectors, latches, fingers, catches, pushers and many more
Miscellaneous	Exercise apparatus, cutter blades, gas filters, weapons, munitions, etc., etc., etc.

Design considerations

Many features that are found on parts made with other metal working techniques are there due to how they were built. **PM** usually can eliminate them.

PM parts can be produced with great geometric complexities. There are feature considerations, somewhat unique with **PM**, that should be avoided. Some are listed below.

- No feature that would resist ejecting parts from tools: reverse tapers, holes other than in the direction of pressing, threads, undercuts, diamond knurls (all of these can be included using secondary machining)
- Thin walls, narrow splines, fine pitch gears (finer than 48 pitch) and sharp corners should be avoided
- Features that require very delicate tools to compact – due to the very high compressive forces needed to compact metal powders.
- Vertical lengths not to exceed ratios of 4 to 1 of their horizontal ones on heavy-walled objects; 2 to 1 on thin-walled ones
- Knife or feather edges should be designed out of parts
- Small projections on top faces of parts need to be large enough to allow for tool safety, ease of ejection, and be located inboard from outside edges of parts.

It is always good practice to discuss your parts – those having questionable features – with **RPM Engineering**.

Virtually any feature that would create problems or be impossible to compact with hard compacting tooling can be added using machining operations.

Whenever a part can be modified to eliminate the additional secondary operations its price will obviously be more advantageous.

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