

Production

Assembly

**Short-run
Prototypes**

THE RIGHT POWDERED METAL TECHNOLOGY FOR YOUR APPLICATION

**Product
Development**

**Consulting
Engineering**

**Tooling
Design**

**Custom MIM
Feedstocks**



APP[®]

ADVANCED POWDER PRODUCTS, INC.

THE MAGIC OF POWDERED METALS...

What is Metal Injection Molding, and what are its advantages?

Metal Injection Molding (MIM) is a process that utilizes the shape making capability of plastic molding and applies it using metal powders. In this process, a metal powder is mixed with a polymer and molded using an injection molding machine. The polymer is then removed and the powder compact is sintered while maintaining the complex shape. The features of this process are high and uniform density, excellent surface finish, excellent strength, and tremendous shape complexity including undercuts, threads, and thickness variations.

Powder Blending

Feedstock Compounding

Injection Molding

Debinding & Sintering

Secondary Steps

Secondary Machining
Heat treating
Finishing/plating
Inspection

What is Press and Sinter, and what are its advantages?

Press and Sintering (P/S) is a process that enables the mass production of relatively complex geometries at a high production rate. This process utilizes the flowability of a powder to fill a die that has an upper and lower punch with machined detail. The punches then compress the powder in the die and give detail to the component. These components are then sintered for strength. This process enables the mass production of highly dimensionally accurate components.

Powder Blending

Powder Compaction

Delube & Sintering

Secondary Steps

Secondary Machining
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Finishing/plating
Inspection

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ADVANCED POWDER PRODUCTS, INC.

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FROM PART DESIGN
TO PRODUCTION...

ADVANCED POWDER PRODUCTS CAN HELP YOU!

Our systems approach is powered by 20+ years experience in metal injection molding (MIM) and press and sinter (P/S) molding technologies. Our specialty is in the development of powdered metal (PM) processes for new PM products. We design the part, the tooling, and material to meet our customer's application requirements. We provide the right solution for the right price.

APP's staff is skilled in all facets of design, materials selection, and production utilizing powdered metals. Our strength is in helping you choose the right PM solution for your project.

Unlike many other PM companies, APP has expertise in both MIM and P/S. This allows us to choose the best PM technology for your application. We consider your product needs and provide the most effective and economical powder technology.

Q U A L I T Y • P E R F O R M A N C E

WHEN IS IT TIME TO USE

1

When you need greater design flexibility...

Utilizing powdered metals not only allows for cost reductions, but allows the design engineer more freedom in design. This freedom of design, especially in MIM applications, can be more important than cost savings from PM.

Design flexibility is not the only area PM can be advantageous. Materials selections are very flexible and can be custom designed around your particular requirements. Since powdered metals can be mixed in various amounts, custom tailoring of properties is possible.

APP can also utilize its expertise in the areas of both MIM and P/S to create sub-assemblies of parts produced with both technologies to ensure customers are getting the best value for their projects.

2

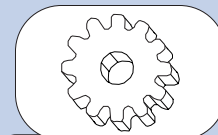
When you are considering strength and performance...

APP specializes in high strength and high precision component development and manufacturing. The following is a sampling of the materials that we can utilize for prototypes and production.

Material Family	Available Features
Stainless Steel	high strength, heat treatable, high corrosion resistance, nonmagnetic, high wear resistance
Low Alloy Steel	general purpose, heat treatable, high wear resistance
Tool Steel	61-70 HRC
Titanium	light weight, high strength
Aluminum	high thermal and electrical conductivity, light weight, high strength
Copper	high thermal and electrical conductivity, low thermal expansion
Magnetic	low core losses and high electrical resistivity, high permeability and low coercive field, and high magnetic saturation
Tungsten	high density and toughness
Carbide	high hardness and toughness
Ceramics	general purpose, high wear resistance

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THE BEN FRANKLIN
TECHNOLOGY
PARTNERS
BUSINESS PLAN
CONTEST

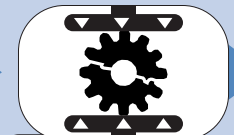
2nd ANNUAL
The Big
\$25,000
IDEA
Business Plan Contest



YOUR NEEDS



APPLICATION



EVALUATION



P/S C

R F O R M A N C E • P O W D E R E D M E T A L T E C H N O L O G I E S ?

