Environmental Engineering Division of JSME

News Letter No.30 April 2019

TOPICS

ABSTRACTS, FIGURES(inc.Japanese words) and CAPTIONS

[2019-1]

Creating New Spatial Value in Sound Environment through Smart Sound Design

Takeshi TOI, Chuo University

ABSTRACT [2019-1]

In recent years, improvements in the quietness of living environments have exposed very small noises which people did not previously notice. This has caused increased interest in sound year by year. Therefore, instead of reducing noise for loud noises which people find annoying as a negative aspect, I am conducting research for comfortable sound design as a positive aspect. This concept involves designing noise and changing it into sound which is pleasant to the human. In addition to improving the sensory value of industrial goods, comfortable sound design improves spatial value in a variety of sound environments, for example home, office and vehicle interior. Comfortable sound is also affected by factors such as visual information and the feeling of operation. As such, it is important to accurately assess the contributions of each sensation and design them appropriately. Furthermore, by instilling sound with functionality, it is possible to provide a variety of support for human lifestyles. Delicate and intricate process of sound creation in Japan is moving toward sound branding.

FIGURES(inc.Japanese words) and CAPTIONS [2019-1]

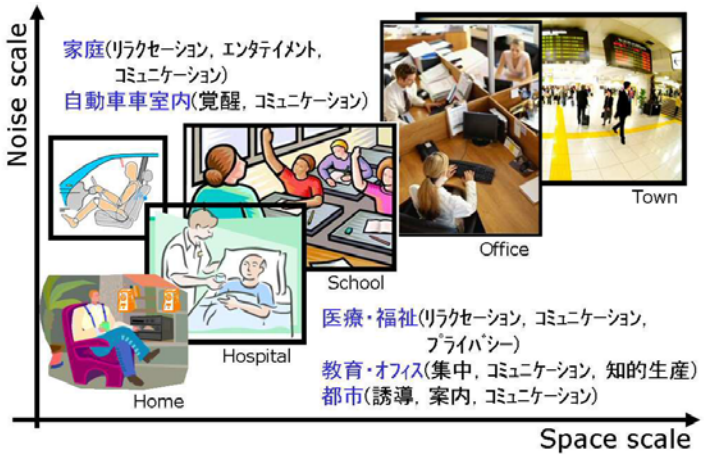

Fig. 1 Smart sound design of various environments

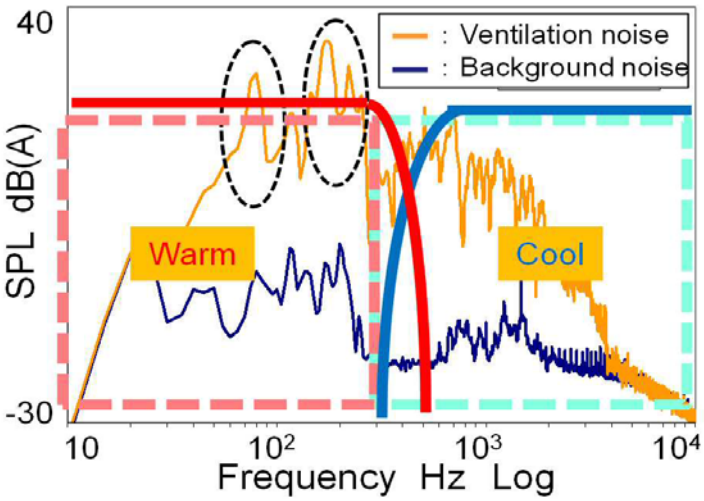

Fig. 2 Change of feeling temperature by air conditioner sound

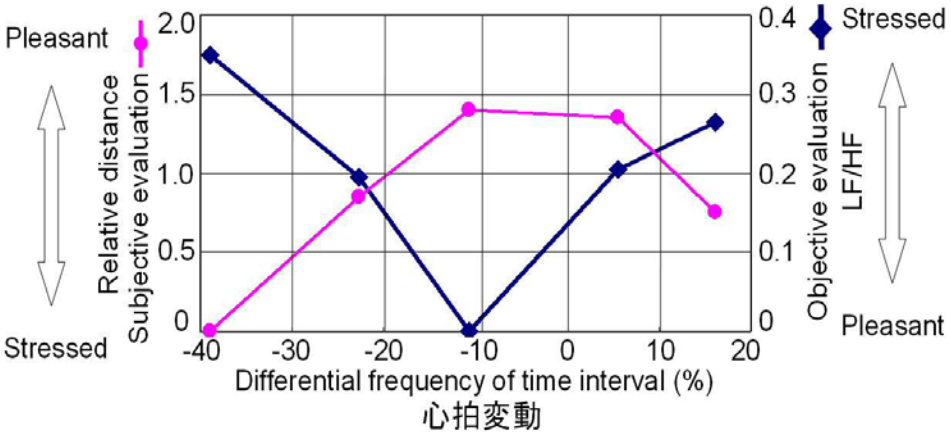

Fig. 3 Comfort of changing rhythmic sense of office machine sound

Fig. 4 Sound partition in vehicle interior with multiple speakers system

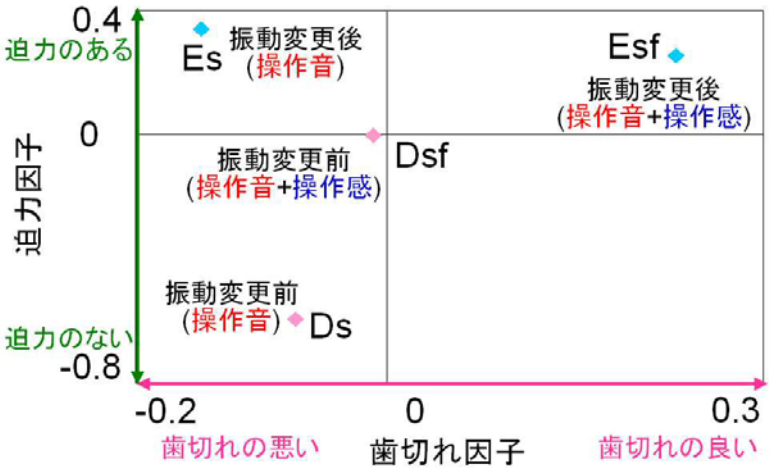

Fig. 5 Impression change of camera shutter sound by the feeling of operation

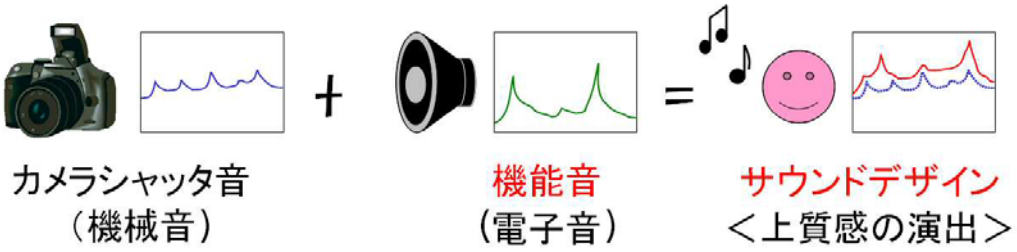

Fig. 6 Sound design by functional sound

[2019-2]

Newest Technological Installments to the Direct Melting Furnace

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Nippon Steel & Sumikin Engineering Co. , Ltd.

