Achieving our “Dream”

President
飯塚 実
Minoru Iizuka

Message from the President

I believe that a company’s value creation story should be a central element of its integrated report. In order to map out growth, it is necessary to have a “dream” based on our company’s purpose and the unique value we provide.

There are many different types of dreams. A dream can be a far-away aspiration of something you want to do or become, which emotionally supports you as you go through life; it can be something that is difficult to achieve but not impossible

through hard work, wisdom, and solidarity; or it can be something more like a target to achieve no matter what.
Our 10-year Long-term Business Plan developed in November 2019 sets the numerical target of 10 billion yen in operating profit, which is not easy to achieve but is by no means impossible. In the electronic components industry, most companies have an operating margin of 5% to 15%, but we have not set a net sales target corresponding to our operating profit target of 10 billion yen. Even if we bring in net sales of 50 billion yen, we can reach our target of 10 billion yen in operating profit, and even with net sales of 100 or 200 billion yen, it will still be attainable.
Of course, we would like to ideally secure an operating profit of 10 billion yen with as low sales as possible, but we cannot change our products in a way that will boost operating margins right away. Our approach will be to merge products with high operating margins and increase their ratio while making good use of existing assets.
However, the likelihood of achieving our goal based on a vague hope or idea alone is close to zero. In order to reach the figures in our long-term business plan, a well-thought-out strategy is necessary. Before the formulation of the long-term business plan, we already had a dream of what we wanted DAISHINKU to become in the future. We had ideas for how to realize that dream, including the ideal design of core parts, the necessary components, and a production system that meets the demands of society and takes into consideration the future labor structure of Japan.
At the time, it seemed like it would take a long time to achieve and could be considered a "dream" in the real sense. However, after overcoming various obstacles, we were able to start developing a long-term business plan exactly because we had confidence that it would be attainable. In addition to this dream, we incorporated a plan to strengthen our business capabilities and formulated the more comprehensive "OCEAN+2 Strategy."
In other words, our value creation story is about the journey—the story—to realize DAISHINKU's dream. With a clear path and concrete goals, our story is more exciting than a vague and hazy story with no clear direction, and we believe there is a world of difference in terms of achievability.
DAISHINKU's value creation story is clearly documented in this first-ever integrated report, so we hope you will find it interesting and take the time to read it to follow along with the story.

I have mentioned that our value creation story is based on the purpose of DAISHINKU and the demands of society. The purpose of DAISHINKU lies in its contribution to the ever-increasing number of devices that will be "connected," ensuring a "stable supply" to meet the growing demand. However, if we continue to increase production for a stable supply with the same approach as before without considering any other matters, CO_2 emissions will continue to increase linearly. In other words, "stable supply" and "environmental initiatives" are conflicting objectives, but we will reconcile them through our technological capabilities and continue to grow as a company. We believe that this, above all, is DAISHINKU's purpose.
DAISHINKU's value creation story has been carefully crafted to achieve this purpose. Although still a work in progress, we are making strides toward its realization.
When issuing this Integrated Report, I thought it was important to focus on conveying our thoughts on how we plan to realize our long-term business plan and how we will turn our dream into reality.

Three years have now passed since the start of the 10-year Long-term Business Plan. In this fourth year (the fiscal year ending March 31, 2024), the first stage of "Developing a foundation" will come to an end, and we are continuing with the plan based on a carefully considered strategy. We are well aware that the process will not be easy at all due to changes in the market and external environment that are beyond our control. However, since we have put a great deal of thought into the strategy, we will stand firm and not waver in the face of setbacks. Therefore, I am satisfied with the progress we have made over the past three years.

The main points we considered in developing the OCEAN+2 Strategy are as follows:

- Smaller and lighter is cheaper
- Large materials yield more products
- High-frequency, therefore low-cost devices
- Increase output per unit area
- Strengthen business capabilities
- Change work
- Continue to create products with attention to detail while evolving them
- New crystals through crystal growth technology
- New devices through our proprietary technology
- In-house CO_2 recovery

By implementing the OCEAN+2 Strategy, we will achieve these goals one by one and continue to grow as a company that can contribute to a connected society.

10-year Long-term Business Plan “OCEAN+2 Strategy”

On the occasion of the 60th anniversary of our founding on November 3, 2019, we formulated our first 10-year Long-term Business Plan “OCEAN+2 Strategy” and launched it in April 2020. Breaking away from a red ocean full of excessive competition, we will explore a new market, namely, a blue ocean, based on the development of products with excellent competitive advantages while striving to achieve a stable, highly profitable corporate structure and working to solve social issues.

One — Supply by one company for built-in ICs and other products centered on key products, Arkh series

Cost — Challenge to lower cost area thanks to the Arkh series, which reduces direct material costs

Element — Unparalleled competitive edge through size increase of synthetic quartz crystals and crystal wafers, our core technology, cutting and polishing technology

Alliance — Alliance through open innovation and collaboration to accelerate value creation

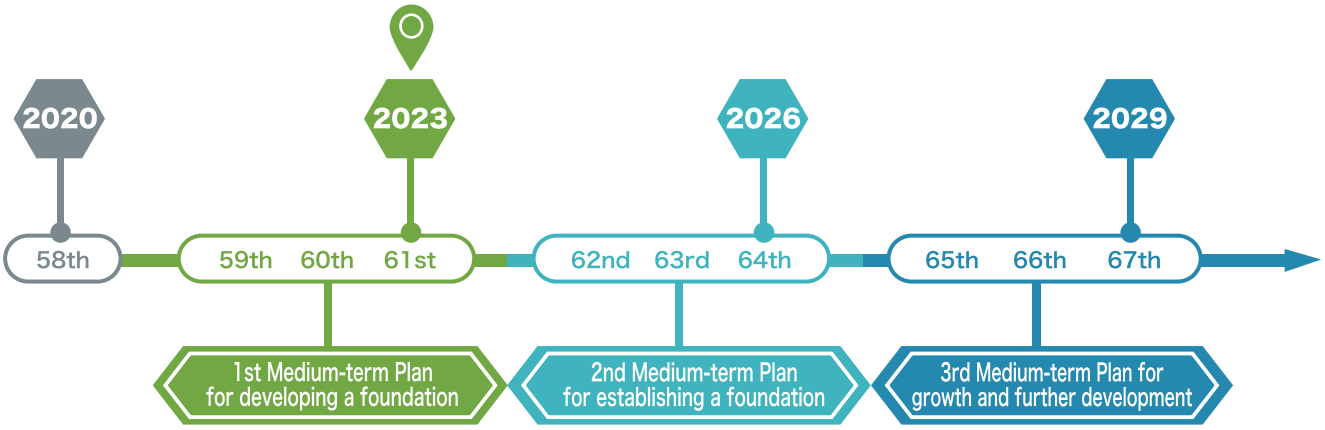
Niche — Creation of stable advantage of being a survivor in a niche market

+1 — Challenges for various crystals based on our growth technology cultivated thus far

+2 — Development of devices that create new value together with new underlying technology

These basic strategies are also connected to our “value creation story,” which will be introduced later, and serve as guiding principles toward the vision that we should strive for.

This 10-year Long-term Business Plan is divided into three phases: the 1st Medium-term Plan for developing a foundation, the 2nd Medium-term Plan for establishing a foundation, and the 3rd Medium-term Plan for growth and further development. For each plan, milestones have been set. We plan to create new value and profits under the OCEAN+2 Strategy while securing stable profits through conventional product development. Currently, we are in the final year of the 1st Medium-term Plan. Although the situation has changed significantly since the start of the 1st Medium-term Plan and we have had to change course, we are steadily preparing for the second plan and aim to complete the first plan, which we consider the stage for developing a foundation.



