



Breaking News: MPP acquires Canadian facility. *See details on page 2.*

MPP Mission Statement

To create value by delighting our customers and enhancing the capabilities of the entire company.

FREE PUBLIC P/M DESIGN SEMINARS

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MPP Wins 2003 MPIF Grand Prize

Bike Rack Parts Win Stainless Steel Award

Metal Powder Products Company has received the 2003 MPIF Grand Prize Award in the Stainless Steel Category for a "clamshell" component that is used in a patented bicycle rack system manufactured by Yakima Products of Arcata, California. Yakima is one of the world's leading manufacturers of bike and boat racks, cargo carriers, snowshoes, and other outdoor recreational and safety equipment.

Two of the clamshell parts are mated to form the housing for an adjustment knob that is an integral part of the rack's quick-release system. The internal hub in the lower cavity mates with notches cut into the adjustment knob. The design creates a slight interference to assure that the assembly will not unthread due to the normal vibrations that occur during vehicle operation. Yakima ruled out die cast parts because of strength, cosmetic, and galvanic corrosion issues. P/M stainless steel (*specifically, 316 N2-33*) was chosen over an investment cast design (*which also required secondary machining*) because it represented a 65% cost saving, closer overall tolerances, improved wear resistance, and superior surface finish.



These stainless steel clamshells won the 2003 MPIF Stainless Steel Grand Prize.

The clamshells are mated to create a housing that accommodates a brass adjustment knob, which rides in the short cavity (*see photo*) and interlocks with the hub on the inner part of the short cavity. Mismatch of the parting lines on the parts must not exceed .005 and must be consistent from part to part. Perpendicularity of the blind pocket to the body is critical to allow smooth working of the adjustment knob. Physical and mechanical requirements include a tensile strength of 60,000 psi, a yield strength of 39,000 psi, a density requirement of 6.5 g/cm³, and a minimum hardness requirement of HRb 50.

The part is pressed and sintered to net shape, requiring only deburring and chemical passivation (*to ASTM A380*). Sintering is done in a hydrogen/nitrogen atmosphere at high temperature for high strength. The part is manufactured at MPP's Anaheim Division in Anaheim, California.

This year's award marks the third time in the past four years that MPP has captured one of the Grand Prize Awards in the MPIF's Part-Of-The-Year competition. The awards have come in each of the major P/M categories: Ferrous, Non-Ferrous, and Stainless Steel.



The clamshells are part of Yakima's Viper bike rack system.



Close-up of Viper bike rack clamp.



STAINLESS STEEL PARTS

MPP has a tradition of winning awards in the Stainless Steel category of the annual MPIF Part-Of-The-Year Competition. The parts shown below both won the Grand Prize in the Stainless Steel category.



STAINLESS STEEL LATCHBOLT

This P/M latchbolt is used in vertical rod safety exit devices. Because of the internal cavity, it was originally manufactured from investment cast stainless steel. By switching to a P/M weldment, the cavity could be produced in a part retaining all the inherent qualities of stainless, with a cost reduction of 40%. It is comprised of two asymmetrical halves that are welded together, re-sintered to stress-relieve the weld, and then deburred, producing a surface finish superior to the cast parts. It won the 1998 Grand Prize Award in the Stainless Steel category.



PRINTER TIMING BELT PULLEY

MPP won the 1993 Grand Prize in the Stainless Steel category with this timing belt pulley for a high-speed commercial printer. Two P/M parts are sinter-bonded together to form the assembly, which replaces a hobbled gear that was assembled to a machined aluminum collet. The conversion to P/M produced a cost saving of more than 80%.

MPP Acquires Canadian Manufacturing Facility

In mid-June, MPP announced the acquisition of the Sinteris Division of Dynagear. The former Dynagear-Sinteris plant is located in the city of Blenheim, in Ontario, Canada. The plant, a QS 9000 and ISO 9002 registered facility, manufactures a variety of powder metal components for automotive engines and transmissions, including clutch hubs, cam sprockets, and a variety of components for exhaust gas recirculation systems. Press capacity ranges from 20 to 750 tons. According to Ben James, Vice President of Manufacturing, the new division (designated as MPP Canada) brings not only the high level of pressing and sintering expertise demanded by MPP, but also "considerable capability in the area of value-added secondary operations and finishing. The facility is particularly strong in the areas of turning, milling, boring, threading, and honing." Rick Armstrong, who served as president of Sinteris, has been appointed Operations Manager of MPP Canada.



