

# Yamaha Motor Monthly Newsletter

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A variety of technologies and knowhow for manufacturing and mass-production are born at the Iwata Main Factory

*The Core of Yamaha Motor*

## The Mother Factory

Strengthening the Foundation of Manufacturing Worldwide

**Yamaha Motor Co., Ltd. currently has roughly 140 group companies worldwide supplying not only motorcycles and outboard motors but also a wide variety of other products ranging from personal watercraft to off-road recreational vehicles in over 200 countries and regions around the globe. Among its global manufacturing and marketing operations, the Iwata Main Factory and Yamaha's other factories around Japan play a particularly important role by actively searching for higher levels of manufacturing technology and production efficiency based on close working relationships with the company's product planning, engineering, design and other development-related departments. Once new methods are brought on line in Japan, they are then implemented at Yamaha manufacturing bases around the world, spreading and supporting innovative and high-quality Yamaha *Monozukuri* capable of producing high-spec products globally. In this issue, we look at the role that the "mother factory" has played since the company's founding in the case of our main product line, motorcycles.**

## From Japan to the World: The Spread of Manufacturing Bases

When Yamaha Motor Co., Ltd. was launched as an independent company in 1955, its only product, the YA-1 motorcycle, was being manufactured in the Hamana Factory (currently the Hamakita Factory in Hamamatsu City) about 12 km northeast of today's headquarters in Iwata, Shizuoka Prefecture. Though small in scale, the Hamana Factory had been newly renovated in line with company president Genichi Kawakami's desire for a facility that was clean, well-organized and efficient to serve as a model factory. Its line of buildings were painted with pure white walls and the all-important work floors were covered with wooden flooring soft enough to not cause scratches or dents on the aluminum motorcycle parts.



The engine assembly line at the Hamana Factory. The factory was designed to be well-organized and was always kept clean (1957).

A policy was adopted for the workers: "Don't bring dirt or dust into the factory. Treat it like your own living room." And as such, the workers removed their outdoor shoes at the factory entrances and changed into clean indoor shoes.

It was in the autumn of 1966 that a new factory was completed in Iwata (the company headquarters moved to Iwata in 1972). Full-fledged export of Yamaha motorcycles to markets primarily in North America and Southeast Asia had begun in the early 1960s, and this new factory was meant to respond to the need for a rapid growth in production capability, from 240,000 units in 1965 to 380,000 in 1966.

However, new policies in the countries of Southeast Asia to promote development of local industry by setting limits on imported goods soon forced Japanese companies to shift from exporting products to locally-based manufacturing overseas. Yamaha began seeking new methods for local assembly and production in line with each country's policies like CKD (complete knock-down) manufacturing, technical/financial assistance agreements and joint ventures. These efforts eventually enabled the manufacturing and marketing of small-displacement sport models and underbone bikes with partners such as Pearl Yamaha (India), Siam Yamaha (Thailand) and Kong Hsue Sheh (Taiwan). This was the beginning of a long and steady process of building and strengthening Yamaha Motor's network of manufacturing bases around the world. As of the end of 2014, the Yamaha Motor group has a global network of 26 manufacturing bases in 17 countries that produces and ships some 5.8 million motorcycles annually.

### Mother Factory Role 1: Building in the "Unique Style of Yamaha"

Despite an annual motorcycle production of roughly 200,000 units—only about 3% of Yamaha's world total—the Iwata Main Factory still serves a vital role as the "mother factory" at the center, supporting the advancement of uniquely Yamaha *Monozukuri* for the entire Yamaha Motor group.

Here is how that role is described by Hirotaka Sugimura, General Manager of the Production Planning Division of the Manufacturing Planning Section at the Manufacturing Center of Yamaha Motor: "We participate and exchange opinions and ideas from the planning and development stages of a new product, and when we are asked to achieve the manufacture of something with this or that level of quality and performance under such-and-such requirements, we serve as the anchor runner for concurrent engineering, handling the aspects involved for manufacturing, procurement and production throughout the process. We always try to come up with solutions that exceed the requirements of the initial requests.

"If original and innovative concepts, outstanding technologies and expressing Refined Dynamism in design are the developmental side of 'the unique style of Yamaha,' then for us in the manufacturing and production divisions, our contribution to the unique

style of Yamaha is the tremendous combined strength of the manufacturing workplaces that gives those aspects form as an actual product.”

One of the most symbolic products of this role is the new 2015 YZF-R1, which features fracture-split (FS) titanium connecting rods, cast magnesium wheels and an aluminum fuel tank, all of which are results of taking on the difficult challenges of complex manufacturing technology. Today, the mother factory in Iwata produces about 90 different models—from large- and small-displacement sport models and competition motorcycles to large scooters and snowmobiles—most of which are shipped to locations throughout Japan and exported to developed markets like North America and Europe.



Displaying the manufacturing technology used for the new YZF-R1 at automotive trade shows attracts the attention of many visitors.

