Innovative Design/Manufacturing Technologies

New Production 2020 Project

Innovative Manufacturing — Manufacturing of New Function, High Performance and Unprecedented High Added Value

In order to prevail against recent fierce international competition, businesses need to create high-value-added products. The objectives of this program are to develop innovative manufacturing technologies leading to products comprised of unconventional materials and functions satisfying a variety of personal and business needs, and to build a platform/system where those technologies can be used. The goals of the program are for the creation of high-value-added products spurred by new ideas conceived through experiencing new technologies, and to strengthen Japan's industrial competitiveness and revitalize its regional areas.

Program Director

Naoya Sasaki

Hitachi, Ltd.

Corporate Chief Engineer, Research & Development Group

Profile

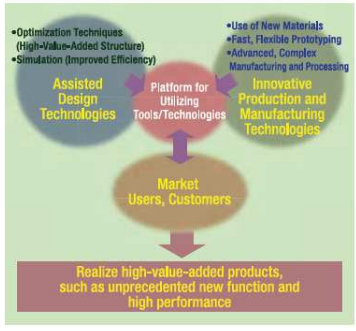
Dr. Naoya Sasaki joined Hitachi, Ltd. in 1982. He assumed the duties of corporate chief engineer in 2014. Throughout his career, Dr. Sasaki has been engaged in the development of mechatronic products and the development and spread of mechanical systems technologies and molecular simulation technologies. He holds a Ph.D. in engineering. He has been named a fellow of the Japan Society of Mechanical Engineering, and he has also been named a fellow of the Japan Society for Computational Engineering and Science.
He is also a member of the Japanese Society of Tribologists.

Research and Development Topics

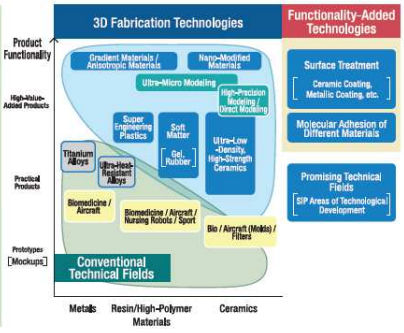
1 Research and develop innovative production and manufacturing technologies

Research and develop innovative production and manufacturing technologies that make possible new structures, complex shapes, greater function, better quality and lower cost. Priority will be placed on promoting 3D fabrication technologies aimed at the diverse application of materials and the development of new materials, and on functionality-adding technologies, such as bonding and surface treatment technologies which add resistance or other diverse functionality.

●Approach to Innovative Manufacturing



●Positioning of Innovative Production andManufacturing Technologies

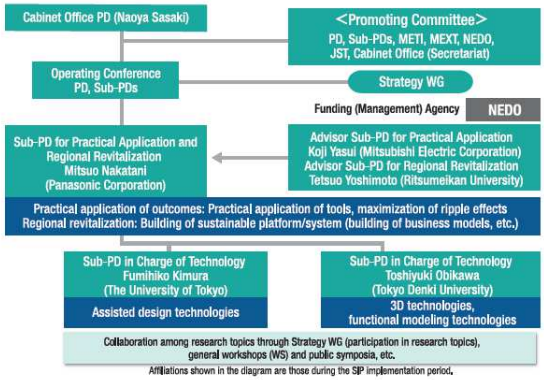


2 Research and develop assisted design technologies utilizing optimization and simulation

Research and develop technologies which make possible diverse functional design, based on needs, value and performance, as well as high-quality product design, incorporating a variety of data such as production and manufacturing conditions. A particular focus will be placed on strengthening and promoting assisted design technologies, such as simulation and optimization, with a goal of realizing high-value-added product design.

Implementation Structure

The Promoting Committee is chaired by the Program Director (PD). The Cabinet Office serves as secretariat. The Committee is composed of relevant ministries, agencies, and experts who provide overall coordination. This committee uses funds and management capacity offered by the New Energy and Industrial Technology Development Organization (NEDO).
The Committee has selected the best research and development personnel as needed through open recruitment.