Japanese characters meaning “Imagination and Creation” engraved on a marble plaque at Central Laboratory

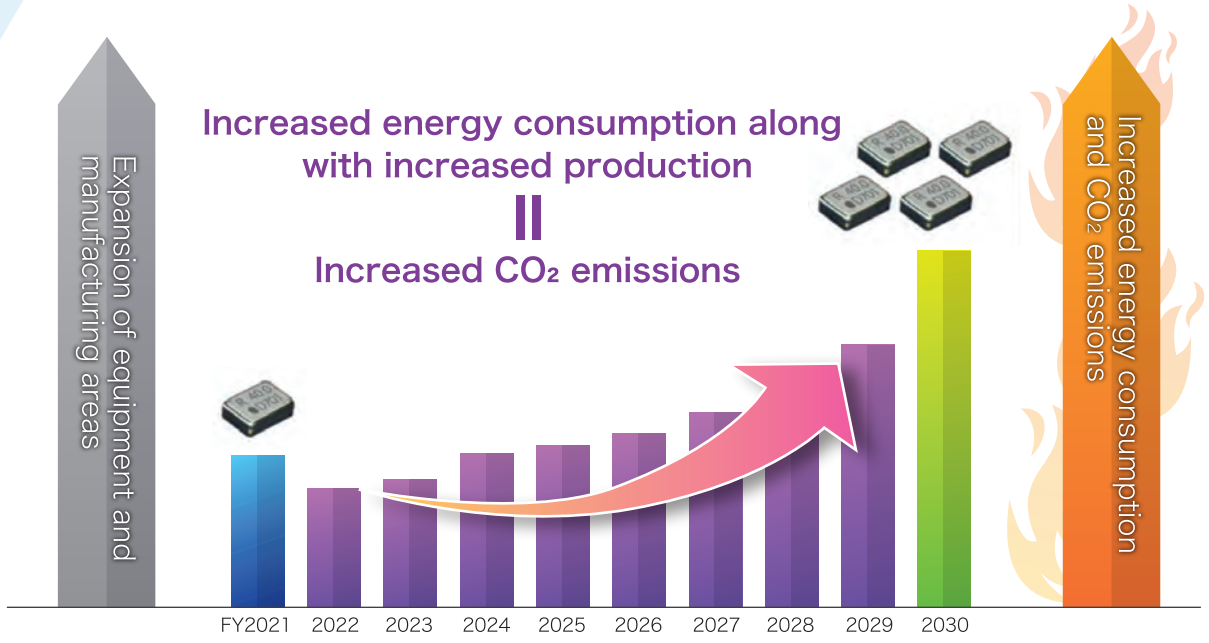
Value Creation Story from a Growth Perspective

Balancing stable supply and environmental initiatives

There is no doubt about the expansion of the timing device market centered on the automobile market for automatic driving and the IoT market where wireless communication is essential. In addition, increased data traffic due to technological evolution requires higher frequency timing devices. Our important mission is to stably provide timing devices, which play an important role in a connected society in the future, in the required quantity when necessary.

We cannot possibly cater for such an increase in demand without capital investment. However, if current equipment is expanded to meet the ever-increasing demand, the equipment's installation area and power consumption will increase along with the increase in production volume, resulting in a simple increase in CO_2 emissions. We will increase our production volume and at the same time reduce CO_2 emissions associated with the increase in volume. We also will promote additional initiatives for CO_2 capture, aiming for further growth as a sustainable company by combining “stable supply” and “environmental initiatives” based on the spirit of “Imagination and Creation.” We believe that the Arkh series, our original key product, is an ideal product that can solve these issues.

Now, let us introduce our main initiatives for “stable supply” and “environmental initiatives,” which we consider material issues.


Expansion of equipment and manufacturing areas
Increased energy consumption along with increased production
=
Increased CO2 emissions
Increased energy consumption and CO2 emissions
FY2021
2022
2023
2024
2025
2026
2027
2028
2029
2030

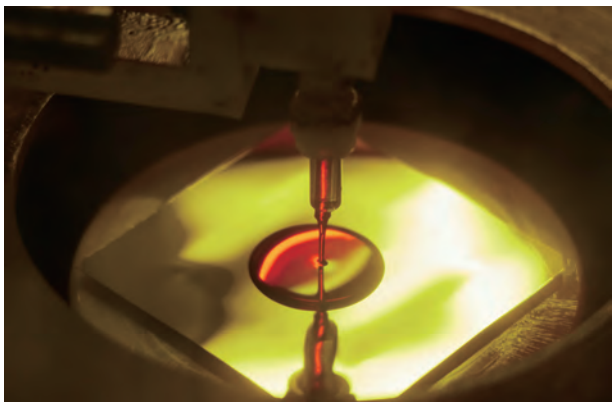
Value Creation Story from a Growth Perspective

Value Creation through Core Technologies —Source of Corporate Competitiveness—

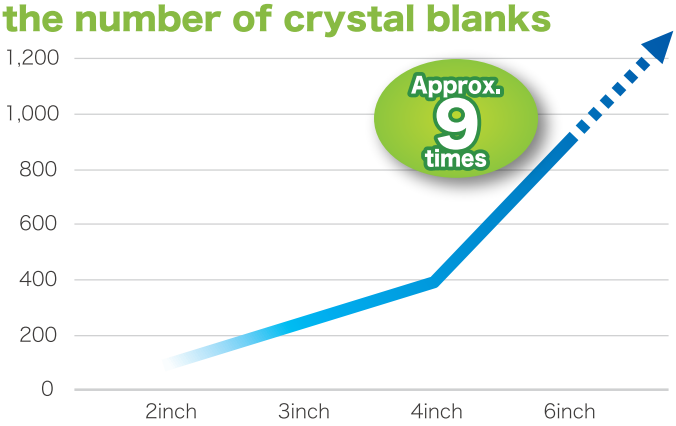
< Improvement in cost competitiveness and advancement of environmental initiatives by increasing the size of crystal wafers >

Challenge

With the development of electronics technology, quartz crystal devices are required to have value, such as small size, high frequency, and high accuracy. In the processing of quartz crystal elements, it is difficult to meet these requirements with conventional machining. Therefore, photolithography (technology to which the mechanism of photographic development is applied) is becoming increasingly popular. This technology, which is also used in the manufacture of semiconductors, is suitable for microfabrication. Photolithography requires a crystal to be processed into a wafer shape. Accordingly, the larger the size of the wafer used, the more quartz crystal elements can be obtained per wafer, resulting in increased productivity.

