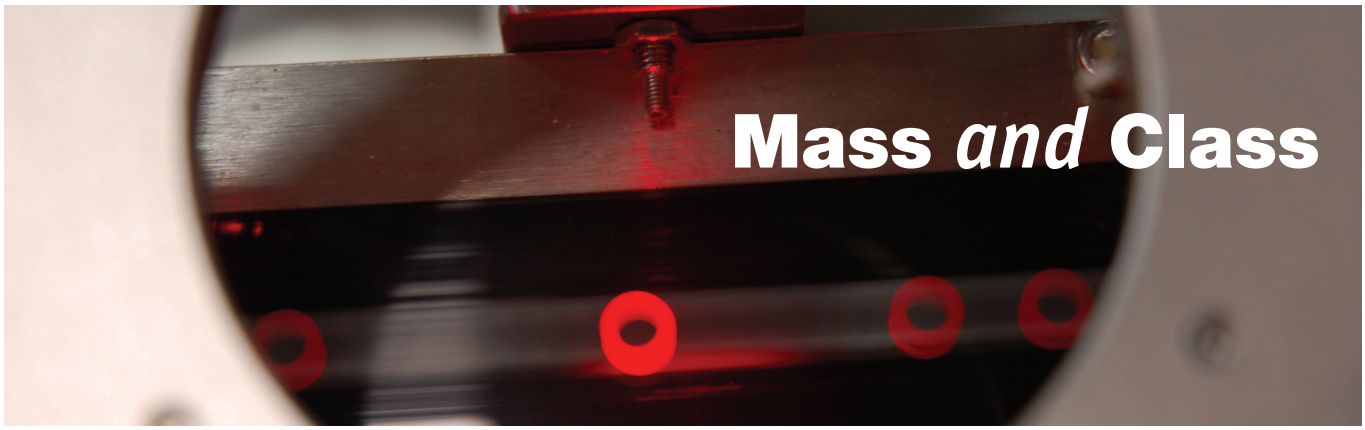


NP Plastics B.V.

NP Plastics is an experienced Dutch manufacturer of injection-molded plastic parts with more than 50 years of experience in injection moulding. The company originated in a tool making company and gradually grew to be specialized in injection moulding of a great number of plastics. The automated 24-hour production system gives NP Plastics the opportunity to produce both small, short running series of several hundredths and series of millions with lead times of several months.

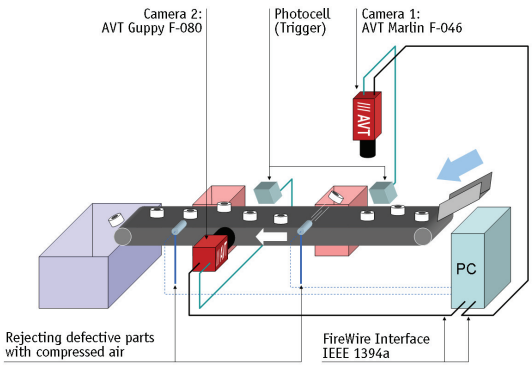
The Challenge: Inspect 600 Plastic Rings per Minute

You see rows of them lined up in almost every office: document binders in various formats. The fine lever mechanics of these folders also ensure that when they are full, the rings are solid and stable when closed and make it simple to open and close them without a great deal of force. Who would have thought that the small plain plastic rollers in this closing mechanism, produced by the millions, were checked for perfect quality with sophisticated image-processing technology? But that is the only way to guarantee that these binders can stand up to the strain of daily office use year after year. To NP Plastics, the perfect quality of the small white rollers was worth the investment in an image-processing system. The challenge was to check the geometry of the approx. 5-mm rings for defects and sharp edges (or burrs) at a rate of at least 600 parts per minute.

The Solution: Image Processing With Two Viewing Angles

To do so, the company turned to Radine BV, one of the leading providers of automation solutions, with over 40 years of experience in the Dutch market. With the support of Data Vision BV, Allied Vision Technologies' sales partner in the Benelux, Radine developed a custom solution using digital cameras to optically check the rollers for quality.

NP Plastics Binder Checking
Radine B.V. / Data Vision (The Netherlands)



The first step is to sort the many plastic rings and put them in order for checking. This is done with a vibrating feed system. The rings are lined up on a conveyor belt and spaced a minimum of 4 cm apart. This is the only way to guarantee reliable measurements. The precision with which the small rollers lie on the conveyor belt is determined randomly: there is no predetermined top or bottom; the angle of incidence of the axis is also completely random. Despite this random arrangement, the system relies on two cameras that take snapshots at two different viewing angles to find defects in the geometry of the rings.

