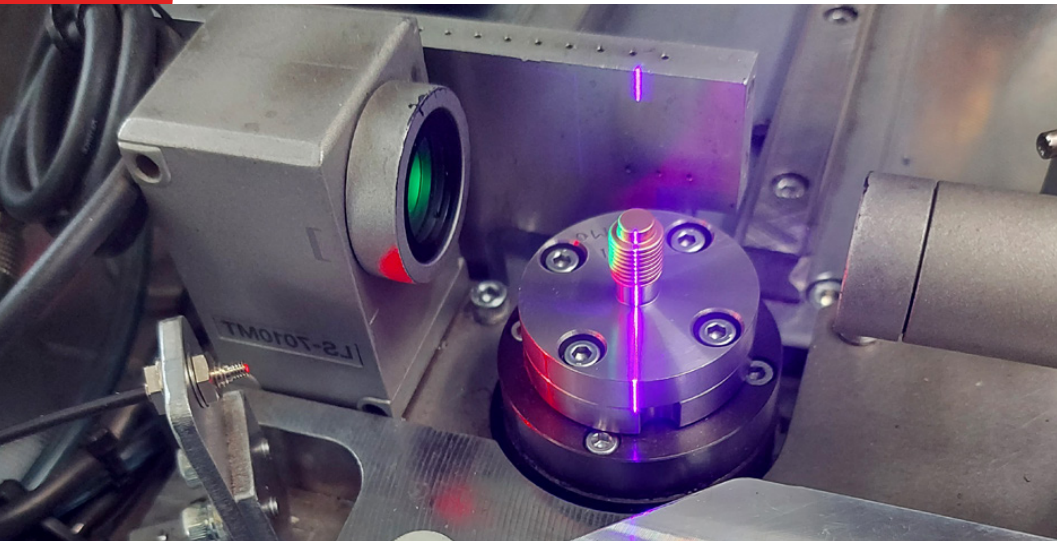




AUTOMATED DEFECTS DETECTION SYSTEM

V
2i



V2i has developed an inspection system for metal bellows used in the manufacture of air-conditioning valves for the automotive industry. All the produced parts are inspected at a rate of one part every 2 seconds.

The automotive industry requires high production rates and stringent quality standards. Meeting these criteria typically necessitates human visual inspection, a tedious, time-consuming, error prone and expensive task. V2i's A.I. based automated inspection system provides a **faster** and **more reliable** results than those human inspections.

The inspection process relies on mounting each inspected bellow on a rotating device using a robotic arm and measuring several profiles during the rotation. The profiles acquisition is performed using a high-performance laser scanner, providing **quick** and **high-resolution** measurements of the inspected bellows. The sensor relies on a blue laser, which ensures that the measurements are of excellent quality, even when dealing with highly reflective surfaces.

The acquired data is then processed to provide an image that accurately represents the outer surface of the inspected bellows and fed to a classification model. The model, developed using **artificial intelligence** and trained to detect a wide range of defect types, is both faster and more reliable than a human operator. The solution is integrated in the production line and communicates with the programmable logic controller (PLC) to sort the bellows into different categories such as good, type 1 defect, type 2 defect, etc.

The A.I. model provides a response faster than the robot's bellow pickup and retrieval times and has therefore no impact on the production rate.

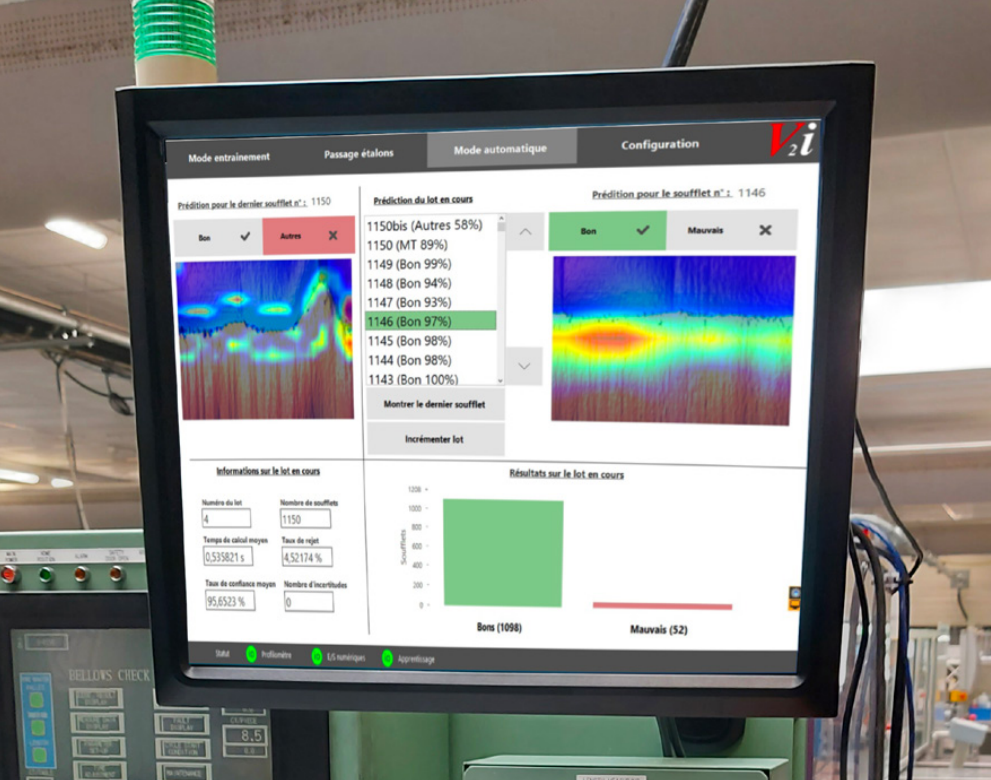
A **custom-built** human-machine interface (HMI) displayed on an industrial touch panel allows the user to:

- View the statistics of the current batch,
- Review processed images of the bellows,
- Train new models,
- Verify the compliance of the models with a benchmark slate of bellows.

The Human Machine Interface (HMI) is implemented in a very versatile way, making it readily adjustable to cater to specific demands.

This inspection mode can be transposed to all types of parts. The addition of artificial intelligence reduces processing time and enhances diagnostic reliability.

The system has enabled our customer **to break free from the quality wall**, while guaranteeing **higher production quality** than previously.



Measuring system requirements

- High resolution,
- High acquisition frequency (>300Hz),
- Robustness (24/7 operation),
- Results reliability,
- Short response time < 1s.

Environmental conditions

- Inline integration of the system on existing production lines.

System architecture

- 1x high performance laser scanner,
- 1x high performance rugged computer,
- 1x Digital In/Out communication card.






Benefits

- Efficient detection of all defect types,
- Early detection of production quality deterioration,
- Easy integration thanks to small footprint and PoE power supply,
- Efficient image processing to ensure a good reproducibility of the measurements,
- Flexibility for easy adaptation to different defect types.



Located in the Liege Science Park, V2i is a recognized Belgian player since 2004 and specialized in the **development of turnkey monitoring systems and vibrations tests & measurements solutions**. To fulfil its objectives, V2i has an experienced team of more than 15 persons and modern facilities. The company has been growing continuously since its foundation and is active in major sectors of the industry (aeronautics, aerospace, automotive, transport, defence, civil engineering, etc).



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