ABSTRACT [2019-2]

NIPPON STEEL & SUMIKIN ENGINEERING (NSENGI)’s Direct Melting System (DMS) turns various wastes, including rubble left behind after a series of Japan’s recent devastating natural disasters, into high quality reusable slag. This contributes greatly to the circular economy of Japan, where landfill shortage is a constant and immediate problem for most local governments. To turn such waste into slag, the waste must be treated in a high temperature and reducing atmosphere environment, achieved in the DMS by the use of coke. However, worldwide trends to stop global warming has pushed the demand for less coke usage and additionally, the efficient production of more energy and the use of less energy during the waste treatment process. NSENGI has aimed to meet these demands and achieved the following; ① half the coke consumption with its Advanced Shaft Furnace, ② increase its efficiency and amount of power production by incorporating technology from Steinmuller Babcock Environment GmbH, Europe’s leading waste to energy company, and developing its own Shot Cleaning Technology for the boiler tubes, and ③ decrease energy consumption by increasing operation stability through the use of AI and IOT.

FIGURES(inc.Japanese words) and CAPTIONS [2019-2]

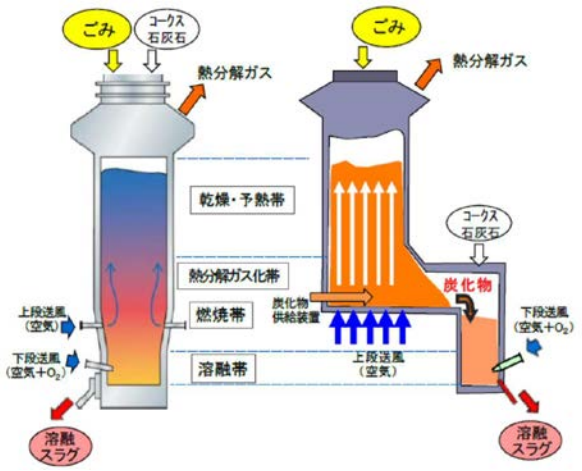

Fig. 1 DMS vs Advanced Shaft Furnace

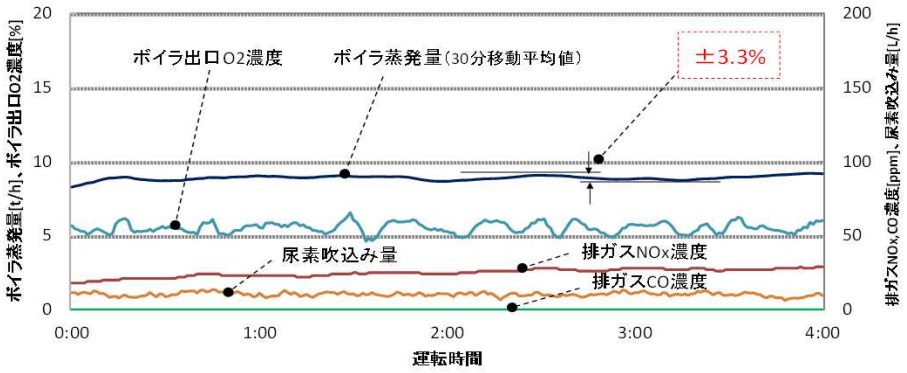

Fig. 2 Low carbon DMS's fluctuation of boiler steam production

