Special Program

KYB Approach to Production Engineering

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1 Introduction

In 2025, KYB celebrated its 90th anniversary. In this milestone year, we also celebrated 35 years of publishing KYB Technical Review since its first issue in 1990, with the publication of the 70th issue. Looking back at the first issue, I found articles on design engineering, including hydraulic pumps and hydraulic active suspensions, as well as articles on production engineering, including plastic processing of tubes and automatic transfer of parts. The order of the articles shows that KYB, a manufacturing company, was already emphasizing production engineering. This report describes how KYB is and will be involved in production engineering.

2 About Production Engineering

The design engineering and production engineering of a product significantly affect its quality, cost, and production efficiency. While design engineering determines the specifications and functions of the product, production engineering determines an effective production method to implement the design. Even if the design is excellent, that is not enough by itself to deliver good products to customers. This is because there are always variations in manufacturing due to people, equipment, materials, and manufacturing methods. This means that not all parts can be processed and assembled in an ideal state. Production engineering is therefore an elemental technology that is indispensable to manufacturing and necessary to keep such variations within acceptable limits and to deliver products with the target quality by design in an efficient, stable manner. You cannot compete with others by analyzing and mimicking the shape and materials of a product and then purchasing and installing off-the-shelf production equipment prior to manufacturing. That level of engineering is out of the question. The only way to gain the manufacturing expertise that will keep your company competitive is to master a manufacturing technology that other companies cannot imitate and produce it on a large scale.

3 Future Production Engineering

It has been said that the strength of the Japanese manufacturing industry lies in “on-site skills.” This is partly because factory workers have accumulated expertise, know-how, and their own methods over many years, which have worked well as tacit knowledge. While it is important to pass on this expertise of veteran workers, the problem has arisen that young workers are not easily recruited as the labor force shrinks due to a declining birthrate and an aging population.

On this other hand, KYB is working on an activity called Ship'30 (Self handling innovation plant 2030) to advance manufacturing for the next generation. We will create a self-sustaining unmanned factory driven by digital technology with minimal transportation, inventory, and operational tasks.

In order to respond to these societal and internal problems and to realize our aspirations, we need to further deepen the traditional role of production technology: providing good products quickly at reasonable prices. Specifically, we will promote automation technology that uses robots and AI to improve production efficiency, use real-time monitoring and data analysis that monitors the status of production equipment and processes and implements self-sustaining processes through abnormality detection and error prevention, and establish a flexible production system that can quickly adapt to changes in product specifications or production volume according to customer

demands and achieve efficient utilization of labor.

In addition, to maintain and improve our global competitiveness, we need to use digital twins that combine these technologies with digital data to realize optimization and efficiency improvement in a virtual space. The essence of digital twins is to reproduce a mechanism and its operating state in physical space in a virtual space, thereby enabling simulation, analysis, and optimization. To achieve this, it is necessary to transform the flows of people and things on the production line into data and build a digital twin of the line. Currently, KYB has not fully prepared a database of production line knowledge, which is a future challenge. One of the possible benefits of digital twins is the transformation of value chain operations processes from product development, design, production, and shipping. When people, things, and information are connected throughout the value chain, it is possible to "front-load" work. By simultaneously designing products and processes in a data-driven way, efficient manufacturing can be discussed from the upstream. For example, manufacturing engineers can use digital twins to look at the chain from materials to finished goods to shipping, and suggest highly efficient, low-cost manufacturing to design engineers. By bringing the upstream process into our field of vision, we can help avoid getting caught up in the concentrated volume work just before mass production begins. In this way, we hope to shorten development time, maximize impact, and focus on our core mission of production engineering. I believe that as automation and efficient production progress, we will come closer to achieving the goal of "human-independent production" as a countermeasure to the shrinking labor force, which is one of the societal issues.

On the other hand, we must also promote sustainability initiatives to reduce environmental impact and achieve sustainable production. Our corporate spirit is "by providing technologies and products that make people's lives safe and comfortable, the KYB group dedicates to the society." To achieve this, production engineering must respond to societal challenges by improving energy efficiency in the manufacturing phase, changing existing processes to those that do not use environmentally harmful materials, and reducing waste.

4 In Closing

Production engineering involves researching and developing new technologies and processes to solve manufacturing problems, establishing specifications, and building and installing mass-production equipment. However, installing new technologies is not always easy. In fact, many times we have to use brute force to get the job done. In these days of louder calls for work style reform, circumstances need to change. This is one of the reasons why the number of people willing to work in production engineering has decreased in recent years. In order to overcome this situation, digital twins of production lines should be realized as mentioned above. We aim to realize attractive production engineering that enables front-loading of production technology development, sufficient offline preliminary verification, and smooth deployment of new technologies in mass production lines.

At the end of the day, manufacturing, or monozukuri, is about developing people. I want young engineers to feel that production engineering is interesting and rewarding. I want to develop the next generation of production engineers through their work, where they face and overcome difficult challenges.

Author

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