

EXPERIMENTAL AND COMPUTATIONAL DEVELOPMENTS OF FSW

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ABSTRACT

For more than one century welding technology plays an important role in most of the technical developments of our society. Friction Stir Welding (FSW) invented in 1991 is unanimously considered one milestone in the development of the welding technology and it is foreseen it will bring important contributions in the development of present and future design and construction of metallic structures. This fact has already being confirmed by the growing number of industrial applications in many and different sectors mainly in the manufacturing of light alloys. The Group for Welding and Joining Technologies at the Instituto Superior Técnico (IST) has started its activity approximately three decades ago and in 1999 the first PhD thesis on the fundamentals and modelling of FSW was presented and since then a new area of R&D in solid state welding is being developed.

The work performed at IST on FSW started based on literature survey, participation in dedicated conferences and seminars side-by-side with basic trials enabling the development of know-how about the experimental and physics fundamentals of the process. Later on with the development of the computational modelling supported by the participation in cooperative research projects allowed definitely the consolidation of the know-how about the material flow, thermal flow and metallurgical evolutions.

Although the need for further develop the modelling of the process, both analytically and numerically, nowadays the efforts are also concentrated in supporting the Portuguese companies interested in acquire the FSW technology and developing non destructive techniques to access the quality of the joints. A summary of some of the work performed at IST on FSW is presented, with more emphasis on the modelling of the process but also revealing some technological features.

KEYWORDS: FSW, experimental fundaments, computational modeling.

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