

Non-Destructive Inspection applied on manufacturing industry

By Alessandro Liani, R&D Manager, Video Systems Srl

Some questions for you

- In a Zero defects scenario, are you taking advantage of use of Non-Destructive Inspection (NDI) in your process today?
- How many NDI techniques do you know and apply in your process?
- Have you considered the advantages of using automated NDI system instead of human supervised ones?
- Have you considered the benefits of using AI to upgrade standard NDI techniques?

NDI quality approach

In literature Non-Destructive Inspection is a wide group of analysis techniques used in science and technology industry to evaluate the properties of a material, components, or system without causing damage [1]. Synonyms of NDI are non-destructive examination (NDE), non-destructive test (NDT), and non-destructive evaluation (NDE) [2].

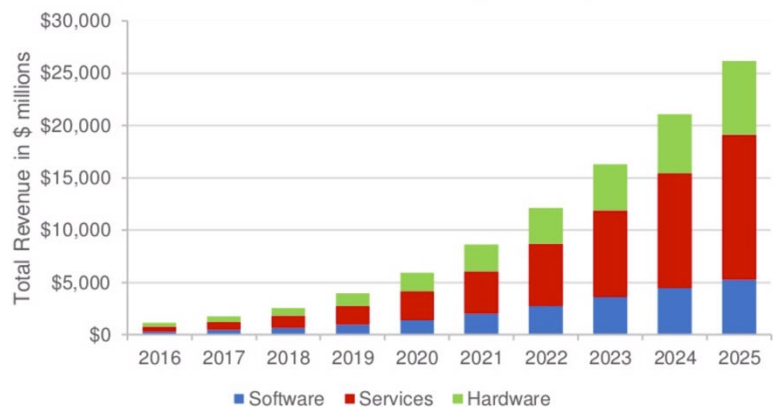
The field of NDI is a broad, interdisciplinary field that plays a critical role in assuring that products and components are reliable for the market. NDI technicians and engineers define and implement tests that locate and characterize material and products conditions and flaws that might otherwise cause planes to crash, reactors to fail, trains to derail, pipelines to burst, and a variety of less visible, but equally troubling events. These tests are performed in a manner that does not affect the future usefulness of the part or material. In short, NDI allows parts and material to be inspected and measured without damaging them.

In general, NDI methods would not only detect the defect, but can also often be used to measure something about that defect, such as its size, shape and orientation. In NDI's portfolio of techniques can be found: Visual and optical testing (VT), X-Ray (RT), Magnetic particle testing (MT), Ultrasonic testing (UT), electromagnetic testing (ET) and more [3].

Visual Inspection: a pillar of NDI

Visual and optical Inspection is one of the most important NDI testing techniques. Many of these tests, which were originally man-made, are now supported by Machine Vision technologies and can today be fully automated. Thanks to new technologies such as ultra-high resolution cameras, high-speed cameras, sophisticated machine vision software the accuracy of quality control with NDI techniques has increased and their presence continues to grow in the industrial control market [4].

Source: Tractica



NDI in hollow glass production industry

In industrial production a key activity is the quality control phase. For example, quality control in industrial hollow glass production market. This is critical compared others industrial sectors because the final products (bottles, tableware, containers) are made for pharmaceutical, food and beverage markets, where a defect of the product can affect human safety. In the last decades, the glass container inspection processes have been characterized by human workforce, mechanical methods, and optical inspection technologies. For many years, the inspection has been entrusted to workers who take the article in their hands, look at it and check if there are any defects. Today in hollow glass production market there are many autonomous non-destructive inspection activities, starting from hot-end (where the bottle is formed starting from a glass drop) down to cold-end (the end of the production line where the bottle is palletized).

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Whilst people can be very experienced in the control task, they cannot guarantee continued reliability and reach the speed required by current production cycles. For this reason, automated systems for the quality control of glass containers have been introduced in the production lines during the past years [5]. The purpose of every hollow glass maker is to produce more containers with best quality and lowest cost. For this reason, the industry connected to quality control system is working every day for augmenting capability of inspection with 2 main goals:

- Increase the capability of system to identify defects
- Reduce the false positives on containers inspection

In the last 10 years, experiences in hollow glass market demonstrate that thanks to AI techniques the capability of automatic quality control system can be increased, and optimal results obtained in a very short time.

What will ZDMP achieve

ZDMP NDI package provides an easy to use graphical tool for design complex quality control algorithms. The web-based tool will be able to select function modules from the library and create graphically the process flow. Thanks to this, a rich portfolio of machine vision tools will be part of ZDMP platform, such as:

- Features Analysis Suite
- Silhouette suite
- AI Image classifier
- AI Image labeller
- 1D/2D DataCode reader (for tracking solutions)
- OCR/OCV toolkit

The zApps developer can thus design very complex NDI applications and in case of tailored needs will be able to expand the capabilities of the base system by developing other modules to be integrated on the platform.

References/Acknowledgements

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