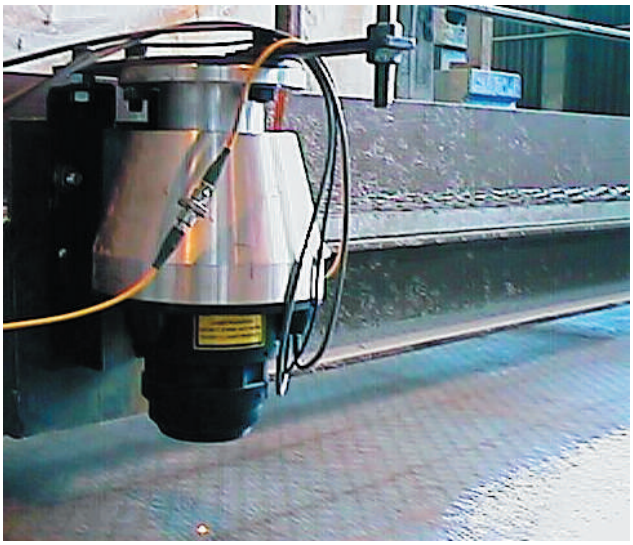
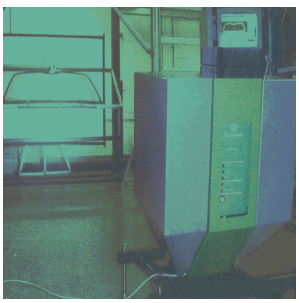
INSPECTION AND PROCESS CONTROL



On-line optical sensor

The demands of our customers mean that Pilkington expends great effort in ensuring it has world class inspection equipment to guarantee top quality, flaw-free glass. Automotive customers in particular insist upon extremely high quality glass. To detect exceptionally small faults, Pilkington has developed its own state-of-the-art glass ribbon scanner which is capable, not only of detecting and accurately measuring very small defects, but is also able to distinguish between types of defects. This gives the glass maker valuable and timely information, allowing process parameters to be altered for improved operation.

The technology for the scanner was conceived and developed at Pilkington using high precision proprietary optics and powerful image processing equipment. The system scans the glass ribbon thousands of times a second and assures that every fraction of the ribbon is inspected for defects. The scanner operates around the clock, 365 days a year and has to be exceedingly reliable. Self-diagnosis reveals any malfunction, enabling the system to be corrected quickly and minimising maintenance effort. Additionally, the system can be monitored at a distance, from the other side of the world if necessary, further reducing the need for on-site maintenance.



Windshield optical assessment

Automatic inspection instrumentation for monitoring and control is a key work area, involving optical, electronics and software experts. Automatic inspection instruments provide more reliable assessments than humans, supply real-time information on the performance of the process and product, can identify pass/fail states and facilitate adjustment of the process leading to improved process capability, yield and quality, and reduction of faults and manning.

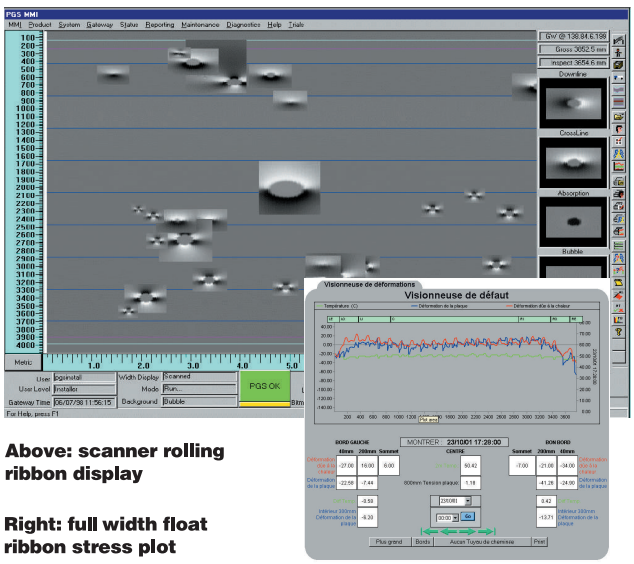
A high resolution non-contact optical sensor developed by Pilkington is capable of measuring the position of up to four surfaces on or within a transparent material such as glass. When supported on-line directly above the moving glass, the instrument can relay readings of glass thickness, shape, wire depth for wired fire glazings, and moreover surface topography for dappled or patterned glass products. Impending processing inefficiencies due to glass thickness variation, deflections in shape or irregular wire depth can be predicted and suitable action taken. This sensor can also be mounted on a robot arm to determine the shape of windshields and other automotive glass products. Crucial measurements checked include lift around the edges, cross curvature and the gap between matched pairs of automotive glass parts prior to lamination.

An area scan optical assessment system has been developed for 100% automatic on-line windscreen inspection. Results are compared with a number of distortion levels set in different quality zones. As well as ensuring product quality delivered to customers, the instrument is also a valuable tool for process improvement.

Extensive database creation is in progress, promoting the use of available information to manage and improve the float manufacturing process by ensuring all relevant facts are stored and are readily obtainable. A significant benefit of the system is to provide a single point of access for all details related to the manufacturing process for the entire lifetime of the line.

The database presents the means to log, analyse and report information in the areas of production, quality control (SQC), shift event logging and plant reporting. This information can then be studied (locally or remotely) over periods of hours, weeks, months or years to identify trends, account for events and track productivity, for example.

The database application suite is based on multilingual Web technology, enabling the user to access any system anywhere in the world. The system thus leads to a broader and accelerated flow of information, decreased application deployment costs through lightweight client technology, lower software systems maintenance costs due to standardisation and improved benchmarking information.



Above: scanner rolling ribbon display

Right: full width float ribbon stress plot

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