



Specialists since 1993
in **computer vision**
for the industrial field

COMPANY PROFILE

SPECIALISTS

for over 25 years of Artificial Vision

- 1993** → Specialvideo has been operating in the artificial vision industry since 1993, specializing in the design of industrial vision systems for automatic detection of defects, non-contact measurements and robot guidance. We provide technologically advanced solutions, customized and supplied turnkey, and we offer continuous assistance to ensure the proper functioning of the system and the production line. Our passion for the most innovative technologies is expressed since the first years of our activity. **Already in the early nineties, Specialvideo realizes, in addition to 2D systems:**
 - **3D systems**, with laser projectors designed ad hoc, to search for the weld bead of pipes;
 - **systems with self-learning statistics**, the techniques that were then at the center of artificial intelligence, for the quality control of blisters and food products;
 - **proprietary algorithms** for finding the valve hole notch in raw castings of light alloy wheels, still in high performance production;
 - **calibrated (precision) measuring systems** for the control of keys, also adopting telecentric optics.
- 1994-99** → First implementation of a **robot guidance with conveyor tracking**. Introduction of linear cameras and color cameras.
In the same years Specialvideo adopts LED lights, which were not yet a standard and therefore required a special card for adjustment and synchronization with the cameras, which were analogue at the time. In the late nineties, the first digital cameras arrived on the market, which Specialvideo adopts for a rapid evolution of its vision systems.
- 2000** → **Robotics applications in ambient light** thanks to the synchronized use of flashes.
- 2002** → The collaboration with Datasensor (now Datalogic) begins for the design and development of a **smart camera**, used by Specialvideo in both standard and special systems..
- 2007** → **Robusto is born**, the flexible, reliable and customizable robot guide system.
- 2012** → Robust becomes 3D, **the first robot guide with laser scanning** is installed.
- 2018** → Specialvideo extends robot guidance to **multi-robot lines for complex systems**, with first applications in the automotive and food sectors.
- 2019** → Continuing along the path of continuous technological innovation, Specialvideo among **the first in Italy** applies **Deep Learning** solutions in industrial production lines, for quality control.

2020 - IN PROGRESS

Our team is made up of highly qualified professionals, employed in the development of new applications.

Over half of the Specialvideo systems are installed abroad and we are structured to follow our customers all over the world.

We create ad hoc projects for each customer, to meet the requirements with maximum efficiency.

Our systems operate in various industries: automotive, pharmaceutical and food, just to name a few. The need to reduce costs and use human resources in different stages of processing has led more and more companies to use machine vision systems to automate production and quality control processes.

We create intelligent and efficient systems for the automation and quality control of your business

www.specialvideo.it

> Quality Control

Machine vision allows you to monitor the efficiency and effectiveness of your work.

Unlike human visual inspection, this technology **guarantees objectivity, reliability, and long-term stability of control, including ad high line speeds.** It lets you check the quality of the products without interfering with the normal production process.

Specialvideo has developed systems for the identification of a wide range of defects such as:

- ☑ spots
- ☑ cracks
- ☑ scratches
- ☑ foreign bodies presence
- ☑ abrasions or irregularities

> 3D

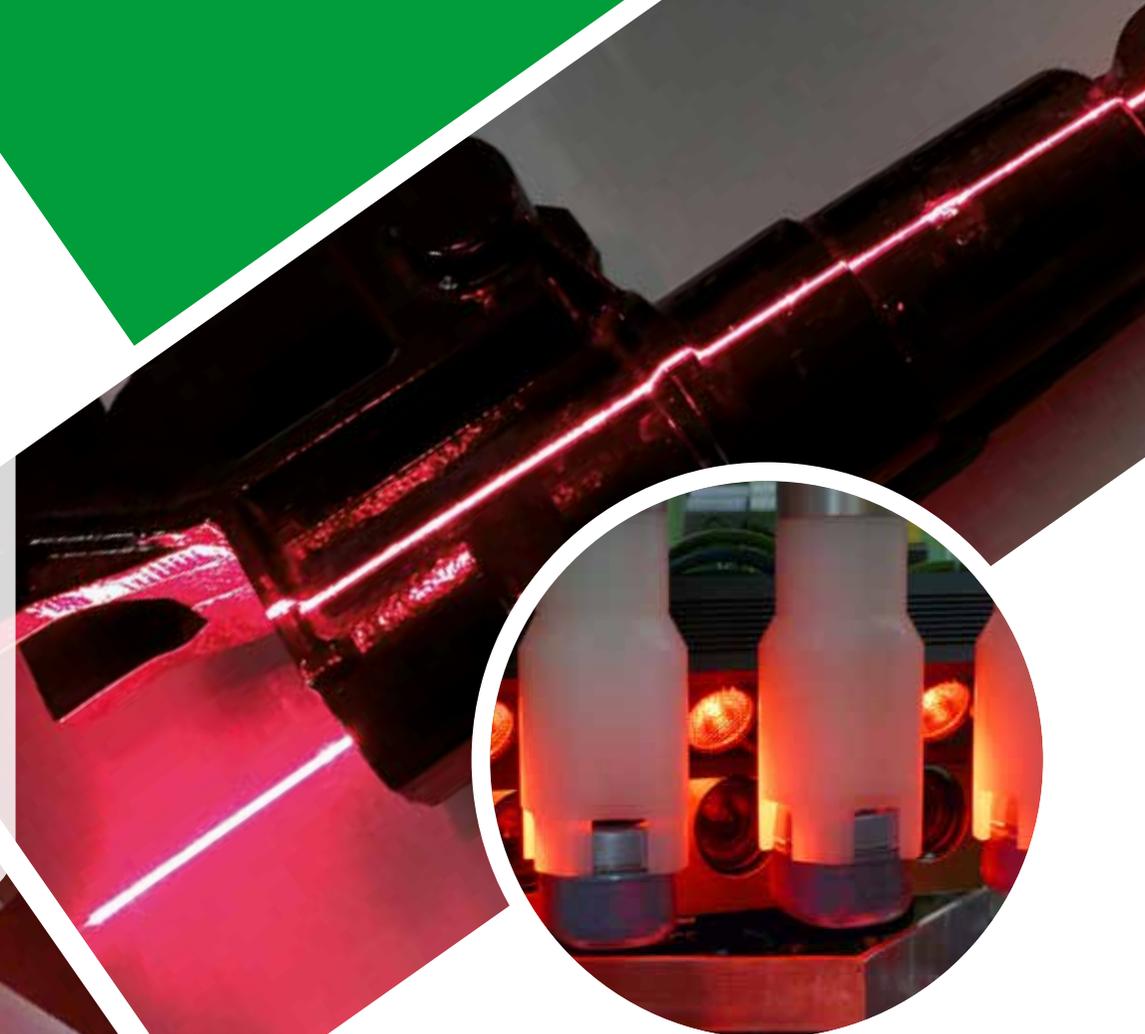
Relying on techniques that also exploit the third dimension, it is possible to obtain a more complete view of the real scenario. The 3D vision systems are **robust with respect to any colour of the product** considered and, in particular, they are **indifferent to situations of varied, dirty or low-contrast background.**

