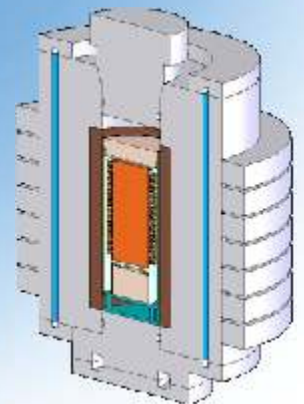
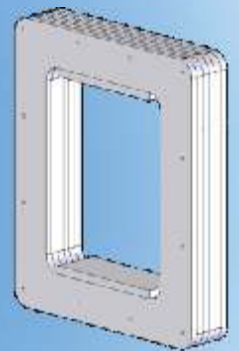
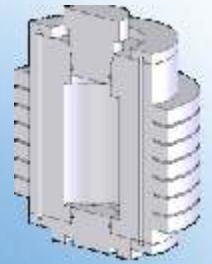
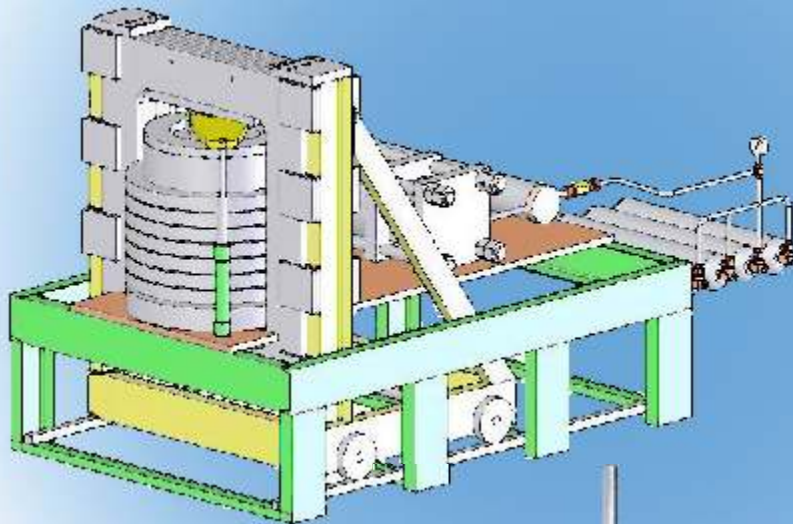


*High Pressure Technology*

**COLD ISOSTATIC PRESS**  
&  
**HOT ISOSTATIC PRESS**



Application Areas:  
Nuclear Science, Metallurgy, Aerospace, Food Processing, Defence, Metal Forming  
and Novel Material Development and Testing.

# *insmart* COLD ISOSTATIC PRESS



INSMART CIP installed at  
LASTEC, Delhi  
Capacity 100mm dia x 450mm height

- OPERATING PRESSURE : 413 MPa = 4,130 Kg/cm<sup>2</sup>
- DESIGN PRESSURE : 455 MPa = 4,550 Kg/cm<sup>2</sup>
- PRESSURE ADJUSTMENT CAPACITY : ± 40 Kg/cm<sup>2</sup>
- PRESSURIZING MEDIA : 85% WATER + EMULSIFYING OIL
- FILLING SYSTEM : HIGH PRESSURE WATER PUMP
- PRESSURIZATION SYSTEM : HYDRAULICALLY OPERATED PROPORTIONAL CONTROL INTENSIFIER SYSTEM.
- DECOMPRESSION SYSTEM : HYDRAULICALLY OPERATED PROPORTIONAL CONTROL DECOMPRESSION SYSTEM FOR GRADUAL RELEASE OF PRESSURE.
- CHAMBER CLOSER SYSTEM: PIN TYPE (Thread less design).
- ELECTRONIC CONTROL : PLC BASED CONTROL SYSTEM WITH TOUCH SCREEN ENABLED HMI. NECESSARY ALARM AND OTHER INDICATORS ARE INCLUDED.



