

Mix and match

Machinery maker Kobe Steel is developing cutting-edge mixing and testing technologies to improve productivity and quality

by Rachel Evans



Kobe Steel has been designing rubber mixers for more than 80 years and tire uniformity machines for around 50 years. In recent years, driven by the demand for more fuel-efficient tires, the company has seen a major change in the requirements of its technology.

With manufacturing facilities established in Japan, the USA and India, it recently opened a sales and service center in China, which is a growing market for the company.

According to engineer Yusuke Tanaka, R&D has focused on improved productivity and quality in tire manufacturing as well as ease of maintenance and rugged design: “An experimental approach based on our experience to date has been the basis of our rotor development. In addition, specialists in materials and mechanical engineering at Kobe Steel’s corporate research laboratories have contributed to advancing development. A case in point is rotor development based on unfilled mixing analysis technology using proprietary computer simulations.”

The Japanese company develops a range of tangential and intermeshing rotors under its Mixtron BB product line, and tire uniformity machines for PCR, LTR and TBR tires.

“Reducing the rolling resistance of tires is of paramount importance in the automotive and tire industries. In future we will also continue to see improvements more generally in terms of tire functionality and performance. In order to handle a variety of compounds, mixers too will require advanced technology,” says Tanaka, who helped design and develop the 5THR rotor, which won Tire Manufacturing

Above right: The Kobe Steel Group including its tire and rubber machinery business, which is part of the company’s wider machinery manufacturing division, employs more than 36,000 experts

Below: Assistant general manager in the industrial machinery engineering department Yasuaki Yamane (left) and engineer Yusuke Tanaka (right) are both based at the company’s main manufacturing facility for tire and rubber machinery, Takasago Works in Hyogo Prefecture, Japan

Innovation of the Year in the 2016 Tire Technology International Awards (see <http://goo.gl/5a6WG5>).

Launched in 2015, the 5THR rotor was recognized for its ability to mix silica-rich compounds used in making low-rolling-resistance tires. “Rubber compounds containing silica need to be mixed for a long time at a certain temperature using a high amount of energy in order to disperse the silica and promote a reaction between the coupling agent and the silica,” notes Tanaka.

Kobe Steel’s 5THR features an innovative design that successfully maintains the temperature of the compound through its extremely high level of cooling capacity and suppresses the heat generated during dispersion of the silica in mixing, while maintaining the productivity of conventional tangential rotors.

“The 5THR’s rotor shape was inconceivable in conventional compounding. This became clear in the development of the system through basic experiments and simulations.

“We call it a hybrid of tangential rotors and intermeshing rotors,” Tanaka explains.

“In addition to our intermeshing rotors that have been highly acclaimed by customers, the 5THR offers an optimum solution while minimizing investment costs in the production of low-rolling-resistance tires.”

Meanwhile R&D efforts at the company will continue to focus on new compound formulations as well as improvements in mixing machinery technology to improve the overall efficiency of the mixing process. “For this purpose we will make every effort to further cooperate with tire manufacturers and material producers,” says Tanaka. **tire**



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Yusuke Tanaka, engineer, Kobe Steel