TIAMA HOT SYSTEMS

A full range of sensors at the hot end

In this article we take a look at how Tiama – one of the hot-end's major players – is continuing to develop new modules of its HOT systems, part of the smart factory concept developed to provide key information regarding the process from the gob to the formed articles.

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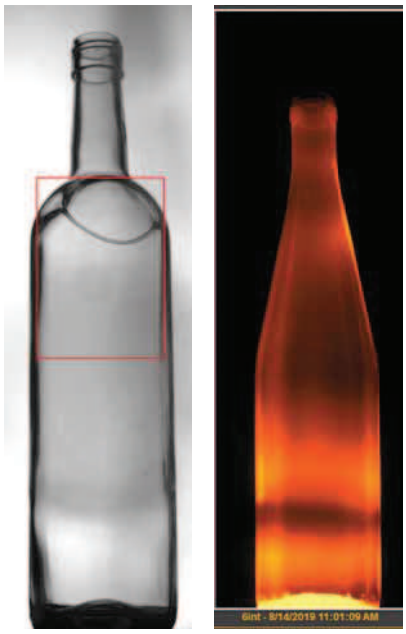
Tiama has always been known for its visions and carousel machines but for several years now, Tiama has also become a major player in the hot end area of the plant.

Starting by developing the I-Care, Tiama then chose to buy GeDevelop and to integrate the Tiama HOT mass into its hot-end product catalogue, with hot-end inspection being a key and strategic point for the hollow glass industry, Tiama accelerated its developments and launched its new expertise called Monitoring, with the Tiama HOT systems, a new range of hot end machines.



**Birdswing detected by the Tiama HOT eye (left)
Tiama HOT form (right)**

Today, the Tiama HOT systems range is composed of five modules, and four of these are online systems positioned along the entire hot end process, starting at the gob level, after the shear cut and until the annealing lehr. They can all operate independently. This modular approach enables customers to meet their specific needs according to their production issues. Modules can be added step by step by customers to take the time to understand how each machine works in order to facilitate their ownership by operators. Several production lines all over the world are already equipped with all the sensors of the Tiama HOT systems range.

TIAMA GOB FORMING CONTROL SOLUTION

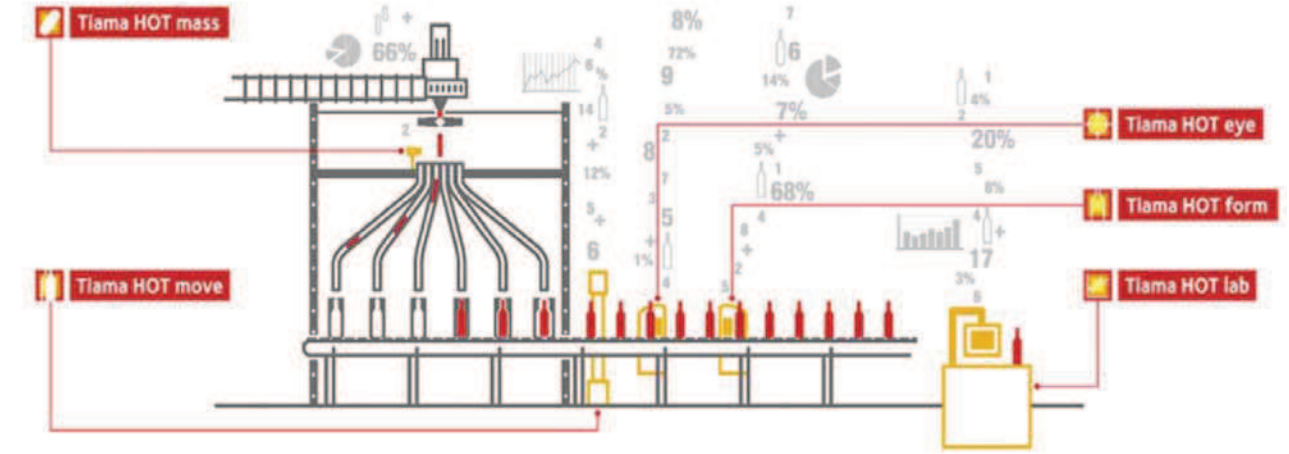
The Tiama HOT mass is installed just under the shear cut and is composed of one or more cameras providing information on the weight, shape and temperature of the gobs. The system operates with closed loops which automatically adjust the weight of the gobs by acting on the tube and the needles. This weight stabilization allows better control of the process limiting the creation of certain kind of defects. The system also monitors the shape of the gobs by providing information on their length, diameter and tilt. All these data are available for each gob and refreshed in real time.