INSMART CIP installed at NML, Jamshedpur  
Capacity: 75mm dia x 150mm height



INSMART CIP installed at BARC, Mumbai  
Capacity: 100mm dia x 600mm height

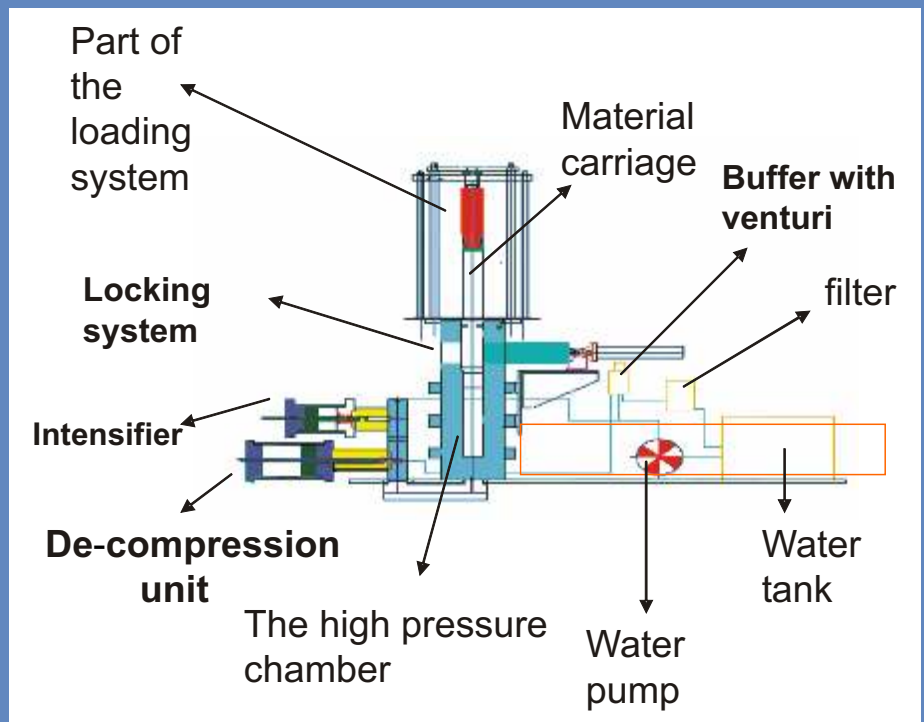
# Theory of Operation and Important Features

The Insmart CIPs are equipped with state of the art high pressure components and advanced electronic controls.

The Diagram on the right describes the main components of the system and explains the operation of the machine.

## EVACUATION AND FILLING OF PRESSURE CHAMBER:

For fast filling of the high pressure chamber an air venturi is used. The air venturi is connected in a parallel circuit (parallel with respect to the main water pressurization circuit). The air venturi system effectively removes the air from the chamber and quickly fills the chamber before the start of the cycle and empties it after the completion of the decompression cycle.



## PRESSURE INTENSIFICATION AND DECOMPRESSION:

Pressures of up to 4000 bar and greater can be achieved in the Insmart CIP systems. The Intensifier and Decompression blocks are used during pressure intensification and decompression cycle respectively. The Intensifier compresses the water from the high pressure pump by the action of a hydraulic ram and intelligent use of high pressure non-return valves. The desired pressure can be set through the touch screen (HMI). After the desired pressure has been reached the decompression cycle starts. The decompression ram starts receding to effectively reduce the pressure inside the compression chamber. The rest of the pressure is dropped through a pressure relieving orifice.

## THE PRESSURE CHAMBER:

The High pressure chamber is made of special steel and is shrink fitted with pre-stressed steel rings. This design makes the chamber capable of withstanding pressures many times the maximum designed pressure for the machine. The chambers are also tested stringently for any material defects.

