Contribution ID: **9** Type: **Oral Presentation**

On the repair of industrial steel parts with a robotized Directed Energy Deposition system

Wednesday, 18 September 2024 14:40 (20 minutes)

The energy sector uses a large amount of moving metallic parts, for example stainless steel pumps or collectors. Such kind of parts can be damaged during the use life and small cracks can appear after some years. Classically, the cracks are manually repaired with conventional welding techniques and the parts can still be used several years after the repair. However, the manual repair leads to large internal stresses that can be an issue and the quality of the repair depends on the operator ability. So, an automatized and reproducible repair could be very advantageous for this sector.

In this study, we have developed repairs by using Directed Energy Deposition (DED). Firstly, we have validated the technology on small coupons in which cracks have been machined. The impacts both on the substrate and on the deposited layer have been studied and a robust process window has been defined for the studied stainless steel. The quality of the repair is excellent in terms of level of porosity, chemistry and mechanical properties. Moreover, the temperature increase during the repair is five times lower with DED compared to classical welding leading to less residual stresses. Secondly, the automatization of the process has been studied by used of a robotized directed energy deposition system enabling to have reproducible repair conditions. The different steps of the repair have been defined and validated. Finally, various types of cracks have been simulated on industrial parts to checked the developed process.

Speaker Country

Belgium

Primary authors: GEORGES, Cédric (CRM Group); Dr JIMENEZ, Norberto (CRM Group); Mr DERRIENIC, Yves (Westinghouse Electrical Belgium); Mr EL DAKDOUKI, Rami (Westinghouse Electrical Belgium); Mr PITOISET, Xavier (Westinghouse Electrical Belgium)

Presenter: GEORGES, Cédric (CRM Group)

Session Classification: Laser Melting, Electron Beam Melting & Direct Energy Deposition Processes

Track Classification: Laser Melting, Electron Beam Melting & Direct Energy Deposition Processes