



Innovative and Integrated Machine Vision Systems



What is Machine Vision?

Machine Vision is a name commonly used for industrial systems that automatically process image from cameras. Then on the basis of following image evaluation those systems perform automated tasks – removal of defective products from manufacturing process, alerting the operator of the machine to mismatches in production, counting number of manufactured products, adjusting settings of the line, etc. The goal is to replace the subjective assessment of a person or a higher level of automation of the production process.

Machine Vision Systems are mainly used in areas of quality control in manufacturing, automation of assembly lines and in security systems for identification of persons and vehicles.

Machine Vision Systems Benefits

Automation of quality monitoring – Machine Vision Systems allow for automated and reliable defective product identification, thus delivering higher quality production to the customer.

Increased efficiency and savings in production – early detection of defected products allows discarding this product from production before it is further processed or assembled with additional components. This reduces energy costs, material and human labor.

Input material check - the system correctly assesses the quality of input material and allows separation of non-compliant items from the good ones. Allows you to compare various parameters of the input material (flatness, surface defects, dimensions, etc.) and provides feedback to suppliers and their comparison. Thus avoids production loss and unnecessary costs, increases productivity, eliminates eventual claims of material and saves engineers' time by revealing mistake early in the production process.

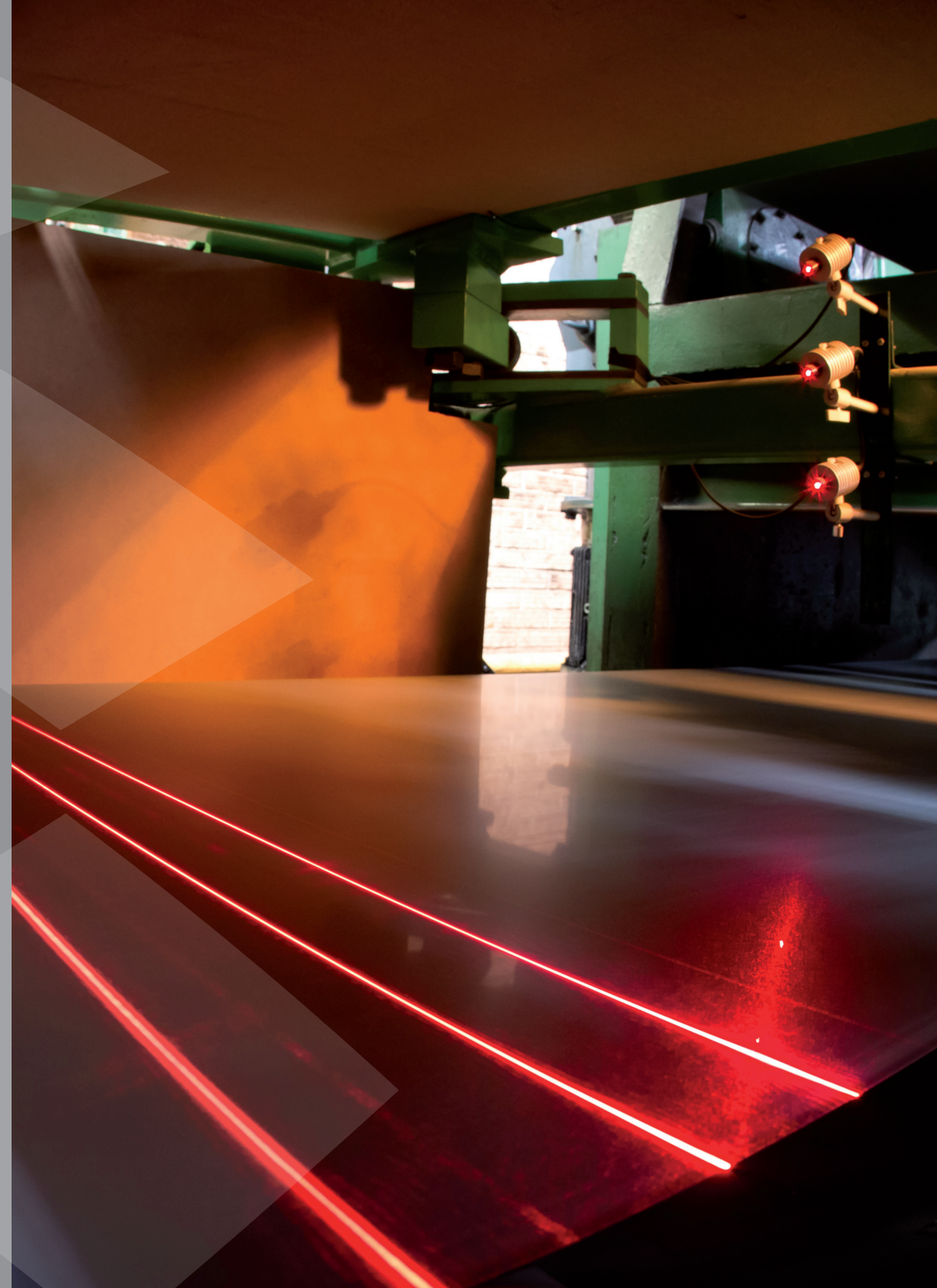
Automatic connection with other systems – the system can automatically communicate with other systems – it can automatically discard defective pieces from production, stop the line in case of repetitive error, communicate with production control system and react to mismatches in production.