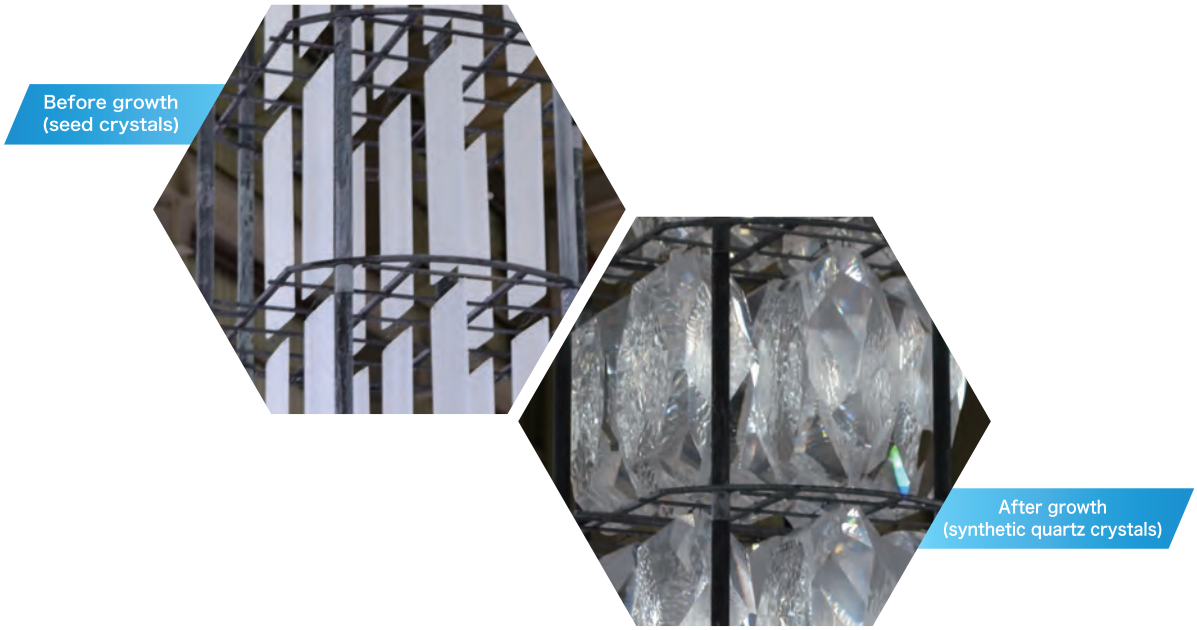


Correlation between wafer size and the number of crystal blanks



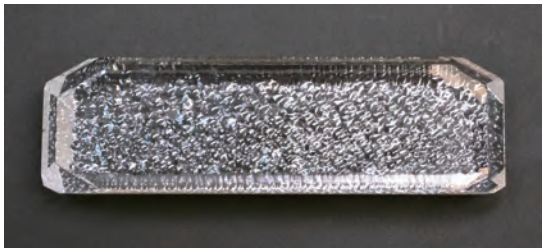
※When the number of producible chips from 2-inch wafer is regarded as 100.

Thus, to secure a competitive advantage in photolithography-type products, we have been working on increasing the size of synthetic quartz crystals and crystal wafers, which serve as core technology, for a decade.
A synthetic quartz crystal is grown by recrystallizing natural quartz melted under high temperature and high pressure conditions on a plate-shaped seed crystal. The growth speed of a crystal varies depending on the direction. Therefore, taking a longer time does not mean growing a larger synthetic quartz crystal. The first thing to do is to develop a seed crystal of the desired size. Formerly, 3-inch wafers were in the mainstream. Now, however, we have already shifted to mass production of 4-inch wafers. In the fiscal year ended March 2022, we expanded the floor space of the Tokushima Production Division to add a clean room for the photolithography process designed for the production of 4-inch wafers. The newly introduced equipment has specifications applicable also to the production of 6-inch wafers in the future.

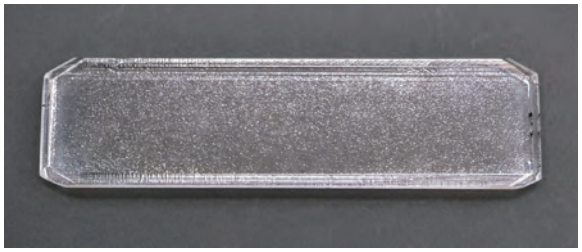


We have already completed the development of synthetic quartz crystals for 6-inch wafers, and in June 2022 we increased the initial mass production lots. We also started developing seed crystals for 8-inch wafers several years ago and are steadily making progress. Although technical and time barriers make it difficult to increase the sizes of synthetic quartz crystals and crystal wafers, advancing this initiative is very important as it is core technology to secure a competitive advantage in the future.
The higher the purity of quartz crystal, the more stable performance is expected to be provided. High-purity synthetic quartz crystals are required in unique environments such as space because defects and impurities will not maintain their features. We optimize the growth conditions, grow high-purity synthetic quartz crystals, and develop devices manufactured only with high-purity synthetic quartz crystals.

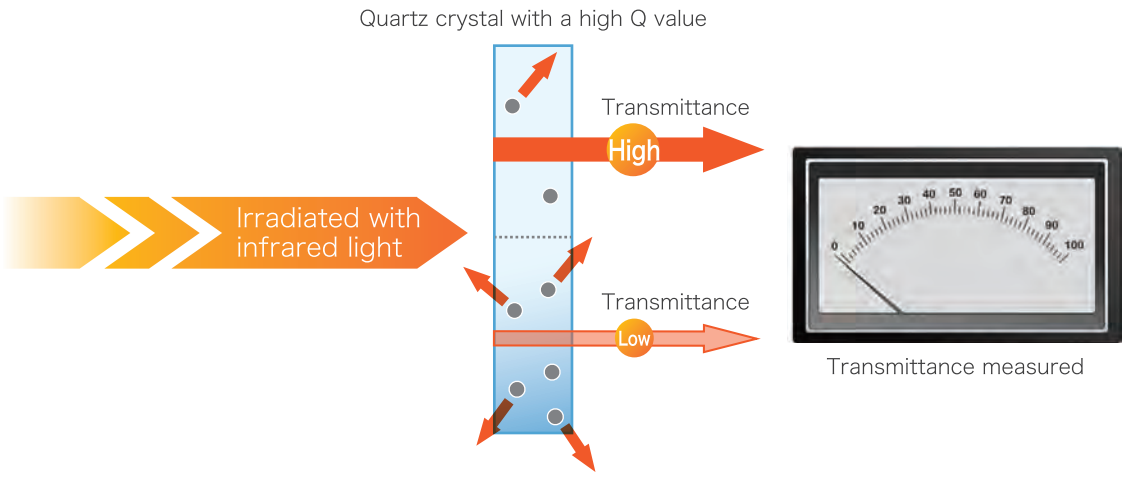
Synthetic quartz crystals with a standard Q value



Synthetic quartz crystals with an ultra-high Q value



* The Q value is a parameter that indicates the purity of quartz crystals. The higher the Q value, the higher the purity.



Point

We succeeded for the first time in the world in the mass production of the world's most giant synthetic quartz crystal, the 6-inch wafer synthetic quartz crystal. We will enhance our cost competitiveness by increasing the size of crystal wafers to gain a competitive advantage in both technology and cost, especially against the rise of our competitors in Asia.