MPP has acquired the Sinteris Division of Dynagear. The plant, pictured here, is located in the city of Blenheim, in Ontario, Canada.

Watch for a full profile of MPP Canada in the Fall 2003 edition of the Metal Powder Press.

MPP Plants Announce Environmental Certifications, New Equipment

In news from MPP's other operating divisions, MPP Washington Street Division recently achieved ISO 14001:1996 certification from registrar NSF-ISR. ISO 14001 is the voluntary environmental standard of the International Standards Organization. It provides a common framework for managing environmental issues. Companies adhering to the ISO 14000 series of standards promise to effect a broadly based improvement in environmental management.

MPP Anaheim, located in Anaheim, California, has added a new high temperature ceramic belt sintering furnace. Ceramic belt furnaces facilitate the process of high temperature sintering, as the ceramic links can tolerate temperatures in the area of 1,315° C. These higher temperatures (normal sintering temperatures run in the area of 1,050-1,150° C) are necessary for the proper processing of high performance P/M stainless steels (see article on page 3). The Anaheim facility also recently added new heat treating capabilities.

The Next Level

Covering the Continent

In the article at the top of this page, you may have read about our recent acquisition of the Dynagear-Sinteris plant in Ontario, Canada, which we have designated MPP Canada. This acquisition is the latest in a series of strategic moves that we have made over the past several years to enhance the capabilities of our company by expanding our manufacturing and technology bases. Since 1999, we have acquired facilities in St. Marys and Ridgway, Pennsylvania, and in Querétaro, Mexico. When we acquired our Mexican facility in 2000, I wrote that it "complements our already strong position in the automotive market." With the acquisition of MPP Canada, we have further enhanced that position as one of the premier suppliers of powder metal components to the North American automotive industry. We are now truly "covering the continent" with our expanded capabilities.



A. Elliott Archer, President & CEO

More importantly, our acquisitions and the investments we have made in presses, sintering furnaces, automation equipment, and people have added value to the products and services that we provide to our existing customers and that we can offer to prospective customers.



STAINLESS STEEL PARTS

MPP – Experts in P/M Stainless Steel

MPP's success in the Stainless Steel Category of the MPIF Part-Of-The-Year Competition (see article on page 1 and photos of previous winners in the margins of this page) is no accident. At MPP, we are experts in the processing and sintering of P/M stainless steel and other highly alloyed materials.

Stainless steel offers some fascinating properties for structural, decorative, and architectural applications. The very words "stainless steel" conjure up images of shiny, untainted surfaces. Such untarnished surfaces can be obtained (and retained) in parts produced by powder metallurgy, but the P/M parts manufacturer must adhere to fundamental metallurgical principles and be adept at controlling the critical elements in the manufacturing environment that affect the quality of P/M stainless steel parts.

The Metallurgy of Stainless Steel

MPP uses both the 300 and 400 series of P/M stainless steel. Both series contain chromium (Cr), which is the key element needed to produce the corrosion-resistant chrome oxide film that is the distinctive hallmark of stainless steels. The 400 series, which is known as a ferritic stainless steel, generally contains lower percentages of Cr, and is therefore less expensive than the 300 series. The 400 series of stainless steels, which are magnetic, are known for high ductility and excellent impact properties.

When nickel (Ni) is added to form a 300 series stainless steel, corrosion resistance is further improved. The higher the Ni and Cr level, the higher the corrosion resistance. Obviously, the cost of the material increases with increasing alloy content. Molybdenum (Mo) can also be added (to both the 300 and 400 series) to improve the resistance to pitting and crevice crack corrosion. Columbium (Cb) is added to 400 series alloys to increase corrosion resistance at high temperature.

