

Sunrise on the future

Davide Cigna talks about Bottero's strategies for the Asian solar glass market

Demand for solar glass is growing daily throughout the world and the glass industry is changing rapidly to keep pace. More than 400,000 tonnes of solar glass was made into solar modules in 2009, and even more in 2010 and the critical criteria of solar glass is becoming increasingly demanding.

The solar module industry has moved most of its production to the Far East, in order to reduce operating costs, but they still require top quality materials, such as the solar glass, to be produced on-site.

A global provider of solutions in the design, production and installation of glass technologies and equipment for more than 50 years, the Bottero Group employs 1200 people at production facilities in Italy and China, as well as maintaining a service and sales network in more than 90 countries. PV glass manufacturers are offered a solutions approach from the exit of the glass from the furnace to the packing of finished products.

Collectively, Bottero has installed worldwide more than 150 lines for float and patterned glass production and for glass coating, laminating and special equipment. This experience includes handling and unloading solutions to manage every dimension of glass and real-time supervision and optimisation systems to improve line productivity. Increasingly, these contracts have been designed specifically for solar glass production.

In approaching the demand of new "solar oriented" glass production equipment, Bottero developed their strategy, moving from one key strength point: being the only glass machinery Company in the world capable of acting as one-stop partner for glass production, processing and production equipment for their customer.

No other company, can support the glass industry in both production equipment (cold-end), processing machines (cutting, grinding, drilling), and customized handling solutions (robot, stackers, packing solutions).

PV glass production

BOTTERO cold ends for PV patterned glass, for example, represent cutting edge technology. Thanks to a dedicated engineering for this specific glass type, some of the most advanced cutting technologies from float glass, flexible unloading solutions and a dedicated control and Scada system, Bottero has become a partner to most of the Asian PV glass manufacturers, with more than 20 cold ends expected to be in operation in Asia by end of 2011.

The winning strategy of the company for this product has been the re-engineering of an "old" technology (rolled glass was widely used in construction in Europe during the '60s and 70s and Bottero was already producing equipment at that time!) to fit into the new requirements of PV glass.

As a result, Bottero PV glass cold end is composed of a lean

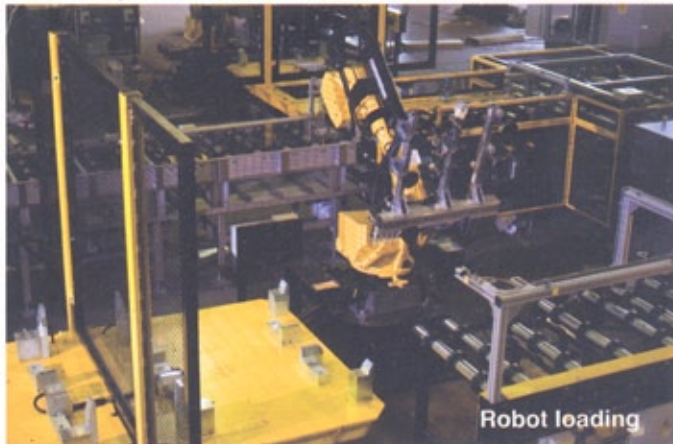
wheels conveyor system, easy to install and maintain, simple solutions for glass selection and easy interface with automatic inspection systems.

On other hand, top quality cutting is guaranteed by the same new generation cutting equipment currently used in the float lines. A better cutting tolerance on the glass sheet, improves the processing operations of the glass itself, giving a better finished product and a longer life of the processing tooling.

The optimizer system is another high-tech software, which greatly improve the overall yield of the equipment, analyzing the quality of each single area of glass and automatically choose the most profitable production to cut.

Also the unloading solutions have been completely reinvented. PV glass production is very sensitive to short-notice orders for small quantities of special products to be produced among the most common productions. The capacity of a PV glass manufacturer to react quickly to this kind of "emergency" could be an added value in the ultra-competitive PV glass world.

That's why Bottero offer robotized solutions for automatic



Robot loading

unloading, which are more flexible and performing than the traditional stacker machines. With Bottero robotized unloading solutions the number of destinations are virtually doubled compared to a normal stacker machine, and it is so possible to manage more dimensions at the same time or different quality sheets.

Full product traceability is guaranteed by a complete SCADA system, which store all the relevant information for reporting and future reference.

These differentials has been greatly appreciated by Asian customers, since almost 80% of new PV glass cold ends in Asia in 2010 has been awarded to Bottero.

PV glass processing

In glass processing, Bottero is going glocal (think global, act local). In fact, in 2010 the Italian group decided to start the local production of the double edger machine GEMINI, specifically used for pencil-edge grinding required in solar glass industry,

in order to meet the demand of Far East customers for a reliable product but at a competitive cost. The machine is well known worldwide since more than 10 years and the demand strongly increased in the last years, accordingly to the boom of solar glass.

Producing the double edger machine in their manufacturing facility in China, Bottero can offer a technology-proven machine, customized for the Chinese and Far East market. The machine have been partially re-engineered in order to maximize the advantages of the Chinese production base, but the design and the quality control have been completely kept under the company quality process.

The machine itself has been of great interest for the Asian solar glass manufacturer; since its official launch on June 2010, more than 60 GEMINI units have been sold in China only.

Moving from this huge and quick success, Bottero is going to develop new "localization" in 2011.

One-stop supplier

The "Solar made in Bottero" is not only limited to these two types of main equipment, but comprises a full range of solution.

A diversified portfolio of glass processing machines is available, including cutting tables, grinding and drilling machines.



String laying system

Standard standalone machines can then be integrated into a processing line that automatically manage the process up to unloading station.

Bottero 'Solar integrated Lines' are turnkey solutions with different levels of automation, tailor-made to the specific requirements of the customer. They generally comprise the following equipment elements:

- Loading systems with robots, stackers or standard loaders to load the glass on the line.
- Cutting and breaking equipment, to cut glass sheets to required dimensions.
- Conveyors and handling solutions to transfer the glass sheet along the process.
- Grinding machines (Gemini and the recently introduced Mercury series) to refine glass edges after cutting.
- Drilling machines.
- Automatic buffer systems (LIFO/FIFO) for intermediate operations.
- Washing machines to fine-wash the panes before entering the hardening process.
- Unloading and packaging systems for finished product.

The company's extensive glass grinding experience has been integrated within the Mercury double edger machine, its latest top level machine, introduced at Glasstec last year. The new machine has been specifically designed for the high-production lines, working 24/7 and to comply with the demands of the solar glass industry. Features include:

- Grinding speeds with corner dubbing up to 20m/min for pencil edge finishing.
- The fastest servo corner dubbing currently present in the market.
- Cup wheel changes 'on the fly', without production stoppages, thereby reducing downtime.
- Automatic wear recovery on the cup wheels to reduce maintenance times.

Bottero lines can also automatically manage the positioning of interlayers between sheets on the rack. Proven automatic solutions are provided for paper and cotton string options, the most widely used in the PV industry.

The entire line is managed and controlled by PLC system and supervised by Bottero production management software, which monitors the line in real time, warning about anomalies, tracking production and storing all process data for every sheet. The most advanced application can also optimise cutting patterns, including several customisable reports for production and statistical analysis and the creation of historical production databases.

Also available is TCO coating handling equipment, offline cutting lines and sorting systems to manage different patterned and float glass materials.

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