

# Partnership delivers practical process automation results

Bottero and Tiama recently announced a partnership agreement, delivering joint co-operation between the two companies to identify the key parameters to manage, stabilise, control and optimise the glass container production process. Initial practical results are already available to the market.

Bottero has developed a software tool to support setup and control of production with multiple weight articles, the Multi Weight Manager (MWM). In principle, each section can produce a different weight, while the variable gob weight is achieved by regulating the parameters of the servo feeder.

MWM has been designed and developed to enhance the Bottero servo feeder, which allows full and independent settings per section. The application is based on an evolutionary 'machine learning' technique and does not need to know any physical information on the production line; only historical and current production data are required. It is able to compensate glass accumulation phenomena due to the return trajectory of the needles and does not require specific firing orders.

With the MWM solution, the user sets the target weights on a per section basis (figure 1), then asks the system to provide a first tuning solution based on 'historical observations' of past performance (figure 2), elaborated thanks to a self-learning approach.

The settings coming from such

a solution are then sent to the automation system controlling the IS machine and after some 'stabilisation' cycles, the actual achieved weights are measured using a traditional weight scale, as shown in figure 3. To facilitate operations on the production line, MWM can integrate commercial weight scales to allow automatic weight acquisition. These values are then inserted into the MWM application, which uses them to 'tune' the solution according to the current status of the production line (figure 4).

The new settings are then applied (figure 5) and the iterations continue two-three times until the required weight accuracy is achieved. This tool improves significantly the job change duration and provides a good quality setup. Still, this approach requires subsequent manual weighting operations, being thus time-consuming, delaying the multi-weight setup procedure and forcing the line to be in full production before having the chance to weigh the bottles produced. All these aspects represent areas of improvement, in the perspective to increase the production efficiency.

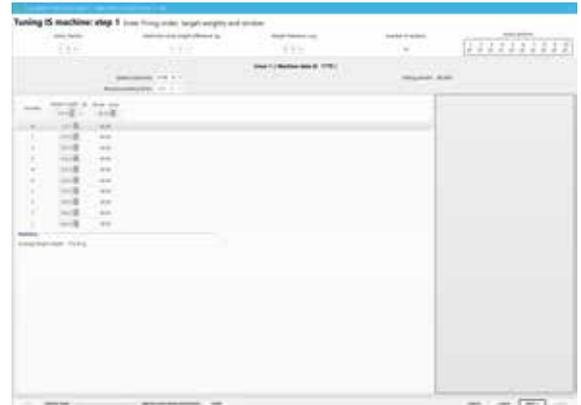


Figure 1: Set up of target weights.



Figure 2: Computation of first solution.

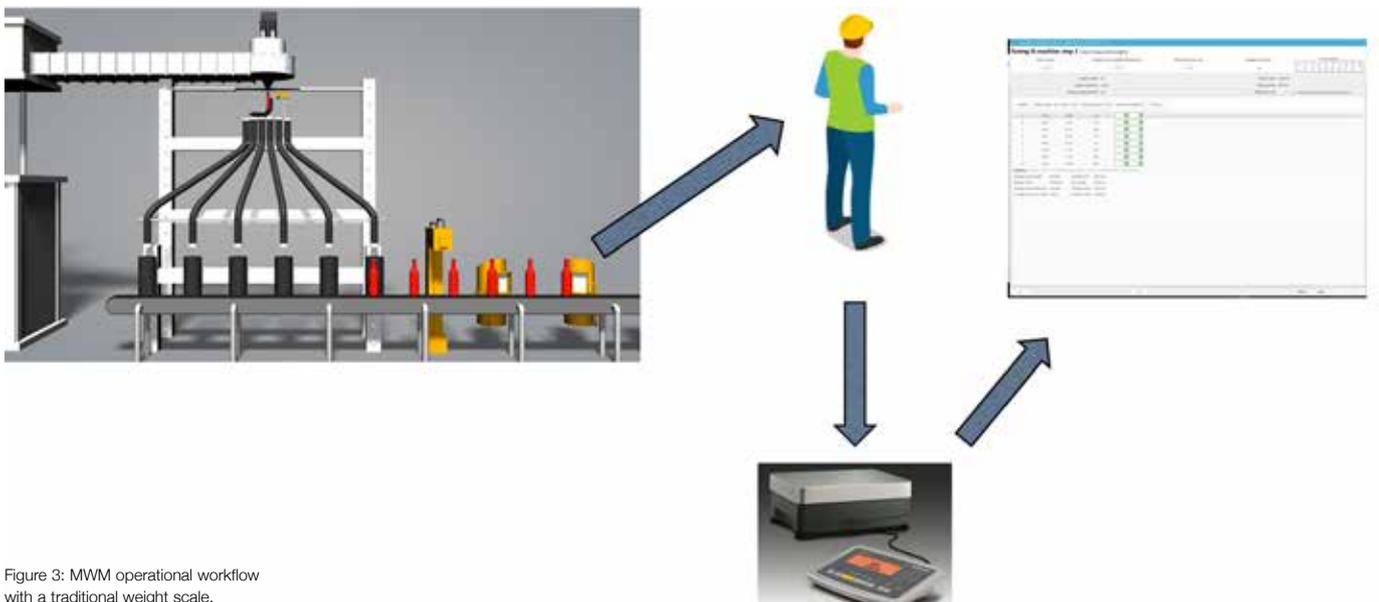


Figure 3: MWM operational workflow with a traditional weight scale.