C O S T

3

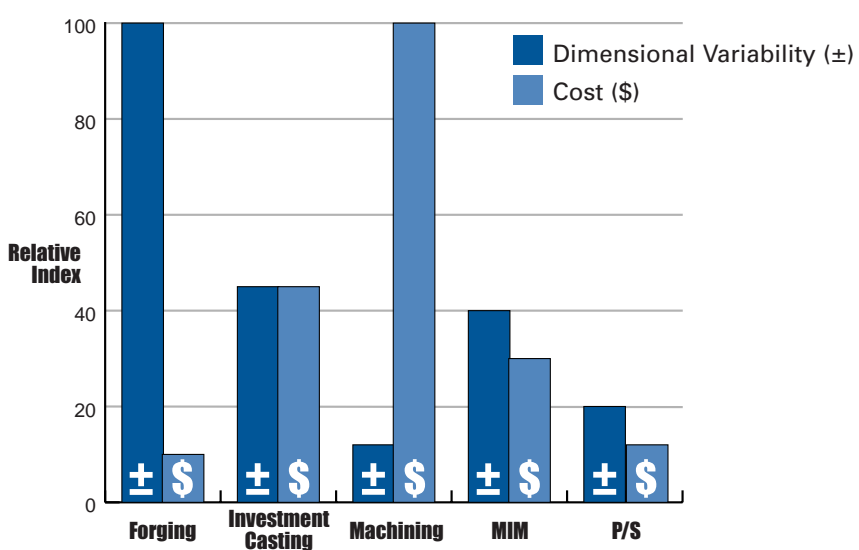
When you need to reduce costs, while maintaining quality...

The following are examples:

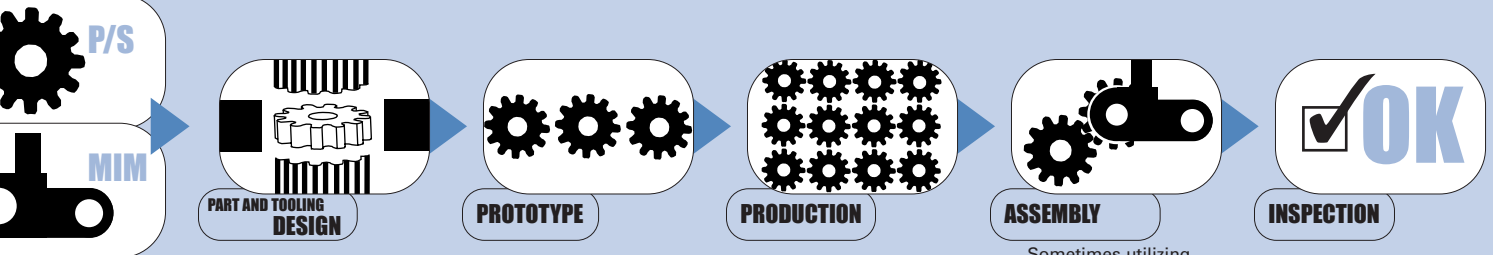
- APP redesigned polymer system and created innovative technology to produce part, increase strength, and reduce costs by 50%
- APP redesigned an aluminum heat sink part for PM from previous manufacturing technology. Cost remained the same, but thermal conductivity increased two-fold.
- APP converted machined gears to P/S cutting cost in half.
- APP converted products made from traditional P/S to MIM with slight cost increase but much greater durability.
- APP reduced materials cost on part by using expertise in secondary finishing to maintain corrosion resistance.
- APP used surface coatings to increase lubricity while maintaining cost.



Comparison of Competing Technologies



WHAT CAN APP DO FOR YOU?



Sometimes utilizing both P/S and MIM parts in one assembly.