

Owens Design Uses CTC Control Platform to Rapidly Develop Instruments Automation System



The OSA 5120 offers automated cassette-to-cassette operation for monitoring contamination and defects after critical production processes.

Owens Design develops and manufactures custom capital equipment and sub-assemblies for the semiconductor, data storage, biomedical and nano-technology industries. They provide a complete product development service including design, prototyping, and volume production assembly services.

The Challenge

Candela Instruments, the leading supplier of Optical Surface Analyzers (OSA) to the global data storage industry, needed to quickly move their metrology (scientific measurement) surface scanning measurement technology from the laboratory to full production. Their product was finding previously unseen defects in the R+D lab and their customers wanted to exploit this technology to improve production yields. Integration with production required a fully automated, in-line configuration to be

developed. Automation parameters such as cassette feeding, disk loading, and integration to factory systems all needed to be defined.

The Solution

Candela's measurement technology was well proven in their manually loaded R+D product. They needed a partner with HDD (hard disk drive) customer expertise and the capability for rapid development to allow them to address this emerging market. Owens Design collaborated with Candela to develop the automation system necessary to bring their metrology technology to high volume production, making fast and efficient process characterization and control, reliability testing, failure analysis and media qualifications a reality.

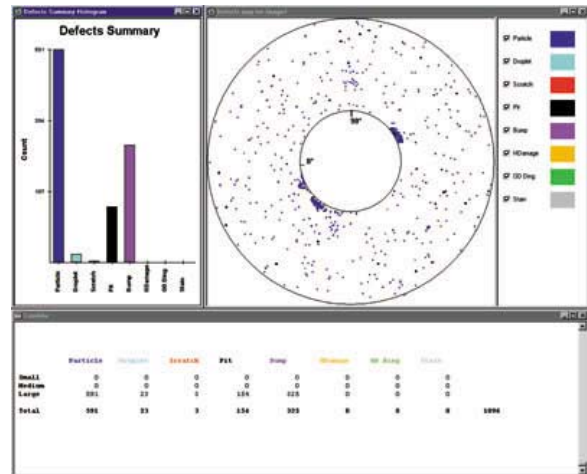
Owens facilitated a successful outcome by actively participating in joint meetings with the end user and developing the specifications to meet their needs for reliable, easily integrateable, and cost effective automation. Once the specifications were finalized, Owens developed the first system in 12 weeks and market acceptance of this product configuration has grown ever since.

About the Machine

The machine, known as OSA 5120, performs optical analysis on thin film magnetic disks or substrates with exceptional speed and sensitivity and under full automation or standalone configuration. The control solution utilized a Control Technology Corp. Model 2600 controller for machine control and a PC for supervisory and data acquisition / processing. The CTC Model 2600 controlled a custom 3-axis robot, indexing conveyor, and multiple I/O

points. The CTC Model 2600 interfaced to the instrument PC via Ethernet communications. Randy Curtis, Vice President of Sales at Owens Design, said, "The CTC control platform was the best choice for this project because we needed to build a single control strategy that could integrate the motion, I/O, and communications, and we needed an easy to use programming tool that would provide a fast turnaround for the project. The Model 2600 met these requirements." Cassettes are loaded to the automation system by the factory conveyors or manually. The cassettes are then indexed to the slot of interest and the disk presented by a vacuum lifter. The disk is then placed to a high RPM vacuum stage by an edge grip handler. Precise placement is critical to prevent damage to the disks as they are placed to the spindle. After the instrument scans the first side, the robot picks, flips, and places the disk back on the spindle for scanning the second side. All automation is recipe configurable for form factors from 65 – 95 mm without operator intervention.

To include a very comprehensive spectrum of metrology and defect applications, the analysis incorporates five measurement methods, both topographical and non-topographical: ellipsometry, reflectometry, scatterometry, Kerr effect microscopy, and optical profilometry. These technologies use light in various ways to detect and classify defects on disks such as particles, stains, pits, bumps and scratches.



Disk defects are depicted on a disk map and counted by user-specified size bins. Defect locations are also reported, facilitating subsequent review by other analytical methods.

At the heart of the system is a proprietary Q-polarized light source that combines P and S linear polarizations to optimize phase shift detection. The light is focused on the disk where it is absorbed, reflected and scattered by the surface based on the disk's smoothness and other properties. The presence of a film or magnetic defect will also introduce a phase shift in the light reflected off the disk.

“We chose Owens Design as our partner to help reduce product development times and introduce an outstanding product to our customers. They have provided a complete outsourcing solution and helped make our automated OSA product a tremendous success,” said Rusmin Kudinar, President of Candela Instruments.

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