

# R&D and Intellectual Property

Yamaha has adopted the corporate slogan of “Sharing Passion & Performance.” Guided by this slogan, Yamaha strives to remain a trusted and admired brand as it conducts its business activities driven by both products and services centered on sound and music. To support its efforts, Yamaha has designated technologies it has amassed in the fields of sound and music as core technologies and is conducting R&D activities with the aim of further advancing and extending these technologies. Yamaha is also sharpening its competitive edge by linking its R&D strategies with its design and intellectual property strategies.

## Research and Development

Yamaha’s musical instruments and audio equipment businesses are managed based on a functional organization that includes production, development, and sales and marketing divisions. Other businesses are managed via a divisional system.

Yamaha’s R&D structure consists of two sections. The first section is the Research and Development Division, which is located within the Musical Instruments and Audio Product Development Group. This section oversees the core technologies R&D functions for enhancing the Company’s foundational elemental technologies and creating new businesses. The other section is the Product Development Group, which handles the product development functions of each business division.

Yamaha’s R&D domain ranges from the inlet to the outlet of sound as well as the multipurpose uses of sound, encompassing acoustics, material properties, electronic devices, sound generators, voice and acoustic signal processing, music information processing, operating systems, communications, and networks.

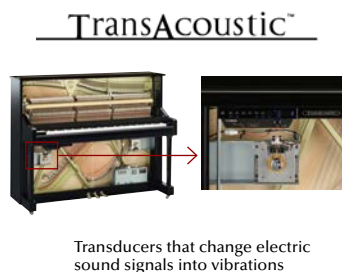
In fiscal 2015, Yamaha identified sound, music, networks, and devices as areas that it needs to further strengthen. In particular, Yamaha endeavored to enhance its scientific understanding of what constitutes “good sound” and advanced R&D initiatives to actually apply “good sound” to its musical instruments and audio equipment design processes. In addition, Yamaha took initiatives to upgrade its various technologies, such as physical modeling, musical analysis, and singing voice synthesis, as well as to advance the development of high-quality sound transmission technology for the network generation and technology related to wireless connectivity.

### R&D Achievements

#### TransAcoustic™ Piano

Yamaha has developed the TransAcoustic Piano, an entirely new and unprecedented hybrid piano equipped with TransAcoustic technology. Transducers inside the TransAcoustic Piano effectively transmit vibrations to the acoustic piano soundboard, thereby allowing digital sound to be produced directly from the soundboard without using conventional speakers or amplifiers. The TransAcoustic Piano is also equipped with a mechanism that can offset any future changes in the soundboard's shape due to fluctuations in temperature and humidity.

The TransAcoustic Piano combines the latest optical sensor technology, which Yamaha has cultivated over more than 20 years of SILENT Piano™ development, with digital sound source technology. This combination of technologies allows the piano to produce the natural sound, tone, and resonance of acoustic piano strings from the entire instrument, even when switched to digital sound. While maintaining the sound quality of an acoustic piano, the volume on the TransAcoustic Piano can be adjusted freely by switching to digital sound. In addition, the TransAcoustic Piano can produce harpsichord, organ, and various other sounds aside from those of an acoustic piano. Moreover, audio from external devices, such as iPhones\* and iPads\*, can be played through the soundboard by connecting these devices to the TransAcoustic Piano. By linking this feature with smartphone applications, the user can enjoy playing along to prerecorded audio in an ensemble performance. In this way, the TransAcoustic Piano expands new scenarios for piano use. Moving forward, Yamaha plans to establish hybrid pianos as a new category of musical instrument by further enhancing this product and its technology.



#### RIVAGE™ PM10 New-Generation Digital Mixing System

The RIVAGE PM10 is a new-generation, flagship digital mixing system equipped with excellent system flexibility and tremendous mixing capacity. It comprises a control surface, DSP engines, and input-output components connected via TWINLANe™, a newly developed ring network. The RIVAGE PM10 can be used in a variety of environments, from concert hall performances with hundreds of people in attendance to concerts with tens of thousands of people in attendance. The system also supports opening ceremonies and other large-scale events, such as theatrical performances, that require complicated reproduction of system and sound settings.

For the input stage of the RIVAGE PM10, Yamaha has developed the Hybrid Microphone Preamplifier. This new preamplifier consists of an analog section, which represents the Yamaha Natural Sound concept in its most advanced form, and a digital section, which uses advanced Yamaha VCM digital modeling technology. The RIVAGE PM10 also comprises TWINLANe, a network that can handle up to 400 low-latency audio channels. The TWINLANe ring network configuration makes it easy to secure redundancy that will keep the network running in the event of cable failure or similar problems. Moving forward, Yamaha plans to further expand the types of components that comprise digital mixing systems.



