



## MPP Mission Statement

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

### FREE PM DESIGN SEMINARS

MPP offers free PM Design Seminars, conducted at your facility.

Design seminars include:

- The PM Process
- Design Factors
- Tool Design
- Material Selection
- Optional Finishing
- Application Factors
- Comparisons to other Metalworking Processes

To arrange an in-house seminar at your facility, call Melinda Hightower at 800.783.2420, or call one of the MPP Sales Managers listed below.

#### Divisions

##### MPP Anaheim

Anaheim, CA 800.767.9706  
Rob Parker, Sales Manager, 714.970.5500  
John Mosco, Director of U.S. Operations

##### MPP Canada

Blenheim, Ontario 519.676.8161  
Rick Armstrong, Sales Manager, 519.676.8161  
Phil Goodwin, Plant Manager

##### MPP Ford Road

St. Marys, PA 888.359.9992  
George Shturtz, Sales Manager, 814.781.5101  
Paul Vavala, Plant Manager

##### MPP Mexico

Querétaro, Mexico 011.52.442.217.05.03  
Fernando Arnaiz, Sales and Plant Manager

##### MPP Ridgway

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Tony Zimmerman, Sales Manager, 740.342.4512  
Scott Clase, Plant Manager

##### MPP Washington Street

St. Marys, PA 888.741.2352  
Steve Patrick, Sales Manager, 814.834.5408  
Dave Ryan, Plant Manager

##### MPP Regional Sales Managers

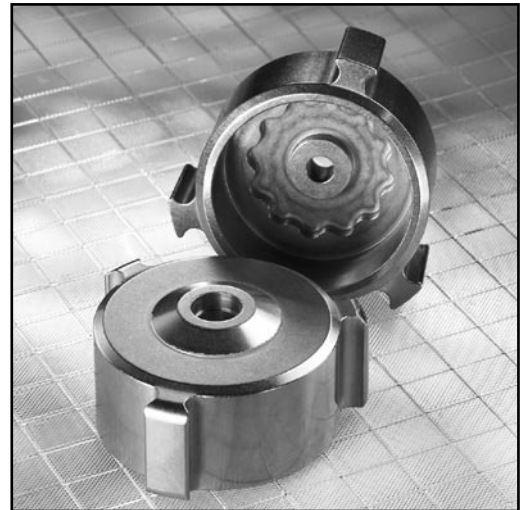
Gary Fulton, 828.441.1138  
Vince Licari, 248.363.4065

## MPP Wins 2007 MPIF Grand Prize Stainless Steel Component Wins Award for Design Excellence

Metal Powder Products Company has received the Grand Prize Award in the Hardware category of the 2007 MPIF (Metal Powder Industries Federation) PM Design Excellence Competition for its PM stainless steel fire protection hardware cap cover. Sponsored annually by the Metal Powder Industries Federation (MPIF), the competition showcases PM's shape complexity, precision, special engineering properties and ability to produce parts that cannot be made economically with other technologies. Design Excellence Awards are awarded each year in various market categories.

The awards were presented during the 2007 International Conference on Powder Metallurgy & Particulate Materials, which was held this year in Denver, CO. The part is made at MPP's Anaheim Division in Anaheim, California.

Officially known as a "Secure Cap Cover", the part is used in conjunction with two other PM parts (both also manufactured by MPP Anaheim) in a fire protection locking system. The cap cover is a complex, 5-level part that is manufactured using 316L stainless steel in a 750-ton press. This multi-level tooling approach maximizes the net-shape benefits of PM, including the reduction of costs associated with secondary machining. The customer achieved a cost saving of more than 80% over conventional machining of stainless steel machine stock.



This stainless steel fire protection cap cover won the 2007 MPIF Grand Prize.

The part undergoes rigorous impact and abuse testing because of its application in a "vandal-prone environment." The three external lugs must withstand impact from a 10-pound sledgehammer and 500 pounds of torque loading. The main body must be drill resistant and the entire part must be corrosion resistant for harsh environment service. Because the part is visible in public spaces, an additional requirement is a cosmetically appealing finish, which is accomplished through ball burnishing. *Continued on page 4.*



MPIF President Edul Daver presents the 2007 MPIF Grand Prize Award to Dan Gibbonney, Engineering Manager at MPP Anaheim.



GRAND PRIZE WINNERS

MPP has a proud history of winning the Grand Prize in the MPIF's Design Excellence competition.