Processing is the Key

Precise processing is the key factor in the manufacture of P/M stainless steel parts. Chromium, that critical element in the metallurgical makeup of stainless steel, is also the most sensitive to a variety of variables in the processing environment. Important components in the processing of P/M stainless steel are:

- **The percentage of hydrogen (H) in the sintering atmosphere.** 100% H atmospheres produce excellent results, provided that dew points are strictly controlled at critical phases of the sintering process (see below).
- **Sintering temperature.** High sintering temperatures (at least 1200° C) yield significant benefits in high performance stainless steels. Diffusion rates, homogenization, recrystallization and grain growth are maximized, while nitrogen absorption is minimized.
- **Dew points.** Dew points must be kept low (-48° C or less) during the high heat section of the sintering furnace (to promote the retention of Cr), and even lower in the transition zone (prior to the cooling section) to aid in the reduction of stable oxides.
- **Cooling rates.** A fast rate of cooling (>200° C/min) will minimize the formation of nitrides and oxides which degrade corrosion resistance.
- **Cleanliness of the processing environment.** The elimination of contaminants, especially free Fe, is critical for maintaining the corrosion resistance of P/M stainless steel.

At MPP, we have invested considerable time and money in becoming experts in the processing variables discussed above. Equipment such as ceramic belt and ceramic pusher sintering furnaces have been introduced into our plants to help attain this state-of-the-art level of processing.

The concepts discussed in this article are covered in greater detail in our Technical Bulletin "P/M Stainless and Tool Steel". For an electronic copy of the bulletin, call 1-800-783-2420 or e-mail your request to mpp@metalpoderproducts.com.



This P/M stainless steel part is used in an automotive timing belt tensioning mechanism.



MORTISE LOCK PARTS

A series of ten complex, multi-level parts are the key components in this commercial mortise lock. They won the 1997 Award of Distinction for MPP in the Stainless Steel category. P/M was selected over alternative methods because the P/M parts achieved the highest strength and greatest precision at the lowest cost.



LOCKSET RETRACTOR

Two halves are welded to produce this stainless steel lockset retractor. This part won the 1992 Grand Prize in the Stainless Steel category.

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MPP OFFERS FREE P/M DESIGN SEMINARS

Because of the importance of end-user understanding of the basics of powder metallurgy, MPP offers free P/M design seminars. These seminars are suggested for design engineers, purchasing personnel, and other specifiers of materials and components. Attendees will learn P/M design fundamentals, and will receive copies of the MPIF P/M Design Solutions Guide, MPP's P/M Design Ideas Kit, and other helpful materials. Lunch and materials are free of charge.

We also offer in-house seminars in your facilities. Seminars are limited in size, so register early.

PUBLIC SEMINARS

October 2, 2003 – Kansas City, KS

October 9, 2003 – Milwaukee, WI

For additional upcoming seminars visit our web site at www.metalpowder.com

IN-HOUSE SEMINARS

To arrange an in-house seminar at your plant or office, call 1-800-783-2420 or call one of the sales managers listed on page one.

Call 1-800-783-2420 for a free copy of our Capability Brochure

Great Summer Reading

Well, okay, you might not want to take it to the beach, but we think you'll want to spend a few minutes looking at our new Capability Brochure. It's full of information about MPP's capabilities in material formulation, pressing, sintering, densification, P/M joining techniques, and value-added secondary operations.

In addition to information about R & D, engineering, manufacturing and quality assurance, the brochure contains photos and brief case histories of more than twenty P/M parts, including several MPIF Part-Of-The-Year Award winners. You'll also find examples of parts that were converted from investment and die casting, forging, machining and other metal forming processes.

Call 1-800-783-2420 today to ask for a copy and find out more about how MPP can put its P/M expertise to work on your next project.



Our new Capability Brochure contains photos and brief case histories of more than twenty P/M parts, including several MPIF Part-Of-The-Year Award winners.

Visit our web site at www.metalpowder.com for more examples of MPP's know-how in manufacturing components for a wide variety of lawn & garden, heavy-duty equipment, architectural hardware, power tool, automotive, and fluid power applications.



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