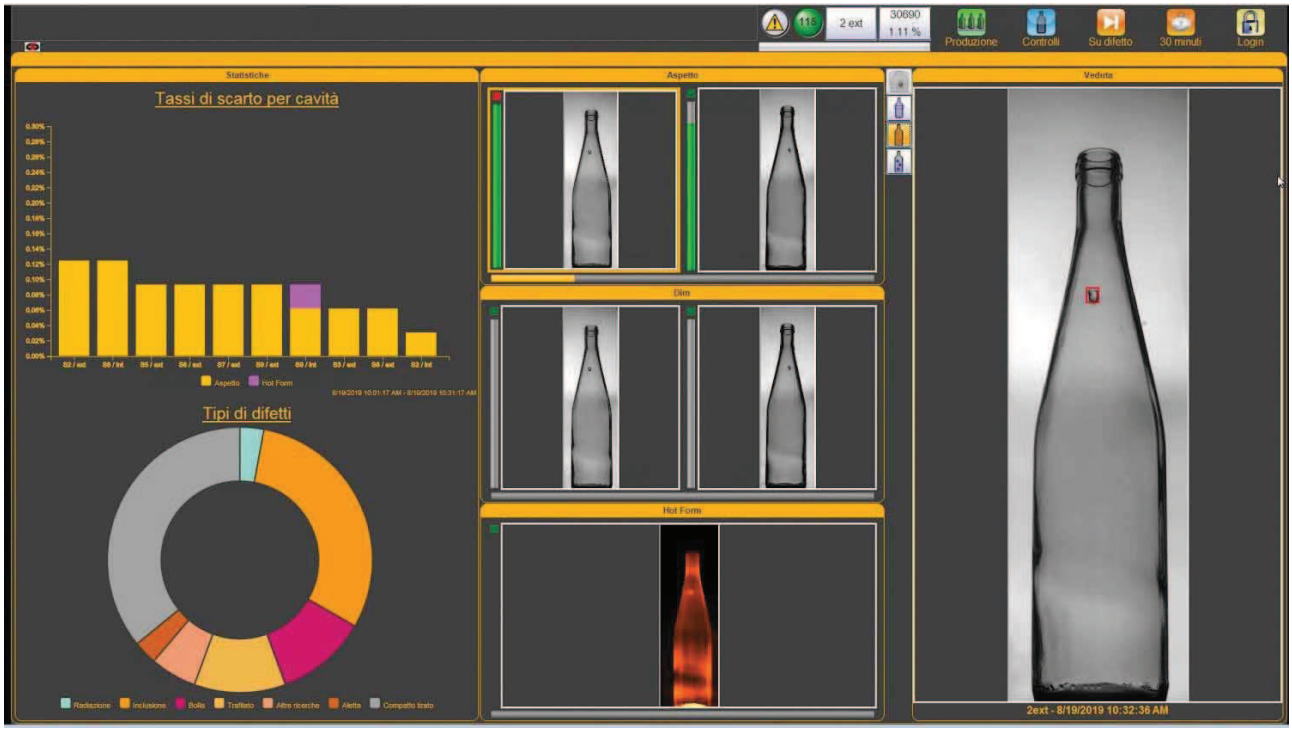
TIAMA HOT END DEFECT RECOGNITION SOLUTION

The Tiama HOT eye is equipped with two high definition cameras integrated inside two metallic tubes and a light source, flashing articles on the conveyor with infrared light not to disturb operators working on the line. The main functions of the system are the detection and recognition of critical defects and the dimensional analysis of the containers. By using high-definition matrix cameras, smaller defects will be detected, and dimensional measurements will be more accurate compared to infrared camera measurements. The Tiama HOT eye benefits from Tiama's cold end experience by running the same algorithms than the mcal4 sidewall inspection which allows the recognition of critical defects. For the dimensional, the system can provide measurements of verticality, height and diameters. In addition, alarms have been integrated into the system, making sure that operators will be alerted directly when a critical defect has been recognized.

TIAMA HOT END INFRARED RADIATION MONITORING

The Tiama HOT form uses one or two infrared cameras and measures the infrared emissivity of articles on the conveyor to identify problems with glass distribution or temperature. Thus, defects such as thin glass or uneven bottom can easily be identified through the Tiama HOT form. The system also provides statistical data to identify production drifts at the early stage of the process. The operators can then immediately re-adjust the IS machine and avoid the creation of defects, which represents a real production gain. In order to limit the footprint on the production line, the camera





Tiama HOT form and Tiama HOT eye main screen

Installation with the Tiama HOT eye, Tiama HOT form and Tiama HOT move

of the Tiama HOT form can be integrated into one of the tubes of the Tiama HOT eye. Both sensors have been designed to resist to the harsh environment of the hot end area and require little maintenance.

The Tiama HOT eye and the Tiama HOT form are both made up of cameras that take images and collect data from the articles. They provide real-time data to the operator on the current production and allow him to quickly identify process issues before articles arrive at the cold end and pass through the inspection machines. They can then react immediately and lehr time is saved. Both systems are synchronized with the IS machine enabling the images and the various data supplied by the sensors to be linked to the sections and cavities of the IS machine. In the event of a drift, the operators know directly where problems arise on the IS machine.

TIAMA HOT END ARTICLE POSITIONING MANAGEMENT

The Tiama HOT move is another module installed at the

output of IS machines, which monitors the transport of articles on the conveyor and provides information on the positioning of the articles in both directions. The system also rejects the stuck or fallen articles on the conveyor to avoid jams in the hot end coating hood or in the annealing lehr, saving time and improving the overall safety of operators.

AUTOMATIC STATISTICAL DIMENSIONAL MEASUREMENT OF HOT BOTTLES

The Tiama HOT lab is an offline system, and is the fifth module of the range. It enables laboratory measurements at the hot end and saves time during job change. Indeed, it is possible to carry out laboratory measurements directly without having to wait for the articles to reach the cold end. In particular, the Tiama HOT lab is able to perform dimensional, thickness and weight measurements. During production, it allows to identify issues on the current production and to solve problems before the operators receive the cold end feedback. A robot arm can also be installed on the machine so that measurements can be carried out automatically, thus saving time for operators.

SMART FACTORY AND BIG DATA ANALYSIS

Tiama HOT systems provide key information regarding the process from the gob to the formed articles. The systems provide a full range of data that can be used in order to have a global overview of the plant, from the hot-end to the cold-end.

A number of big data analysis projects have been carried out on lines equipped with all Tiama HOT systems sensors. The data provided by the systems could be correlated with different parameters of glass processes and IS machines, allowing to improve production by reducing certain defects thanks to better process control.

The Tiama HOT systems are fully part of the smart factory concept developed by Tiama called YOUniverse in which its five fields of expertise are all necessary to move towards smart factories. Traceability, inspection, intelligence and services are all very important in the Tiama strategy, and monitoring is key for the YOUniverse to live. ■

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