



## Technologies

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### Message from the Director of Corporate Technology & Business Development Unit

## We aim to provide unique value by creating new seeds and initiatives that foster future demand

### Pursuing value that is ahead of its time while remaining humble about our success

Despite facing an unprecedented year because of the COVID-19 pandemic, Murata achieved record fiscal results in 2020. However, as the person responsible for technology and business development, I recognize that today's prosperity is due to the technologies that were introduced through the struggles of our predecessors 20 and 30 years ago. Accepting this with humility, Murata must focus our energy on a renewed commitment to research and development to ensure that future generations are best positioned to tackle tomorrow's challenges.

### Sowing the technology seeds that will blossom 10 and 20 years from now

It is impossible to fully predict what will happen in the future. It is also too late to act when the world's and customers' needs become evident. That said, we need to think about what Murata can do to prepare for a future that is difficult to predict. A crucial step is to develop technology options that can be deployed when there are major changes or waves of innovation. Reaping the benefits of research and development takes considerable time, and the main

way to beat the global competition on this front is to be faster than others. Therefore, it is crucial to ready the technology now for future growth.

SAW filters are one example of readying a technology. Research on SAW filters, which are now one of our biggest earners, has continued for more than 40 years. However, the business only turned profitable in the past decade or so. Up until then, it continuously made a loss. When we first became involved in RF technology, we focused on dielectric filters and multilayer LC filters as "Murata of ceramics." However, demand for SAW filters increased as the popularity of mobile phones grew from the mid-1990s. SAW filters, which only had a narrow focus for a long time, suddenly blossomed due to this technological innovation wave.

In the future, Murata is aiming for an organizational structure that can generate as many technological options as possible. It bears repeating that this development is essential in creating new business opportunities and ensuring that we are good stewards for younger generations. As noted earlier, we are promoting Murata-style innovation so that younger employees 10 and 20 years from now can benefit from the technologies we develop today.

### Fostering a corporate culture that values the deep core of technology

We often hear: "Murata has continually produced innovative products and generated growth in each era. What is the secret to that success?" That is certainly the ultimate truth in terms of product development. Our fundamental research and development approach is to steadily work towards always advancing our technologies, solutions, and products. While this may be a surprise, there are no secrets to Murata's success. We work diligently on the concerns that are important to us and are steadfast in creating those solutions – it is just what we do. That is how Murata's research and development works.

One important differentiator is our deep understanding of and focus on technology. For example, we refrain from telling someone who offers a new idea that it is impossible or unfeasible. Our culture is one of affirmation and approach new endeavors with a "Let's give it a try" Mentality.

We frequently discover business possibilities through casual conversations with our customers. President Nakajima refers to this as the "benefits of random conversation." New ideas and breakthroughs do not always come from formal meetings. By contrast, unexpected insights emerge when standing around talking in the hall or chatting after a meeting. We can also move things along by saying, "We will see if we can make it." Even if this may seem a waste of time, we take on such challenges with conviction. This collaboration helps build customer trust which then helps to generate more opportunities. Even though it takes time to build these relationships, it is a fundamental part of Murata's model to create new business.

In terms of valuing technology, another one of our characteristics is to go to the trouble of investing in technology. Even when our net sales were only around 300 million yen, we successively introduced high-priced electron microscopes and analysis equipment that did not align with the scale of sales. If research and development is necessary, we invest and prepare for challenges ahead which is also the Murata model. Of course, our steady strengthening of the financial base enables such investments – another strength of ours.

There is also something characteristic in the personnel side of our research and development efforts. We do not take a cookie-cutter approach to human resources, but actually empower diverse members. Respecting diverse values is a Murata style. For example, one of our developer's mastered creating Noh (Japanese classical theater) masks. We recognize that everyone needs to walk their own path. We also say that even if the path is rough, you

can move forward if you believe in yourself. These aspects correlate to our research and development efforts. Rather than abandoning an initiative because there are no short-term results, we persevere and maybe even adjust the original scale and scope. From there, we look for the "green shoots" of a new business opportunity.

### Technology displays that stimulate the potential needs of customers

We will develop a pool of technologies and make a concerted effort to further outside cooperation and collaboration. We will share our advancements with outside stakeholders, customers, academia, and start-up businesses. The main aim is to uncover the potential needs of customers and others by displaying our technologies = seeds. Our business is not one of pursuing technology once the world's needs become apparent. It is already too late once those needs become clear. Reactive research and development is no way to win in a world that is competing for innovation.