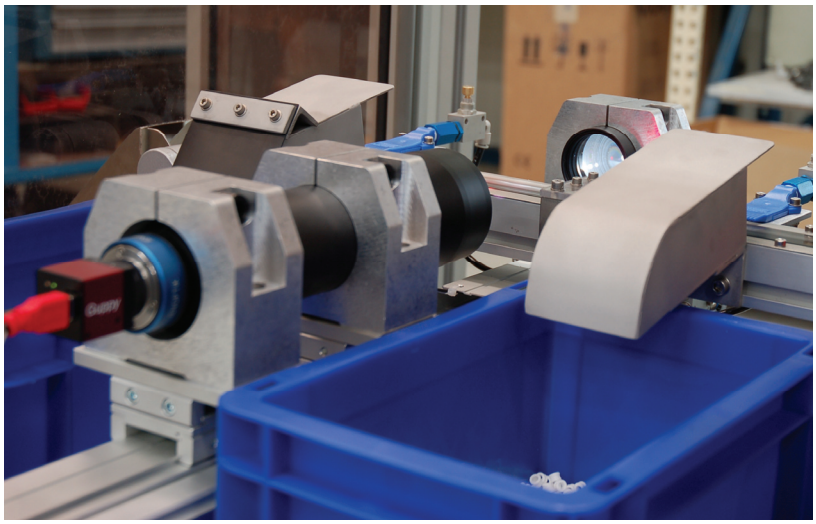
The first camera hangs over the conveyor belt and checks the rings from above. The outer and inner diameters are measured first. A second digital camera is installed on the side of the conveyor belt and checks the outer circumference of the rollers. By measuring the height of the part, defects can be identified that are not visible from the top perspective. Both cameras are triggered by a photo cell directly over the I/O port that detects the presence of a ring on the conveyor belt. This guarantees that each individual part is detected with precision.

The Requirement: Fast Image Acquisition For Immediate Reaction

“For this application, we need fast, sensitive digital cameras that can deliver clear sharp images during the production of over 600 parts per minute,“ explains Maarten Bruin, who is responsible for the project at Radine. „This corresponds to an image frequency of 10 fps at full resolution. Since the objects being checked are on a moving conveyor belt, a short exposure time (max. 85 µs) is also crucial to prevent blurring due to motion.“

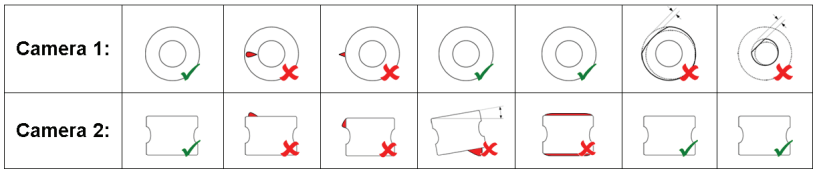
Customer Satisfaction With AVT Marlin and Guppy Cameras

Data Vision recommended that Radine select two FireWire digital cameras from Allied Vision Technologies. The vertically mounted camera is a Marlin F-046B monochrome CCD camera with SVGA resolution (0.4 megapixel). Side views of the rollers are taken by an AVT Guppy F-080B. This XGA digital camera (0.8 megapixel) is equipped with a sensitive 1/3“ CCD sensor. Both cameras have an IEEE 1394a interface. With up to 53 and 30 fps, respectively, they can reach a speed of 10 images per second at full resolution with no problem at all. With their short shutter times of minimum 11 µs (Marlin) and 20 µs (Guppy), both digital cameras also deliver clear sharp pictures without blurs and thus permit precise, reliable evaluation.

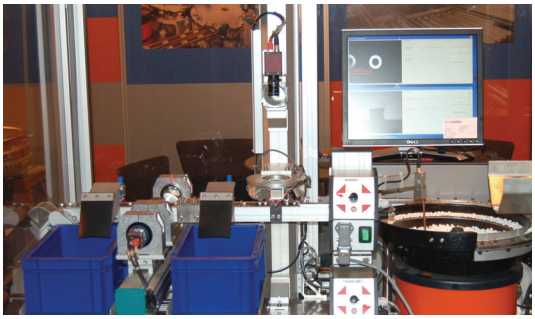


“We are especially proud of this sophisticated image-processing solution“

Bas H. Pot, NP Plastics.



The images are analyzed rapidly in the PC by an MVTec Halcon-based software application that compares them with typical defect patterns. Burrs and irregularities are recognized immediately, and defective parts are automatically rejected by compressed air even before they reach the next testing station.



Practical Use 24 Hours a Day

This system is in operation at NP Plastics 24 hours a day.

“With this system, we can guarantee our most demanding clients that, even when millions of them are produced, each individual plastic roller that leaves our factory has had a complete check-up”, says Bas H. Pot, who supervised the project at NP Plastics.

Allied Vision Technologies in the Netherlands

NP Plastics and Radine were supported on this project by Data Vision, Allied Vision Technologies’ exclusive distribution partner in Benelux.

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