

A Visual Inspection System for Transparent Products, There is such a thing !

During our visit to the manufacturing facilities at this veteran company, which produces advanced water meters, injection molding machines worked diligently. Swift robotic arms moved plastic components and delicately placed them in front of the quality control camera. The parts found to be flawless were then passed to the final packaging station. The manufacturing process, impressive in its efficiency is supported by a modern addition, the Machine Vision system by Inspekto.

"The trigger for the entire project comes from a challenge in quality control that has been accompanying us for a long time," said Hagai Adar, Materials Technology and Injection Manager at Arad. "The water meters we manufacture ...demand perfect transparency. Even a small defect or slight cloudiness disqualifies the product. This is not a parameter we can compromise on... Every return of such a shipment damages our reputation and has an economic toll. We sought an automatic solution that can address 100% of the products."

The challenges faced by Arad and the transition to automation in quality testing for transparent injection-molded covers have previously been handled by Arad's quality controllers, despite human eyes struggling to achieve sufficient accuracy. Machine operators and quality controllers used to inspect the covers under green light, at different angles, trying to detect defects. This was only a makeshift method, cumbersome and with inconsistent results.

SU-PAD, the company that has been supplying Arad with injection molding machines and its automation solutions for many years, led the solution. It included integrating an automation system and Vision control with the injection molding machines. "The initial and challenging stage in implementation was integrating the existing robots with the camera interface so that they could precisely position the product underneath," says Yoni Krispil, Sales Manager at SU-PAD. "Our team worked closely with Arad's team, and the work was completed quickly within three months."

Even integrating the Vision system was not trivial. The main difficulty lies in working with transparent models. "The systems need to consider background and light reflection, and not every system is suitable for that. Moreover, in existing standard systems on the market, the setup between products is complex and usually requires our intervention, the automation supplier," explains Yoni. "As a solution, we chose to go with Inspekto's system that comes with built-in lighting and a unique Anti-Reflection patent. It's capable of producing reflectionless and detailed images even on highly reflective parts."

Inspekto's Vision system, co-founded by Yonatan Hyatt, with Israeli-German cooperation, offers a unique solution in the industry suitable for testing a wide variety of materials - plastic, composites and even metals and shiny transparent surfaces. At the core of the technology is the AMV-AI™ system, consisting of three artificial intelligence mechanisms working together. The first mechanism dynamically adjusts the optical-electronic system according to the specific test. The second identifies the tested part, and the third determines if it is defective or not. The decision is made by comparing it to the tolerance range that the system autonomously learned during the initial installation. Throughout the process, the system continues to correct and adapt itself.

"Working with SU-PAD was successful all the way. The installation itself was done at their labs, and only after the system worked successfully did we move it together to Arad," said

Noam Horovitz, Product Manager at Inspekto. "Once the system is installed, the customer can work independently, which makes our solution particularly convenient and cost-effective."

Fast machine learning within only 20 models

"Vision systems are particularly challenging when the defect's location on the product is unknown," clarified Yoni Krispil. "The probabilistic model of machine learning allows for a solution after a high number of models - hundreds or even thousands. Not so with Inspekto's system. In its case, only 20 models are enough to teach it to locate the defect, instead of hundreds or thousands."



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