Research and Development

Performance Against Materialities / KPIs (FY2022)

Creating and providing environmentally friendly products, and products that reduce health risks

New Product Development

Secured **172** patent (domestic and overseas / as of end-August 2023)

Implementing communication and exchange with customers to address society's problems

Training participation (once a year)

Research and Development Policy

Having identified "environment, air and health" as a societal issue that we must help solve, we have positioned construction machinery filters, air filters, and healthcare as the three domains at the core of our research and development efforts aimed at creating high-value-added products as a comprehensive filter manufacturer.

Research and Development System

As a manufacturer specializing in filters, we keep speedy research and development in mind as we reflect customers' requests and society's needs in our product development. In accordance with research and development regulations, we consolidate planning and development proposals in the Research & Development Division, where they are converted into projects. The feasibility of moving forward with a project is determined through design reviews and conferences with the participation of top management.

We have approximately 90 employees involved in research and development work, making this an exceptionally large department relative to the size of the company. In the Yokosuka Innovation Center, which started operation in February 2022, we consolidated units that had been spread out among the Yokohama (Sugita) Development Center and Yokosuka Media Lab. Some staff have also been allocated to the Saga Branch Office and the Suzhou Development Center in China.

The research and development site comprises a division that provides core support for the group, with responsibility for development from a medium-term perspective (new product development) in which the Development Design Department and the Research & Development Department envision product lines one to five years in the future, as well as (basic) research from a long-term perspective to cultivate technologies that are essential to us as a manufacturer. Since FY2023, in order to reinforce trend-conscious development work, we have strengthened our system for elemental technologies in the Research & Development Department, including new exploration. In the Development Design Department as well, we carried out a restructuring within the organization, including strengthening of the system to improve cost, and the quality it produces.

Setting Research and Development Goals

For our FY2022 research and development targets, we adopted the theme of next-generation model filters, and we worked to produce results in this area.

Major FY2022 Development Themes

- Development of filters for the next generation of product models (Aeration measures, etc.)
- ICT filter development (contamination level sensors, differential pressure sensors, etc.)
- Filters for agricultural machinery
- Long-life filters for construction machinery
- Development of products utilizing nano-fibers, etc.

Interaction with Customers

Our Research & Development Division and Sales Division work together to communicate promptly with customers every day so that we can reflect customer requests in our products. After the COVID-19 pandemic, we resumed in-person visits in FY2022, and have conducted training sessions on filters at our sales office in Thailand in efforts to deepen interaction with customers.

Collaboration with Research Institutes

We are conducting joint work with the New Energy and Industrial Technology Development Organization (NEDO) to research and develop innovative sensing devices that could overcome the difficulties current IoT technologies are having in detecting ultra-fine dust, and enable operation and measurement in extreme environments characterized by drastic temperature distributions and flow intensity.

TOPICS

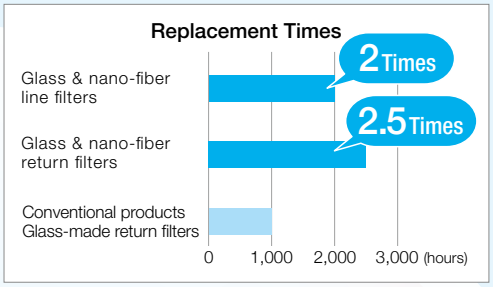
Environmentally Friendly YAMASHIN-FILTER Products

Use Disposal

Extending Long-life Filter Service Life Even Further

Return filters and line filters for large-scale construction machinery that use nano-fibers help reduce waste because of their major extensions of service life. While the replacement time for return filters is 1,000 hours*, those made with glass and nano-fiber have replacement times of 2,500 hours, and with line filters as well, this effect of nano-fibers also enables a long service life of 2,000 hours with the same excavator.

*Filter products using glass fiber only

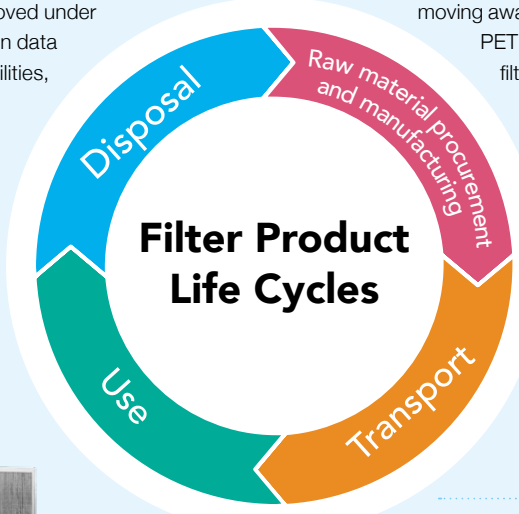


Use Disposal

NanoWHELP® Air Filters Contribute to CO_2 Emissions Reduction

Incorporating nano-fibers, NanoWHELP® has earned a strong reputation for filter performance and environmental friendliness (approved under U.S. MERV14 standards). Used in data centers, hospitals and public facilities, NanoWHELP95 can reduce CO_2 emissions by 23% per year* compared to our company's other products. In FY2022, NanoWHELP® sales volume was six times greater than in its first year, and we will continue to expand its adoption as a product that protects health in all kinds of settings.

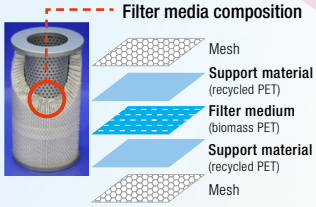
*Third-party assurance obtained



Raw material procurement and manufacturing

Using Filtration Media with Low Environmental Impact Materials

Aiming to put in place circular materials that help reduce CO_2 emissions and dependence on fossil resources, we are moving away from conventional petroleum-derived PET resins, and toward the development of filtration media made using biomass PET. The use of biomass PET for filtration media and recycled PET for support material enables us to reduce CO_2 emissions by approximately 30% per filter (according to in-house calculations).



Use Disposal

Reusable Mask Products

Our mask products such as Zexeed®, the ultimate YAMASHIN filter mask, incorporate nano-fibers that are even finer than the micro level in a three-dimensional porous structure that prevents exposure to virus droplets, pollen, and PM2.5 particulates. These are high-performance masks offering strong collection capabilities and negligible degradation in performance even after prolonged use. They can be washed and reused repeatedly, which helps conserve resources and reduce waste.

Transport

Lightweight Transmission Filters

By switching the material of our element replacement parts to resin as a substitute for our steel cartridge type transmission filters, we have succeeded in reducing the weight by about half, which reduces CO_2 emissions in the manufacturing process as well as in product transportation.