# GUARANTEED QUALITY WITH HT5600

**Delta Visione has chosen the CODESYS-based HT5600 Panel PAC as its all-in-one solution for controlling its automatic sorting machines based on advanced vision systems.**

## The challenge

Delta Visione designs and manufactures automatic sorting machines capable of checking every single item in a series production process, identifying, and rejecting those that do not conform and thus ensuring quality control over 100% of production. The automatic sorting machines can check metal, plastic and rubber parts produced by shearing, stamping, or turning. For Delta Visione, it was essential to differentiate itself from its competitors by creating machines characterized by extreme **versatility**, which could control a wide variety of articles, limiting retooling activities and easily integrating complex feeding systems, making it possible to create real **turnkey test islands**.

**SECTOR**
Sorting machines

**COMPANY**
Founded in 1987, the company is constantly growing both from the structural point of view and from the technological innovation, factors that are the basis of the progressive consolidation in the Italian and foreign markets. Constant investment in research and development and collaboration with the most important players in the field of artificial vision and traceability allows Delta Visione to offer systems and services of absolute technical excellence.

**PRODUCTS**
Delta Visione manufactures custom-made systems for applications of:
• Industrial marking
• Traceability
• Machine Vision
• Selection machines
Delta Visione machines are used mainly in the food, automotive, pharmaceutical sectors and in general in applications that require 100% quality control of production and product traceability. The standard equipment of remote assistance on each machine ensures the customer an accurate and timely after-sales service anywhere in the world.

A step in this direction had already been made with the realization of a **proprietary software** for the management of the image processing part for all types of machines and for all types of quality control. This is made possible thanks to the extreme modularity that characterizes the software that allows the customer, thanks to a user-friendly HMI interface, to have complete autonomy in the development of new recipes or in the application of different algorithms of automatic selection.
Normally, however, the automatic selection machines are composed on the one hand by an industrial PC that deals with the image processing part- and therefore requires considerable computing power- and on the other by a PLC for the management of the automation part of the machine.
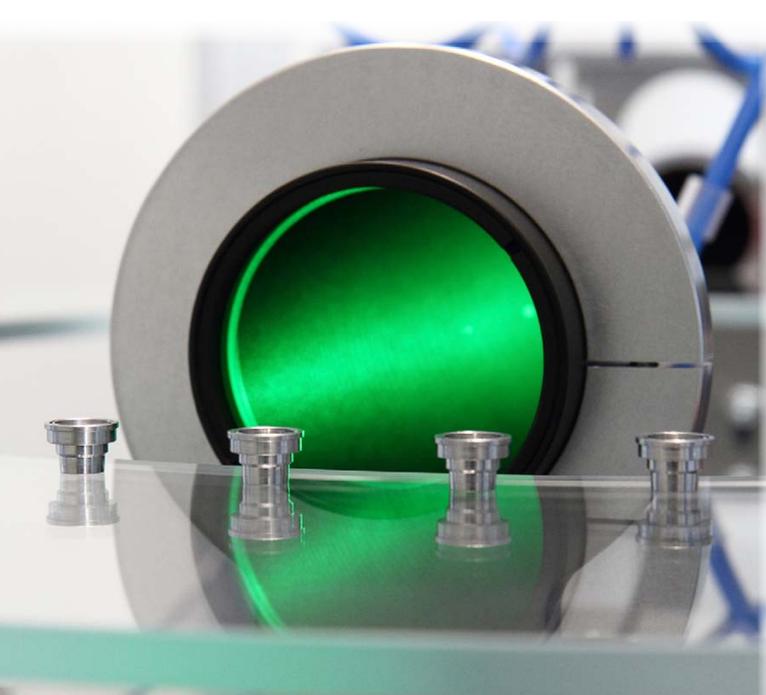
## (1) Modular software, flexible and reusable in every machine

To realize a complete software that could manage all the functions of the machine, it was therefore essential that the software of the control part also reflected the same modularity and flexibility that characterize the vision software, so that it could be used in every machine.

The competence in software development in .NET environment with high-level languages such as C++ provided Delta Visione's technicians with a certain familiarity in object-oriented programming, leading the company to want to create a modular solution also for the control part, a fundamental characteristic that allows it to be easily adapted to any type of machine and to possible future evolution of the same, such as the addition of new cameras or other types of measuring devices or the modification of the cameras originally installed. Flexibility is also essential to be able to easily adapt the project to the different types of loading systems of the pieces entering the machine and to the unloading systems of the controlled products at the exit, with possible automatic boxing or palletizing according to the customer's needs.

## (2) Full integration between HMI, control, and remote assistance

The optimal integration between the vision software and the control part must allow the perfect synchronization between the images acquired by the cameras and the part handling to allow the tracking during all the instants in which the piece moves inside the machine, a result difficult to obtain with the traditional solution based on separate PC and PLC, besides being a limitation from the point of view of overall dimensions, wiring and cost.

The possibility to provide assistance to customers remotely could also be a further added value to differentiate itself from its competitors in providing not only high-quality machines but also an after-sales service to match.

