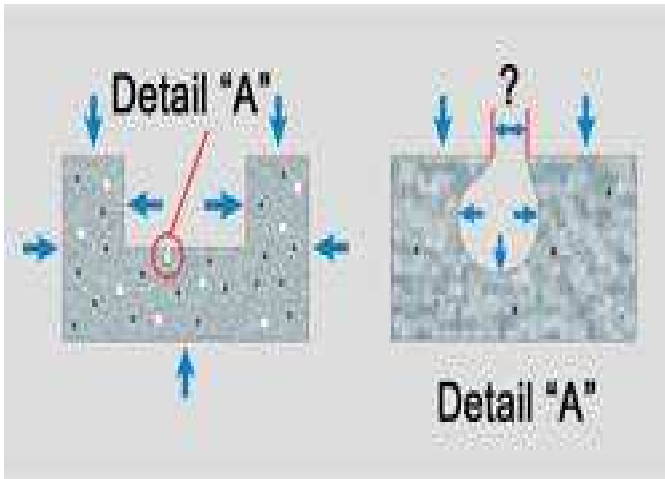


# HIP- Technology At A Glance

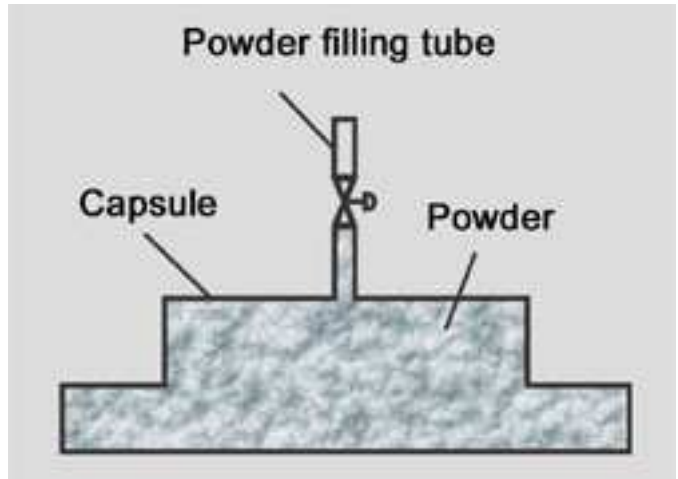


## Posthipping



Isostatic pressure = all over pressure

## Powder Metallurgy



Sintering: capsule with metal powder

### Posthipping

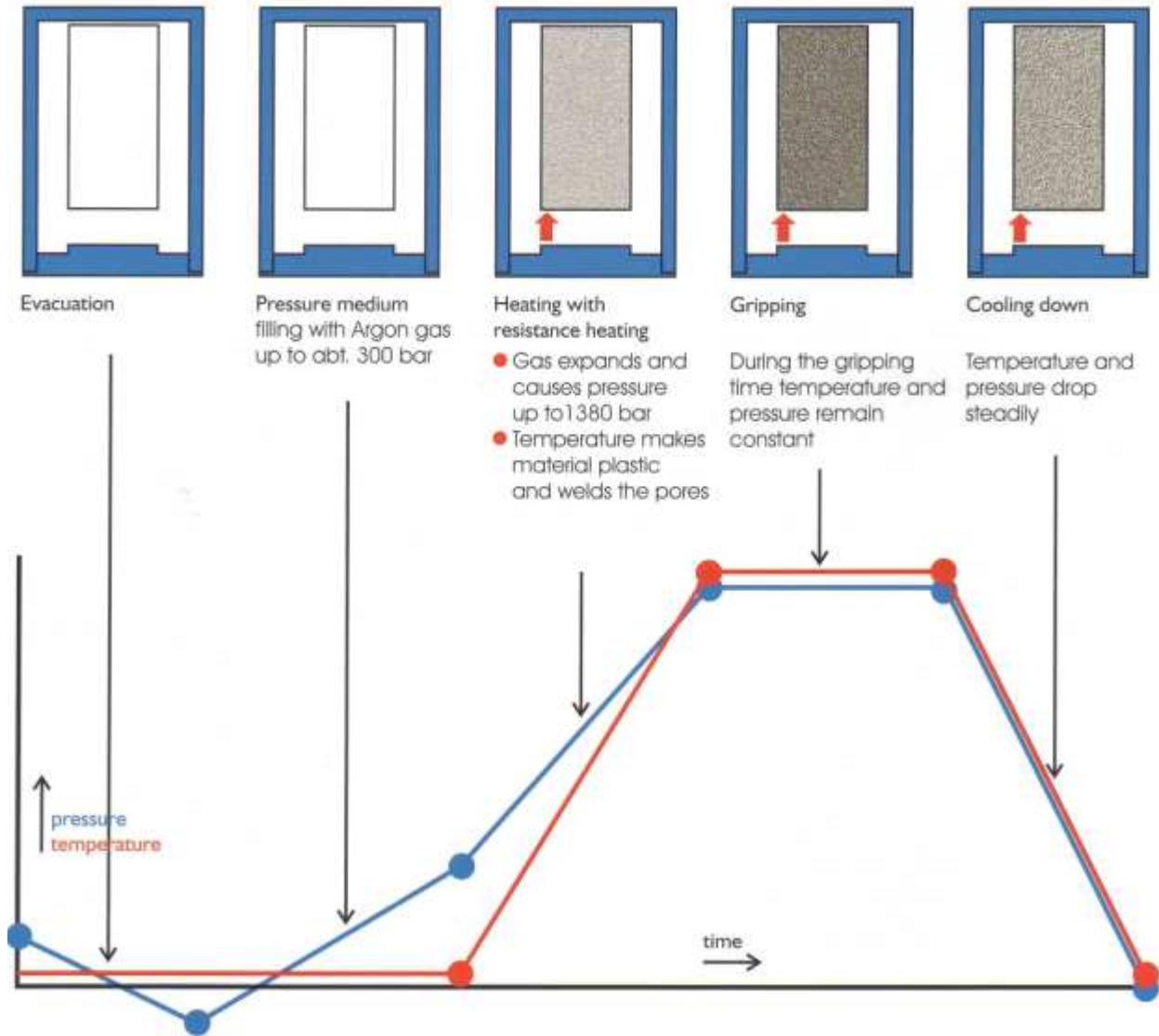
Distribution of pressure with hot isostatic pressing: The gas pressure shows all over effect; detail "A" shows, that open pores caused by penetration of gases cannot be eliminated.

