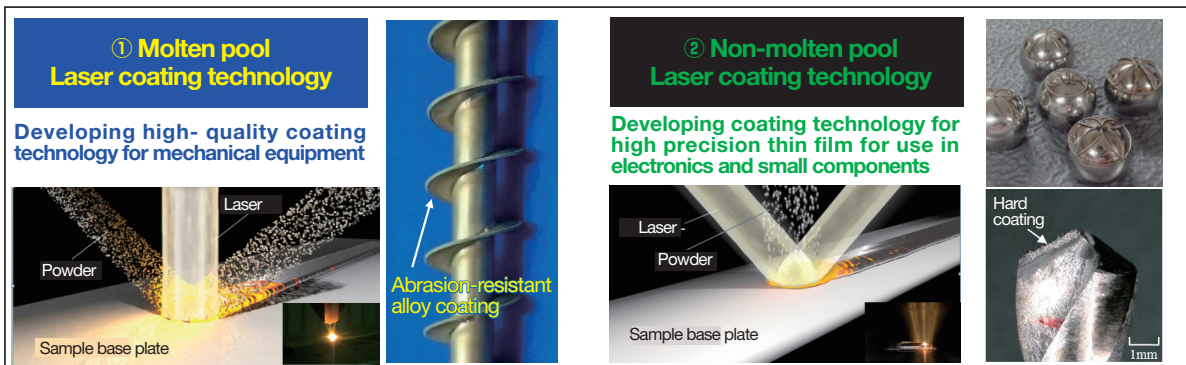


# Realizing a High-quality Metal Coating for Precision/Small Components

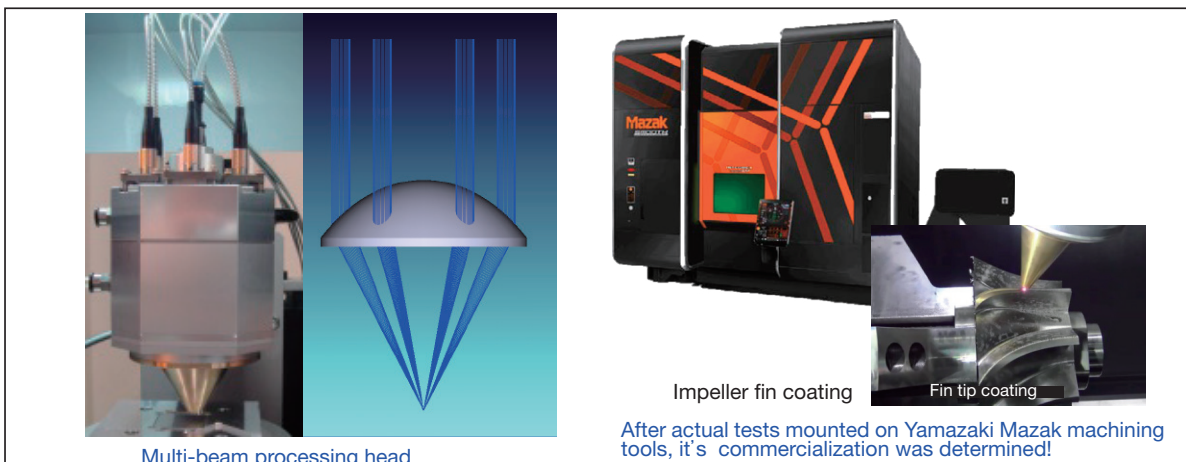
## About this Project

Performance improvements are often requested in several industry fields, such as manufacturing machinery, transportation equipment, and electronics. To fulfill these requests, we need coating technology to be applied to the surfaces of materials of various characteristics. In this project, we are developing two laser coating technologies that enable high-functioning coating for materials and structures that were difficult to apply coating to. Furthermore, we have conducted numerical and process analysis using the large-scale synchrotron facility SPring-8, producing a SPLICE simulation to optimize coating conditions.



