MONITORING THE OUTGASSING OF POWDERS PRIOR TO SINTERING AND HIPING

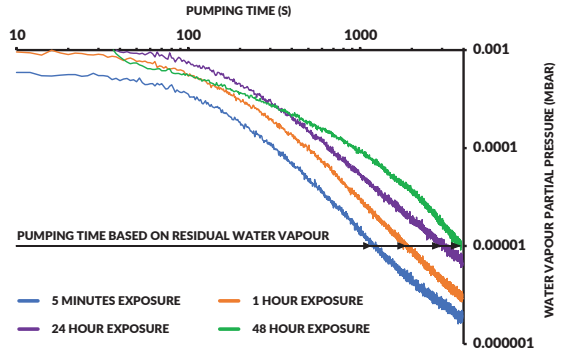
OPTIMIZATION OF HOT ISOSTATIC PROCESSES USING GENCOA OPTIX

Hot Isostatic Pressing (HIPing) is a process to densify powders or cast and sintered parts in a furnace at high pressure (100-200 MPa) and at typical temperatures of 900 to 1250°C. HIPing has developed to become a high-performance, high-quality and cost-effective process to produce many metal (or ceramic) components.

HIPing is commonly applied to the manufacture of parts such as steels and superalloys that are used across many industry sectors such as:

- Energy
- Process Industry and Tooling
- Transportation and Aerospace
- Nuclear and Scientific
- Oil and Gas

The HIPing process uses canisters to contain the metal/ceramic powders. Prior to the any powder being introduced, the containers must be leak-tested to ensure that they are free of any leaks. The next step is outgassing to remove adsorbed gases and water vapour. The degassing process is achieved by vacuum pumping with the end-point for the process being poorly defined.



Residual water vapour with different canister exposure times

Although time consuming, degassing of HIP canisters is a critical step in the manufacture of powder hot isostatic pressed components. Carried out effectively, this stage of the process enables high quality components to be produced by preventing the retention of atmospheric contaminants such as oxygen, nitrogen, hydrogen and argon which are responsible for defects leading to poor material performance.

Gencoa Optix is a gas sensing instrument that can be utilised to monitor the level of contaminant gases such as water vapour, nitrogen, oxygen etc. Optix requires no additional pumping or sampling equipment, And can operate throughout the entire degassing process.

Outgassing of canisters is a process that can take up to several days to complete. However, the introduction of Optix can save a considerable amount of time through monitoring of the degassing process. Optix detects and notifies users when degas is complete, based on the residual gas analysis to shorten processing times for HIPed parts, whilst ensuring quality and traceability.

Unlike other vacuum gas analysis methods, Optix is a highly sensitive stand-alone device that is industrially hardened. It uses 'light' to detect the gas species and the detector is not within the vacuum environment. Any contamination or vacuum problems will not harm the detector, so monitoring will be maintained and damage avoided.

Without a need to replace filaments or carry out the disassembly of components for maintenance, Optix delivers 100% operation uptime even in the harshest environments.

OPTIX BENEFITS

- Wide range pressure measurement
- Leak checking of HIPing enclosures
- Monitoring the effectiveness of the pump-down
- Monitor degassing and gas partial pressures to determine the optimum processing time.
- Sampling of gas during HIPing to check purity of argon
- Traceability for parts – data saved of residual gas traces during all process stages

Visit **www.gencoa.com/optix** for further product information, or email **sales@gencoa.com** to contact our sales team.