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RSB PROPOSAL

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1. FP7 Context

Title: Development of a new joining technology based on the combination of the processes resistance spot welding and brazing for its application to aluminium – steel modular body in white vehicles.

Acronym: **RSB (to be changed)**

Theme: Transport (FP7 Cooperation Work Programme), sub – theme sustainable surface transport

Activity: Strengthening competitiveness

Area: 7.2.5.1 Competitive industrial processes

Topic: SST.2007.5.1.2 Cost effective manufacturing and maintenance (level 1: generic activities)

Instrument: Collaborative projects small or medium – scale focused research

Open in call: FP7 – Sustainable surface transport (SST) – 2007 – RTD – 1

2. Abstract

The project is aimed to develop a new hybrid joining technology based on the combination of resistance spot welding and brazing processes (RSB process). The RSB process will be designed to cope with dissimilar joints of aluminium to steel thin plates. These joints are identical to the ones used to produce advance body in white concepts, combining different materials to enhance crashworthiness, reduce weight and as a result fuel consumption and emissions.

Market requirements were the main driver for the evolution of advanced concepts of the kind, shifting from the traditional monocoque body concept to the modular concept. This implies the use of materials with specific properties depending on their function in the vehicle (energy absorption, lightness, aesthetic, etc.). It is a fact that nowadays, it exists a necessity of using front and rear modules made out of aluminium, to be later jointed to a steel safety cell. Conventional joining techniques (RSW, GMAW) are not useful for those applications as a number of metallurgical problems arise. Current joining solutions are based on hybrid joining techniques, e.g. rivet – bonding. Nevertheless, these solutions have significant disadvantages including their high cost, their increase in weight, limited flexibility, and others.

Resistance Spot Brazing will overcome these problems, allowing a broad implementation of aluminium – steel concepts. Hybrid resistance welding – brazing techniques to join aluminium components are to date barely investigated. Consequently, this represents a real opportunity to acquire a key knowledge for the European transport industry, increasing its competitiveness through this innovative process.

A multidisciplinary consortium will execute the project. The consortium will investigate the characteristics and the requirements of the RSB process, including the definition of appropriate filler materials, the state of application (paste or solid pre – forms) and the application method. A selected application will be defined and specific joint requirements will be established. Comprehensive laboratory tests and real pilot tests will be performed during the project. It is expected that the industrial viability of the process will be demonstrated and precise data of technological characteristics, productivity and economics will be obtained.



3. Objectives

The main objective is to develop a new hybrid joining technology based on the combination of processes including resistance spot welding and brazing (RSB process).

Other technical objectives for the successful development of this project include:

1. To develop an aluminium – steel joining process with good mechanical properties.
2. To develop a filler metal (composition and form) that adapts to resistance heating mode and metallurgical affinity both with aluminium and steel sheets.
3. To develop an automatic deposition method of filler metal to achieve typical automotive productivity rates.
4. To determine non-destructive testing methods to evaluate the quality of joints.
5. To develop new electrode tips (material and geometry) for this new process.
6. To elaborate a weldability and troubleshooting guide about this new process and this new type of joint.

4. Work plan

WP1. Definition of the application. Definition of the industrial process requirements

WP2. Laboratory testing

WP3. Modification of standard RSW equipment. Integration of specific filler materials suppliers

WP4. Pilot production testing

WP5. Process validation: Crashworthiness testing

WP6. Exploitation

WP7. Project management

5. Consortium

RTDs: Project Management. Process development. Laboratory testing. Weld characterization.

OEM & TIER: Process and application definition. Pilot production testing. Exploitation.

Brazing filler material supplier: Adapted filler material development.

System integrator: Adapted RSW equipment development.