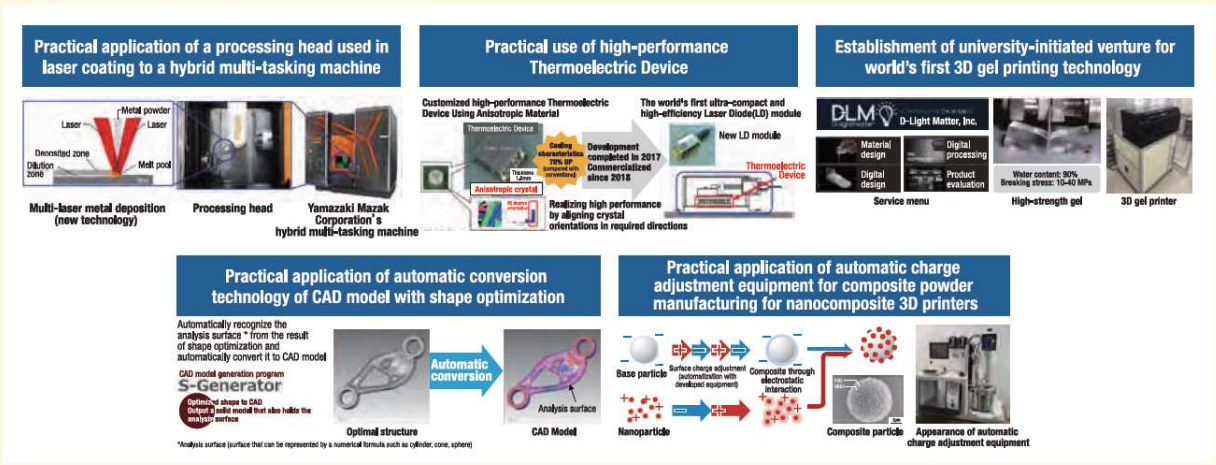
Achievement over the last 5 years

Developing Many Socially-Implementable Tools/Technologies in Pursuit of Innovating Manufacturing Technologies Using Expertise and Specialty Technologies Possessed by Participating Companies and Universities

SIP has developed many tools/technologies, primarily for 3D fabrication, functionality addition, and design support. Representative examples of commercialized technologies are as follows: A laser coating method which enables high-precision, high-quality coating was developed by a team led by Osaka University Professor Tsukamoto. This method has been utilized by Muratani Machine Manufacture Co., Ltd. in the commercialization of a special laser coating machine ideal for minute precision components. Yamazaki Mazak Corporation has also applied the method to its hybrid multi-tasking machines and realized their commercialization. D-Light Matter, Inc. (DLM) was established by a team led by Yamagata University Professor Furukawa to create a business through the practical application of gel materials in devices. Professor Nakano et al. of Osaka University and Panasonic Corporation have improved the cooling characteristics of thermoelectric devices by 70% (conventional ratio) through costomized design and anisotropic control of metallic materials. Since 2018, they have been working toward the practical application of this technology to commercialize and mass-produce cold thermal devices in 2019 through the verification of their commercial viability in the field of household appliances. Kyoto University Professor Nishiwaki et al. and Quint Corporation developed a system that supports conceptual configuration design based on topology optimization. Part of the technology for automatically converting the shape into a CAD model has been incorporated into the company's software, which has been successfully commercialized. The University of Tokyo Professor Niino et al. and Aspect, Inc. have developed and commercialized a 3D printer for super engineering plastics. Professor Muto et al. of Toyohashi University of Technology and Gifu Prefectural Ceramics Research Institute have developed automatic charge adjustment equipment for grain integration through electrostatic interaction, which is set to be marketed by KD-CLOUT Co., Ltd. in 2019.

•Primary Examples of Developed Tools / Technologies

•Representative Cases of Commercialization



In conjunction with tools/technologies development, a system to continuously disseminate and develop those tools/technologies after SIP has been established.

Eight researchers' associations and public testing institutes nationwide have been designated as an "utilization place" of tools/technologies, which are especially beneficial to local small- and medium-scale companies by creating an environment that allows their personnel to actually touch and use these tools/technologies. For tools/technologies that require customization by companies, consortiums, etc., technical instruction and interchanges for those tools/technologies have been established. Now six consortiums and study groups are presently in operation. SIP has also established its own Monozukuri Network with a Web portal (http://www.sip-monozukuri.jp/) to provide one-stop access to those areas of use. We hope that through these systems, a virtuous cycle in which SIP's achievements are utilized by companies and tools/technologies are further enhanced through their utilization, will be created and continued after SIP.

•Places Where Tools/Technologies Are Utilized