

Reference | Sintavia, LLC

Quintus Hot Isostatic Press with URC™



Photo courtesy of Sintavia, LLC.



Location

Davie, Florida, USA

Quintus Equipment

Model QIH15L HIP

“Quintus HIPs set the industry standard for technology and safety.”

Doug Hedges, President
and COO, Sintavia

Sintavia Additive Manufacturing Center Unleashes Power of Quintus High Pressure Heat Treatment

Compact Hot Isostatic Press consolidates multiple process steps in single HPHT cycle for safety, reliability, productivity

The rapidly emerging field of 3D printing took several steps forward with the launch of Sintavia’s Additive Manufacturing Center in 2015. Sintavia is the first company in the world to house all phases of its metal additive manufacturing, post-processing, analysis, and testing on site, in a visionary end-to-end production chain.

A highlight of Sintavia’s impressive equipment line-up is the Quintus Hot Isostatic Press (HIP), model QIH15L. Part of the family of compact production systems developed specifically for markets like additive manufacturing, this next-generation Quintus press breaks new ground by combining the conventional HIP cycle with the other heat treatment steps critical to ensuring material performance. The new press design enables Sintavia to rely on a single system for stress relieving, densification, solution heat treatment, and ageing, in the streamlined process of HPHT (high pressure heat treatment).

The AM Revolution

After a long career in aviation maintenance and operations, Sintavia founder Brian Neff recognized the promise of additive manufacturing for unprecedented design flexibility and streamlined production. Still, even with the AM revolution, metal powder-based 3D printed parts are susceptible to porosity and lack of fusion. This means they will have defects to some extent—pores from entrapped gas or areas with poor melting, for example. To reduce material imperfections and achieve optimal mechanical properties, 3D printed parts must undergo further process steps.

Hot Isostatic Pressing (HIP) has become the standard practice for defect healing of AM parts. The HIP process applies high pressure (50 to 207 MPa/ 7,250 to 30,000 psi) and high temperature (400° to 2,000°C/752° to 3,632°F) in tandem, thus eliminating internal pores. HIP can achieve 100% of maximum

theoretical density and improve the ductility and fatigue resistance of critical, high-performance materials—essential characteristics for demanding applications like jet engine components and satellite fixtures in the key industrial sectors Sintavia serves.

Quintus HPHT Innovation

As further testimony to Sintavia's pioneering vision of additive manufacturing, the company turned to Quintus Technologies, the world leader in high pressure technology, to supply its hot isostatic press. In September 2016, the Florida fabricator installed a QIH15L HIP, which features a hot zone of 7.3x19.7 inches (186x500 mm), enables pressures up to 30,000 psi (207 MPa), and handles temperatures up to 2,550°F (1,400°C). Thanks to its unique thermal and pressure enabled consolidation, all heat treatment functions can be performed in the press in a dramatically condensed timeframe (hours rather than weeks), within the four walls of the AM Center. Pressure and temperature can be run independently. The 3D printed part, still on the build plate, can be put into the HIP furnace as it comes up to temperature for stress relieving.

Quintus's proprietary Uniform Rapid Cooling™ (URC) feature delivers carefully calibrated cooling rates, above 150°C per minute, rapidly drawing internal and surface heat out of the component material, creating the capability to include solution heat treatment and ageing directly in the HIP cycle. All sub-systems are interconnected to provide a complete production station.

The tightly controlled HPHT process not only removes all porosity but also has a positive effect on the microstructure, eliminating undesirable material properties that can arise during traditional cooling. Components are ready for final finishing steps, such as machining and polishing, in record time.

By performing both high pressure and heat treatment functions in a single system, the Quintus press gives Sintavia the benefits of reduced downtime, excellent process control, less energy consumption, and lower total process costs.

Changing the Manufacturing Landscape

Sintavia's landmark facility co-locates high-speed metal AM printers, precision post-processing equipment, a full complement of mechanical testing devices, and a complete metallurgical and powder laboratory to produce complex components for critical industries.

With our singular capabilities, we have built an end-to-end production chain that changes the manufacturing landscape," observes Doug Hedges, Sintavia's President and COO. Housing all functions under one roof not only "produces turn times that are unmatched in the metal AM industry today," he continues, it also allows for closer control to maximize the integrity of customer product, from when the powder arrives at the facility to when the finished parts leave the dock.

"Sintavia is able to optimize parameters, serially manufacture, and audit quality much faster than any of our competitors," Hedges points out. "OEMs are demanding—and achieving—reduced cycle times and improved quality from their manufacturing supply chains. Quintus HPHT will help our Additive Manufacturing Center stay in front of the curve."



The new modular design of QIH15L HIP shortens installation time and reduces space requirements. The press is delivered as a complete plug-and-play unit, with the gas compressor module, cooling module, and power module all mounted in a 103x73-inch skid. It features easy-to-use control systems along with data acquisition and reporting capabilities.



Improved material properties with optimized parameters.

For more information please visit www.quintustechnologies.com or email info@quintusteam.com

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