On-Line Profilometer Technical Description and Specification

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Bytewise On-Line Profilometer

Technical Description
November 18, 2010

Overview

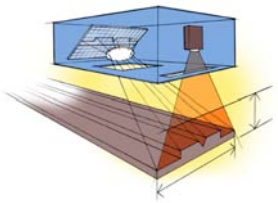
The On-Line Profilometer measures the cross-sectional profile (top and bottom) of the extrusion as it is moving. This profile measurement is matched and compared to the AutoCAD template. Software calipers are automatically applied to measure thickness. Upper and Lower Control Limits can be set in the software.

This system makes the profile measurement simultaneously across the profile; it does not scan side-to-side in a Z pattern. It has no moving parts. The simultaneous measurement is more accurate than scanning systems. The measurement frequency is 12 measurements per second maximum. The system can recognize and measure multiple extrusions side-by-side within one system.

Systems are configured from modular components to achieve the desired width range, thickness range, and accuracy.

Sensors

The system utilizes high-resolution digital cameras and laser light sources to measure the top and bottom sides of the extruded profile. These cameras and light sources are assembled into complete sensor assemblies that are calibrated and tested at Bytewise. Multiple sensors are combined to configure systems for wider fields of view.



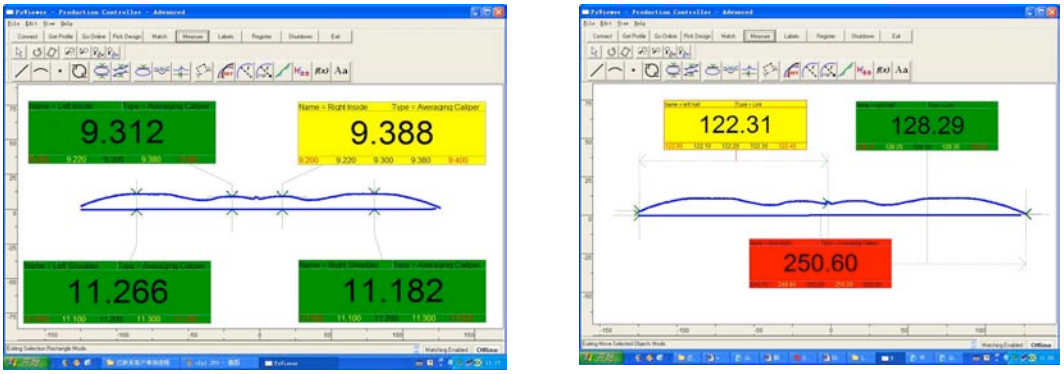
C-Frame

Sensors are pre-assembled into a C-Frame. The C-Frame provides for sensor mounting, alignment, and protection from the surrounding environment. The user is responsible for mounting the C-frame so that the extrusion is maintained within the measurement range. At right the C-Frame is shown with the optional cooling system.

Software

The OLP Software runs on a standard desktop PC. This provides for the real-time data acquisition, display, and data logging. Each measurement cycle produces a data record that is stored along with its timestamp on the hard drive in a data log file. Profile360 Software is a package that provides the following:

- Caliper-based utilities to program each profile design for specific thickness and width measurements, and feature recognition
- Recipe management for all profile designs
- Comparison of measured profile to design template
- Display of all real-time measurement data
- Display of trend data
- Data logging for all measurement results
- Standard report printing



OLP display of an extruded tire tread with various calipers

Data Output

The system supports data output to a PLC or host network via Modbus TCP over Ethernet. The data message can be configured to include the timestamp, measurement parameters, and error values.

Registration Fixture

Sensors are factory calibrated. A Registration Fixture is provided to register the sensors into a common coordinate system. This also provides a means to verify the measurement capability of the system to a certified standard. The software includes a routine that controls the laser source, collects the profile image, extracts the reference points, and corrects their positions based on registration standards. Registration verification cannot be done while the extrusion line is running, and should be done at the operating temperature.

Electrical Cabinet

The Electrical Cabinet is a NEMA 4 cabinet that houses the PC, UPS, monitor, communications hub, and power supply. It also includes an alarm beacon (red, yellow, green, horn) to signal when control limits are exceeded. An Ethernet port is provided for LAN connection. The cabinet is equipped with an air conditioner. The cabinet can be positioned up to 10 meters from the instrument.

