



HOT ISOSTATIC PRESSING

FOR IMPROVED MATERIAL PERFORMANCE



Hot Isostatic Pressing (HIP) is a specialised manufacturing process employed in industrial sectors to eliminate internal defects in components that occur during the initial manufacturing process. This is achieved by subjecting components to a blend of high temperature and high gas pressure (approx. 2000 bar) within a regulated environment

The CSIR houses state-of-the-art HIP technology with the ability to perform HIPing, quenching, and heat treatment in one cycle. This integrated approach results in **reduced costs** and **increased productivity**. The facility's operations are supported by specialised non-destructive testing (NDT) and metrology laboratories that uphold standards of quality and precision.



APPLICATIONS

- Casting densification
- Additive manufacturing
- Powder metallurgy
- Metal injection moulding
- Introduce compressive residual stresses in parts to improve fatigue performance.

MATERIALS

- Steel
- Titanium

TECHNOLOGY EQUIPMENT SPECIFICATIONS

Each component of the HIP is integral to ensuring the process's versatility and success.

PRESS TYPE	QIH 32 MOLYBDENUM RAPID COOLING FURNACE
 Maximum operating pressure	207 MPa
 Maximum operating temperature	1 400 °C
 Maximum height of workload	890 mm
 Maximum diameter of workload	300 mm
 Design pressure	228 MPa
 Pressure vessel volume	242 dm ³
 Maximum weight of workload	350 kg
 Temperature control	± 8 °C
 Number of heating zones	3 pcs
 Number of furnace thermocouples per heating zone, type B	2 pcs
 High quench capability for in situ heat treatment	

PRESS TYPE	QIH 32 MOLYBDENUM RAPID QUENCHING FURNACE
 Maximum operating pressure	207 MPa
 Maximum operating temperature	1 400 °C
 Maximum height of workload	500 mm
 Maximum diameter of workload	270 mm

- Aluminium
- Magnesium
- Nickel superalloys.

INDUSTRIES

- Aerospace
- Automotive
- Mining
- Industrial
- Oil and gas
- Power generation.

Pre-HIPing assessments and measurements are crucial for establishing a material's initial condition. These include density measurement, dimensional analysis and mechanical property testing. Metrological analysis such as surface profilometry provide high-resolution data for analysing surface finish and geometrical accuracy.

METROLOGY EQUIPMENT

- Absolute Coolant -proof caliper
- Digimatic Depth Micrometer
- Digital Micrometer
- Dial Test Indicator.

Pre and post-NDT, such as ultrasonic testing or radiography, is typically performed to identify existing defects or irregularities like cracks or voids.

NON-DESTRUCTIVE TESTING EQUIPMENT

- IR Thermographic Testing Equipment
- Eddy Current Flaw Detector – NORTEC 600
- Digital Ultrasonic Flaw Detector – Karl Deutch – ECHOGRAPH 1090
- Ultrasonic Phase Array - M2M- GEKKO 170
- Digital Ultrasonic Thickness Gauge - CYGNUS 4
- X-Ray Radiography (Basic 2D microfocus Xray radiography)
- Magnetic particle inspection.

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