Techical Center

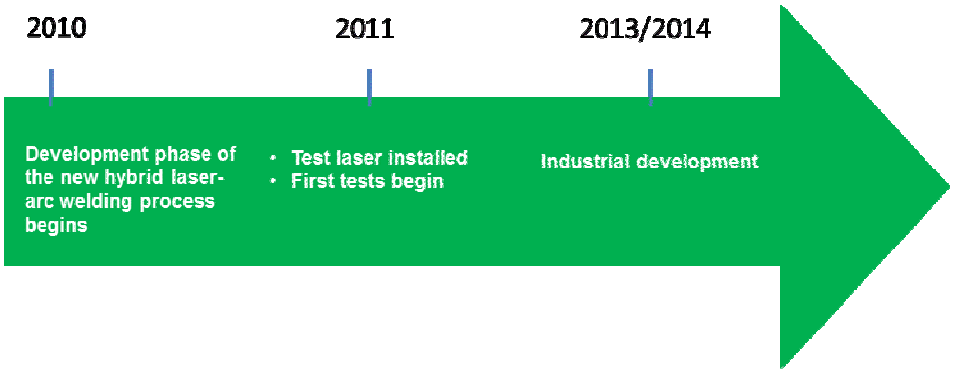
AREVA Chalon/St-Marcel

Hybrid laser-arc welding

The hybrid laser-arc welding process – a newcomer to the nuclear industry

AREVA's Chalon/St-Marcel Technical Center has developed a welding process – known as hybrid laser-arc welding – that has never been used in the nuclear industry before. The process combines the gas metal arc welding process (also known by its subtype, MIG) with a laser beam.

Already used in the automotive industry for welding thin metal plate, the process will be tested in the coming months to determine whether it can be used two or three years from now for welding thick parts made by AREVA, such as reactor vessels and steam generators. The Technical Center has recently acquired a hybrid laser-arc welding facility, worth nearly a million euros, to carry out this test program.



Advantages

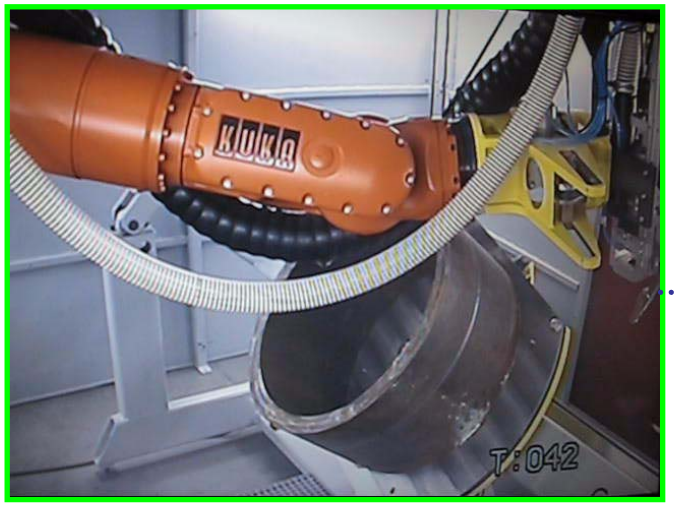
- Increased deposition rate – i.e. the amount of metal deposited per unit time – leading to reduced welding time.
- Improved weld quality through increased weld penetration, thus reducing the risk of defects such as inclusions or lack of fusion.

Target application

- Narrow-gap welding on carbon steel or stainless steel to replace existing submerged arc welding or TIG processes.

Safety requirements

- Laser safety equipment or work confined to special area.
- Gas and welding fume exhaust system.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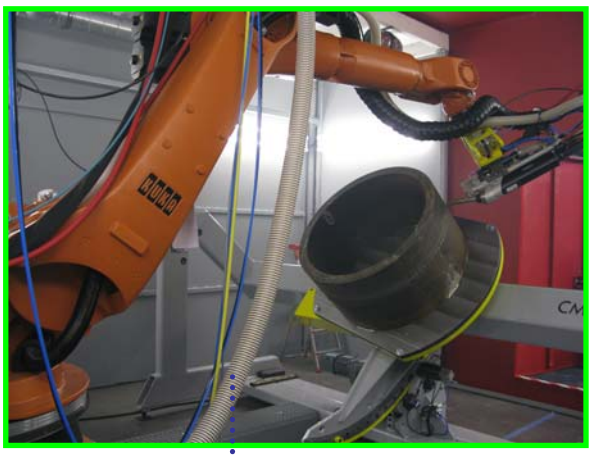


TruDisk 6002

Welding – a key technology in the nuclear field

What is welding?

Welding is the most commonly used method for joining metals. It guarantees unique, high-quality metal continuity that cannot be achieved with other joining methods, such as riveting, bolting or crimping. It calls for a combination of expertise in metallurgy, mechanical and thermal engineering and many other fields.

Today's welding processes benefit from cutting-edge technology. They can use a wide range of energy sources, including chemical (flame), light (laser), electrical (arc) or mechanical energy.

Weld quality is vital in the nuclear industry as welds are used for sealing reactor components, such as the reactor vessel and steam generators. Each weld is subjected to thorough inspection at every stage of the manufacturing process. AREVA has long considered welding as one of its key technologies.

AREVA: a leader in welding processes

Since it first began to manufacture heavy components for the nuclear industry at its Saône-et-Loire sites, AREVA has innovated constantly in welding techniques for the nuclear industry, one of the core businesses of its plants. Innovation in this area serves three purposes:

- Improve weld quality.
- Reduce welding time.
- Improve welders' working conditions.

The most significant progress made in recent years includes the automation of several manual welding processes, reduced welding grooves, the use of TIG and MIG processes and, more recently, the assessment of the hybrid laser-arc welding process.

R&D at the Chalon/St-Marcel Technical Center

AREVA's Chalon/St-Marcel Technical Center has specialized in welding processes for 20 years. It develops new and innovative welding technology aimed at making progress in such vital areas as performance, reliability, repeatability and quality for nuclear applications.

In this respect, the Center has already helped develop many processes, including narrow-groove orbital TIG (Tungsten Inert Gas) for stainless and ferritic steel, and robotic narrow-groove orbital MAG (Metal Active Gas) for lining welds.

In addition to its development activities, the Center is increasingly involved in computer simulation work and research on fundamental physical phenomena.

It possesses its own metallurgy laboratory and a facility equipped with orbital welding machines, welding robots, viewing equipment, and welding generators.