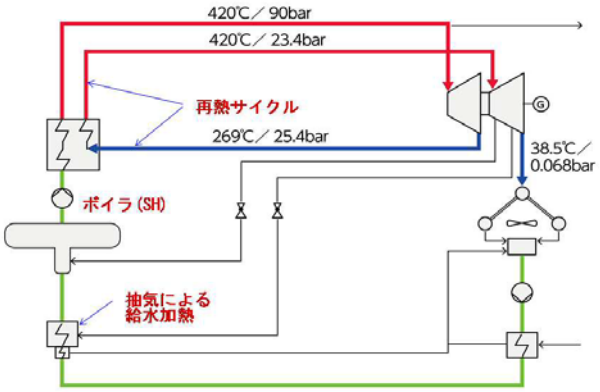

Fig. 3 Regeneration/Reheating Cycle of Steam

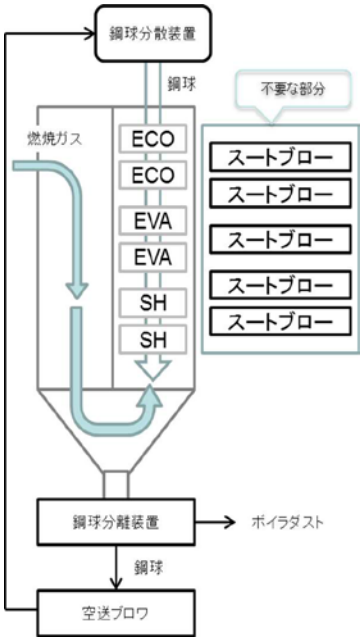

Fig. 4 Overview of Shot Cleaning Technology

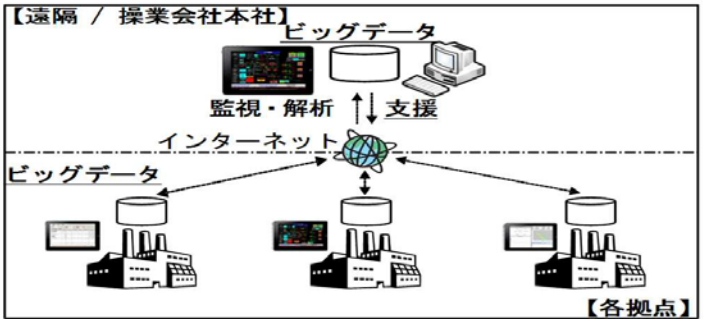

Fig. 5 Remote Surveillance and operation assistance through PlantPAD®

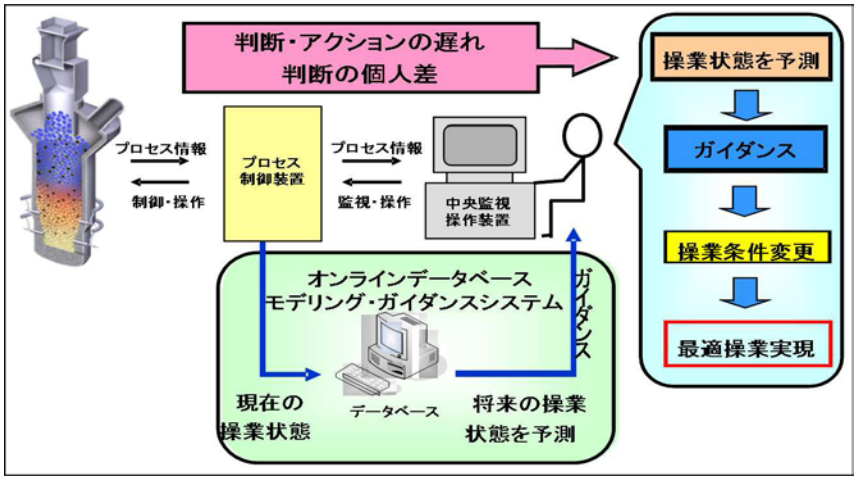

Fig. 6 Operation Condition Setting Guidance System

[2019-3]

Development of LCA Methodology for Future Technologies under Research and Development

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ABSTRACT [2019-3]

LCA becomes a popular method to evaluate environmental burdens of technology in the world. From academic point of view, LCA on conventional technologies was almost finished and hence, we need to explore more advanced technologies under research and development for a case study. Also, from practical view point, LCA on advanced technologies is quite useful for scientists to appeal the environmental impacts of their technologies and also for managers to select the feasible technologies at their early phase. However, there are many problems to apply conventional LCA to such advanced technologies under research and development. Especially, scale effect is one of largest problems for that. Now we are developing the methodological framework for LCA on advanced technologies at research and development phase. Such a method would be useful to promote the development of future technologies.