### Direct Shaping (Sintering Under Pressure)

A direct shaping is also possible. Metal powder is put in a hollow body, showing the outside contour of the desired part. The capsule material can be made of moulded steel sheet, glass or gastight ceramic. After evacuation and tapping of the form filled with powder the sintering under pressure is effected in the HIP press.

## HIP - Hot Isostatic Pressuring

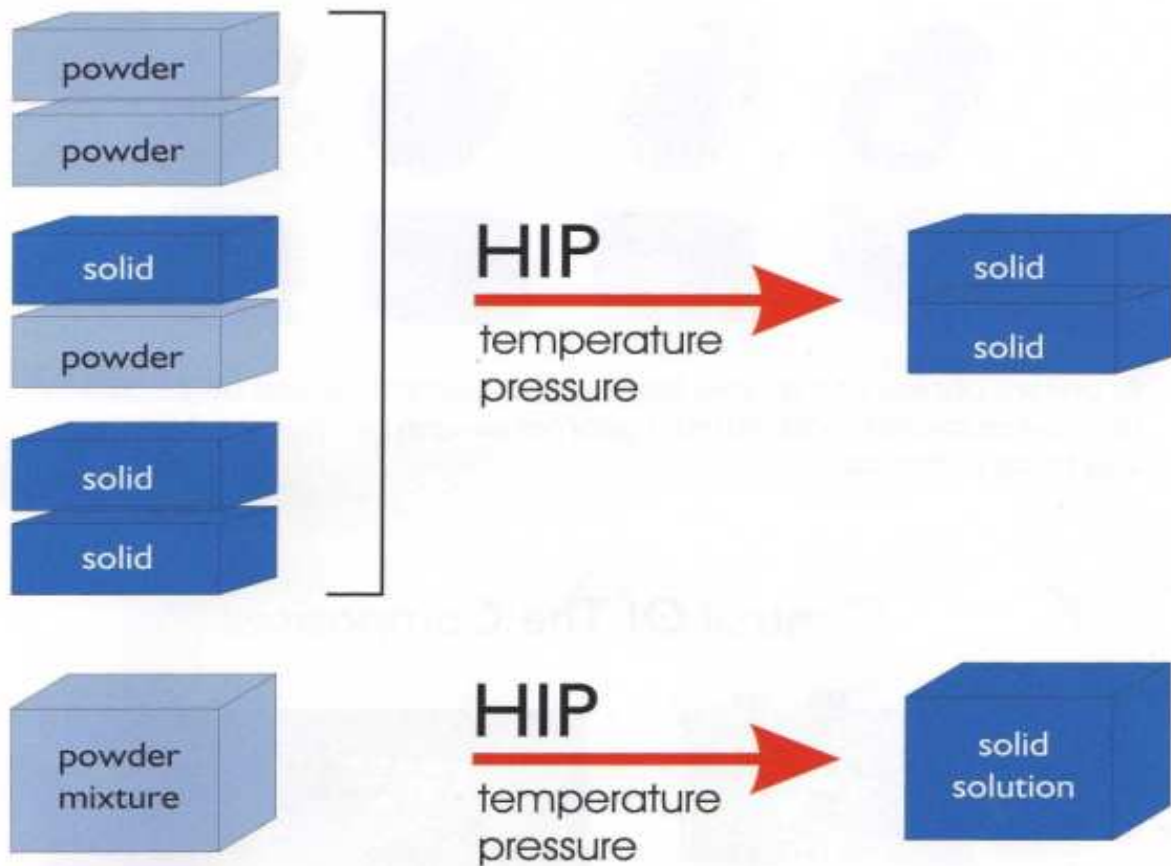
### The Procedure And The Operations



Schematic process of pressing cycle

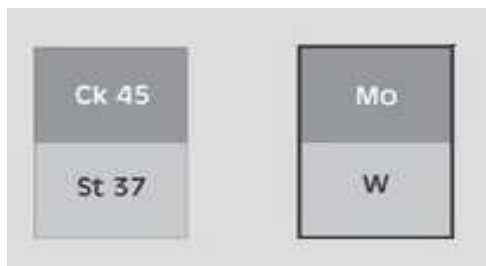
By combination of pressure and temperature a process is started in the autoclave of the HIP press, which effects with the most different material a closing of the pores and as a consequence an elimination of same. The HIP - Technology enables structures and material used to post hip the most different materials; the manufacture of shaped parts made of spezial material, the diffusion welding and the production of composites.

## Composites and Diffusion Welding



### Composites

By means of powder alloys can be produced which demix immediately in the liquid state and form own, rough phases. Different powders are mixed together and afterwards sintered in a capsule under pressure. As the