\* iPhone and iPad are trademarks of Apple Inc. registered in the United States and other countries.

## Intellectual Property

Since its founding, Yamaha has sought to acquire its various patents and other intellectual property rights while simultaneously respecting the intellectual property rights held by third parties. More recently, the Company has taken steps to integrate its business, R&D, and intellectual property strategies by implementing a number of measures designed to maximize the contribution of its intellectual property on its business earnings.

### Patents

In order to differentiate itself from its competitors, gain business advantage, ensure greater flexibility, and enable licensing to third parties, Yamaha has formulated patent strategies tailored to its operations in specific business segments. These strategies include establishing target technical fields for patent acquisition, such as core technologies, new businesses, and new technologies, and building a strong patent portfolio by identifying and focusing on its core competencies.

From the standpoint of asset optimization, Yamaha annually assesses its full portfolio of patents held within and outside of Japan, evaluating patent rights in terms of present application and future potential, and ultimately retaining only those rights deemed most advantageous.

As of March 31, 2015, the Yamaha Group owned a total of approximately 5,000 patents and utility models in Japan. Outside of Japan, the Group also held a total of roughly 4,800 patents, mainly in the United States, Europe, and China. Going forward, Yamaha is working to increase the number of patents held in China in particular.

### Designs

Yamaha views design as a critical element in setting its products apart from other offerings in the market, and consequently makes every effort to properly safeguard and utilize these assets. In recent years, Yamaha has taken bolder steps to acquire design rights in China to protect itself against counterfeit products. As of March 31, 2015, the Yamaha Group held a total of approximately 900 design rights in Japan and overseas.

### Copyrights

In addition to industrial property rights, such as patents, designs, and trademarks, the Yamaha Group produces numerous copyright-protected works, primarily in the fields of sound and music. Music-related copyrights are of particular importance to Yamaha in terms of its overall intellectual property policy. The Company takes steps to ensure their proper management and use, including undertaking legal action when necessary.

### Brands

Yamaha has taken numerous initiatives to maintain and enhance the value of the Yamaha brand. In 1986, the Company established regulations for brand management, and also set up a Companywide brand management committee to maintain and improve brand value by ensuring the effective use of the Yamaha brand. In order to protect the Yamaha brand, the Company acquires trademarks in numerous product domains in each country.

### Anti-Counterfeiting Measures

In recent years, the number of cases of unauthorized third parties manufacturing and selling products under the Yamaha brand or reproducing counterfeit Yamaha product designs has been increasing. Using government agencies and various legal means, Yamaha has vigorously combated cases of counterfeiting with growing success. Going forward, Yamaha plans to adopt a more aggressive legal approach, including litigation against infringers, to preserve the Yamaha brand value and the value of its businesses as well as to maintain consumer trust in the Yamaha brand.

### Intellectual Property Management Systems

As part of the corporate body, the Intellectual Property Division oversees the integrated management of all intellectual property held by the Yamaha Group. In addition, members of the Intellectual Property Division are assigned to each business and R&D division, where they ensure that the Company's intellectual property strategy is integrated within its business and R&D strategies. The Intellectual Property Division also works in close communication with each business division to promote Yamaha's intellectual property strategy from both Companywide and business domain perspectives.

#### Yamaha's Intellectual Property Receives High Appraisal Globally

##### Thomson Reuters Selects Yamaha as Top 100 Global Innovator

2014 THOMSON REUTERS  
**TOP 100**  
GLOBAL INNOVATORS

Yamaha received a Thomson Reuters 2014 Top 100 Global Innovators Award from Thomson Reuters Corporation, a global business data provider based in New York City. The award, which began in 2011, recognizes the world's top 100 innovators for invention excellence by analyzing intellectual property trends based on proprietary patent metrics developed by Thomson Reuters.

Award recipients are selected based on four criteria derived from data on patent registration rates, portfolios in major markets, impact of patents based on how often they are subsequently cited, and patent volume. This is the second time for Yamaha to be selected, after being selected for the first time in 2011. Yamaha received high praise for its patent volume and the global scope of its intellectual property protection initiatives. Also, Yamaha's score for its successful patent registration rates rose substantially over the previous year.

Patents Owned by Yamaha (As of March 31, 2015)

