

HIP Products



Hot Isostatic Pressing

For Your Needs

Kennametal INC is a global company in the industry of metal.

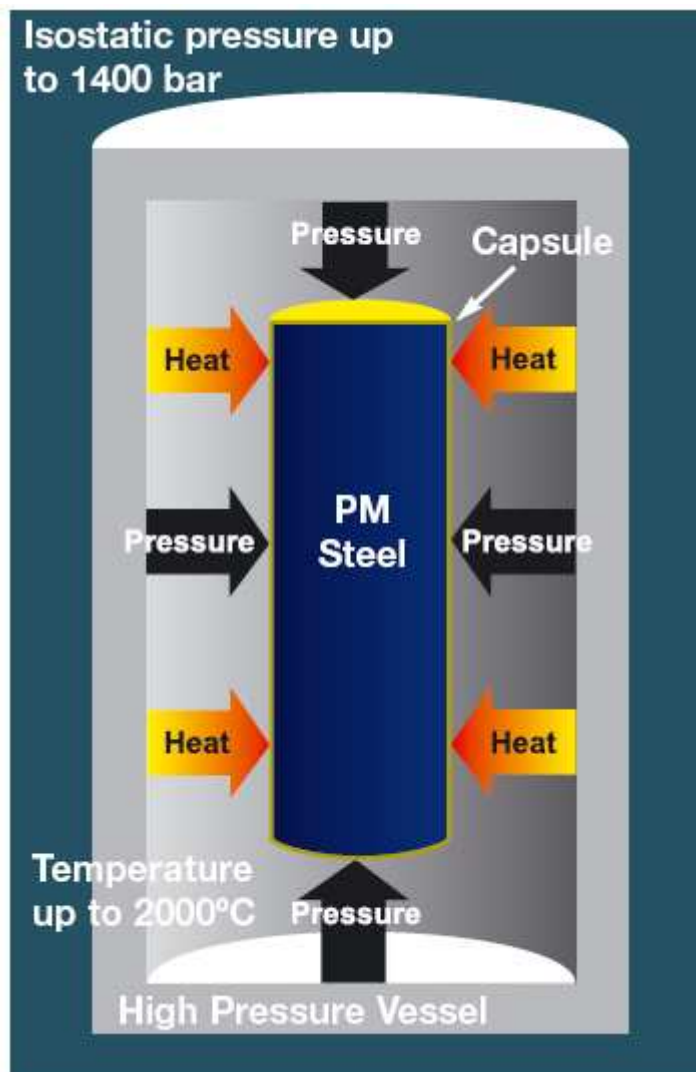
Our **Centre of Competence (CoC)** for Hot Isostatic Pressing (HIP) is in Biel (Switzerland) with more than 30 years experience.

Due to the demands of our customers we have enlarged our services and offer in addition to tool hipping, also products such as Powder Metallurgical (PM) Steels and Composites.

Our production is highly flexible to meet market needs.

This is the foundation for our success.

Our goal is to use the knowledge gained by working closely with our customers in all sectors of the market in order to produce HIP products that are optimised for individual applications.



Manufacturing process of HIP Products

Parts with closed porosity can be densified under high pressure and temperature without encapsulation. The increase of density is seen by final inspection.

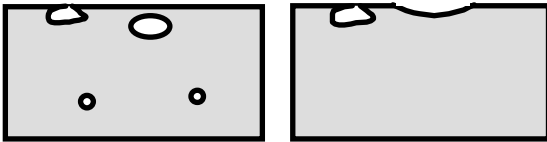
Manufacturing of powder metallurgical parts needs an encapsulation to apply the gas pressure uniformly onto the surface of the parts during hot pressing. After densification the capsule has to be stripped. Quality control is made by ultrasonic measuring and analysis of the polished section. Parts can be machined according to customer specification.

Kennametal is approved to international quality standard ISO 9001:2000 and FDA.

