

Research topics for graduate students for 2023

Professor Hayato Yoshioka

Department of Mechanical Engineering

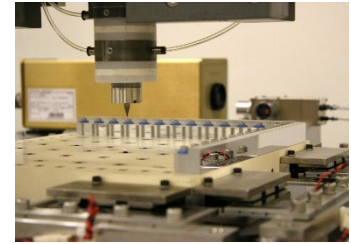
Acceptable course(s)

- Master's Degree
- Doctoral Degree



Research Topics

Our main research field is realization of advanced manufacturing systems which can provide high precision, high efficiency, flexibility with lower cost. The manufacturing system consists of machine tools, measuring systems, monitoring functions, robot manipulators and so on. Following are a few research topics.



1. Fabrication of functional curved surface with fast tool servo technology

We have developed a fast tool servo mechanism for milling process [1] for fabricating curved surface with micro textures. The textured surface is expected to provide various surface functions. We are evaluating the system performance and the function of the generated surface.

2. Robotic milling system for flexible cutting process

Industrial robots have a flexibility to machine a complex curved surface, however the stiffness of structure is lower than conventional machine tools. Therefore, we have evaluated the relationship between posture of robot and machining characteristics, and investigate determination method of optimal posture for precise machining[2].

3. Reconfigurable manufacturing system with autonomous mobile robots

Future industrial factories will be required to have a reconfigurability to produce various products with short product cycle. Autonomous mobile robots (AMR) which moves omnidirectionally can do tasks instead of human operators. We have studied on the applications of AMR in flexible manufacturing systems[3].

Articles Related to Research Topics

[1] Yoshioka, H., Kojima, K., Toyota, D., Micro patterning on curved surface with a fast tool servo system for micro milling process, CIRP Annals, Vol.69, No.1, (2020), pp.325-328. (DOI:10.1016/j.cirp.2020.04.046)

[2] Leandro Batista da Silva, Yoshioka, H., Shinno, H., Zhu, J., Tool orientation angle optimization for a multi-axis robotic milling system, Int. J. of Automation Technology, 13-5, (2019), pp.574-582. (DOI: 10.20965/ijat.2019.p0574)

[3] Inoue, S., Urata, A., Kodama, T., Tobias, H., Maruyama, Y., Fujita, S., Shinno, H., Yoshioka, H., High precision mobile robotic manipulator for reconfigurable manufacturing systems, Int. J. of Automation Technology, 15-5, (2021), pp.651-660. (DOI: 10.20965/ijat.2021.p0651)

Lab. Web page: <http://www.iis.u-tokyo.ac.jp/>