

Assure Quality Assurance and Control Software

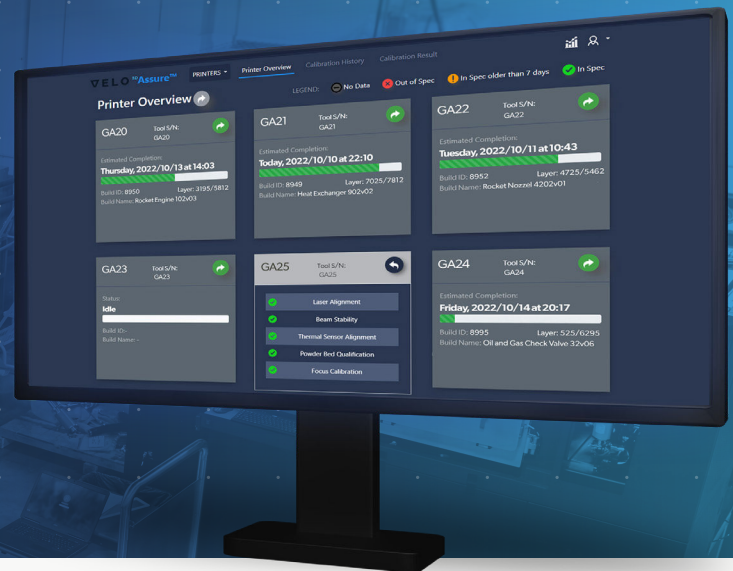
Provides unprecedented traceability of machine health, part integrity, and build reporting

Working in concert with Sapphire and Flow, Assure, a revolutionary quality control system, enables visibility into every layer of the build through real-time, multisensor, physics-based excursion detection algorithms.

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Assure validates printed part quality to provide the transparency needed for volume production

Factory Monitoring

Real-time machine fleet tracking and live build progress status enables operators to have effective oversight on factory performance. Now integrated with Grafana, engineers can create custom graphs and dashboards pulling from nearly 1,000 different sensor readings that reveal detailed insights into the process.

Tool Health

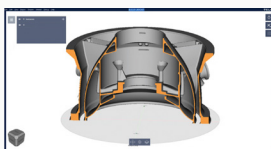
Automated system calibrations enable each system to replicate parts within geometric and material property specifications. Assure records printer calibration history so that you can quickly identify issues and trends.

In-process Monitoring

Provides an overview of basic build performance data (Optical health, powder bed quality, build chamber environment, etc.), and lets you drill down to explore specification compliance in detail.

Build History Reporting

Easily filter historic records by tool id and completion status or search by build file name, work order number, build id, number of layers, and more. Assure's on-demand build report consolidates a vast amount of data into a concise summary of critical build information. View tool calibration status, build data, interrupt reporting, and height mapper images documenting any deviations.



Flow
Print Preparation



Sapphire
Metal AM Family of Printers



Assure
Quality Validation

UNDERLYING INTELLIGENT FUSION MANUFACTURING PROCESS

Assure Capabilities

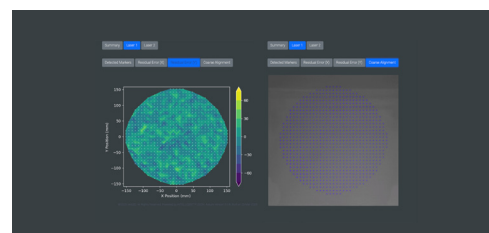
Pre-print Calibrations

Assure displays Sapphire's automated calibration results that ensure consistent geometric accuracy, surface finish, and validated material properties year-to-year and system-to-system. These in-situ calibrations can be run directly by the user from the printer control screen with no added equipment in a runtime environment. Results of these routines are displayed on Assure and archived for the life of the system for future reference. The main checks composing the Tool Health Checklist (THCL) include: powder bed qualification, focus calibration, laser alignment, thermal sensor alignment, and beam stability.



Multi-Laser Alignment

Pre-build, in-situ alignment ensures high quality overlay between lasers. This fully automated calibration routine runs without additional equipment and validates alignment at multiple locations on the build plate. Additional run-time checks quickly validate alignment every layer making on the fly adjustments if necessary. This improves surface finish by removing part stitch lines and helps to eliminate overlay porosity due to mismatch.



Process Monitoring

During the process, Assure tracks a layer-by-layer validation of atmosphere, consumables, and powder bed health to enable part quality. Throughout the print, factors like oxygen and humidity are tracked to verify that material properties stay consistent. By monitoring consumable indicators, like filter life and powder levels, Assure helps to prevent unexpected interrupts. Lastly, the system continually monitors for part protrusions that can occur due to excessive stress or build set up issues.



Height Mapper

Provides a detailed, layer-by-layer view of powder bed quality and laser behavior. Height Mapper is a 3D structured light scanner that reveals powder bed topography and ensures a conformal powder bed prior to and after each layer. A very powerful tool for troubleshooting a build, this process checks for target layer thickness, smoothness, and part protrusions.



Integration with Grafana

We have incorporated Grafana visualization application for customized views of the factory and printer status. With Grafana, operators can now access custom powerful analysis tools for deeper understanding of the entire process.