FIGURES(inc.Japanese words) and CAPTIONS [2019-3]

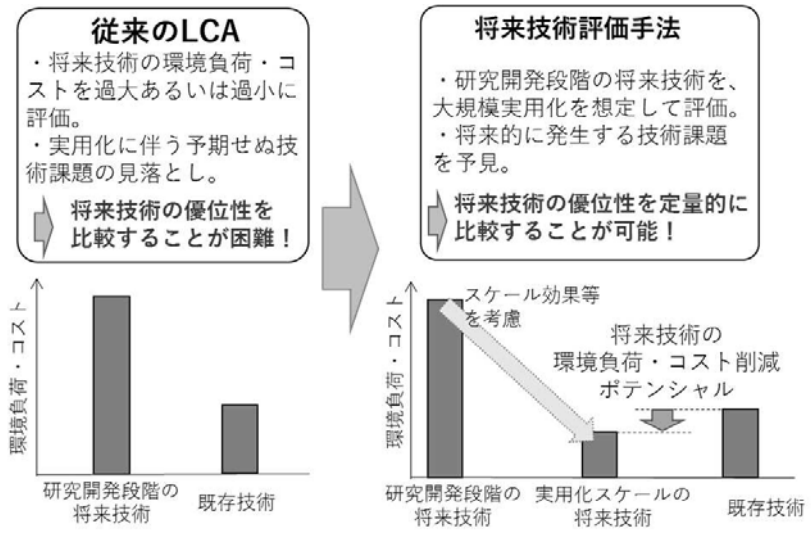

Fig. 1 Methodology of LCA for future technologies

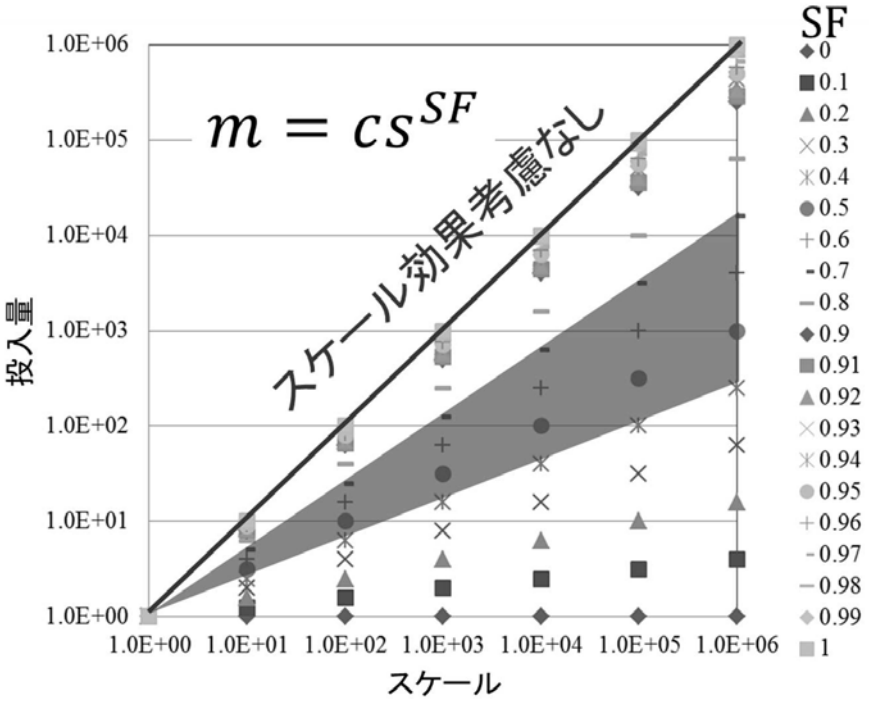

Fig. 2 Scale effect

[2019-4]

Development of Rankine cycle power generator using MEMS technology

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ABSTRACT [2019-4]

Development of Rankine cycle power generator using MEMS technology is started at college of science and technology, Nihon University. MEMS power generator is expected to be used in the field of IoT (Internet of Things) devices as alternatives for batteries. The MEMS Rankine cycle power generator can use low grade heat sources such as waste heat from IoT devices, body temperature and so on. So fluorocarbons, which are used as refrigerant and has a low boiling point, are used in this Rankine cycle system to use low grade heat sources. In this time, the MEMS turbine with fluorocarbons are tested.

