

# Stevanato *group* *n e w s*

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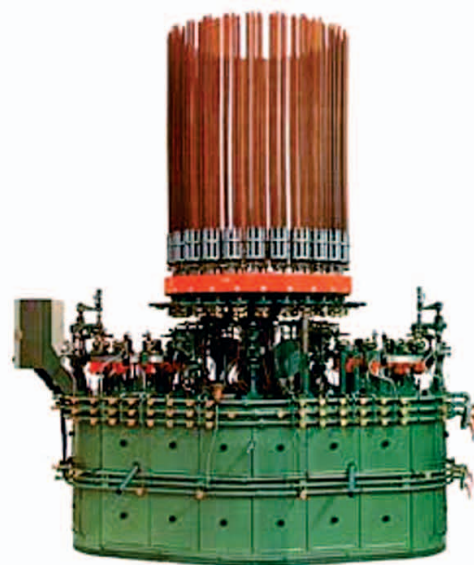
## New glass tubing containers production process with advanced process control and regulation CRAFT-199-7344, April 2003

New glass tubing container production process with advanced process control and regulation is a project co-funded by the European Union in the framework of the CRAFT R&D Programme, co-ordinated by SPAMI (IT) and with the participation of the following partners:

Freeman & Harding (UK)  
Bonus (CZ)  
Monico (IT)  
Bunder (D)  
Glafo (SW)

The aim of the Project is to redesign the production process of glass tubing containers, creating a new generation of automated high speed plants with advanced electronic applications instead of traditional electromechanical ones with manual feedback. The plants integrate sensors which monitor input, process and output parameters, and use this data to drive an overall control logic, unified for the whole cycle.

This imply to develop new sensing devices and to integrate existing ones, to model the production process, to design the control system and to define its operation through a series of field tests connected to laboratory measurements of vials chemical/mechanical properties. It is necessary to correlate the physical/chemical characteristics of the sample produced by the pilot plant with all the variables related to manufacturing process and to input materials, which has never been performed before.



The innovative pilot plant has the following characteristics:

**Perform high precision operations for raw glass-tube processing** – the existence of two key factors in traditional glass processing, heavily influencing vials final quality, is well known, i.e.:

- Glass tubing thickness
- Glass tubing diameter

In order to successfully address the problem of product quality, the project developed the following components:

- High precision automated real-time system for glass tubing thickness measurement
- High precision automated real-time system for glass tubing diameter measurement

Self regulating the whole production cycle – a large added value to the system has been obtained through the interaction among the automatic control systems and the global process control system. The single units are self-regulating and linked in a central system thereby achieving a high level of automation and precision.

**Performing a quality control of the product over 100% of output including cosmetic defects** – it is realised through an artificial vision system based on computerised CCD devices and a sophisticated system of control software.

**Increase productivity** – to obtain a higher output the glass must be heated at a increased speed with respect to the traditional processes. Therefore, to achieve it, it has been necessary to implement a high precision monitoring of the processing temperatures in order to control the chemical release of the end product.

**Have an acceptable cost** – of installation and operation and offer simplicity of dialogue between the control system and the operator

### **Strategic aspects**

The project strategic aspects lies in the newly developed methodologies for the industrial processing of glass containers which are made available through a new generation of plants.

The innovative aspects reached within the activities of the project are the development of an artificial vision system to perform quality control on 100% of the final product. This sub-system is able to detect also cosmetic flaws, resulting a completely innovative achievement for an industrial on-line processing.

To measure glass tubing characteristics, also a measurement system has been realised. This sub-system, using laser devices, implements the detection of wall thickness and diameter dimension for glass tubing: the two parameters represent the raw material in the container production.

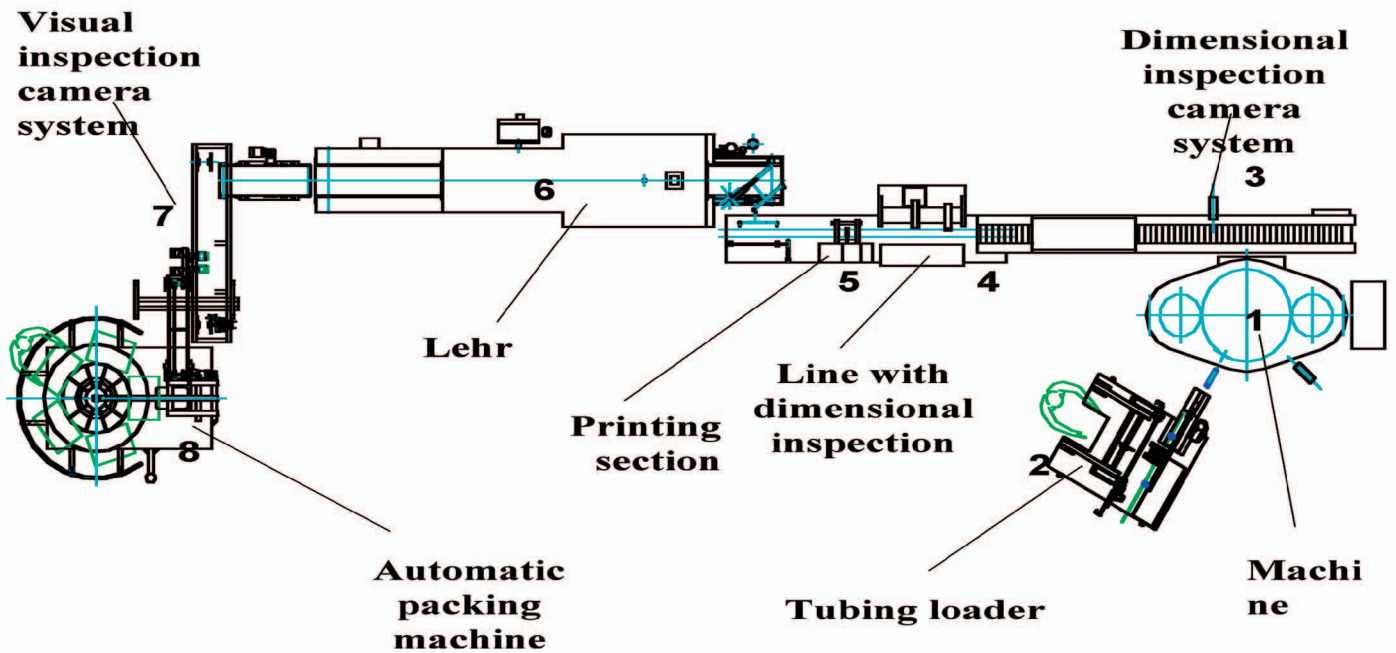
Furthermore, to achieve a higher productivity, an optimisation of the flame glass cutting, using an auto-adjusting system, has been developed.

In the end, an advanced automated central control system has been realised. Throughout its application, the system is able to operate avoiding human interaction, especially to outperform manual feedback, no more necessary.

### **User Requirements**

In synthesis the basic user requirements we have satisfied can be identified as follows:

- a) Higher quality final product
- b) Acceptable plant costs
- c) Reduction of rejection
- d) Automated production system
- e) Increased productivity
- f) Meet the requirements of European Pharmacopoeia
- g) Enhancement of working conditions



### Prototyping activities

During project activities, a pilot plant has been realised. It was necessary to carefully test the newly developed devices and sub-systems and was designed taking into consideration the needs for a easy installation, monitoring and safety.

The pilot plant has been used to produce glass containers of the same type of already marketed ones. On these products a lot of tests has been performed in order to verify the functionality and efficiency of all the new sub-systems.

All the tests gave a positive response: the system comply with all the requirements highlighted during the project activities.

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