

<Research on Innovative Design/Manufacturing Methodology of Tailor-made Rubber Products and Socio-Economic Value Co-Creation with Reactive 3D printer >

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●Research of Background

- Because of current modern life and life longevity, it has become common to put on shoes daily for long time .Shoes have become very important to support the total body weight of its own. Consumers pay much concern to “foot comfort” or “shoes fit feeling” in various life scenes, such as health promotion , rehabilitation, running or other sports, business use, etc.
- Kobe is the birthplace of the rubber industry in Japan and the country ‘s largest base of chemical shoes, but the Great Hanshin-Awaji Earthquake gave serious blow to its rubber and shoes industry. But Kobe is still the major player after its revival. But it is utmost important for Kobe area to realize an innovative outcome of the rubber industry under the global competition. This innovation is expected to enhance the competence of Japanese manufacturing technology.

●Schedule and Technological Goal

	2014	2015	2016	2017	2018
①Research and development of interactive design techniques and of agile manufacturing system		<ul style="list-style-type: none"> • Application to the First Loop • Analysis and design in the Second Loop 		<ul style="list-style-type: none"> • Application to the Second Loop • Establishment of design technology in the Third Loop 	
②Research and development of materials and 3D printer		<ul style="list-style-type: none"> • Research and Prototyping of the first 3D printer machine 		<ul style="list-style-type: none"> • Prototyping the second 3D printer machine 	
③Market development		<ul style="list-style-type: none"> • Market research for shoes and other applications development 		<ul style="list-style-type: none"> • Installing “Value co-Creation Platform” • Other applications development 	

【Technological Goal】

Evaluation index		Intermediate target (2016)	Final goal (2018)
System development	Personal compatibility coverage rate	Achievement of the initial target of personal compatibility coverage rate	Expansion of the target mother number for the personal compatibility coverage rate
	Delight	Development of the delight index	Achievement of the delight index improvement target
Material/3Dprinter	Material	Polyurethane rubber (outer sole) and UV cross-linking synthetic rubber (insole)	
	Manufacturing rate	Achievement of the early manufacturing time target	Reduction of the manufacturing time
Target Products		Prototype shoes friendly for Quasi-lead user	Product shoes friendly for Quasi-lead user Manufacturing functional components (partly tailor-made products) for mass user

● **Research Scope**

① **Life innovation and RD of design/manufacturing systems targeting value-co-creation focusing shoes as pioneer model**

The results of system development in the First loop (lead user) is applied to the Second Loop (quasi-lead user), further turning the cycle of analysis, design, production and operation, and aim to realize change of lifestyle. Ultra-Delight, which is not be grasped by conventional market analysis, will be incorporated to shoes design with agile contract-type manufacturing system in the Third loop (mass user). “Value- co-creation Platform” where users and producers brings together to realize new value co-creation will be installed.

② **RD on design/manufacturing systems of tailor-made rubber products with reactive 3D printer**

For integrated molding of shoes sole, novel 3D printer technology will be studied, e.g. using micro reaction field through two-liquid type ink jet nozzle or micro extruder, both of which require research of new rubber formulation.

● **Strategies and Promotion for Commercialization**

① For sustainable value creation, this promotion system mutually circulates both traditional producer innovation providing values and user innovation providing values created by users’ participation. Involvement of users in design and development evolves wide spectrum of technologies realizing potential needs. Proposal by researchers of new product or service will inspire idea creation of future product or service.

② The framework of users’ participation to value co-creation is constituted by Kobe University, prefectural research institute located in Kobe area, and many leading business companies as provider or user.

③ “Value co-creation Platform” will be installed in Hyogo Prefectural Industrial Technology Center and corresponding facilities will be expanded in all prefectures in Japan.