FIGURES(inc.Japanese words) and CAPTIONS [2019-4]

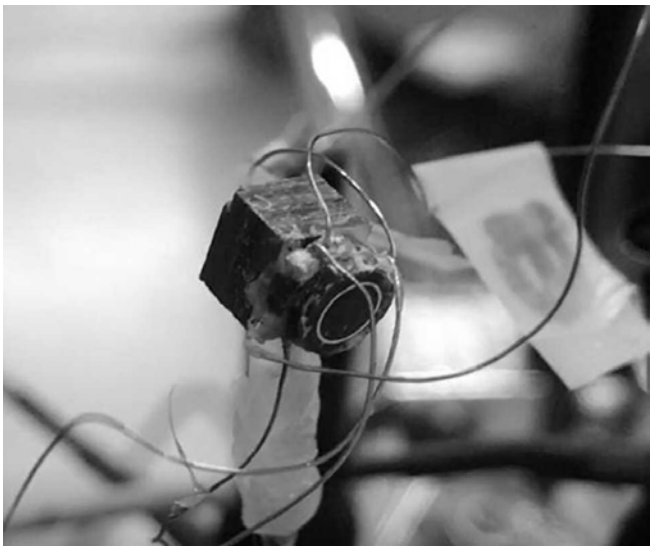

Fig.1 View of MEMS turbine power generator

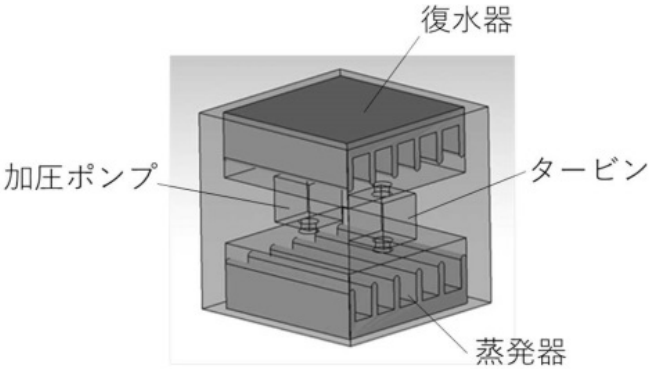

Fig.2 Overall schematic diagram of MEMS Rankine cycle power generator

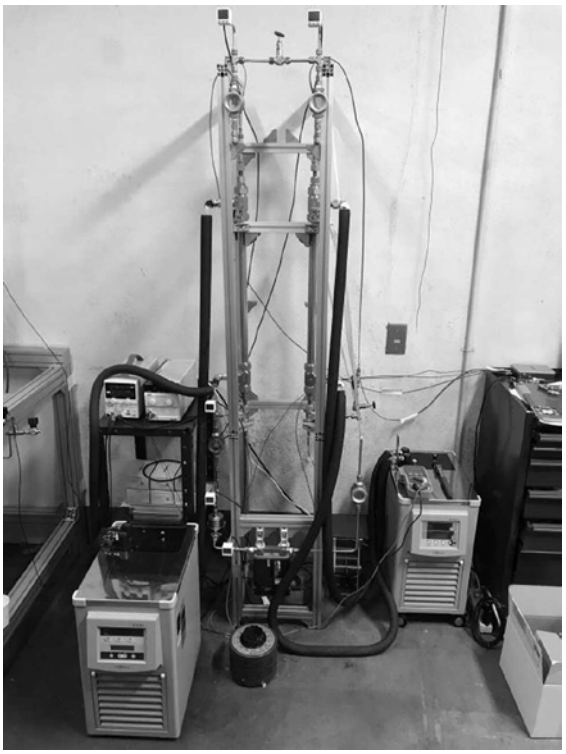

Fig.3 View of cycle system developed in laboratory size