

Technical Paper

Enhanced Intelligence Kit VFT-orbit-2



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Making digital generators “smart”

There are more than 1,000 VFT generators installed around the world making lenses. And for 100 years Satisloh has been designing, building, and researching how to make a better, faster, more efficient generator. And now, how to make them intelligent: the next evolution in lens manufacturing - enhanced intelligence.

The goal: create a system that recognizes and monitors both internal machine conditions and external environmental conditions during lens processing. With these capabilities we are able to use all monitored parameters for improving the overall equipment efficiency and the surface quality.

To achieve better monitoring inside and outside of the machine as well as adding intelligence to the machine, software and hardware modifications were necessary. This paper gives a brief overview of how the Enhanced Intelligence Kit achieves this.

Smartbox

A smartbox is the key component of the VFT-orbit-2 Enhanced Intelligence Kit. Internal and external sensors collect all necessary information for process stability in real-time; the smartbox uses this data and smart algorithms to automatically initiate actions to maintain consistent generating quality.



Figure 1: Smartbox implemented in the machine base

Automated self-calibration

The well-known self-calibration is even more powerful and accurate than previous versions. Implementing new accuracy limits and a new measurement routine the calibration delivers excellent results and ensures the best possible lens quality.

Adding a Lens Depot improves machine uptime and utilization. Situated close to the loading arm, it houses two calibration lenses: one for calibrating the milling tool and the other for the turning tool.

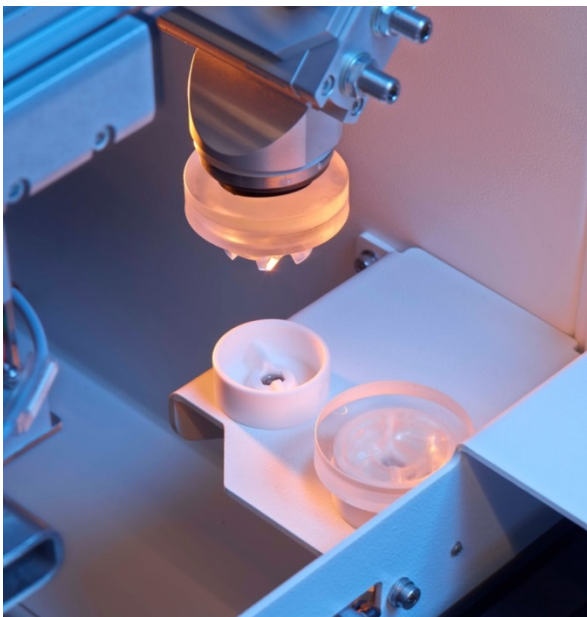


Figure 2: Lens Depot inside the machine houses calibration lenses

Fast-Tool flow monitoring

New sensors in the VFT-orbit-2 monitor the exact coolant flow during the turning process, detecting clogged nozzles immediately and preventing “dry-cut” to preserve the Fast-Tool’s integrity. All data is collected in the machine’s parameter log file and is accessible via MES-360. A manual evaluation of the data is also possible.

Thickness corrections are also done during this process.

Based on triggers chosen by the customer, the loading arm automatically picks up the calibration lens and the machine generates the surface, measures, and makes any necessary axis alignment corrections. This is all done automatically, without any operator intervention and minimal downtime.

Based on customer needs, the system can be programmed for any or all of the following conditions to initiate a self-calibration cycle:

- Temperature (machine base); coolant and ambient temperature deviations will create warnings or even stop the machine
- Specific time
- Lens count
- Recurring time intervals (e.g. every 8 hours)

Cooling circuit

Another critical component of the Enhanced Intelligence Kit is a new cooling circuit design. All internal motors are supplied by two separate closed cycle cooling systems. One circuit supplies both fast-tools plus the milling spindle. The second circuit supplies the A-, B- and Y-axes.

Because of this separation, it is possible to keep the flow rate higher, making the complete cooling system more robust and reliable.

Equipped with additional flow/temperature sensors, the machine easily recognizes clogged tubes and process-relevant temperature deviations - alerting operators when issues arise.

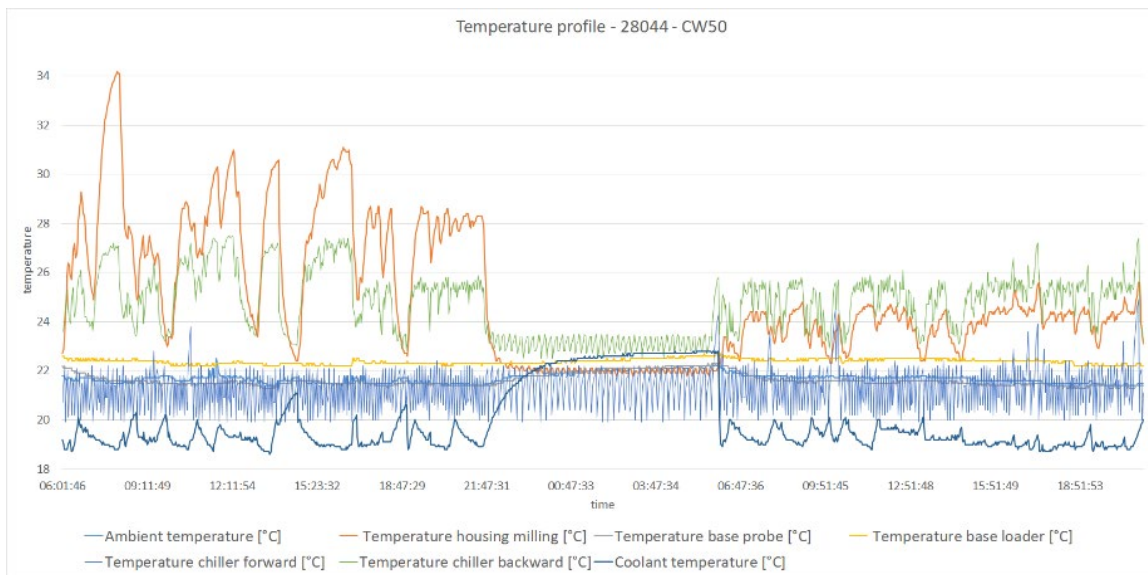


Figure 3: Temperature log example: (left) w/o circuit separation and (right) with circuit separation

SUMMARY

The Enhanced Intelligence Kit for VFT-orbit generators is an excellent investment in future-proofing a lab's surfacing line. The smart system recognizes and monitors both internal and external conditions, improving overall equipment efficiency and surface quality while reducing the cost per lens utilizing multiple technologies.

A **smartbox** seamlessly uses data gathered and smart algorithms to automatically initiate actions to maintain consistent generating quality.

Automated self-calibration with the internal Lens Depot maintains consistent surface quality without relying on operator intervention and stopping production.

Fast-tool flow monitoring sensors track coolant flow to preserve the Fast-Tool's integrity and stream collected data to MES-360.

New **second Cooling Circuit** design maintains a higher coolant flow due to a larger cross section and rate alleviating pressure on fittings – extending their usage life and eliminating leaks.

Contact your local Satisloh representative for details about how adding the Enhance Intelligence Kit to your VFT-orbit generators can improve both lab productivity and consistent surface quality.