

ABOUT THE TECHNOLOGY

ISOSTATIC PRESSING

Maximum density. Exceptional performance.

Isostatic Pressing is a method of compacting powdered materials using equal pressure applied from all directions—unlike conventional pressing that compacts only from top and bottom. The result is a part with uniform density, superior mechanical properties, and minimal internal stress.



How It Works

There are two main types of Isostatic Pressing: Cold Isostatic Pressing (CIP), performed at room temperature, and Hot Isostatic Pressing (HIP), performed at high temperature and pressure for full densification.

- Powder is enclosed in a flexible mold or metal canister
- The container is placed in a pressure vessel
- Gas or fluid pressure is applied uniformly from all directions
- In HIP, the part is also heated to high temperatures during pressing
- The result is an ultra-dense part ready for machining or final use

Isostatic pressing takes pressed materials to the next level—where strength, precision, and reliability are non-negotiable.



North Central Pennsylvania
Pressed Materials Consortium

Want to know more? Visit pressedmaterials.org or contact our Regional Innovation Officer, John Williams at jcw5919@psu.edu

Features and Benefits

- Ideal for high-performance parts used in aerospace, medical, and energy sectors
- Used as a post-processing solution to increase density of AM or PM parts
- Enables difficult-to-form geometries with better mechanical consistency
- Extends the capabilities of conventional PM and additive workflows

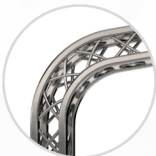
Example Applications



- Nuclear fuel components
- Orthopedic implants



- High-pressure valves and fittings
- Tool steel and hard metal dies



- Structural parts for aerospace and space launch systems

Key Advantages Over Other Processes

MIM Offers...	Compared To...
Uniform density and grain structure	Density variations in uniaxial pressing
Fewer defects or stress concentrations	Porosity or cracking in casting/welding
Excellent mechanical strength	Lower strength in low-density PM parts
Ability to densify complex shapes	Limited form factors in traditional PM
Enhanced performance in critical parts	Standard specs in non-isostatic methods

Real-World Innovation: HIP Adds Strength to 3-D printed Titanium Metal Implants

A U.S. medical device manufacturer uses hot isostatic pressing (HIP) to strengthen 3D-printed titanium implants. The process removes internal porosity, enhances fatigue resistance, and delivers mechanical performance comparable to wrought materials—meeting rigorous surgical standards for precision and durability.

Future Potential

North Central Pennsylvania companies can use isostatic pressing to deliver ultra-dense vehicle components, aerospace turbine parts, hydrogen storage vessels, and medical implants—meeting the highest global standards and securing a strong position in emerging markets.

