●Development Stage

(Fiscal Year 2007-2009)

Nagaoka Area

Next-generation product development of magnesium alloy

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Life Sciences
IT
Environment
Nanotech Materials
Others

Framework for Project Promotion

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Project Strategy Coordinator···Yoshio Yoshino (Niigata Industrial Creation Organization)

Core Research Organization

Nagaoka University of Technology

Major Participating Research Organizations

Industry···Uenotex Co., Ltd., Tsubamex Inc., Ltd., Nakano & Co. Labs, and others

Academia···Nagaoka University of Technology,
Nagaoka National College of Technology,
Chiba Institute of Technology, Shinshu University

Government···Industrial Research Institute of Niigata Prefecture

Aims of Project

The Nagaoka area possesses the accumulated technology of metal mold production, press work, and precision part processing. Local enterprises are currently developing a new magnesium alloy and processing technology, and have succeeded in commercializing many products.

This research seeks to develop marketable structural parts for cars, aircraft, trains, etc. using a new magnesium alloy (strong and with good forming properties) developed during the Basic Stage. The commercialization of this product will contribute to the prevention of global warming and to the stimulation of regional industries and the Japanese economy.

Contents of Project

1. Technology for the mass production of new magnesium expanded material

The aim here is to use the new magnesium alloy developed during the Basic Stage as a structural material for parts in cars and other vehicles. We established a system to mass-produce the magnesium wide-board material.

2. Development of surface treatment technology with high corrosion resistance

2-1 Development and evaluation of basic surface-treatment technology

Given that the new magnesium alloy developed as part of the Basic Stage is of practical use as an industrial material with high corrosion resistance, we developed appropriate surface-treatment technology.

2-2 Development and evaluation of practicable surface-treatment technology

Given that new metallic material (e.g., magnesium alloy) has a practical use as an industrial material with high corrosion resistance, we developed a relevant method of surface treatment.

3. Highly effective mechanical joint, different type of material conclusion, and development of precise cutting technology

We established machine conclusion and welding, and joint technology appropriate for the magnesium board material. We investigated a method of joining the developed magnesium alloy with different metals.

4. Development of complex shape-giving press technology

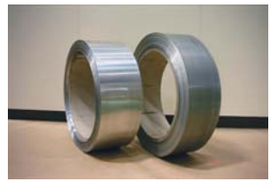
We developed shape-giving press technology using heat to mold the magnesium alloy. We also developed the press molding technology required to achieve production using lightweight materials.

Main Results

1. Technology required for the mass production of newly developed magnesium flatting material

We introduced the technology that reduced the temperature of the sample to that of the rough rolling and finish rolling of the DC casting billet at the time of each rolling. This technology was used to develop mass-production rolling systems for thicknesses of up to 0.8 and 2 mm.

This method prevented the development of edge cracks, and we succeeded in obtaining a rolling board material with excellent surface properties.



New alloy rolling coil

2. Development of surface treatment technology with high corrosion resistance

2-1 Development and evaluation of basic surface-treatment technology

We investigated an anodic oxidation coating with energy-conservation properties. The thickness of the film generated with an alkali was tens of microns, suitable for practical use. We succeeded in making a film with hardness equal to the anode oxidation film of aluminum, and with flame- and heatproof properties.

2-2 Development and evaluation of practicable surface-treatment technology

The material lying on the surface is removed by processing in alkaline solution, which adds organic acid as preprocessing for the conversion treatment. The corrosion resistance of the magnesium alloy was improved by this processing.

3. Highly effective mechanical joints, different types of material conclusion, and development of precise cutting technology

The generation of a bubble was controlled by conversion treatment and anode oxidation treatment. We succeeded in improving the bonding and bonding fitting strength in using these treatments, and produced a strong joint.

We also clarified the strength characteristics of the welded material and the TIG welding process.

Moreover, we developed a connection for Pinching and SPR (self-piercing rivets), evaluated the joint and strength characteristics, and completed testing of the machine finishing method.

4. Development of complex shape-giving press technology

The press molding technology has been improved by our understanding of the press bend criteria for stable machining. We developed a device for assessing tension-addition bend processing, and confirmed its effectiveness. The forming limit has been improved by using opposing pressure molding technology applied to magnesium alloy. The profile accuracy has also been improved.

Machine that bends it pull by it