MICRO-EPSILON

Automated machinery for winding fiber cables

There is a demand in the fiber optics industry for improved automated machinery for winding fiber cables onto drums for storage and shipping. The ideal fiber winding machine can intelligently wind the cable such that the cable is wound in a very consistent manner – neither with too much gap nor too tightly wound. This requires adequate real-time information from a sensor to close the loop and allow for control of the various motion components of the machine. The benefits to such a machine include mitigating costly damage to the fiber cables, delivering consistent quantities of product on each drum, and perceived quality due to neat windings.

Due to the delicate nature of the target material, a non-contact sensing method is required. However traditional vision systems are too lighting dependent to dependably measure the windings. Also, the fiber cable windings do not offer adequate contrast to allow an ordinary X/Y vision system to reliably distinguish one wind from another. Lastly, since the sensor must be robotically moved laterally across the drum and away from the drum as the cable is wound, traditional vision systems would be subject to calibration issues.

Spot triangulation lasers would be required to scan across the cable windings, reducing measurement speed and adding unwanted additional complexity to the machine.

The innovative solution for the fiber cable industry is the 2D/3D line scan laser model LLT2800. The laser line projected by the sensor allows for multiple windings to be measured simultaneously. The laser line is triangulated onto a proprietary rectangular CCD array, creating hundreds of true X/Z profiles per second and allowing for real-time control at high winding speeds. The sensor self-calibrates with each new profile such that the dimensional data is always valid, regardless of the motion of the sensor relative to the drum. Custom software onboard the machine is utilized to interpret the resulting 3D target data and provide closed-loop control of the machine motion accordingly.

Measurement system requirements

Accuracy (x axis):	200 microns
Resolution (x axis):	100 microns
Accuracy (z axis):	200 microns
Resolution (z axis):	40 microns
Scan Rate:	400 Profiles per second
Line Speed:	up to five meters per second

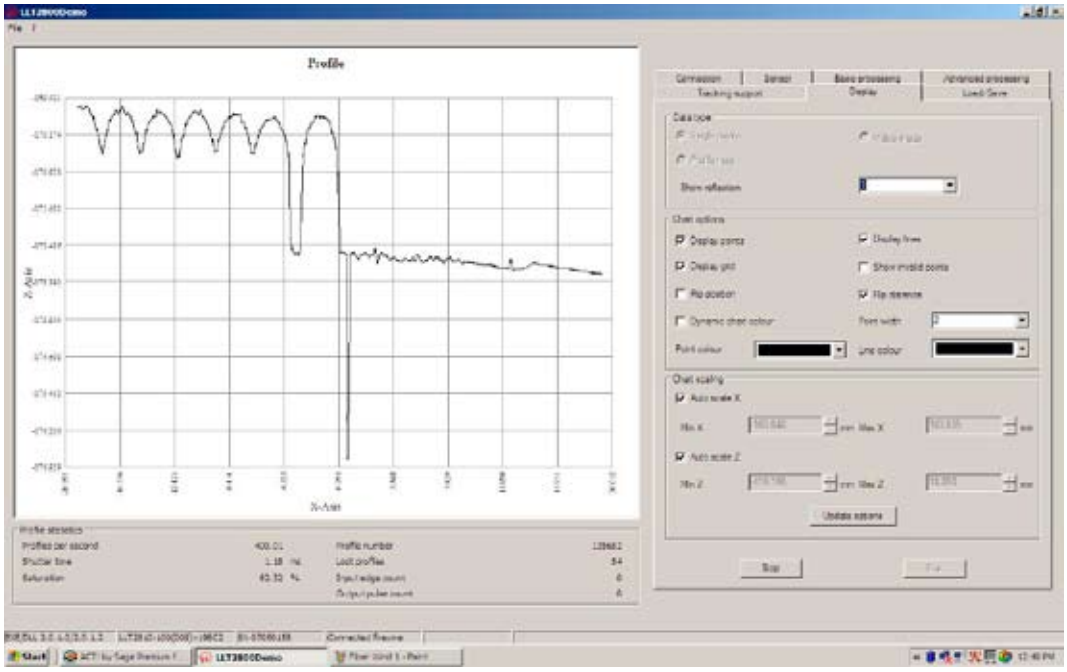
application

Ambient conditions
Clean manufacturing environment
Room Temperature

System structure
LT2800-100

Reasons for the system selection
External Lighting Independence
2D Profile Output without moving the sensor back and forth
True X/Z axis measurement
Self Calibration

Technology advantage
Self calibration
High Speed
Proprietary rectangular CCD array



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