Value Creation Story from a Growth Perspective

Value Creation through Key Products —DAISHINKU's Original Products—

< Optimum devices for "stable supply" and "environmental initiatives" >

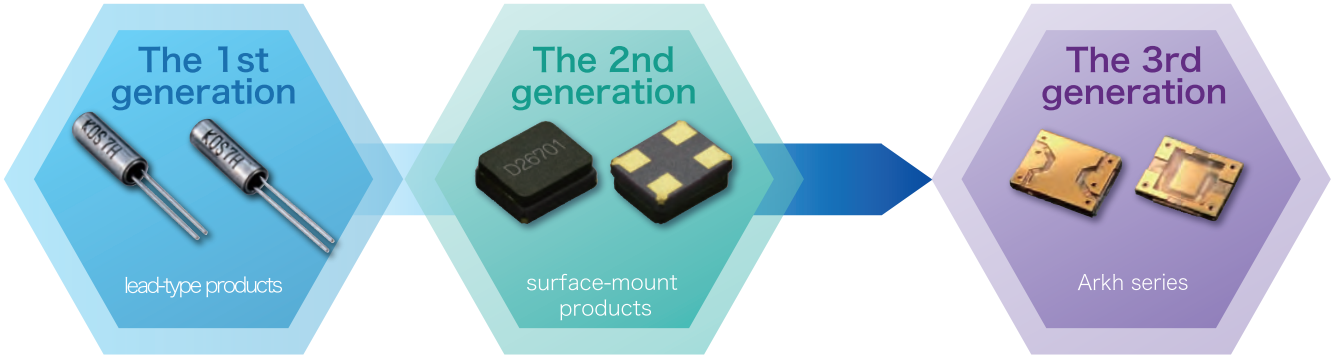
For electronic components of a device, which consist of a small number of parts, the product design and production method play an important role in reducing CO_2 emissions and advancing other environmental initiatives. To realize our ideal, the following requirements need to be met.

- To make products smaller/lighter
- To increase the output per unit area
- To enable fully automatic production
- To reduce the external procurement ratio
- To embed products in other parts used by customers

It is our original Arkh series products that meet these requirements, serving as key products that can both ensure a "stable supply" and "environmental initiatives."

< About Arkh series >

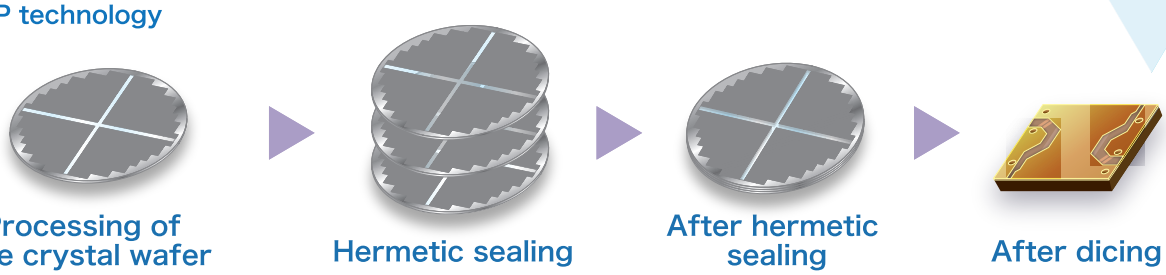
We define the first generation of crystal devices as lead-type products and the second generation as surface-mount products using ceramic packaging, which are currently in the mainstream. The products newly developed as the third generation are those of the Arkh Series, based on the Arkh.3G, which has a completely novel structure.



Unlike a conventional structure in which a quartz crystal element is held in a ceramic package using a conductive adhesive, the Arkh.3G adopts wafer-level packaging (WLP) technology that allows three crystal wafers to be bonded together. In WLP, the process from wafer cleaning to bonding is carried out in a vacuum without exposure to the air, enabling the prevention of contamination by foreign substances and reduction of quality risks to the greatest extent possible. Another feature of the Arkh.3G is that it is half the thickness of conventional products, serving as our overwhelmingly superior original product, especially in terms of demand for thin products. Using these technologies developed for the production of the Arkh Series, we will work to create new value.

Arkh series

WLP technology



Processing of one crystal wafer

Photolithography is applied to a crystal wafer to form outlines and electrodes.

Hermetic sealing

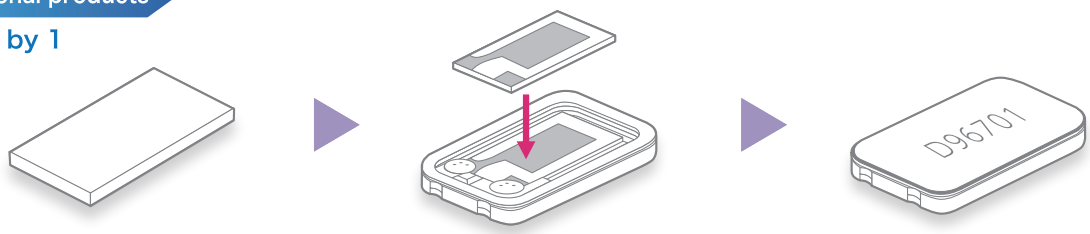
After hermetic sealing

After adjusting for periodicity in a vacuum atmosphere, three crystal wafers are bonded, sealed and diced.

After dicing

Conventional products

1 by 1



Processing one crystal blank

The synthetic quartz crystal is cut at an angle suited to a specific purpose or application. It is then polished to obtain a desired frequency.

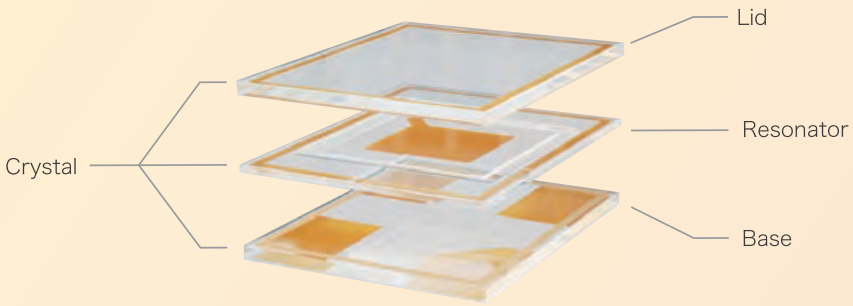
Bonding the crystal blank

The crystal blank with electrodes is fixed in a package of ceramic or other similar material with a conductive adhesive, whose humidity and time of application are strictly controlled.

Sealing

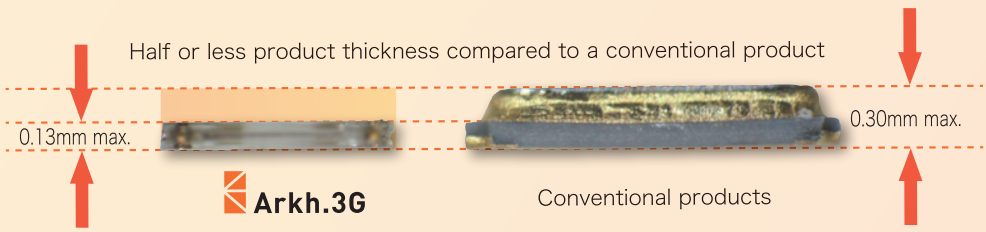
Arkh.3G

Structure of Arkh.3G



* Arkh.3G have received the 2019 Good Design Award.

