

Nagaoka Area

Enhancement of Advanced Material and Development of Green Processing Technology

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Project Promotion

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TOKYO LOST-WAX IND. Co., Ltd., Nano-TEM Co., Ltd., TWINBIRD LTD
HAKKAI CREATES CO., LTD, Nippon Seiki Co., Ltd., UNION TOOL CO
SUNARROW LIMITED, KURAKI CO.,LTD, ONE ROAD CO., LTD
TOYO RIKAGAKU KENKYUSHO CO., LTD., ITAGAKI KINZOKU.CO.,LTD
Nojima Seisakusho Co. Ltd., Terrano Seiko Co. Ltd., Takeda Press Die Co. Ltd
Tanabe Press Co. Ltd., ACTIVE CO.,LTD., Nagumo Seisakusyo Co., Ltd
NIIGATA-KEN KENOH JIBASAN CENTER
Academia... Nagaoka University of Technology, Niigata Institute of Technology
Nagaoka National College of Technology, The University of Tokyo
Government... Industrial Research Institute of Niigata Prefecture
National Institute for Material Science

Core Research Organizations

Nagaoka University of Technology, Niigata Institute of Technology,
Nagaoka National College of Technology

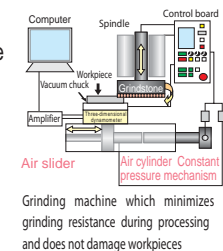
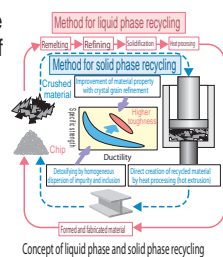
Aim of research and development

Mg Alloy is a material with high potential for its characteristics of lightweight and recycling, but not commonly used due to its workability and inflexibility to meet requirements of molds. Therefore, in order to solve such issues, the industry-academia-government joint researches of the material and processing technologies which have been mainly conducted by Nagaoka University of Technology in the area was further developed for development and commercialization of a strong and easy-to-press Mg alloy including development of the fabrication method of the mold. In the production process from material processing, production, disposal and recycle, research and development activities are conducted to achieve Green Process being earth-friendly. This research and development to enable Mg alloys to be used for many autoparts aims to make Nagaoka Area to be a competitive and eco-friendly industrial city which proud of "Super Skills of artisans" in addition to "science" and "technology."

Contents of research

1. Development and the LCA evaluation of low negative environmental impact production technique of unworkable metallic materials

It aims at creation of the development guidelines of the high-toughness Mg alloy that is available for plastic-processed at a low temperature, development of the surface functionality adding technology available for design and recycle through development of the eco-friendly technology to make the transparent anodic oxide films, and development of the green process in the Mg alloy creation upon development of the environmental harmonic recycling technology.

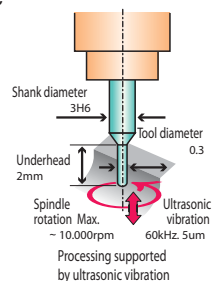


2. Establishment of eco-friendly technology for surface processing

The constant-pressure grinder with operation power of ten grams or less is developed to attempt the expansion of the magnesium alloy use. It will be effective for development of a new type of grinding stone and its performance database as well as a damage-free surface processing method for lightweight metals.

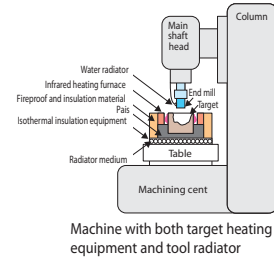
3. Development of monitor invoking type highly accurate metal mold processing

A highly accurate mold processing technology without the final hand finishing process is developed upon practical use of "the method to finish grinding of metal materials on diamond", which is not generally recommended, rather than the ultrasonic wave-assisted processing method. The processing phenomenon is observed directly, the theory of the ultrasonic machining is established by various analysis methods, and an optimal processing condition is led.



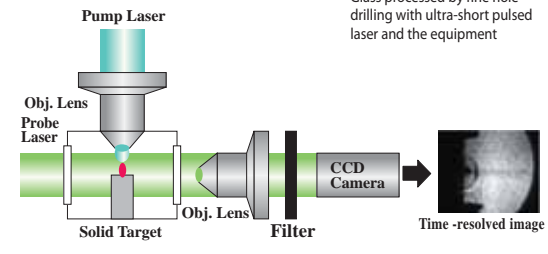
4. Metal mold heating and development of highspeed metal mold processing using tool

An ideal highspeed grinding technology with high accuracy and energy-saving to cut soft workpieces using the hard tool is developed by applying both workpiece point heating and tool point cooling.



5. Establishment of technologies for fine form processing, speed high precision cutting, and point processing by the next generation laser and electrospark machining

A processing method is developed to create fine forms for scale of 20E m or less (e.g. hole diameter, trench width) on specimen by the next generation laser and electrospark machining. The processing conditions to reduce influences on the target for processing such as heat and cracks.



The main study results

1. Development of efficient magnesium alloy

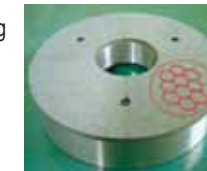
Various alloy components are examined in the trial manufacture, and the Mg-5.5mass%Al-0.15%Mn additive alloy is developed. Against the target value of tensile strength multiplied by the value of ductility for 7500MPa, this alloy has achieved the target value as 295MPa for tensile strength, 26% for extension and 7670MPa for the value which the tensile strength multiplied by ductility.



The formation example of the developed material

2. Development of high efficiency grinding grindstone

A honeycomb type grindstone that aimed at the minimum number of grits necessary for processing and efficient layout. The grinding force can be reduced to the utmost limit, and the processing method is harmless on the grinding object.



Appearance of high efficiency grinding grindstone

3. Development of spindle rotation sway measurement instrument

This device is a trial product of the device that measures the motion error of the small diameter end mill tool in high accuracy on it. This product will be commercialized upon measurement testing for improvement. It is considered that the demand for this measuring instrument should extend in the era when the nanofabrication technology is to be more important. "Spindle Rotating Sway Measurement Instrument" (a new product).



Appearance of spindle rotation swinging measuring instrument

4. Fixed pressure sending grinder

As this device does not damage not only hard materials but also soft ones, it is expected that the demand widely extends to the parts processing in the semiconductor industry and the communication.



Appearance of constant pressure grinding machine

5. Pinpoint heating for workpiece and pinpoint cooling system for tools

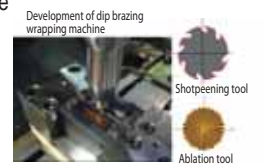
Producing a mold by hard materials is to open a way for development of new press molding methods for new materials. It also enables longer life of molds. With commercialization of this processing device, superhard materials may also be used for mold, which will significantly contribute to development of the industry.



Appearance of machine for development

6. Dipping type automatic lap finish device

Metal mold polishing is currently conducted by hand. This device enables automation of the polishing process of hard materials as well as improvement of the precision to achieve the shape.



Appearance machine for development and tools