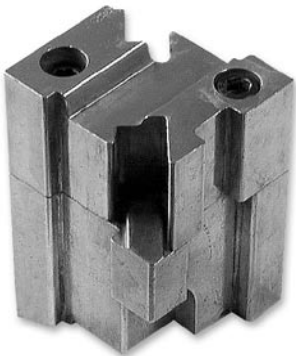
CAM CAP

This PM aluminum camshaft bearing cap won the 2006 MPIF Grand Prize in the Automotive Engine category.



COMPRESSOR VALVE PLATE

This copper-infiltrated steel compressor valve plate won the Ferrous Grand Prize. It replaced a four-piece brazed stamping and resulted in an overall cost saving of 30%.



BRASS COUNTERWEIGHT

MPP garnered the Grand Prize in the Non-Ferrous Category for this counterweight used in the robotic arm of a tape library retrieval system. It represented a cost saving of more than 50% over proposed alternative methods.

# MPP "Going Green" with Energy-Saving Parts

In the world of powder metallurgy, "green parts" is the term normally applied to PM parts that have been pressed but not yet sintered. However, in an ever more environmentally conscious business environment, "green parts" might soon be used to refer to parts that contribute to energy saving or that are environmentally friendly. In that regard, MPP has several parts that fill the bill.

Our PM aluminum parts are a perfect example. Customers in a number of our served markets have significantly increased their use of PM aluminum in recent years not only because of its light weight (it is about a third as heavy as copper or steel), but also because of its recyclability. Aluminum is completely recyclable and, therefore, very energy-efficient. Most of MPP's aluminum parts (such as our aluminum camshaft caps) find their application in the automotive industry, where their light weight saves thousands of barrels of oil every year. Also contributing to energy efficiency in the automotive industry are the new breed of hybrid and other fuel-saving transmissions, such as CVTs (continuously variable transmissions) and electric drives that have been introduced by all the major automotive manufacturers in the past few years. MPP supplies PM transmission components to a number of automotive OEMS.

The automotive industry is not the only one "going green". In almost every industry, product designers list energy efficiency as one of their primary design goals. One way of achieving that is through the use of high-efficiency gear sets. MPP's expertise in the design and manufacture of PM gears has allowed us to take advantage of this trend. (See article on facing page.) As the trend to "green parts" continues to accelerate, MPP is well positioned to participate.



This PM aluminum cam cap (for an in-line 6-cylinder engine) is just one example of energy-saving PM parts.



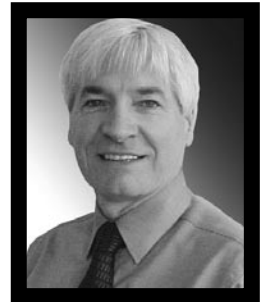
PM gears such as this spiral bevel gear are used in energy-saving, high-efficiency gear sets.

## The Next Level

# Living Our Vision Statement Every Day

*"Incorporating our core values, we will be the acknowledged industry leader for the supply of innovative custom-engineered products of exceptional value." – MPP Vision Statement*

Energy-saving components. Grand Prize award-winning parts. High-performance PM gears manufactured with our proprietary UltraDense<sup>SM</sup> process. Everywhere you look, you'll find another example of how, at MPP, we're trying to incorporate innovation into everything we do. As well we should, since innovation is one of the key elements of our company's Vision Statement. We're testing new materials, new lubes, and new sintering techniques. All of these efforts have a single goal – to provide you, our customer, with "innovative custom-engineered products of exceptional value."



Ben James, President, MPP



GRAND PRIZE WINNERS

# MPP Introduces ToughGear<sup>SM</sup> High Performance PM Gears

For more than 25 years, Metal Powder Products Company has been producing various gear forms using the conventional powder metal (PM) fabrication technology. These gears have successfully performed in a wide variety of applications, including highly stressed transmissions and other applications. Now, with ToughGear<sup>SM</sup>, MPP has taken the manufacture of PM gears to a new level, combining the basic advantages of PM gears with a higher level of performance and precision.



MPP produces a wide variety of PM gears.

Gear forms that can be manufactured by PM include spur, face, bevel, rack, spiral bevel, eccentric, and helical gears. Conventional PM processing through sintering will result in AGMA Class 5-7 gears. If higher performance gears (AGMA Class 8-11) are required, then post-sinter processing is needed to improve dimensional accuracy and surface finish.