sintering temperature is far below the melting point the dispersion of the different elements will not be destroyed. Though it is possible to manufacture a smooth matrix which is evenly composed by hard substances. The additional pressure during the sintering guarantees a 100% density.



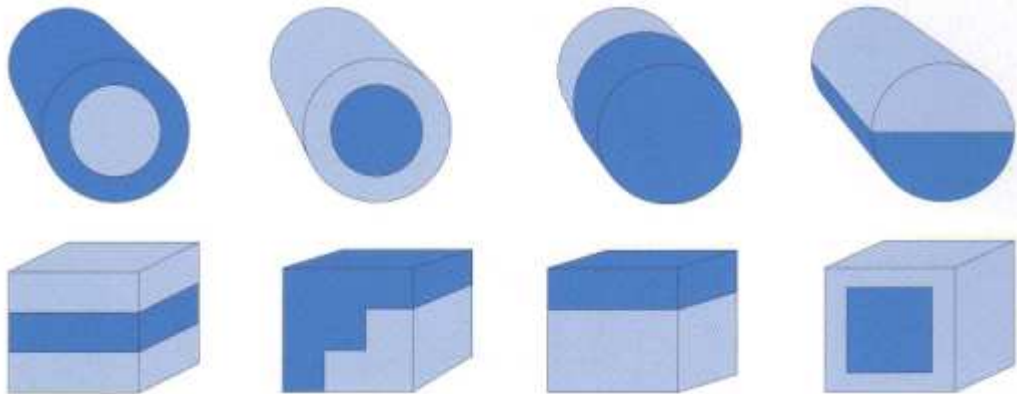
Gastight welding of 2 materials

Gastight, weldable encapsulation of non-weldable material

### Diffusion welding:

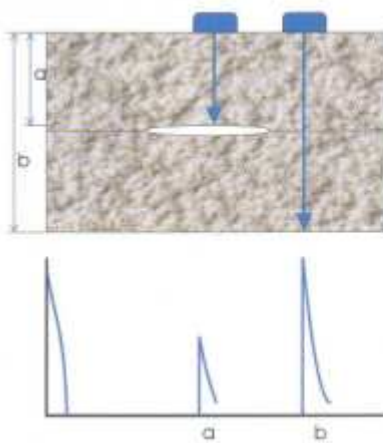
This means the manufacture of a combination of two different materials by diffusion. The combination of pressure and heat enables to weld together material like Mo-W. To do so, a gastight sealing of the two contact surfaces is necessary. This may be effected by putting a welding bead at the end of the contact surfaces or by encapsulation.

## Geometries in Composites



By correct choice of the base form and a preparatory work which fixed the Stop measures the most different geometries can be manufactured of 2 or more materials.

## Control of The Composites



Every composite coming from Kennametal HTM is tested by means of ultrasound. By doing so perfect welding between layer and basic form can be guaranteed.

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