

Basic Stage

(Fiscal Year 2004-2006)

Osaka East Area

Next-Generation High Definition Welding Technology (FSW) Development

Project Promotion

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Core Research Organizations

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Industry... Isel Co., Ltd., Sigi Seiki Co., Ltd., Nakata Co., Ltd.,
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 Fujikin Incorporated, Tig Co., Shimonishi Seisakusho,
 Shimano, Inc., Shin Nippon Koki Co., Ltd.
 Academia... Osaka Prefecture University,
 Osaka Sangyo University, Kinki University,
 Kansai University
 Government... Technology Research Institute of Osaka Prefecture



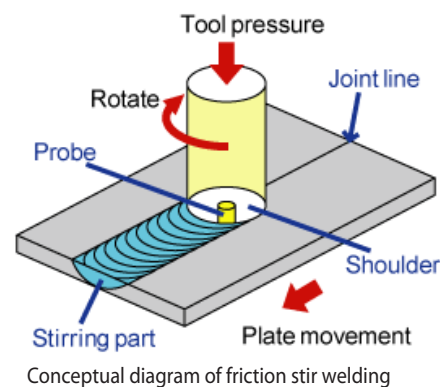
Aim of research and development

The Osaka East Urban Area (which includes the cities of Higashi Osaka, Yao and Daito, etc.) is one of the most important centers of the machining and metalworking industries in Japan and has a number of leading Japanese manufacturers who possess high-level technological capabilities. The present project based in this area is aimed at conducting research and development into next-generation welding of light metal alloys, etc. using friction stir welding (FSW) - an epoch-making light metal welding technology that has recently begun to be used in railway carriage manufacturing, etc. - as well as into 3D welding systems. Welding technology is one of the key elements of the assembly technology, so the high-quality welding technology being developed through the present project will meet a wide variety of industrial demands as a core technology in the machining and metalworking industries. Moreover, as this technology is expected to find the ways for applications in the aerospace industry in the future, it has considerable potential to vitalize the manufacturing industry of Osaka Prefecture and to act as a trigger for reinforcing the technological base and raising the international competitiveness of local manufacturers.

Contents of research

Research into Highly Functionalized Welded Sections of Light Metal Materials and Its Condition Optimization (Research Theme A)

In the industries such as cars, railways, ocean vessel, aerospace and aircraft, the expansion of the application field is expected toward usage of the aluminum alloy which is lightweight and has a light intensity or toward usage of the magnesium alloy and titanium alloy. It was very difficult to exercise melt welding using these lightweight materials in the past. It has been designed to establish the welding technique that can integrate module without ruining the excellent characteristics of such materials. It is considered that friction stir welding (FSW), which is jointed in the solid phase by the plasticity flow without melting the materials, is the most suitable and an epoch-making welding technique, so the material degradation is few and it is jointed very efficiency. In research theme A, by studying the optimum conditions of the joint for each light weight materials and by making its data base, it is aimed to establish the high-quality automatic welding method, which is integrated with 3-D joint in the research theme B.



Research into High Quality Welding System Automation using a 3D Drive. (Research Theme B)

Currently, in the field of friction stir welding technique, application of such technique has already started in the car, the ocean vessel, etc. in order to expand the application field of the technology, it expected to develop its technology from a straight line joint in conventional plane to the joint in solid carved surfaces in the future. There are some subjects to be cleared in the method of guiding the joint path and in the production of equipment. In the theme B, we develop the system which makes the joint path from the measured data, in addition to the guiding of the joint path to be calculated by the CAD data, also, another target is to provide the integrated automatic system to be considered in the most optimized condition which is supplied by research theme A, based on the progress of development of a method to easily produce the jig easily.



The main study results

Production of Friction stir welding device

The introduced devices are unique welding devices that are equipped with a high output linear head (A head) and a 3D drive head (B head) on either side of a gate designed for its high rigidity. These devices are compatible with the diverse aims of the present project.

We ordered the production and assembly of these devices to a small and medium-sized enterprise in local Higashi Osaka City. In addition, many other companies in the Osaka East Area participated in the process of producing the devices.



Friction stir welding device