Advantages over human evaluation – the system is more accurate and reliable than a human eye. Unlike humans it doesn't get tired. Machine Vision Systems are, as opposed to subjective human assessment, consistent in their conclusions.

Statistical comparisons and evaluations – data archived by the system can be used for creation of statistical reports. Help to identify causes of defects and provide assistance with the adoption of measures to prevent their occurrence.

Impact on the end customer - early detection of potential mismatches in production will significantly contribute to the way you are perceived by your customer. Reliability of your production will be perceived by them as your significant competitive advantage.

Contactless measurement – no intervention in product is required for evaluation. Camera scans products from a distance and does not have to come in contact with it in any way.



Machine Vision System Capacity

Measurement of dimensions and tolerances - a common application is measurement of dimensions of manufactured parts and their check against required dimensions with regards to the permitted tolerance. It is possible to check external dimensions, diameters of holes, threads correctness, spacing of components, etc.

Surface defects – it is possible to detect mechanical and other damage of surface of manufactured products. It is possible to perform the detection and evaluation of scratches, holes, cracks, dirt, improper engraving, incomplete printing (of manufacturer's logo, best before date, etc.), and many other defects arising in production.

Flatness measurement – thanks to the system of lasers and cameras it is possible to evaluate flatness of manufactured product. It is possible to detect a wide range of defects – from ripples on plate to cracks. Flatness measurement can be generalized to detect deviations of product from the required shape – i.e. in the manufacturing of steel rails, bottles, etc. Specific application examples can be flatness measurement and data archiving of steel plate – see our product “Shape Scan System”.

Mechanical processing check – Machine Vision Systems can detect incorrect mechanical processing of the product – defects caused by shearing, molding imperfections, molding burrs, deformations resulting from handling of the product during manufacturing – bends, chips, dents and others.

Recognition of parts before assembly - machine vision is able to correctly identify parts on automatic lines of assembly and prior to the assembly to check the part itself for the correct position and orientation.

Assembling - it is possible to automatically determine whether the manufactured product includes all the required parts. An example might be checking the correct assembly of doors in the automotive industry. The system can detect the presence of all parts of the doors - cranks, plastic parts, controls, and can inform about the missing elements.

Packaging, complete assembly, counting - the system can check for correct number of candies in a box of chocolates, the correct level of liquid-filled bottles. It is possible to check the contents of the box before closing, whether the packaging of product is correct, or even defects on the packaging.

Barcode reading – Machine Vision System can read the contents of bar codes and matrix codes and identify product bearing incorrect label or for example - you can verify the correctness of the code on the product packaging.

Color resolution - vision systems with color camera allow for identification of color components. They are able to determine whether there is no fault in the product color. Whether plastic mold of correct color was used for manufacturing, it is possible to identify corrosion, etc.

