

Monotsukuri (Manufacturing) Innovation

We are working towards monotsukuri (manufacturing) innovation with the goal of delivering outstanding levels of diversity to improve our product competitiveness and commonality to increase our production efficiency.

Integrated Planning and Common Architecture Concepts

Mazda has been working towards monotsukuri (manufacturing) innovation in order to develop and produce more diverse products in a more efficient manner by utilizing common development methods and production processes. We want to achieve that by focusing on the next 5 to 10 years and by developing our future models with an integrated planning strategy that reaches beyond vehicle ranks and segments. Our development strategy is based on integrated planning, which allows us to think outside the boundaries of vehicle models and ranks and create a common optimal structure for each feature, which we implement across all vehicle models. Our production strategy, on the other hand, is based on a common architecture concept, which allows us to utilize flexible production methods in order to manufacture the products we have designed in an efficient and responsive manner. The goal is to create a flexible production system that is capable of responding to changes in the number of units on the production line or to the introduction of new vehicle models quickly and at minimal cost. This is going to help us improve the efficiency of our business operations. The monotsukuri (manufacturing) innovation has enabled us to make our product development processes more efficient, improve the way we invest in production equipment, and significantly reduce vehicle costs. We managed to achieve all that with the new-generation products and Skyactiv technology introduced in 2012 with the Mazda CX-5. In addition, our design methods based on the common architecture concept have enabled us to quickly apply the latest technologies and design features to all of our products at once. With the economies of scale Mazda has been able to achieve in its entire lineup, we can now develop and produce vehicles with high-quality basic functions at low cost. In addition to the integrated planning methods we use for the development of next-generation technologies, we are also seeking to promote highly efficient development processes with model-based development.

Model-Based Development

As car functions continue to become more sophisticated and diverse, the structures and control systems that make those functions possible also grow more and more complex. In order to be able to continue developing such complex systems quickly and with limited resources, it is crucial that we utilize the model-based development method, which allows us to make our development processes more efficient at the planning stage. In model-based development, we first create a model of the product we are planning to develop, including the car itself, its control systems, the passengers in it, and its driving environment. Next, we use computerized simulations to plan every aspect of the development process and optimize the model efficiently. Since this development method is based on simulations that encompass the entire process from the design stage to vehicle evaluation, we have been able to reduce the amount of work related to creating part prototypes and verification tests. This method also allows us to develop sophisticated and complex new products at a fast pace and with a small amount of resources while maintaining high product quality. We have been using the model-based method to develop our Skyactiv technology, a project that started in 2006, with the goal of achieving the best fuel economy and driving performance in the world. We completely revamped the control system from its basic functions, developed the combustion system to achieve equal combustion characteristics regardless of the engine displacement, and introduced the Skyactiv-G technology to attain the highest compression ratio in the world. Our development efforts allowed us to completely remake our engines, transmissions, and vehicle bodies to deliver outstanding driving performance and fuel economy. In the future, we are going to continue developing the Skyactiv technology by using the model-based method in order to deliver driving pleasure, exceptional environmental performance, and outstanding safety to a wider spectrum of customers.

Model-based development

This method is designed to develop outstanding products by linking (1) the car, (2) its control system, (3) the passengers in it, and (4) its driving environment in a (quantified) model without using an actual full-scale vehicle.