## The MPP UltraDense<sup>SM</sup> Process

As gear applications become more demanding, and the surface stresses exceed those sustainable by gears produced by conventional techniques, improved material and processing techniques must be employed to enhance the performance of the PM components. These can include higher strength alloys, implementation of high temperature sintering, double pressing/double sintering, gear-rolling, specialized densification techniques, shot-peening of the surface, and other techniques. MPP's proprietary UltraDense<sup>SM</sup> process utilizes a combination of these techniques in the production of ToughGear<sup>SM</sup> gears and other high density PM parts.



MPP uses the gear rolling process, in which sintered spur or helical gears are "squeezed" between two master gears.

## Gear Rolling

MPP uses the gear rolling process, in which sintered spur or helical gears are "squeezed" between two master gears to increase the accuracy of vital gear dimensions. In the case of a 31° helical crankshaft gear, the AGMA level was improved to 8 and higher. Gear rolling also reduces surface roughness of the surface-densified gear to a level that is better than a cut reference gear. Likewise, the hardness profile in the flank region of the rolled gear matches the hardness profile of the solid steel reference gear. The surface-densified layer, which has a depth of about 0.2 mm, provides superior fatigue and wear performance.



This 47-tooth spiral bevel gear has a pitch angle of 80° and a mean spiral angle of 25°.

Face and bevel gears are excellent candidates for the UltraDense<sup>SM</sup> process. A good example is a 47-tooth spiral bevel gear with a pitch angle of 80° and a mean spiral angle of 25°. On this gear, the UltraDense<sup>SM</sup> process increased overall density to the 7.4-7.5 g/cc range, with a minimum density of 7.7 g/cc at the root of the surface-densified layer. This gear has a heat-treated apparent hardness of HRC 50, with a case depth of 0.25 mm.

To find out more about MPP's ToughGear<sup>SM</sup> gears and the UltraDense<sup>SM</sup> process for high density PM parts, call us at 800-783-2420.



## BICYCLE RACK CLAMSHELLS

These clamshells, used in a patented bicycle rack system, were **Grand Prize winners** for MPP in the Stainless Steel Category. PM was chosen because it achieved closer overall tolerances, improved wear resistance, superior surface finish and significant cost savings.



## INERTIAL VALVE

This bronze inertial valve for an active shock absorber system won the **Grand Prize** for MPP in the Non-Ferrous Category. MPP worked with the customer from the beginning to verify that the valve achieved cost and performance objectives.

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We welcome your comments and suggestions. Please send us the names of others who should receive this newsletter.

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## MPP OFFERS FREE PM DESIGN SEMINARS

Because of the importance of end-user understanding of the basics of powder metallurgy, MPP offers free, in-house PM Design Seminars. These seminars are suggested for design engineers, purchasing and quality assurance personnel, and other specifiers of materials and components. Attendees receive the MPIF Design Solutions Guide and other valuable materials. MPP also provides lunch.

### In the Design Seminar, you'll learn:

- How to save 30%-80% compared to casting, extrusion, forging, stamping, machining, and other processes
- The basics of PM technology
- How to design for PM, including tooling design, material selection, and application factors
- How to specify PM materials
- What's new in PM
- And much, much more!

To arrange an in-house seminar at your facility, call Melinda Hightower at 800.783.2420, or call one of the MPP Sales Managers listed on Page 1.

Call 1.800.783.2420 for a free copy of our Capability Brochure

### MPP Wins 2007 MPIF Grand Prize Continued from page 1

Pressed in a 750-ton press, the part weighs 4.2 pounds (1,920 grams) and is fabricated to a typical density of 6.5 g/cc, with a nominal hardness of 55 HRB, yield strength in excess of 20,000 psi (137 MPa), and elongation in excess of 20% as sintered. The large external lugs are precisely oriented to an internal depressed wave form that allows the part to mesh and interact dynamically with two other parts. The part is pressed to near net shape. Secondary operations (all performed in-house at MPP) are limited to CNC machining of a seal groove, internal and external counter bores for seals and bearings, plus three depressed locking pockets.



*The three external lugs on the cap cover must withstand an impact test from a 10-pound sledgehammer and 500 pounds of torque loading.*

### Continuing a Winning Tradition

This year's award marks the sixth time since 2000 that MPP has captured one of the Grand Prize Awards in the MPIF's Design Excellence competition. Some of our previous Grand Prize Award winners are profiled in the margins of this page and the facing page of this newsletter.