License plate recognition – Machine Vision System can automatically identify cars by reading their license plate numbers. This can be used to register all the cars passing through company's gateway, register all the cars entering zones with limited access, system can be connected



to an automatic scale to alert security on a weight difference of vehicle when exiting your company or automatically control the gate, etc.

Inspection of printed circuit boards (PCB) - camera in the production process of printed circuit boards can be used to detect and discard plates fitted with broken links, poorly drilled holes. It is also possible to check whether all the position on PCB have corresponding components installed in them.

Text recognition - by reading texts with a camera it is possible to recognize correct labeling of product. The system can identify the presence of labels glued to the packaging and check printing of data such as best before date, correct information on the nutrition label information (GDA), in the automatic assembly lines it is possible check whether correct part is coming to the line according to the text printed on the part. It is also possible to check other graphic elements on the package - logo, elements informing about discounts, etc.

Other – Machine Vision Systems are increasingly used in a wide range of applications. Its usage is possible in many fields not listed here. Others include, for example, inspection of drawn glass, steel, solar panels check, check of correct coating, counting dead pixels on flat LCD screens, checking correctness of pill packages in the pharmaceutical industry, etc.

Reference

ArcelorMittal Frýdek-Místek a.s.

Monitoring and measurement of flatness on the production line. Vision system captures a wide range of defects arising during the manufacturing of cold-rolled grain oriented electrical steel strips (company product Surface Scan System). The system also includes flatness measurement (company product Shape Scan System). Vision system is supported by applications for statistical evaluation, data visualization, applications for subsequent production lines and other support software.



ECO FER s.r.o.

Development of metallurgical models for steel making in the converter and ladle furnace. Implementation of applications for operators.



STIN KOVO s.r.o.

Applications enabling communication between production system and manufacturing lines. Machine usage optimization – combination of logistic needs, ordered products and ordering of manufacturing materials.



ArcelorMittal Reference Letter

ArcelorMittal Frýdek-Místek a.s.
Flat Carbon Europe



Reference of the machine vision system

We have approached the Argutec, s.r.o. company on the basis of recommendation with our need of custom tailored automated quality monitoring software for evaluation of defects on a grain oriented electrical steel strips. The main decision factor was their flexible attitude towards development and their innovative ideas, which convinced us.

System was developed in close cooperation with our managers, technologists and production. The result is very well balanced system suited for the specific needs of whole production process.

Implementation of the machine vision system of Argutec has brought mainly financial savings, increased yield and quality, accurate statistical and analytical reports of the quality with ability to continuously evaluate data in order to improve quality of production.

I can warmly recommend system made by Argutec Co. as well as Company Argutec itself. The individual approach of Argutec Co. to our needs, the company's efforts to understand our problems were professional.



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Argutec, s.r.o.

Argutec Company was founded by specialists involved in development of industrial systems (not only in the field of machine vision) for several years. The main objective of Argutec is to provide your company with solutions with high level of innovation, seamlessly integrated into your production workflow. Image analysis algorithms are custom-tailored to your exact needs, no third party solutions are used – this gives us unlimited possibilities in development and none of your requirements is a problem. Don't adapt yourself to someone else's solutions and let us develop truly your system.

We are proud of our individual approach to our customers and your satisfaction is our ultimate goal. We are fueled with joy to be able to work on interesting, creative projects and we believe in positive influence of this approach on quality of final products.

Experience with complex product development speaks for Argutec, s.r.o. We have vast experience mainly in these fields:

- machine vision systems,
- operator applications,
- applications for data visualizations,
- applications for statistical and analytical data evaluation,
- mathematical models and production workflow optimization,
- communication with production line control systems,
- enhancement of existing systems with sensors, counters and other parts to work with additional software,
- development of control systems based on microcontrollers,
- manufacturing of custom-tailored lighting systems – both line focused and area.

The Argutec company name has been derived the name of Argus Panoptes, the Giant, from Greek mythology. Argus was a primordial all-seeing giant with one hundred eyes in service of goddess Hera whose main task was to guard priestess Io. For these abilities of ultimate guardian he was selected as a great representative of machine vision principles.



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