## Mother Factory Role 2: Technical Support for Overseas Bases

Because they are constantly putting the latest models into production, the Iwata Main Factory and the other Yamaha factories in Japan have developed an ever-growing wealth of manufacturing and production technologies and knowhow. Transferring this technical expertise to the group’s overseas manufacturing bases when and where it is needed to help raise levels of quality and productivity is another important role of the mother factory. One standout example of Yamaha innovation in manufacturing technology is the DiASil casting process used to create the non-plated aluminum cylinders used in more than half of the Yamaha motorcycles produced at group bases overseas. Another example is “near net shape manufacturing” that produces parts like pistons and gears very close to the final shape specification and thus minimizes the amount of machining work needed afterwards to complete the part.

Furthermore, in the area of production methods, the “theoretical-value-based production” system to remove any unnecessary movements during work, and the “divided workflow assembly line” based on it are two more examples. These innovations were the product of sweeping structural reforms (consolidation of factories, introduction of production systems based on production scale and the number of assembly work processes, etc.) made necessary by the sharp drop in unit production in Japan due to the global recession following the financial crisis of 2008. From the results, the new system was selected as the global standard for Yamaha motorcycle assembly. Many of Yamaha’s manufacturing bases overseas have adopted it and it is contributing to improving operating efficiency.



This “divided workflow assembly line” in Indonesia increases efficiency by eliminating any need to turn around while working. This waste-free production method was first perfected at the Iwata Main Factory and is now used in many overseas group factories.

“Our manufacturing bases in Indonesia have been manufacturing Yamaha motorcycles for nearly 40 years and have an incomparable annual production volume of 2.5 million units. They are among the best suited for implementing new manufacturing technologies and production systems,” says Sugimura. “Recently, we have adopted a practice of doing the basic technological development of new methods in Japan and then putting them into practice on the mass-production lines in Indonesia. Then, they are introduced in localized versions to our bases in other countries of the region like Thailand and Vietnam. If a number of regional bases can be made to function in this way as mother factories, the Iwata Main Factory will likely come to serve more as a ‘grandmother factory,’ working more on advanced R&D with a role more focused on the group’s needs globally.”

### Mother Factory Role 3: Manufacturing in the Ideal Location and Nurturing Valuable Human Resources

Originally, the general formula was to have Japan handle the manufacture and supply to the world markets of all high value-added sport bikes and the like. Meanwhile, overseas factories located in the highest unit-consumption areas would produce the required number of mainstream mid- and small-displacement commuter models sold there that needed relatively fewer assembly processes and less specialized manufacturing or production technologies.

Recently, however, as the capabilities of the regional bases have advanced, there are now more cases of high value-added models being handled by overseas bases, such as the case of Yamaha models developed exclusively in Taiwan being exported to markets that include Europe, North America and Japan, and the YZF-R25 being built in Indonesia or the TRICITY 125cc 3-wheeled commuter model manufactured in Thailand.

As our shared model platform strategy moves forward, we will no doubt see less of bases in neighboring countries manufacturing the same model, and instead, it will become the norm for numerous model variations with different exterior designs, coloring and detail specs—all created from the same platform—being shared among a number of countries via cross-trade.

As Yamaha's global manufacturing network makes the transition from local production for local consumption to manufacturing in the ideal location, Sugimura points out that, "What we need now [from the overseas bases] is the manufacturing capability and quality control necessary to handle high value-added model production. And, toward that aim, what we are focusing heavily on now is developing human resources."

At the main motorcycle assembly factory in Japan, there is a facility for classroom study and hands-on training named the "Aka-tombo Dojo," which borrows the "Red Dragonfly" nickname of the company's first motorcycle and symbol of Yamaha *Monozukuri*, the YA-1. Here, a special team of educators teaches a tiered curriculum of courses aimed at new employees, section supervisors, line overseers, workplace leaders and site managers respectively. Through this program, Yamaha is continually training and educating employees to understand the manufacturing process leading up to and following those of their own workplace, and to be capable of working in a number of fields. These efforts go further to include training to become multi-skilled and able to work at factories for different product lines, to become an expert technician highly experienced in their own specialty and capable of assembling an entire large-class sport model in a team of two, and people with the broad perspective and sure judgment necessary to serve as leaders and managers.

Among these curriculums, those aimed at instilling basic knowledge and fully mastering skills are also adopted as training for new employees at our overseas bases. There is also a program for leader-class employees from these bases to study and do on-site training for half a year at the Iwata Main Factory in Japan, but Sugimura admits that the programs for overseas bases are still in the development stage. But, he is also confident that when these programs are in full swing and producing results, the Yamaha Motor group will reach even higher levels of market competitiveness throughout the world.



The Aka-tombo Dojo is where the tradition of Yamaha Quality is carried on by teaching everything from the basics like how to use tools properly and the correct order of work processes, to workplace mentality such as the right attitude to approach tasks with.

## Message from the Editor

This year, a new motorcycle development company in Indonesia, a motorcycle manufacturing base in southern India and another in Pakistan will all begin operations. Every day, Yamaha products are being produced in countries all over the world. Though automation may become more advanced in the future, it will surely continue to be human hands that create the "Unique Style of Yamaha," regardless of where products are made.

At Yamaha Motor in Japan, several programs that communicate the joy of *Monozukuri* are run throughout the year, including tours of the factory and hands-on crafts workshops for children.

For this issue, I visited the *Aka-tombo* Dojo and was able to not only feel the joy and responsibility that comes with building new things but also to see how our spirit of *Monozukuri* is passed on—it was a rewarding experience.



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