

Uniform Tablet Coating: OMRON's Vision Systems Help IMA Group Raise Its Pharmaceutical Industry Standards

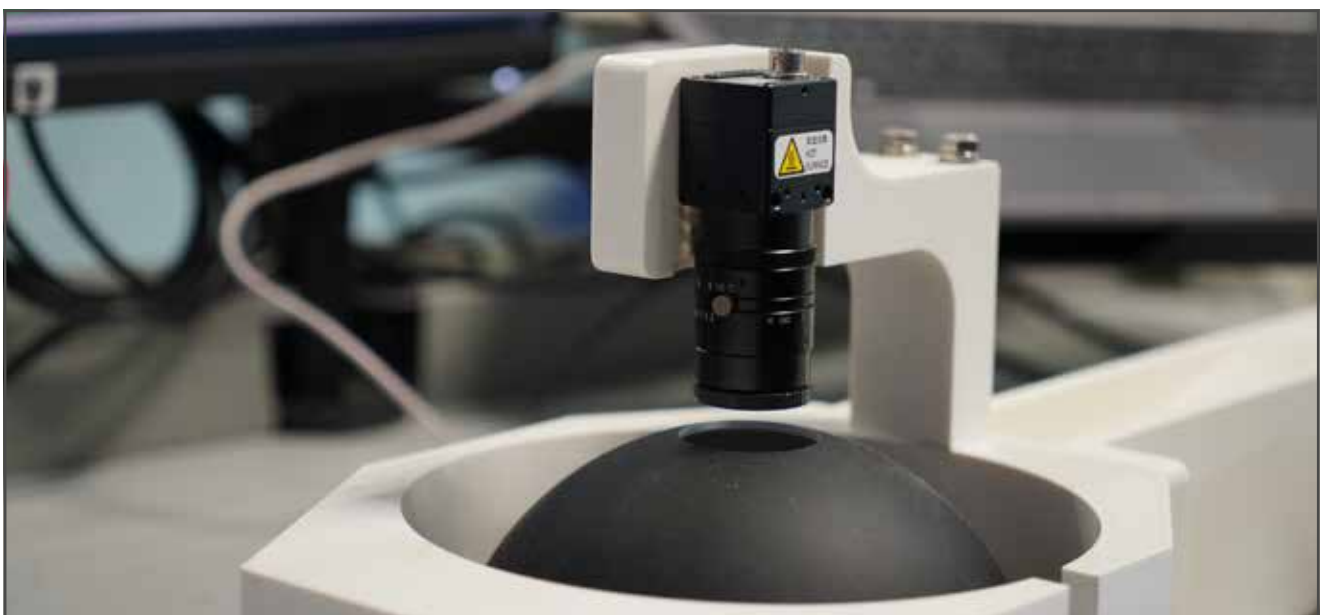
IMA Active, a division of IMA Group dedicated to the production of automated systems and machinery for the pharmaceutical industry, has recently upgraded its continuous tablet-coating solution with the installation of OMRON's vision system equipped with a high-speed color camera and dome light. The result: a highly accurate assessment of coating uniformity, both in terms of the surface of the individual tablet and across all the tablets collectively.

In order to move from the traditional batch approach toward continuous production, the pharmaceutical industry is constantly looking for technological solutions whereby processes can be monitored in real time.

By way of response, **IMA Group**, a world leader in the design and manufacture of processing and packaging equipment, is developing increasingly innovative machines for

processing oral solid dosage forms within one of its pharma divisions — IMA Active. One example of this is **CROMA**, a continuous tablet-coating machine that, thanks to the installation of an **OMRON vision system**, is now able to make a highly accurate assessment of coating uniformity, both in terms of the surface of each individual tablet and to ensure that all the tablets are coated consistently.

According to **Marco Minardi**, Automation Manager at IMA Active, „*The Quality by Design (QbD) concept is essentially based on principles that define the desired quality profile for both the product and production through the identification of key attributes. This means continuous process monitoring is crucial to maintaining a consistent level of quality throughout the product's life cycle. Therefore—to ensure the right and most appropriate levels of safety—real-time and online monitoring strategies are essential.*“





Consistent Results with Geometry and Monitoring

CROMA has been designed to facilitate truly continuous production, moving the product through the entire coating process. The advantages for customers in the pharmaceutical industry include **optimized production, process flexibility, efficiency, a reduction in equipment size and lower costs**. More specifically, the system enables you to use **up to four modules working in series or in parallel**. The tablets pass through a rotating perforated drum supplied with a flow of hot air, and their exposed surface is coated using spray guns.