Cross-sectional comparison between the Arkh series and conventional products

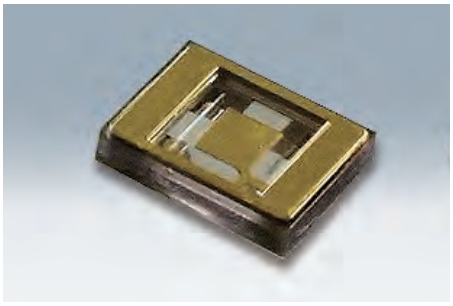


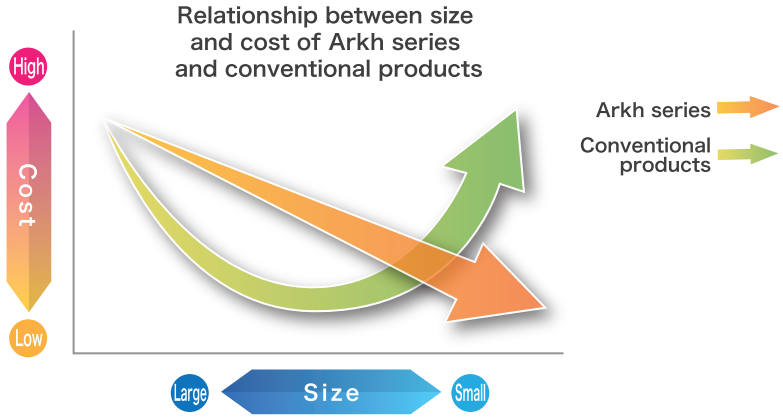
Value Creation Story from a Growth Perspective

(1) Small/lightweight/low cost —new original devices—

Growth

The smaller the product size, the fewer parts are used, reducing costs. However, when the product is smaller than a specific size, the technical handling difficulties increase, leading to cost increases. However, the world's most miniature Arkh series uses wafer-level packaging technology to stack crystal wafers on top of each other, allowing it to take advantage of our core technology of larger crystal wafers, resulting in smaller product sizes at lower cost. This way, we will combine our original efforts to strengthen corporate competitiveness.

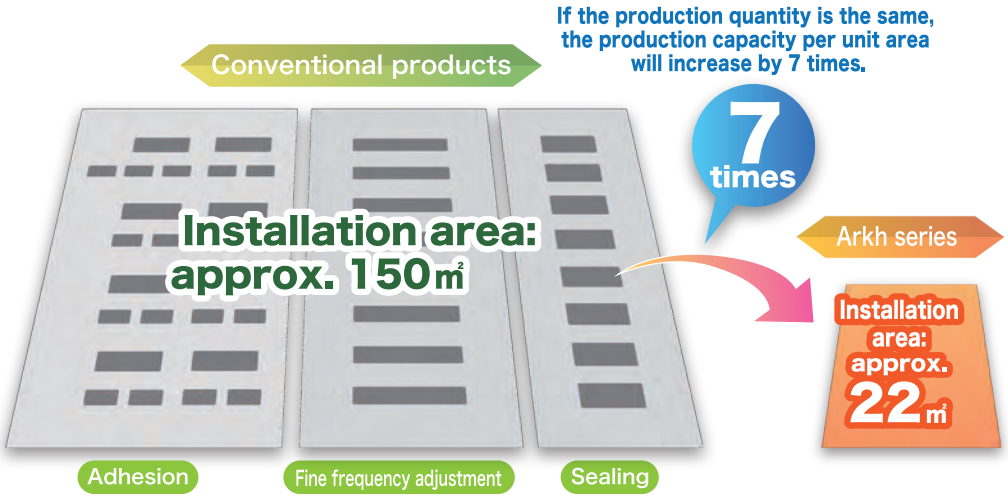




(2) Challenge of achieving a seven-time increase in output per unit area — to reduce CO_2 emissions and increase in productivity —

Growth

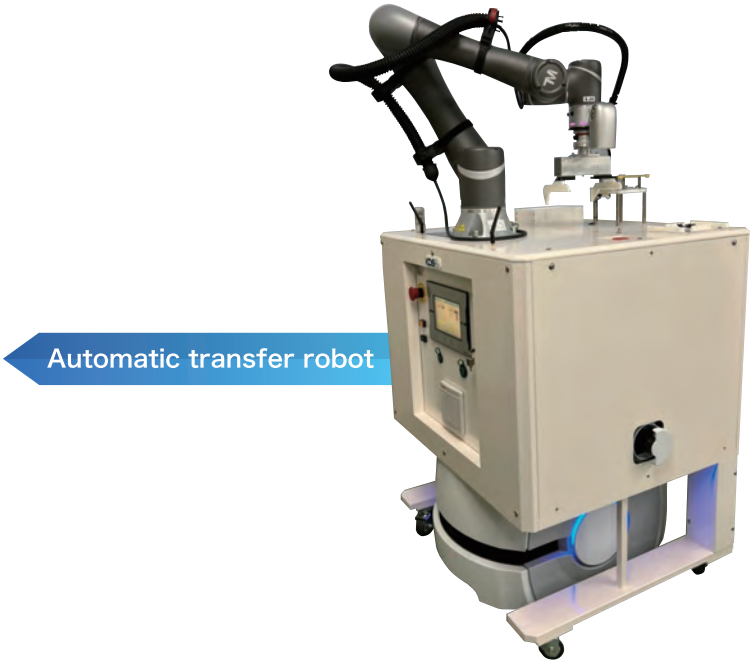
We believe that the adoption of WLP technology in the production of the Arkh series will allow us to take full advantage of the size increase of crystal wafers, which we are currently working on. As the assembly of conventional products requires quartz crystal elements to be mounted one by one on ceramic packaging, the production capacity depends on the assembly equipment. WLP technology, on the other hand, enables assembly in wafer form. Therefore, the number of crystal devices that can be produced in one assembly is proportional to the wafer size. In other words, using larger crystal wafers can increase the output per unit area. Meanwhile, unlike conventional products, the Arkh series products do not need to be transferred one by one for each process, whereby the equipment installation area can be significantly reduced. By reducing the equipment installation area and using WLP technology, we will increase the production capacity per unit area to seven times the current level. While ensuring a stable supply without adding more plants or equipment, we are taking on the challenge of reducing CO_2 emissions."



(3) Fully automatic production —original production lines—

Growth

The design concept of the Arkh series, represented by WLP technology, makes it possible to build new production lines. The Arkh.3G can be assembled in a vacuum atmosphere without human contact from the time the crystal wafer is placed until the product is completed. We are taking on the challenge of fully automatic production by further evolving this production line.

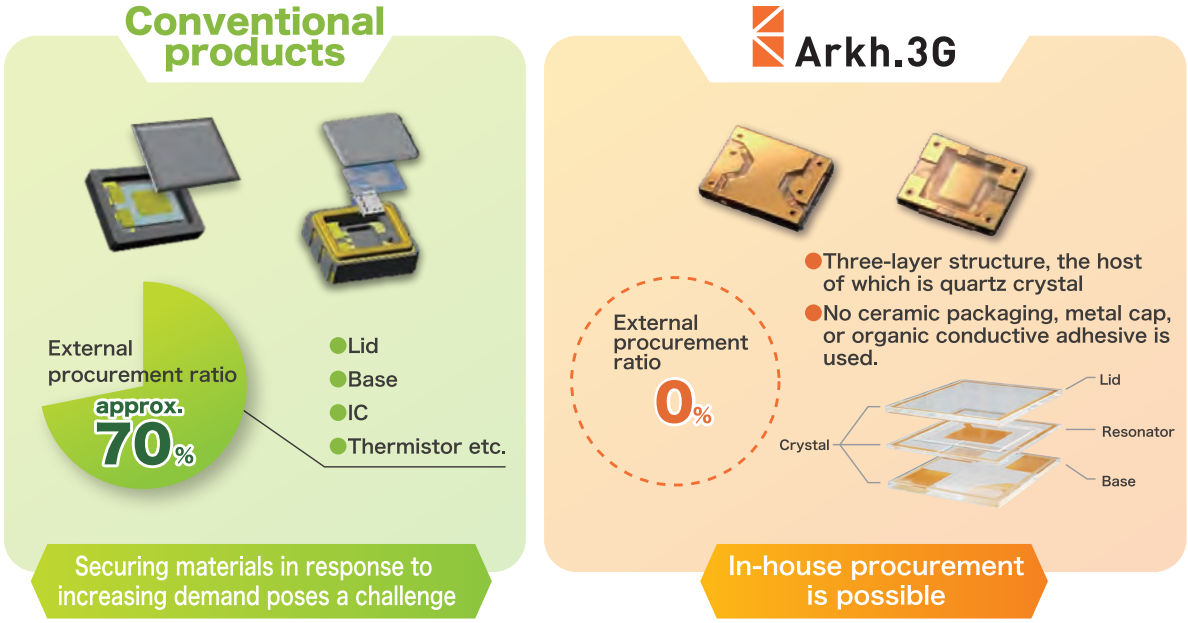


Automatic transfer robot

(4) Reduction of external procurement ratio —Stable supply—

Trust

Using crystals, which can be procured in-house, for the packaging, the Arkh series does not require packaging materials to be procured externally. Therefore, stable procurement can be ensured without being affected by supply chain disruptions due to, for example, the COVID-19 pandemic. We are taking on the challenge of ensuring a stable supply also in terms of the business continuity plan (BCP).

