

Report from Commission V: NDT and Quality Assurance of Welded Products

IIW 2026 Salzburg Tuesday 14/7/2026

In this summary, we present the agenda, key topics, and main discussions from the 2026 Annual Assembly of the International Institute of Welding Commission V. Our focus is on recent developments in nondestructive testing (NDT) and the quality assurance of welded products.

The assembly took place on July 14, 2026, with sessions in both the morning and the afternoon.

The safety of key infrastructure, especially in the context of smart factories and automated production, depends heavily on the integrity of welds.

Even a small flaw in a weld, whether in deep-sea oil pipelines or electric vehicle battery packs, can mean the difference between a safe structure and a catastrophic failure.

Traditionally, manufacturing and inspection are handled as separate processes.

After welding a part, it is allowed to cool before undergoing tests like X-ray or ultrasonic testing. If any defects are found, the metal is ground away, the joint is reheated, and the welding is done again. This results in increased costs, logistical problems, and delays in project timelines.

Research presented at the assembly aims to reduce or eliminate these issues by introducing in-process testing.

One notable innovation from the University of Strathclyde involves the use of robotically deployed ultrasonic roller probes to inspect thick welds during the welding process. This method allows for the immediate detection of flaws such as slag inclusions, turning quality control into an ongoing feedback loop and significantly reducing processing time.

The use of Artificial Intelligence marks a major change in modern NDT practices.

To overcome the limitations of generic AI models in heavy industry, scientists are developing Physics-Informed Neural Networks (PINNs). Contrasting typical AI models, PINNs integrate fundamental thermodynamic and fluid dynamics equations into their algorithms, ensuring that their predictions are consistent with real-world physics.

Additionally, the industry is rapidly moving away from traditional film-based radiography towards advanced 3D imaging techniques such as the Total Focusing Method (TFM).

These methods provide inspectors with detailed volumetric insights into the structural integrity of welds.

As these advanced technologies transition from research labs to actual production environments, efforts to establish international standards, led by experts like Commission V Chair **Charles MacLeod**, are essential.

By combining advanced physics, generative computing, and robotics, the future of manufacturing will not only detect defects more efficiently but also help prevent them from occurring in the first place.

Commission V, a specialized division of the International Institute of Welding, plays a crucial role in promoting the exchange, dissemination, and standardization of Nondestructive Testing and structural health monitoring knowledge for industrial and societal safety.

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