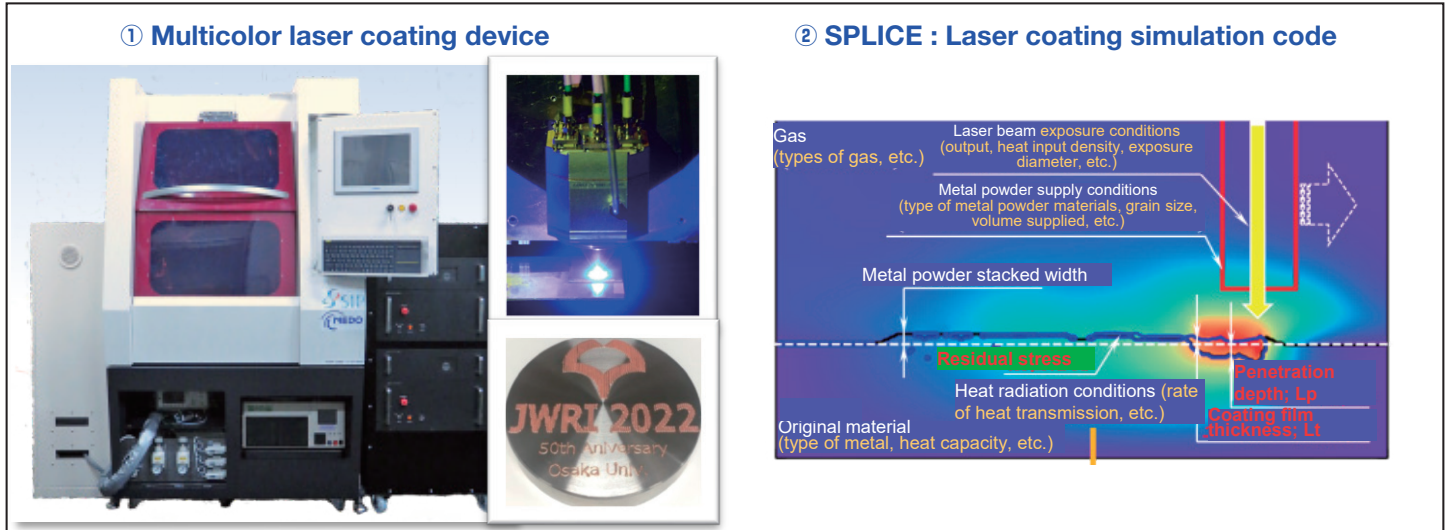
## Test Uses / Application Examples

The multi-beam processing head developed in this project is shown in the graphic below. In contrast to existing methods, raw powder materials are loaded from the center using a direct-injection method, and they are heated and fused using multiple laser beams to create coatings. The ambient influence of the heat created by this process, therefore, is suppressed as much as possible. As the process makes use of multiple laser beams, switching to higher output and combining laser beams of differing wavelengths is easy, making high-quality coatings possible. One aspect of this achievement has been its mounting on machine tools by the Yamazaki Mazak Corporation, and then releasing a press release for multi-laser metal deposition in November 2016.



## Research Achievements

- ① We have developed the world's first multicolor laser coating device that combines IR lasers and blue semiconductor lasers. Pure copper coatings have been enabled with the use of this device. This technology is expected to contribute to the developments of fusion reactors.
- ② We have built the computational science simulation code SPLICE, formulated using uniform non-compressible gas/liquid/solid viscous flow for its multiphase flow field (which includes phase changes). By running this code in the cloud, users are now able to run advanced computational analysis using consumer PC hardware.



## Future Outlook

We support the laser coating technology platform at the Joining and Welding Research Institute at Osaka University as well as the non-molten pool laser coating technology platform at the Industrial Research Institute of ISHIKAWA, and have also built a support system for the SPLICE simulation code at the Japan Atomic Energy Agency.

[Sending information from the Kansai and Hokuriku areas to the world!](#)



Research Theme : Development of laser coating methods for realization of high value-added design and manufacturing

Members : Joining and Welding Research Institute Osaka University, Japan Atomic Energy Agency, Industrial Research Institute of ISHIKAWA, OSAKA FUJI Corporation, MURATANI MACHINE MANUFACTURE CO.,LTD., Sanyo Special Steel Co., Ltd. , Furukawa Electric Co., Ltd.

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