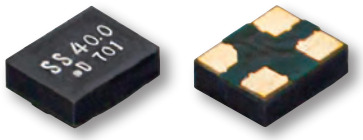


Value Creation Story from a Growth Perspective

(5) Trend toward resin molding —ceramic package-less—

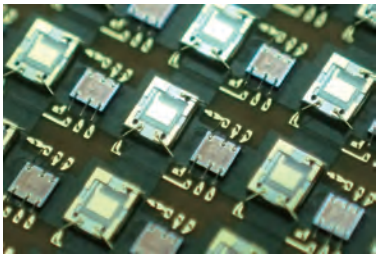
Looking back on the history of packaging, the mainstream for ICs have changed from ceramic packaging to resin mold packaging. For crystal devices, on the other hand, the conversion to resin molding in terms of small products had yet to be achieved until recently because crystal devices require physical space for their mechanical oscillations. However, embedding an Arkh series product instead of a crystal blank has enabled resin molding, solving the packaging issue. Ceramic packaging is also used as a packaging material for various sensors. Therefore, there are concerns about supply shortages due to increasing demand.

Large ceramic packages, in particular, hinder stable supply because they decrease the number of packages obtained from one sheet. With our proprietary technology that allows us to use mold packaging instead of ceramic packaging, we are taking on the challenge of ensuring a stable supply of products of various sizes requested by our customers.



Arkh series product embedded in our in-house mold oscillator

Pursuing environmental friendliness and short delivery times



What's Arkh?

Origin of the brand name “Arkh”

The name is from the Greek word **“arkhitekton,”** namely, the etymology (origin) of the English word “architecture,” which connotes the meaning of “structure.”
The brand name represents our desire to emphasize that the brand is the “origin” of crystal devices with a completely new “structure.”

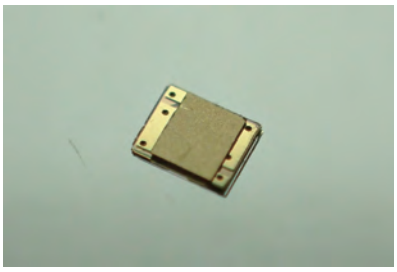
Arkh logo

The character “Arkh” is created using the diagonals of hexagons. These characters are overlapped to express the “overlapping of crystals.” A crystal is also symbolized at the left end of the logo to express the spread from the crystal.

(6) Thin thermistors —new structural devices—

Challenge

We are developing crystal resonators with thermistors as a line-up for the Arkh series. An efficient assembly is possible if the thermistor can be placed as one layer of the Arkh.3G. In addition, if the thermistor can be made thinner, the thermistor can be placed in any layer of the Arkh series without adding a new layer.

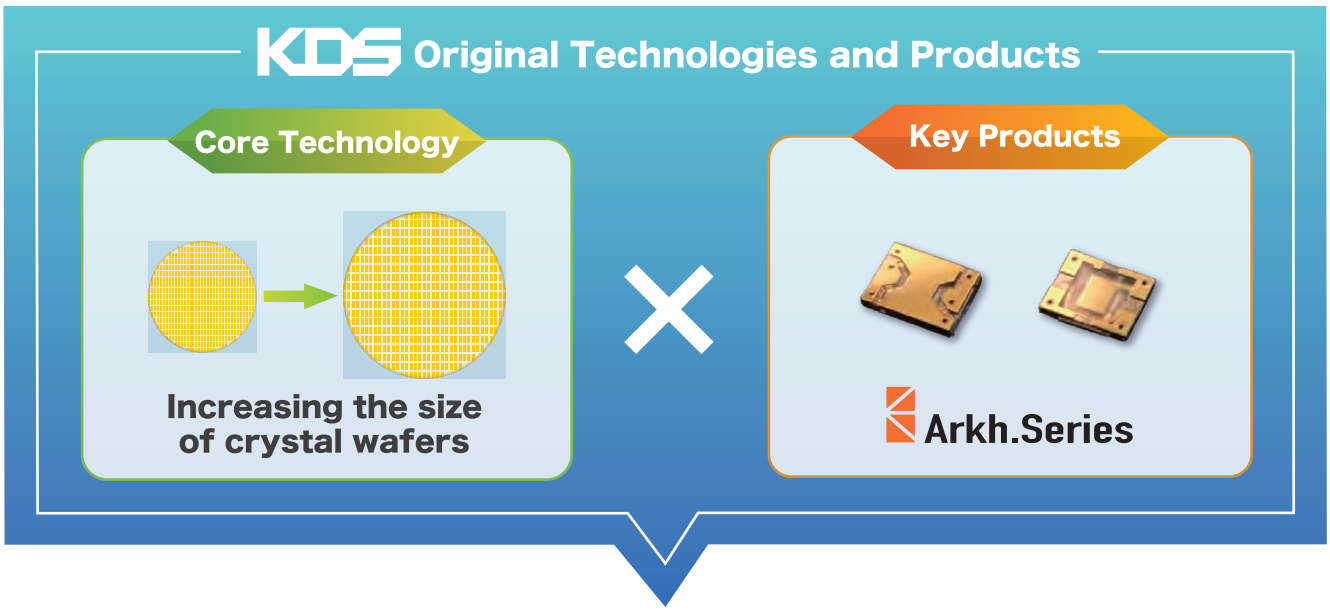


Arkh series equipped with thin thermistors

Point

Thus, the Arkh series is an ideal device that enables "stable supply" and "environmental initiatives."

With our original core technology "Increasing the size of crystal wafers" and our key product "Arkh Series," we aim to be a game changer in the crystal device industry and create corporate value.



