

MICROWELDING TECHNOLOGY PLATFORM

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Abstract The BWI (Belgian Welding Institute) works in collaboration with CEWAC (Centre d'études wallon de l'assemblage et du contrôle des matériaux) and MULTITEL, 2 other approved research centers on a project concerning micro welding and associated quality controls. A platform that groups different micro welding processes and adapted, advanced quality controls has to be build up. The technologies are: micro friction stir welding, micro-plasma, micro-TIG, micro-resistance welding, micro-laser welding, micro-electron beam welding, digital micro-radiography and micro-control via adapted penetrant inspection. Some of these technologies are already available at CEWAC, others are new. The installation of all the equipment, the existing and the new machines, is foreseen by July 2010. This platform will be accessible for all companies, to know the technology, to compare different techniques, to ask for the best solution, the best parameter set-up for their application, to make small pre-series, etc...

Keywords micro welding, non destructive testing

1 INTRODUCTION

The BWI (Belgian Welding Institute) works in collaboration with CEWAC (Centre d'études wallon de l'assemblage et du contrôle des matériaux) and MULTITEL, 2 other approved research centers on a huge project concerning micro welding and associated quality controls. The application of this project is done within the frame work of the first call of the FEDER project 2007-2013. It has started on July 2008. To start with, a platform that groups different micro welding processes and adapted, advanced quality controls has to be build up at CEWAC. The technologies are: micro friction stir welding, micro-plasma, micro-TIG, micro-resistance welding, micro-laser welding, micro-electron beam welding, digital micro-radiography and micro-control via adapted penetrant inspection.

This platform is open for all companies that are interested in it. By participation in this research project, companies get an insight in the possibilities of micro-welding and associated quality controls. They will be able to assess if these processes are usable for their specific applications, taking into account the joint properties, the necessary investments, the profit increase in comparison with the current applied technique, the reliability of the processes, and so on...

The different projects are described more in detail

2 DESCRIPTION OF THE PROJECT

2.1 Project « MICROSOUUD »

This project, with the collaboration of Cewac and BWI, is about the investment in high-technological equipment and in complementary infrastructure in order to realize collective research projects. The technological platform about 'micro welding and adapted, advanced controls' will be developed under strong accreditations (for aerospace, aircraft, medical world...). This platform gives service and knowledge of the modern technology of micro welding and associated quality control to the companies, and more specific to the SME's. This will allow them to use these technologies in the creation and realization of innovative products/services (taylor-made pre-series) and/or to adapt their existing, less competitive product.

The goal is to introduce these technologies more easily in the companies by sensitization and collecting practice technological expertise. Training, application specific to the company will be possible and also they will be capable to realize small series at CEWAC, following the strong standards and accreditations. So, companies should easily get introduced in the new market and have insight in the technology, accreditation, profitability, environment and training of their human resources.

The project is focused on the advanced technologies such as: micro friction stir welding*, micro-plasma, micro-TIG, micro-resistance welding, micro-laser welding*, micro-electron beam welding*. The technologies indicated with * has been bought within this project and will be operational by July 2010; the others were already available at CEWAC.

Also the associated quality controls such as digital micro-radiography and micro-control with adapted penetrant inspection will be available. These are very cost-effective techniques, which are at the same time difficult to access and which mean an investment as well for purchase as for the training of the people as for the knowledge of the accreditation and standards in the domains of micro mechanics, aircraft, aerospace, medical, electromechanics, transport, security,...

This project fits completely in the further development of the research centers CEWAC and BWI, who work closely together since the signature of a scientific collaboration in 2005.



Figure 1. Examples of micro-assemblies

2.2 Project Laser NDT

This project 'laser NDT', a collaboration between Cewac and Multitel, wants to introduce and develop the technology of micro laser welding in the companies and at the same time, wants to miniaturize existing components. This project is focused on the development of specific control methods for micro laser welding (so it can be seen as a more in-depth study of the previous project).

The industrial development of the laser technology requires a qualitative non-destructive control usable in the production line. This can reduce the cost and avoids also the production of wasted products. Taking into account the small joints and the small thicknesses, the classical non-destructive tests are not appropriate, with the exception of radiography. The radiography is at the moment less profitable for a continuous industrial project, due to his cost, the difficulty of interpretation, the application after the welding and so on. The goal of this project is to study and validate an innovative method for quality control which can be used in a continuous process of micro welding, in other words, an automatic system of in-line quality control. The system will exist of signal acquisition, filtering and analysis which will be compared to reference signals and as result will send an alarm in case of unacceptable failure.

2.3 Project Introtech PME

This project consists of the offer of technological services (information, dissipation, technological transfer) which give an answer to the needs concerning establishing, development and/or reinforcement of the companies, and more specific the Walloons SME's and SE's. This has to allow to introduce innovative technologies of welding and quality control in the production, mainly of metals. This makes the company able to improve the competitively, productivity and/or the quality of the production.

The micro-assembly technologies such as laser, electron beam welding, friction stir welding, micro-TIG, micro-plasma, radiography, ... will be valorized.

3 CONCLUSIONS

This platform MICROSOUND will support the build-up of a network of competitive SME's in the domain of micro-assemblies and micro-controls. They will have access to similar technologies which will improve and accelerate the dissipation and the transfer of technology, in the direction of the SME's, as well as in the direction of technology centers and training centers.

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