

Metal Surface Polishing Technology Using Laser

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⇒ Laser polishing technology not bounded by space constraints

Client / Market

- Machine tool market

Necessity of this Technology

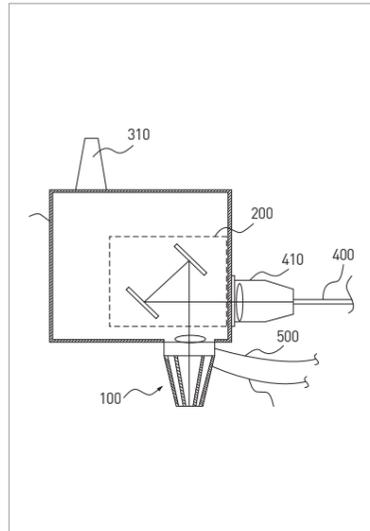
- In the industry, mechanical polishing has been done using powder, but polishing a 3D shape like a die is generally done manually, and it is difficult to perform precisely while also taking a long time—thus a new polishing method of using laser is proposed.
- For laser surface melting polishing, the polishing process is done inside the polishing chamber filled with inert gas to prevent oxidation while laser beam is irradiated onto the metal surface; however, the work space is limited depending on the chamber size that the size and movement of the subject of machining is limited; also, a separate device is used to fill the chamber with inert gas.

Technical Differentiation

- Laser surface melting polishing process does not require a polishing chamber, therefore is not limited by the work space or the size and movement of specimen.
- Metal machining process such as milling and polishing can be done at the same time inside a same machining device—e.g. machining center.
- Benefits of laser polishing include precision, flexibility of process, non-contact machining, and the smallest heat-affected zone.
- Automation is easier compared to mechanical polishing, and the process time is shorter. It does not require consumables like an abrasive or wheel—therefore less pollutants.
- Oxidation prevention gas is sprayed through the nozzle, therefore, without space constraints, various sized materials can be processed, and process reliability is improved through cleaning.

Excellence of Technology

- The result of NAK 80 test showed that the surface roughness (Ra) of specimen after milling was $0.40\ \mu\text{m}$ while that of post-laser polishing was as low as $0.18\ \mu\text{m}$. Regarding roughness before and after laser polishing, after polishing, in the 89,000 Hz, it was



DESIRED PARTNERSHIP

Technology Transfer

Licensing

Joint Research

Other

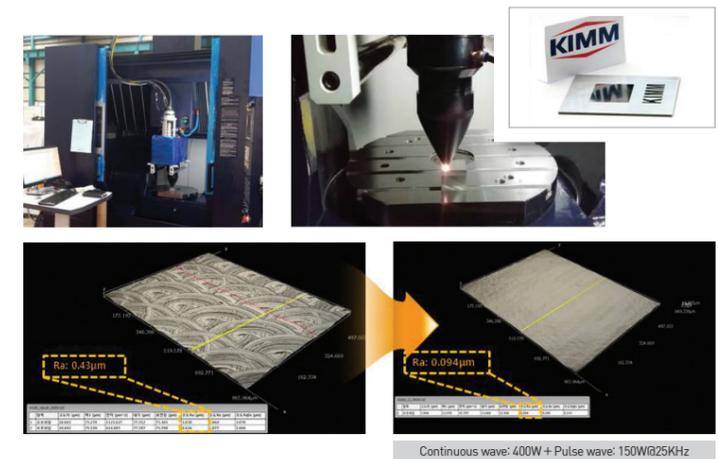


TECHNOLOGY READINESS LEVEL [TRL]

Research, basic explanation | Project concept or idea development | Technology idea verification | Prototype development | Trial product production/evaluation in similar environment | Pilot field demonstration | Development and optimization of commercial model | Commercial product demonstration | Mass production and initial market launch

shown that the frequency component was reduced compared to pre-polishing, which proved the effectiveness of laser polishing.

Laser Polishing System



Current Intellectual Property Right Status

PATENT

- Metal Surface Polishing Method Using Laser (KR1358332)
- Laser Machining Device Using Bellows (KR1425410)
- Laser Optical Head (KR1469645)
- Optical Head for Laser Machining (KR1517602)

KNOW-HOW

- Laser scanner and CNC-linked machining technology
- Interface technology between laser and CNC
- Laser-polished surface luminance measurement and FFT analysis