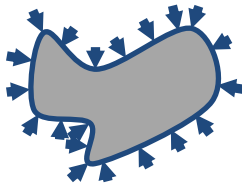


# Cold Isostatic Press System CIP – ISOMAT

## 1 Overview CIP-Technology

During cold isostatic pressing (CIP), any desired object (powder-filled elastic moulds) is compacted by means of an isostatically (i.e. from all sides) effective pressure medium. Thus, the compacted material is of homogeneous and high density.



A liquid (usually water with an additive) at room temperature is used as pressure transmitting medium at pressures between 300 and 6000 bar depending on the application.

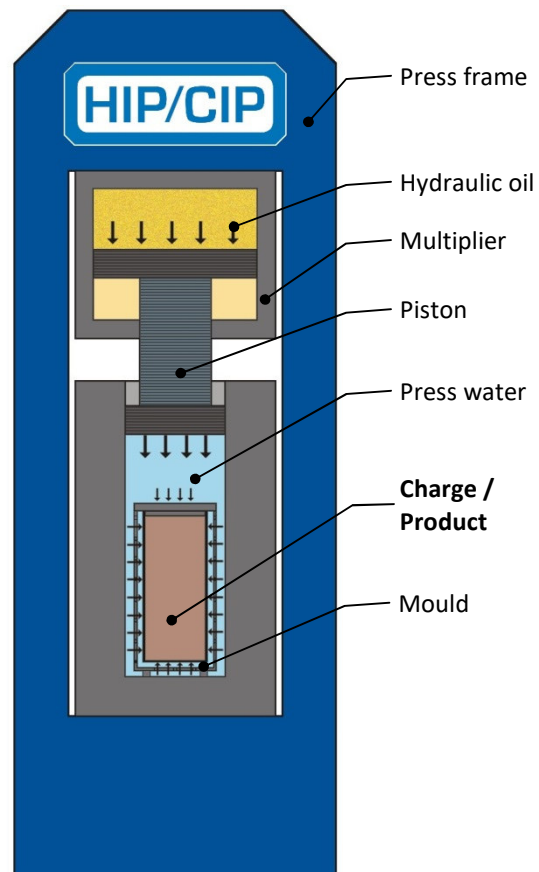
## 2 Applications

CIP technology application examples are:

- Fireproof ceramics
- Oxide ceramics
- Transparent ceramics
- Graphite
- Carbides
- Superalloys
- Synthetics

## 3 Isomat System

The Isomat system is extremely variable in use and is especially suitable for small-lot production.



At first, the material to be compressed is put into the recipient filled with press medium. In the next step, a piston plunges into the recipient from above. The hydraulically driven piston applies big force to the press liquid, thus creating the desired pressure inside the recipient.

For loading and unloading, the recipient is moved out of the press frame, so it is always easily accessible for the operators. The recipient hatch is at a working height of approx. 1m.

## 4 Multiplier Features

As described above, pressure is built up by means of a hydraulically driven piston, which is the core component of the so-called multiplier.

The piston or rather the multiplier transmits (multiplies) the hydraulic drive pressure of max. 500bar to the desired press water pressure inside the recipient (up to 6000bar). The ratio between the oil-side surface and the water-side surface of the piston determines the transmission ratio between oil pressure and pressing power. This allows relatively low hydraulic pressure generating very high press force.

Our system has various decisive advantages for the operating company in comparison to systems in which the working pressure is generated directly by high-pressure pumps:

### Operation, Maintenance, Service

As the complete drive technology is compiled of standard oil hydraulic components, the system according to industrial standards is extremely robust, durable, and well maintainable for the operator.

As no special high-pressure components are used, any industrial hydraulic service should be able to perform replacement and maintenance works.

### Control Accuracy

The process pressure control accuracy is excellent and reliable as different renowned manufacturers fall back to fully developed servo valve technology.

### Production Reliability due to Media Separation

The multiplier serves as a firm media separator: while the drive side operates under oil, the process side operates under press liquid. Both media are highly suitable for their specific operation purpose – and this solely and exclusively. Therefore, our system separates both media as a principle.

There are many reasons for this:

Water is suitable for high-pressure operation to an excessively limited extent due to its poor lubrication properties.

Therefore, high-pressure water pumps and especially their interior guides and seals are of much more elaborated design than oil hydraulic pumps to make them resistant against the corrosive and abrasive effect of the water.

Generally, for all other water fittings, e.g. valves, there is a very small selection on the market regarding function, nominal size, and alternative fabrications. This is explained by the properties of water and by the high operating pressure itself. Since in a system with direct pressure build-up, all components bear the extremely high water pressure load (commonly 2000 bar), while in oil hydraulics, there is a maximum of 500 bar.

The most important argument against direct press water pressure generation is its sensitivity against press water contamination.

In everyday CIP operation, it is unavoidable that e.g. powder residues sticking on the outside mould of the pressing tool enter the press water. Trace amounts of impurities cause premature malfunctions of valves and wear of moving pump parts. The level of press water clarity required by pump and fitting manufacturers is unattainable in daily Cold Isostatic Press operation - even under application of all possible preventive measures. Anyway, permanent press water filtering is a minimum duty, which causes increased plant operating efforts. Such filter systems are not required in our multiplier design because this principle prevents press water as well as its impurities entering the hydraulic system.

The foregoing arguments raise the question, why hydraulic oil is not also used as the medium transmitting pressure to the charge.

Oil is unsuitable for this purpose because openly handling it is intolerable for plant operators due to safety and practical reasons. Furthermore, draining oil would cause severe soiling of the plant environment in very short time.

Consequently, using an oil hydraulic system as a drive and press water as a pressure transmitting medium and separating both sides from each other is the proper approach. In our plants, it is the standard solution.

## 5 Plant Model