## ELECTRONIC CONTROLS:

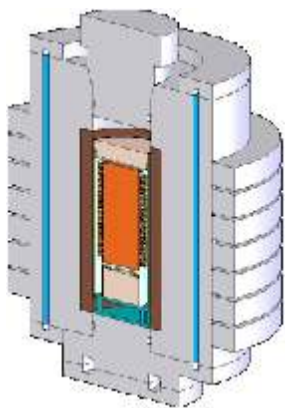
The Insmart CIP systems are equipped with PLC based control system. The Interactive HMI system (human machine interface) allows the user to set the desired pressure and time for pressurization. It also displays the pressure-time chart on the touch screen. The control panel is also equipped with a parallel set of controls along with emergency stop switch.

# *insmart* HOT ISOSTATIC PRESS



Manufactured under Technical Collaboration with  
NATIONAL ACADEMY OF SCIENCES  
OF UKRAINE

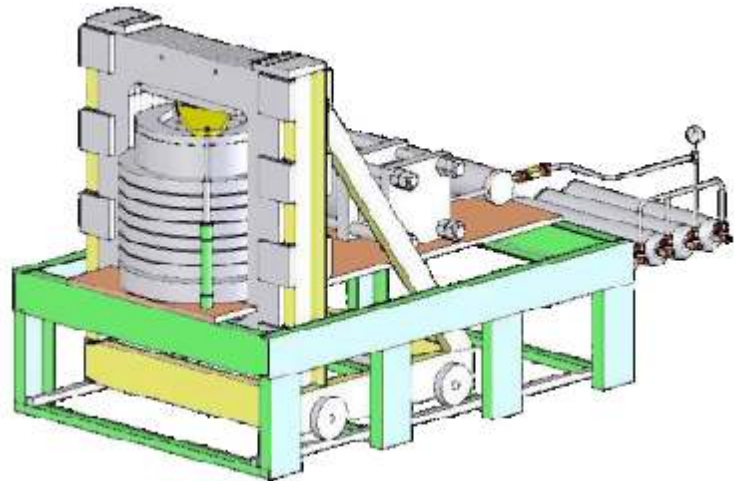
THE GAS INSTITUTE



High Pressure  
High Temperature  
Chamber



Heating  
Element



The Insmart Hot Isostatic Press is capable of generating pressures up to 2000 bar and simultaneously maintaining temperature up to 2000 degree Celsius. The HIP (Hot Isostatic Press) uses Argon gas as compression media. The main features of this system are listed below.

### **Precompression chamber:**

The HIP first compresses the Argon gas from the cylinders to a pressure of 400 bar using a hydraulic compression system. This chamber acts as an intermediate pressure buffer during the operation.

### **Intensifier:**

The intensifier of this stage pressurizes the gas from the precompression stage, in programmable steps to the desired pressure (upto a maximum pressure of 2000 bar) for injection into the next stage.

### **High Pressure High Temperature Chamber:**

This stage has an inbuilt electrical heating element which can maintain the temperature of the chamber upto a maximum temperature of 2000 degree Celsius. The chamber is made of special steel which is capable of withstanding very high variations in temperature and pressures over tens of thousands of cycles. It is also fitted with prestressed shrink fitted rings. Strategically located water channels in the outer periphery are used for cooling this chamber. The machine incorporates molybdenum heating element when the maximum temperature for the furnace is 1600 degree Celsius (In inert argon atmosphere). When the maximum temperature is 2000 degree Celsius Tungsten/Graphite (In inert argon atmosphere) element is used. A vacuum pump is used to evacuate the air from the chamber to facilitate oxygen removal and filling argon into the system.

### **Yoke and Telescopic loading system:**

The HIP has a yoke, which holds the top sealing plug against the pressure developed in the high pressure high temperature chamber. The Telescopic loading system allows the user to quickly load and unload the material from the top.

### **Operation:**

The HIP system first attains a temperature which is desired. Then the pressurization cycle starts which injects incremental volume of argon into the high temperature high pressure chamber to obtain the desired set pressure. If in any case the pressure inside the vessel exceeds the desired pressure a servo actuated valve will leak the argon gas into a silencer (which also drops the temperature of the gas) and finally the gas is released to atmosphere. An elaborate set of safety interlocks make HIP intrinsically safe.

 ***insmart* Systems**

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