We should not only develop a pool of technologies, but also stimulate the potential needs of customers and business partners by sharing these technologies. We strive to create "technology displays" to show our customers and business partners that we can fuse the external and internal knowledge required for innovation.

I do not think there is anything remarkable about a future vision that anyone can predict. It is difficult to build a competitive advantage simply through the extension of current technologies. This is certainly not the path taken by Murata. I am concerned that we will not be able to innovate in useful ways for the future if we only deal with research and development using the past framework. Companies with large organizational structures can be inhibited by preconceived notions that impede bold research and development and instead focus only on safe bets. We must avoid this scenario at all costs since innovation is hindered in such an environment.

### Developing human resources that encourage innovation

We need to further enhance the human resources pool to encourage research and development. In addition to our long-standing "career formation program" for younger employees, we also have a training system for cultivating talent at each level. We believe it is important to establish a work environment where employees can engage in research and development activities with no

inhibition. At the end of last year, we completed the construction of the Minato MIRAI Innovation Center, the largest research and development facility in the Kanto area. Our research and development at this center spans energy, healthcare, IoT, and the mobility markets. We also dedicated a floor to co-creation with our customers and partners. This will be a place for those important “random conversations” and function as a place for showcasing technology.

In addition to these initiatives, we are accelerating our activity with start-up businesses. People who have worked at large companies for many decades tend to have different ideas from those at smaller organizations that produce various things based on new concepts. Given that, there could be divergence when talking to both. That is why we encourage interaction with start-up businesses to motivate our engineers and to better understand and support these organizations. We believe this initiative will also help to create new business opportunities for Murata.

Additionally, in the past it was common for people in research and development to work in the same department or on the same technology area for a long period of time. However, at Murata, we want engineers to associate with as many technologies as possible given the expanding breadth and depth of the high-tech market. We believe that rotating through various areas will also cultivate internal innovation.

### **Accelerating enhancements to the research network in Japan and abroad**

President Nakajima conveyed the message to employees that “no-one can work alone.” While this applies to an individual’s job, the same can be said about a company’s research and development activities. Given the extent of globalization, there are things that Murata cannot do by itself. It is imperative that we collaborate with universities and other companies. I envision us as the technology exchange hub with outside entities to achieve “knowledge collaboration” – a very abundant source of innovation.

We have already achieved significant results from external collaborations. We are currently developing a new material through cooperation with U.S. universities and are now pursuing commercialization for certain applications. Additionally, by fusing our designs with a partner’s glass-based materials technology, we successfully produced unprecedented high frequency characteristics. We have many other technologies under development and hope to showcase them all at some point in the future.

Building on that, it is becoming increasingly important to identify the true value of advanced technologies, and we recognize the need for management to qualify our approach and efforts. For research and development projects that are directly connected to business, we determine whether to proceed based on discovery that factors in investment economy calculations. For projects that are at an early stage, we focus on evaluating the aptitude of the technology, such as whether it is unique and its potential. This is not easy and a task with considerable responsibility for the future. Management is committed to enhancing efforts in this area going forward.

We actively promote the acceleration of co-creation with outside entities such as start-up businesses and academia as it leads to a greater understanding and adoption of the internal development mindset. I believe one of my important tasks is to enhance our research and development network and select and support technologies with future potential by allocating the appropriate resources.

### **The endless challenge to advance the future of electronics**

My steadfast belief in research and development is that “There cannot be true innovation if we pursue a technology that is sought by 100 out of 100 people in the world.” Hitting a home run in research and development requires us to have passion for and conviction in our own technologies. Breakthroughs are made when one challenges oneself with conviction. There could be a precipitous cliff or a never-ending desert ahead. We make meaningful discoveries by believing in our colleagues while facing challenges day after day. In some cases, there may be continuous pursuit of the possibilities for more than 10 or 20 years. This requires patience of the individual as well as the company. The final destination to be discovered is the blue ocean that no-one had anticipated. True research and development value is derived not by following an easy or safe path. If anything, it is the result of travelling down a painful or challenging path.

Murata will continue to create the future of electronics as an “Innovator in Electronics.” Therefore, we ask for the continued support of all our stakeholders.