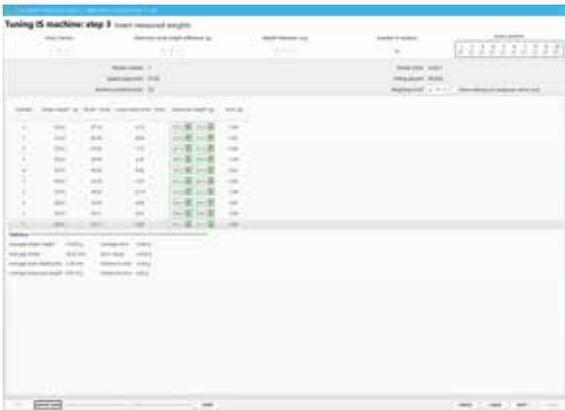


Figure 4: Acquisition of actual weights.

**Gob weight control**

From its side, Tiama has developed the camera-based HOT mass system, which calculates the speed and volume of the gob while falling. The main objectives of the Tiama HOT mass are to regulate automatically the weight of the gob and to control its shape.

Tiama HOT mass has evolved during recent months in the direction of managing multi-weight production. Association between gob and section has been implemented. Calibration uses a single article, hence no extra workload for the operator and no extra f bottle wastage. This calibration is automatically extended to all other articles.

Bottero and Tiama have worked together to integrate the Tiama HOT mass and the MWM, in order to simplify job changes in the case of multi-weight production. When the user has given to the MWM the target weights per section, the MWM (as in the original version) applies the new settings, based on experience. Immediately, the Tiama HOT mass measures the volume/weight of every gob and transfers the results to the MWM. The MWM can then fine-tune the settings based on the difference between the target weight and the one given by the Tiama HOT mass (figure 6).

After a few minutes, even before producing the first bottle, the adjustment of the feeder parameters for multi-weights is performed automatically. This solution has been tested successfully under glass for more than six months. It offers significant advantages compared to other solutions:

- No need to manually weight the bottles produced.
- No production losses due to manual weighing.
- Possibility to set up multi-weight productions (at feeder level), while other operators change equipment on the shop floor for the new jobs to be put into production.

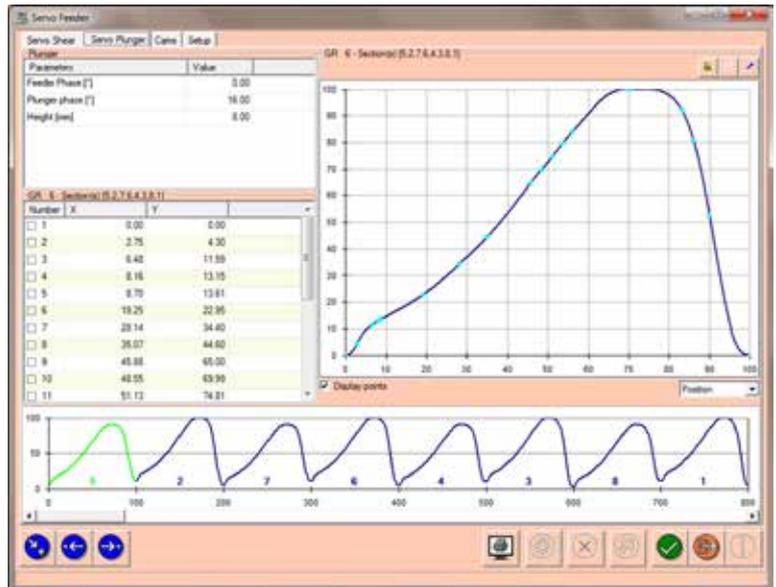


Figure 5: New feeder settings to apply.

In this way, as soon as the IS machine is ready for production, the multi-weight gob setup is already up-and-running. Exploiting the consolidated machine learning approach and the established interface with Tiama HOT mass, MWM will evolve in the next level to support gob shape management features, taking advantage from gob shape measurements performed by Tiama HOT mass to set up the feeder to regulate and control the gob shaped in a multi-weight/multi-shape production environment.

**Positive user feedback**

The system is already installed on a production line, with great satisfaction expressed by the user. When asked about the value of the package, the production manager at the glass factory simply said: "I did not calculate precise figures yet but if I consider the huge time saving when changing jobs, the very short time to achieve stable production and the high quality of final results,

I have to say ... it has a great value!"

And his positive words has been followed up with facts, since Bottero and Tiama have already been asked to install the same system on all other production lines within the factory.

When announcing the co-operation, Bottero and Tiama have clearly stated that developing solutions to enhance the production efficiency of customers and increase the operative safety of the glass container forming process were the targets. This first example is in line with the fundamentals of the challenge. ●

**Further information:**

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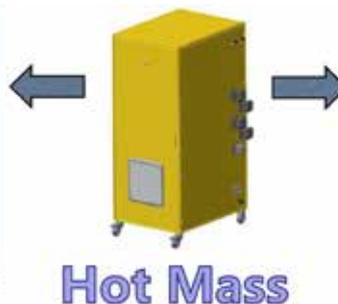
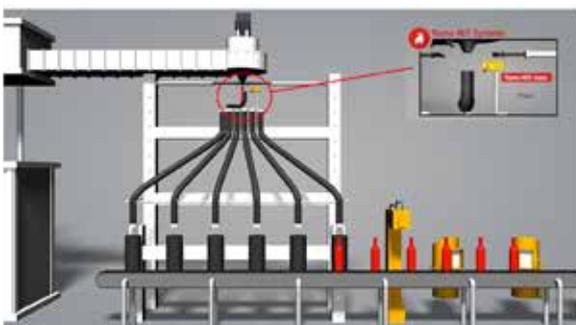


Figure 6: MWM-Tiama HOT mass operational workflow.