

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

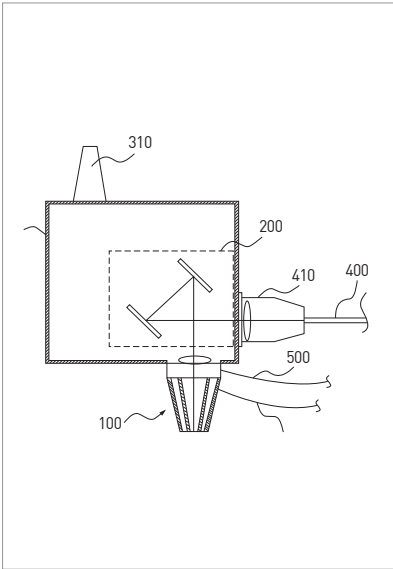
- In the industry, mechanical polishing has been done using powder, but polishing a 3D shape like a die is generally done manually, and it is difficult to perform precisely while also taking a long time—thus a new polishing method of using laser is proposed.
- For laser surface melting polishing, the 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 μm while that of post-laser polishing was as low as 0.18 μm. Regarding roughness before and after laser polishing, after polishing, in the 89,000 Hz, it was



DESIRED PARTNERSHIP

Technology Transfer

Licensing

Joint Research

Other

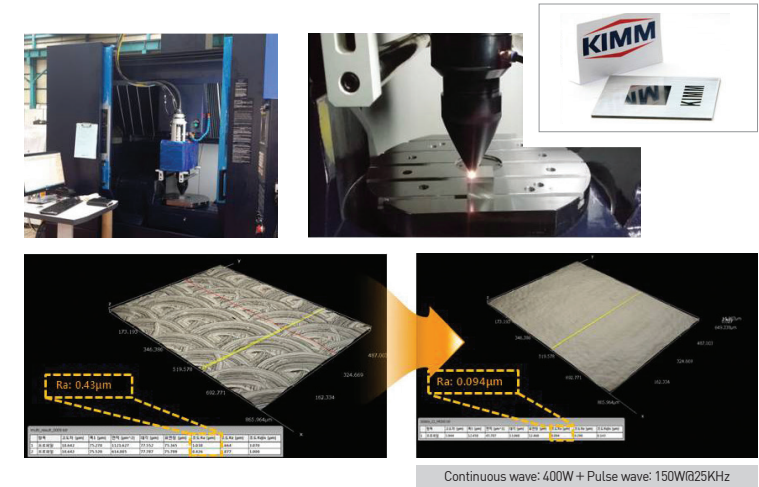


TECHNOLOGY READINESS LEVEL [TRL]

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|-----------------------------|-------------------------------------|------------------------------|-----------------------|---|---------------------------|--|----------------------------------|---|
| 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