Technology

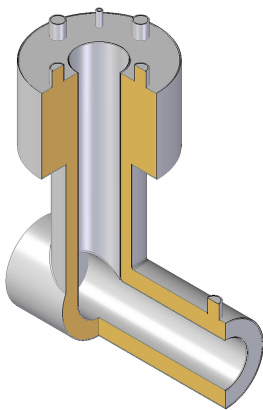
before

after



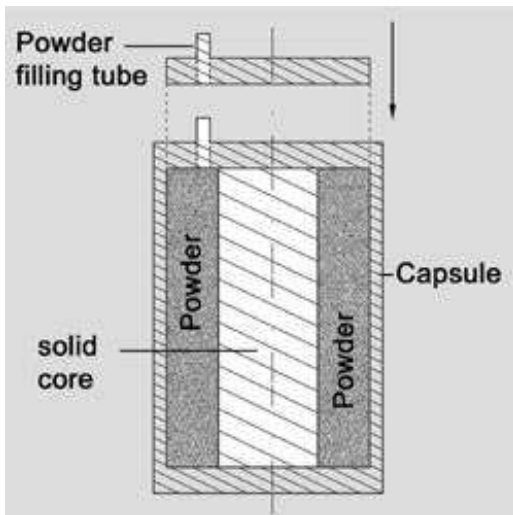
Tool HIP-ing - Post HIP-ing

- Pressure and heat applied uniformly
- whilst open porosity can not be eliminated, 100 % of closed porosity can be eliminated



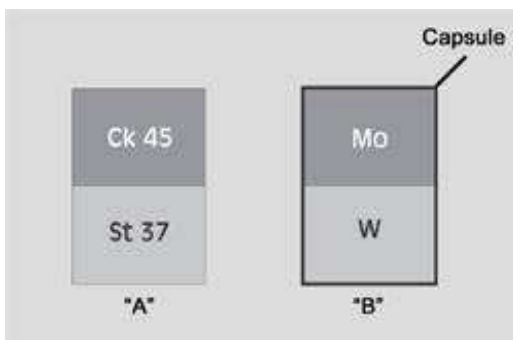
Powder Metallurgical Steel

- Powder is encapsulated, typically in steel capsules
- Pressure and heat is applied uniformly to all surfaces



Composites: Solid/Powder

- Powder and base body are encapsulated
- Pressure and heat is applied uniformly to all surfaces
- Diffusion zone is generated



Composites: Solid/Solid

- Solid parts are encapsulated
- Pressure and heat applied uniformly
- "A" for weldable materials no encapsulation is necessary.
- "B" for non-weldable materials an

HIP Service - Redensification To Improve Your Quality



General Properties:

- Highest achievable density
- Homogenous annealed micro structure
- Higher static strength (up to 30%)
- Higher dynamic strength (up to 100%)
- Easier to polish
- No new casting for defect parts
- No segregation or grain growth

Applications:

- Hardmetals
- Cast parts
- Re annealing
- Ceramic wear parts

Powder Metallurgy “The Best You Can Get”



Conventional steel



PM steel

General Properties:

- Maximum abrasion resistance
- Maximum corrosion resistance
- High strength since no porosity
- Homogeneous & fine microstructure
- No phase segregation

Materials:

- Low carbon steels
- Tool steels (HSS, ...)
- Stainless steels (duplex, austenitic, ...)
- Nickel-base alloys
- Cobalt-base alloys

Composites

“Use The Best Where It Is Needed”



General Properties:

- Combination of different material properties
- No segregation of different phases
- Homogenous micro structure
- Diffusion bonding between the used materials
- No segregation zone between the basic material and the layer
- Solid coatings thicker than 2 mm
- Special steels and hard-face layers

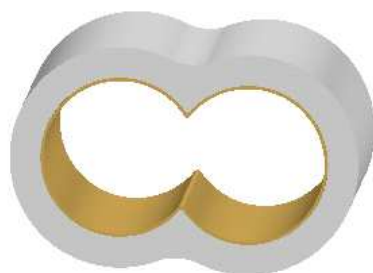
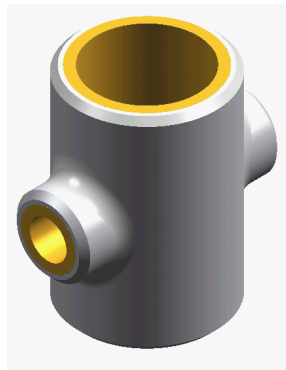
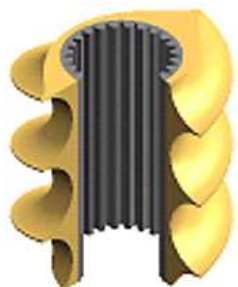


Applications:

- Plastic and food extrusion machinery
- Centrifuges
- Subsea and off-shore equipment
- Cutting tools
- Rolls
- Valves & pumps
- Broaches

Technical Data Of The HIP Units

	Diameter mm	Length mm	Max.temp. °C	Max.pressure bar
HIP1	200	500	2000	1000
	247	700	1450	1000
HIP2	450	1300	2000	1300
HIP3	900	2700	1400	1400
HIP4	600	1700	1400	1100



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