Sensor Cooling System (Option)

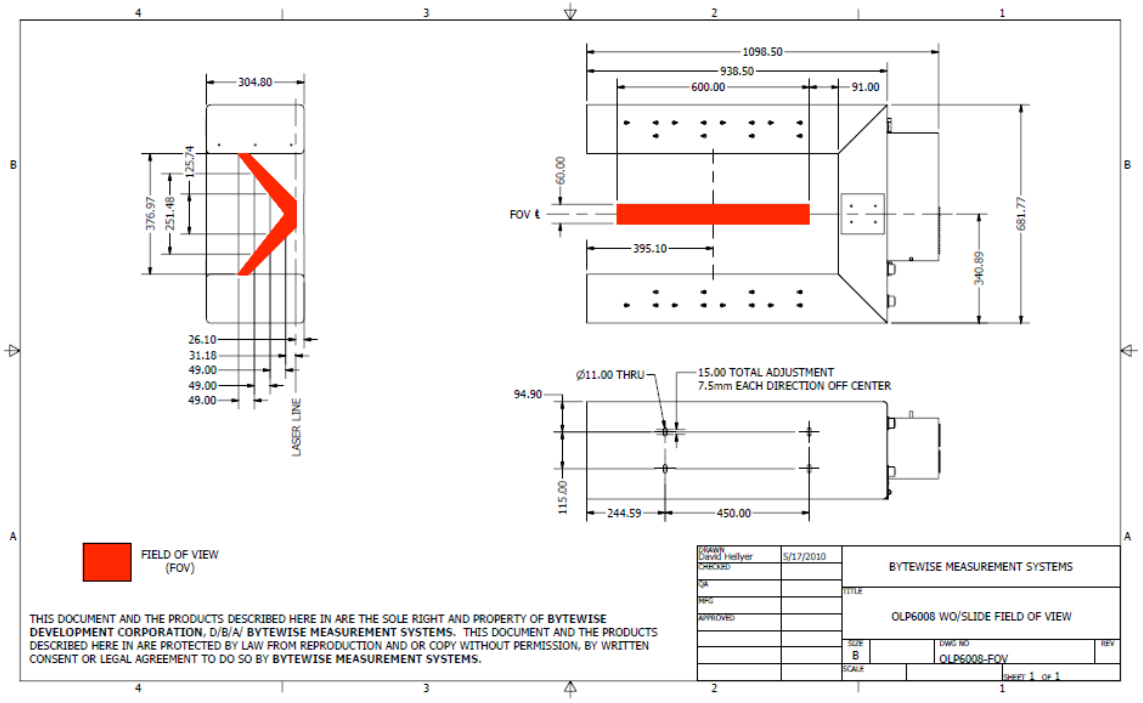
Sensors must operate below 45 degrees Celsius. If the environment is jot ore the unit is installed near the die this option is required to assure proper operation.

Two-Position Slide (Option)

This option enables the unit to be retracted off the line for cleaning or checking.

External Trigger (Option)

The external trigger option includes an encoder with cable and PC card so that the system can acquire profile measurements according to the distance of extrusion travel rather than time interval. In this arrangement the measurement stops when the extrusion line stops. Buyer is responsible for encoder mounting.



Dimensional Drawing for the 600mm OLP

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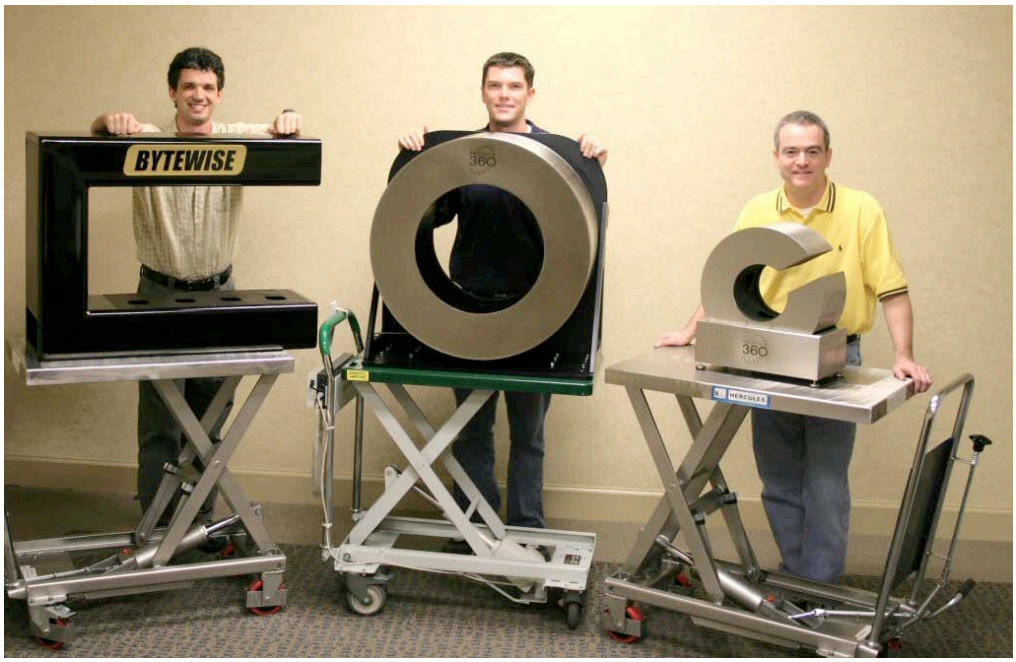

The Profile360 Product Family

OLP Installed on a Tread Line