Non-destructive inspection services for zero-waste manufacturing

ZDZW aims to reduce defects in the submerged arc welding (SAW) process used in the production of wind turbine towers, demonstrated at the GRI facilities

Achieving zero defects and zero waste is a huge milestone for any industrial process, which may be accelerated by having advanced non-destructive inspection techniques to ensure quality on the go. We speak to Oscar Salgado of the ZDZW project, which aims to bring the impacts of such techniques to the manufacturing sector

Non-destructive inspection techniques are pivotal for achieving the dual goals of zero-defect and zero-waste manufacturing. In the pursuit of zero defects, these techniques provide a comprehensive means of scrutinising every aspect of the manufacturing process without causing any harm to the materials or products being examined.

By employing cutting-edge technologies such as imaging systems, ultrasonic testing, and thermal monitoring instruments among others, manufacturers can detect even the most subtle defects or irregularities that might otherwise go unnoticed. This meticulous scrutiny not only ensures that every product meets the highest standards of quality and reliability, but also minimises the risk of costly recalls or rework due to undetected defects slipping through the cracks.

On top of this, non-destructive inspection plays a crucial role in realising zero waste by enabling manufacturers to optimise their production processes and minimise material wastage. By conducting thorough inspections at various stages of manufacturing, companies can identify inefficiencies, defects, or deviations from specifications early on, allowing for timely interventions to rectify issues and prevent further waste generation downstream. Additionally, these inspection techniques facilitate the recycling and reuse of materials by ensuring that only high-quality components make it into the final products, thereby reducing the need for raw materials and mitigating the environmental impact associated with excessive waste generation.

The Horizon Europe project ZDZW (Grant Agreement No. 101057404) is on a mission to make manufacturing more efficient, more green and more sustainable, focusing on the two critical aspects of zero-defect production and zero-waste manufacturing. By striving for flawless production processes and minimising waste generation, ZDZW aims to transform the capabilities of a wide range European industries, including automotive, home appliances, renewable energy, e-health, and food and beverages.

The project is improving the manufacturing process of high-quality large metric fasteners, using induction heat treatment, for the wind and aerospace industry, demonstrated at the ERREKA facilities

Integrity inspection ensures that manufactured parts meet stringent standards of integrity and durability, thus minimising defects

Oscar Salgado, ZDZW coordinator and senior researcher at Basque technology centre IKERLAN, explains how the project is employing a multifaceted approach to achieve its goals: “We are targeting three key areas across the manufacturing process and product lifecycle in our project. Integrity inspection ensures that manufactured parts meet stringent standards of integrity and durability, thus minimising defects. Visual inspection guarantees that products adhere to visual quality requirements, encompassing aspects such as shape, colour, and overall appearance. Finally, Thermal inspection services focuses on energy-intensive processes like thermoforming, where efficient inspection can lead to significant waste reduction.”

To accomplish its objectives, ZDZW leverages a diverse array of inspection technologies, encompassing 11 different solutions. These technologies, ranging from advanced imaging systems to thermal monitoring instruments, are tailored to address specific needs within the manufacturing ecosystem.

How ZDZW is making a difference

The real litmus test for ZDZW lies in its pilot initiatives, where theoretical concepts meet practical application. Six distinct pilot projects span various industrial sectors and processes, including injection moulding, welding, lithography, and packaging. From mass production of plastic components to the sealing of coffee capsules, each pilot represents a unique testing ground for ZDZW's innovative solutions.

Beyond these predefined pilots, ZDZW has also opened its doors to additional participants through an open beta testing programme.

PROJECT INFORMATION

Project Title
ZDZW – Non-destructive inspection services for digitally enhanced zero waste manufacturing

Project Objective
ZDZW develops digital non-destructive inspection (NDI) services as a set of strategic technologies to improve production efficiency, zero-defect, and sustainable manufacturing of European industries. To pursue the main goal of reducing defects and the generated waste in manufacturing processes, ZDZW addresses defect minimisation and waste reduction in three key areas that cover the entire manufacturing process and product lifecycle.

Project Duration and Timing
36 months: Sept 2022 - Aug 2025

Project Funding
EC Funding: €8 448 129

Project Partners

Ikerlan
Innerspec Technologies,
Norblis Aps,
Video Systems,
Yoran Imaging,
DIRA Reliability,
Simulargе Bilisim,
Siemens,
EURA AG,
Zabala Innovation Consulting,
Din Deutsches Institut Fuer Normung,
Information Catalyst,
Software AG,
Fundingbox Accelerator,
Lithoz,
GRI Towers Galicia,
Matz-Erreka,
Arcelik,
GLNPLAST,
Aircode UG,
Illycaffe,
Danmarks Tekniske Universitet,
Instituto Tecnologico De Informatica,
Universitat Politecnica De Valencia,
Asociacion De Investigacion Metalurgica Del Noroeste,
Fraunhofer,
Fitfactory Innovations

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This initiative invites interested parties to explore ZDZW's technologies and potentially integrate them into their manufacturing processes, fostering a culture of collaboration and innovation. "This programme has now been open for a few months, and we plan to keep it open for a fair while longer," says Salgado. "It is a slightly different approach than the pilots, as we are not offering funding to these applicants – rather, we are trying to promote these solutions and show that they really can be used to improve how businesses operate."

Inspection as a service

While cutting-edge technologies like artificial intelligence permeate various industries, ZDZW remains focused on practical applications rather than theoretical advancements. The project emphasizes the adaptation and refinement of existing technologies to suit industrial needs, paving the way for tangible results and real-world impact.

"We're looking to introduce a new concept in the field of inspection – inspection as a service," explains Salgado. "Typically, these solutions are expensive and can be prohibitive for small or medium enterprises unfamiliar with the technology. So, we're pioneering a business approach akin to leasing or renting, offering flexible models based on usage or volume. This opens doors for newcomers, not just large enterprises, to access these innovations, fostering inclusivity and new possibilities in various sectors."

ZDZW is developing a system for inspecting parts produced by plastic injection moulding processes, demonstrated at the GLN facilities

Beyond ZDZW

As ZDZW reaches the midway point of its 36-month timeline, the project stands at a critical juncture. With 18 months under its belt, progress has been steady, albeit with the occasional challenge. Looking ahead, the team anticipates completing the development phase by month 24 and transitioning to full-scale implementation. Beyond its current timeline, ZDZW envisions a future where its innovations continue to thrive. Commercialisation avenues, such as marketplace platforms, offer potential pathways for the project's long-term sustainability. Additionally, ongoing skills development and community engagement initiatives ensure that the benefits of ZDZW extend far beyond its initial scope.

"ZDZW doesn't just aim to transform manufacturing processes: it also seeks to empower individuals and communities," says Salgado. "Through webinars and training sessions, we are disseminating knowledge and expertise, fostering a culture of continuous learning and innovation."

It is evident that ZDZW is more than just a project – it's a catalyst for change. By marrying innovation with practicality and sustainability, ZDZW charts a course towards a future where manufacturing isn't just about productivity and profit, but about forging a more resilient, eco-friendly, and prosperous world for generations to come.