Strengthening of corporate competitiveness

Value Creation Story from a Growth Perspective

Evolution of Production Lines for Conventional Products —to reduce CO_2 emissions and increase in productivity—

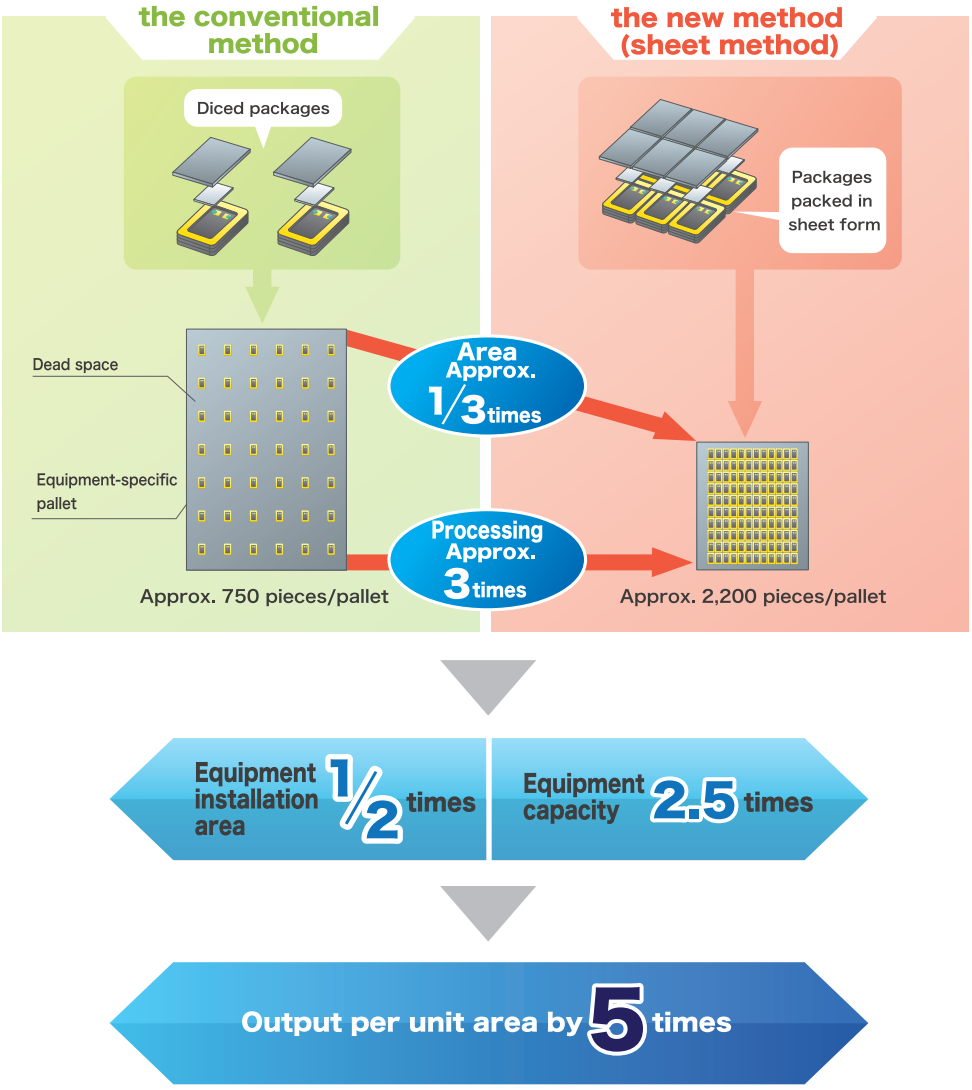
< Building flexible production lines >

Challenge

Currently, our production lines have different equipment for each model, making it difficult to change models and production bases. On our existing production lines, products are loaded onto different equipment one by one for each process, requiring complicated product transfer. Therefore, the production lines tend to be enlarged. In addition, the sizes of containers (pallets) used to transport products vary by model, which increases the number of dedicated equipment. Also, an increase in the number of product models leads to an increase in the number of production equipment.

To resolve this issue, we are working on developing equipment that can carry out assembly without requiring process-by-process product loading by using packages in sheet form through the application of the technologies cultivated in the production of the Arkh series. The development of such equipment will reduce dead space and the number of pieces of transport equipment required. In addition, we are working on building a production line that can process a large number of pieces at the same time. By advancing these initiatives, we are taking on the challenge of increasing the output per unit area by five times while aiming to halve the equipment installation area and to increase the equipment capacity by 2.5 times. We believe that building a flexible production line that can produce products regardless of product model is effective also in terms of the business continuity plan (BCP) because such a production line can help avoid geopolitical risks. If the current production line is changed to a flexible one, the amount of CO_2 emissions per assembled product can be reduced by approximately 40%.

Comparison image of the conventional method and the new method (sheet method)



Reduction in the Number of Days Required to Grow Synthetic Quartz Crystals and Improvement in the Energy Efficiency of the Growing Furnace —to reduce CO_2 emissions and increase in productivity—

Challenge

Synthetic quartz crystals are grown in a growing furnace called an "autoclave" under high temperature and high pressure conditions over a long period of time. In growing synthetic crystals, electricity charges account for more than 70% of the cost. Therefore, reducing power consumption will lead to the reduction of CO_2 emissions. As an initiative to reduce power consumption, we have improved the energy efficiency of the growing furnace itself. By reinforcing and repairing thermal insulation materials, we succeeded in reducing daily power consumption by about 20% when compared to the consumption before taking measures.

In addition, through our efforts to shorten the number of days required for growing crystals by reviewing the growing conditions, we have reduced power consumption by 30% or more per growing. As a result, the energy consumed to grow synthetic quartz crystals has been approximately halved and the production capacity of the same equipment has increased by 1.5 times.

Electricity charges account for about 70% of the cost of growing synthetic quartz crystals

↓

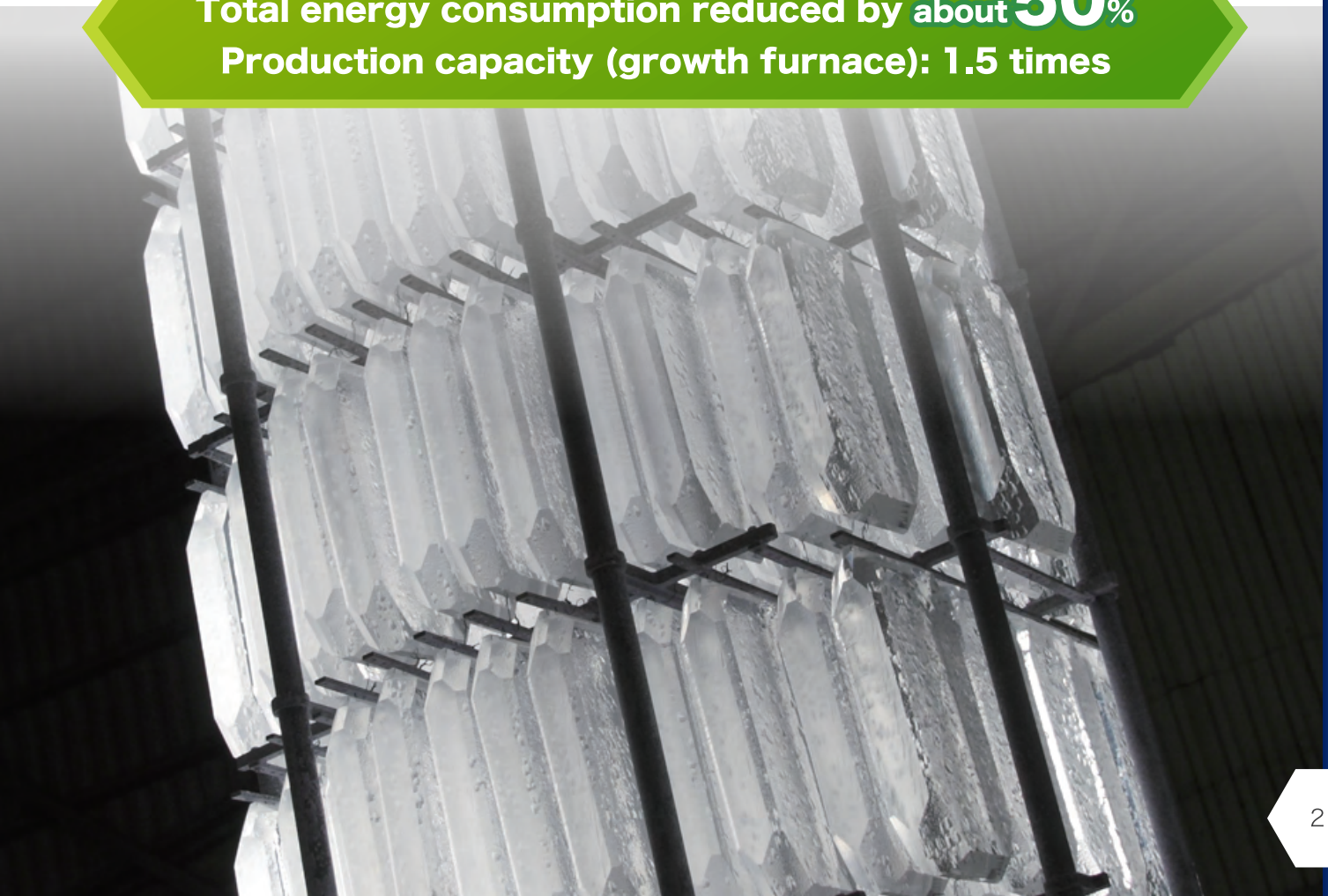
Saving energy by about 20% by improving the crystal-growth furnace (reinforcing heat insulating material, etc.)