Market standards require each individual tablet to be uniform, both in terms of its outer coating and in relation to other tablets in the same batch. The internal geometry of the machine has therefore been designed **to ensure maximum repeatability of the process**. Processing all of the tablets in the same way is the first step to ensuring that the product's appearance is uniform.

However, for the result to be verified, **process monitoring** is also required to ensure that the quality indices of all tablets processed are analyzed effectively. IMA Active therefore sought help from OMRON and its vision systems, which use highly customizable, high-performance industrial cameras that can be programmed in standard languages and feature the most common, up-to-date communication protocols.

Consistency Equals Compliance

To ensure that processes are monitored continuously and accurately in compliance with established standards, IMA Active deployed computer-based vision technology using an **OMRON industrial vision system equipped with a high-speed color camera** (nominal frame rate of 163 fps)

and a dome light. OMRON's system can continuously capture images while eliminating other misleading elements, such as shadows and reflections, that can impact the inspection.

Within IMA Active, ad hoc tablet tracking software has been developed using Python and OpenCV. According to **Giuliano Maria Emiliani**, Software Engineer at IMA Active, *„We can monitor production easily and efficiently, processing every frame captured by the camera on the fly. First of all, the system detects each individual tablet. The position of the tablet in the next frame is then predicted based on physical considerations, which makes it easy to follow its entire journey. This means the coating of each tablet is only inspected once, thus reducing computational load. Finally, based on the data collected, significant indicators of coating uniformity for the tablets both individually and collectively are calculated and sent in real time to the machine via OPC UA (Open Platform Communications Unified Architecture). By doing so, specific process parameters can be modified to improve the quality of the final product. This really is the definition of smart automation.“*

Visual inspection and quality control solutions are only part of OMRON's extensive range of industrial automation technologies, which also include robotics, handling, monitoring and safety systems. In this particular case, in addition to the vision system, OMRON offered IMA Active **highly specialized technical support to help choose the best solution and fine-tune the system**. This made it possible to assess the use of **scalable solutions for the preliminary test process** from the outset, which ruled out standard vision systems in favor of open technologies that offer a greater degree of freedom.

„When it comes to Pharma 4.0 and digitization processes, we know how important it is to take a holistic approach and ensure effective collaboration between the technology provider and the machine installer/manufacturer in order to achieve true transformation,” says **Michela Siena**, Key Account Manager, Life Sciences, at OMRON.

Accurate Tablet Monitoring

The CROMA tablet-coating system equipped with OMRON's vision system has proven robust and adaptable to various product types. Any change in process performance can be easily detected by monitoring uniformity indicators. The technology is **able to inspect the tablets** processed by the machine by working within a CIELAB color space to pinpoint color variations more accurately.

Overall, inspection automation has enabled IMA to achieve a new level of accuracy within the world of continuous coating. **Coalescence between the product and the**

machine has finally been achieved: By having comprehensive knowledge of the product status, CROMA can self-regulate in order to refine the process.

Marco Minardi summarizes by saying, “This project has a clear vision of the advantages for our customers and, most importantly, for patients. Instead of using offline instruments such as color spectrophotometers to analyze the coating of a few tablets per batch, our solution allows us to monitor production in real time. This significantly increases the reliability and overall quality of production, enabling us to provide tangible safety-related support to customers throughout the pharmaceutical world.”



About IMA Group

IMA Group is a world leader in the design and manufacture of automated machinery for processing and packaging pharmaceuticals, cosmetics, food products, tea and coffee. The Group has an extensive sales network spanning around 80 countries, with 53 production plants (in Italy, Germany, France, Switzerland, Spain, the UK, the USA, India, Malaysia, China and Argentina), representative offices in central-eastern Europe and more than 50 agencies. For more information, visit <https://ima.it/en>

About OMRON

OMRON Corporation is one of the world's leading organizations in the field of automation. Its work is based on core „Sensing & Control + Think“ technology. OMRON operates in various sectors, including industrial automation, electronic components, systems for social infrastructures and solutions for healthcare and the environment. Established in 1933, OMRON has around 30,000 employees worldwide, offering products and services in approximately 120 different countries and regions. For more information, visit <https://industrial.omron.eu>