We can apply the various approaches of the 3D computer vision: laser triangulation, stereo cameras, Time Of Flight (TOF) cameras, projection of textured light patterns, and more.

In particular, for an advanced performance, we have developed proprietary laser line extraction algorithms, with:

- ☑ Better resistance to reflections and image noise
- ☑ Possibility of using downgraded lasers
- ☑ Removing the physical protections from the external lights

CUSTOM SOLUTIONS





Robot Guide

The robot guide is an artificial vision system that can guide the robot to perform an action using the camera.

In the industrial field robot guidance systems provide the ability to see objects and then allow to pick up the pieces in random positions or to perform a machining path which is not the default. The use of industrial robots in robotic stations allows to realize automation systems which are extremely versatile and with reduced tooling times.

Specialvideo has developed special calibration algorithms to get the best performance: the calibration function allows the vision system to know the reference system of the robot and, at the same time to correct perspective distortion of the objective. The perspective deformation compensation is required especially in cases in which the camera is positioned close to the pieces, or it is inclined with respect to the work plane.

The robot guidance system can be configured to work with still or moving parts and also with pieces in contact with each other and partially occluded. **It can be also equipped with functions for quality control**, to detect the presence of defective parts and consequently manage the pieces' deviation.

The main application concerns the removal of pieces on the conveyor belt (2D), arranged in layers on pallets (2D multi-layer), or bulk pieces where it is necessary to use three-dimensional techniques (3D).



Non Contact Measurements

Off-line or laboratory systems are used to achieve maximum measurement accuracy.

It is also possible to carry out **non-detectable measurements with traditional contact methods**: for example on pieces that can be deformed by the contact of the instrument or between virtual points, i.e. calculated by interpolating geometric figures such as straight lines or circumferences.

The checks carried out on the pieces directly on the production line allow to immediately discard the products out of tolerance: they can **prevent the creation of defective pieces, detecting in advance** a slow degeneration of the production process, allowing to intervene before the defect compromises the quality of the product.

According to the characteristics of the object to be measured and the degree of accuracy desired, the most suitable technological choices are adopted for the specific application, using for example sub-pixel processing algorithms, precise calibration functions, and perspective deformation compensation.

The hardware components also (lighting system, cameras, lenses) are chosen on a case-by-case basis, based on specific needs.

In the field of non-contact measurements we have created vision systems capable of measuring with high precision:

- lengths
- concentricity and eccentricity
- linearity
- locations
- depth of objects





> Color Recognition

Innovative color control solutions e multispectral analysis.

When a color quality check is required, unlike other methods (such as spectrophotometers and remote colorimeters), vision systems allow to perform **100% control of production**, in fully automatic way.

Our systems are capable of providing information on the **spatial distribution** of colors over the whole surface of the product.

With **multispectral** cameras and illuminators, we can analyze different wavelengths of UV light, visible, near IR, far IR and thermal IR, emphasizing particular materials that are distinguished in the different acquired bands.

In the field of color recognition, we have developed special algorithms that allow to achieve high accuracy in the selection and classification of colors, in extremely short analysis times and with robust and reliable self-learning procedures.



> Deep Learning

Specialvideo is expanding its knowledge on the topic of Artificial Intelligence and Deep Learning applying these research topics to industrial applications. In our vision systems, we can adapt existing neural network models or **create and implement new structures** aimed at the solution of a specific problem.

We also build vision systems that include both neural networks and traditional algorithms, thus composing a **hybrid product** with capabilities based on the strengths of both technologies: reliability, accuracy, and generalization.

The field of applications for deep learning is very wide and suitable for natural products subject to extreme variability of shape and appearance, or in the case of highly variable defects:

- ✔ Recognition
- ✔ Localization
- ✔ Anomaly detection
- ✔ Classification and search for defects



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