↓

Saving energy by about 30% by reducing the growing period from 150 days to 100 days

↓

Total energy consumption reduced by about 50%
Production capacity (growth furnace): 1.5 times



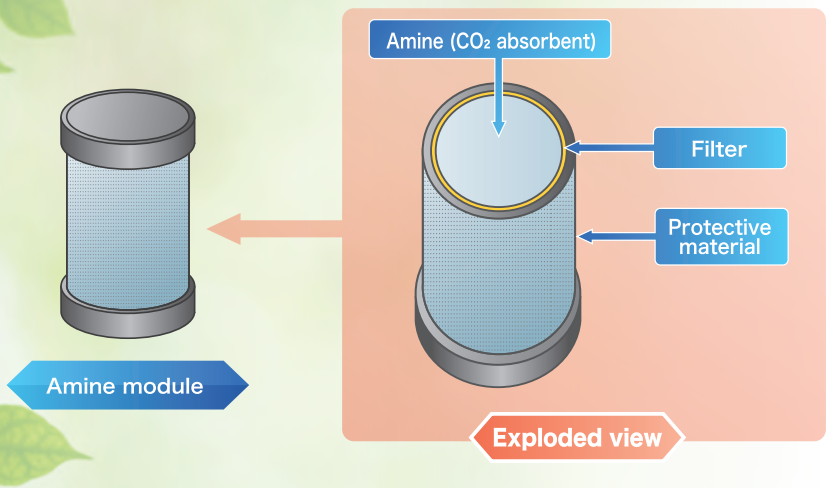
Value Creation Story from a Growth Perspective

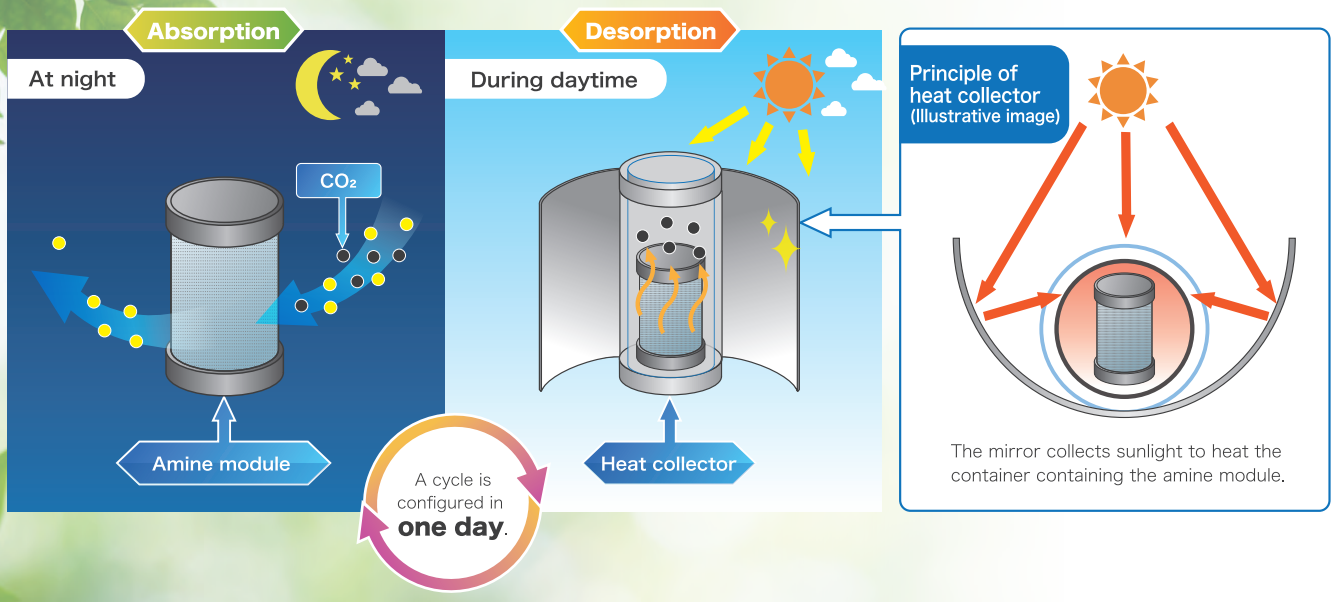
Initiatives toward carbon neutrality —tackling new initiatives—

< Tackling the challenge of CO_2 capture >

Challenge

In addition to reducing CO_2 emissions, we are also taking on the challenge of developing small CO_2 capture modules, or "amine modules," which use the CO_2 absorbing material "amine" as an approach to capture CO_2. The amine module absorbs CO_2 from the atmosphere by simply putting it on the floor, and the absorbed CO_2 can be extracted by heating the amine module at altitude. In general, heating to high temperatures consumes electricity, leading to the problem of CO_2 generation from power plants. For this reason, we are aiming to extract CO_2 from amine modules by solar heat collection, which does not use electricity or fuel.





We have set forth the "Scope 1+2*" Carbon Neutrality Challenge in 2030 as our environmental policy. As one of our initiatives to achieve this goal, we will continue to explore the effective use of amine modules.

* Scope 1: Direct emissions from fuel use and industrial processes of the company
* Scope 2: Indirect emissions from the use of heat and electricity purchased by the company

The Value Creation Story of DAISHINKU

Initiatives

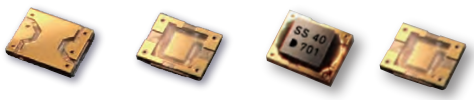
Core Technology

The size increase of synthetic quartz crystals

The size increase of crystal wafers

Arkh.Series

Fully automatic production



Trend toward resin molding

Built-in IC

Output 7 times

Collaboration products

Conventional products

New production line

Output 5 times

Challenge of ensuring “stable supply” and “environmental initiatives”

Increase in productivity

Reduction of environmental impact

Carbon neutrality

- CO_2 emissions control
- Strengthening of cost competitiveness
- Reduction of external procurement ratio
- Saving energy
- CO_2 capture and separation efforts