It was necessary, therefore, a PAC (Programmable Automation Controller), that is a system that integrates the high performance of an industrial PC with the characteristics of determinism required by the automation part of the machine and that could incorporate in a single solution all the features required: vision software, control logic and Motion part through SoftPLC, human-machine interface, and remote assistance.
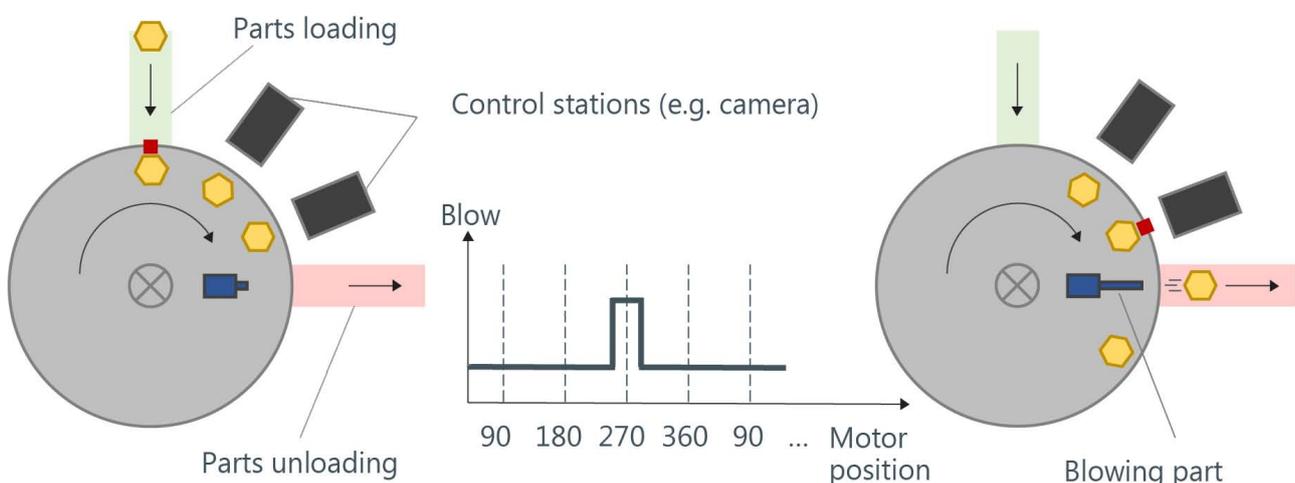
## Solution with HT5600 and CODESYS

Thanks to an Intel Core i5 seventh-generation quad-core processor at 3.4 GHz, HT5600 provides maximum performance for vision applications and, thanks to the integration with CODESYS, becomes a powerful Panel PAC even for the most demanding control applications.

One CPU core is dedicated exclusively to the CODESYS application while the others to the vision software, allowing the exchange of information between the two parts through shared memory and thus ensuring perfect synchronization.

The automatic sorting machines of Delta Visione are distinguished mainly by the type of transport of the parts to be inspected inside the machine. In the rotary handling sorting machines, the parts are placed on a glass disc or housed on a support mounted on a mechanical table with controlled pitch rotation, managed by a brushless or stepper motor that transports the parts from the loading system to the unloading system, passing through all the inspection stations (vision or measurement) distributed around the circumference. Checks at the stations are carried out using high-resolution 2D and 3D digital industrial cameras with bi-telecentric optics or with other measuring devices such as laser profilometers or eddy current devices. In both cases, it is essential to be able to quickly acquire images and synchronize the acquisition with the movement part of the rotary table. In this way it is possible to precisely control the motor that moves the table and the blowing systems of the pieces that do not present defects on the basis of the measurement made by the camera, implementing in fact a digital cam that manages the blows present in the stations as shown in the diagram below, allowing to carry out defect and dimensional controls even complex ones of the order of microns, reaching high productivity up to 10 pieces per second.

The architecture of the control part is realized with CODESYS according to the principles of modern PLC programming and written entirely in ST language, using POUs (Program Organization Units), state machines and appropriate function blocks realized internally for specific tasks such as the one just described above. All the parts of the machine communicate through **EtherCAT** protocol that allows the management of all the stations of the machine through EtherCAT Couplers guaranteeing low response times and reduced costs.

The interface with the Motion part of the rotary table is also managed via EtherCAT thanks to dedicated libraries developed in-house by Delta Visione engineers, as well as auxiliary functions such as file access and communication via TCP/IP or RS232 serial protocols.



Parts loading

Control stations (e.g. camera)

Blow

Parts unloading

90 180 270 360 90 ... Motor position

Blowing part

The resulting modularity allows the project to be easily reused also in other types of machines where the piece handling happens not through a rotary table but thanks to an anthropomorphic robot or through a linear conveyor belt, always interfaced with the control part through EtherCAT and using libraries and function blocks dedicated to the different transport systems. The versatile and flexible structure of the machines from the hardware point of view and the high accessibility of the control stations are therefore also reflected in the software that allows to easily parameterize each electronic device, allowing the user to create in guided mode a practically unlimited number of control programs, minimizing the retooling time to change the measuring instrument from one type to another.

### Remote assistance with UBIQUITY

To ensure effective technical support in real time, Delta Visione has based its remote assistance system on UBIQUITY, the complete and secure software developed by ASEM and installed in bundle on all industrial PCs such as the Panel PAC HT5600 used in this case. UBIQUITY allows remote access by Delta Visione programmers to all machines installed in the world with Internet connection, allowing them to interact both at HMI and remote desktop level and at CODESYS-based control application level.

The **remote assistance** system guarantees a punctual and timely support both in the initial machine **commissioning phase**, for example when the operator has to set correctly a recipe parameter for a particular machining, and in case of **maintenance**, for the management of

anomalies and machine stops.
UBIQUITY proved to be a fundamental asset in some critical situations in which the support technician was able to remotely debug the CODESYS application thanks to the **Trace** functionality provided by the platform.
The possibility to connect remotely to each machine at any time has also allowed to realize partial software **developments and upgrades** on machines already installed in the field.



Thanks to the remote assistance, in fact, it is not necessary to send expert personnel on site, saving enormously on response times and travel costs, allowing Delta Visione to provide its customers all over the world with a complete assistance service from every point of view, an essential added value for its customers.

**ASEM**

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