



RELEASE

Yanmar Unveils its Exciting New eFuzion Concept at bauma

The eFuzion concept – a spectrum of innovative technology in a single concept machine

Munich, 9 April 2019. At this year's bauma, Japanese manufacturer Yanmar is presenting an original new concept vehicle to the public for the first time. Packed with innovative technology, the eFuzion concept demonstrates the depth and breadth of Yanmar's global R&D, investing efforts in developing and implementing innovative technologies to inspire creativity and unleash future possibilities. Yanmar is a leading global manufacturer of industrial equipment, and market leader in compact construction equipment. The eFuzion concept, primarily developed by Yanmar's robotics research team, is a working demonstration of a precision machine with a robot arm that shows the possibilities of autonomous construction machinery of the future.

The eFuzion concept - sustainable technologies for the future

The eFuzion concept is a vehicle from Yanmar's research centers to demonstrate technologies for tomorrow's industry and production that are at an advanced level of development. "All key technologies of e-mobility, robotics, connectivity, autonomous driving and computer-assisted operations have been integrated into our eFuzion concept," explains Giuliano Parodi, Chairman and CEO of YANMAR Construction Equipment. "With eFuzion, we can prove our strengths in innovation and demonstrate that we are developing technologies that will further revolutionize industry 4.0."

The eFuzion concept moves autonomously in a specially designed eCubator, a 6 x 6-meter cube. The networked, intelligent vehicle carries out all-electric, autonomous operations under its own programming. In the eCubator demonstration, the eFuzion machine utilizes its precision fine motor control by selecting red balls with its robotic arm, before adding the respective red ball to another box, gradually creating the Yanmar logo. The two different processes illustrate how the machine performs an excavation task autonomously, while avoiding or overcoming obstacles such as those that occur on a construction site. In the second case, the machine is operated manually to grab an object on the construction site.

The name eFuzion concept derives from "e" for electric and "Fu" for future, and symbolizes the digitization and transformation of processes in business and industry. The surface of the eCubator, a 6 x 6-meter cube, changes from opaque to transparent, making the concept machine visible, but only

1

eFuzion





does so for demonstration purposes. The name intends to invoke associations with “incubator”, as in start-ups and their disruptive ideas. The technologies behind such disruptions, which change processes in industry and economy, are under development at Yanmar’s R&D centers.

The eFuzion concept is by no means a stand-alone demonstrator of technology. Rather, it is the result of Yanmar’s extensive technology and research foundation, which, together with proven technologies from other Yanmar business segments, is the result of the company’s own research and development activities.

CASE - Connected, Autonomous, Sharing, Electrification

With CASE, Yanmar is looking at how its customers will work and do business in the next 100 years.

Yanmar already offers thousands of customers advanced communications and IT solutions with SMARTASSIST-REMOTE, a system that allows any user with a smartphone to remotely monitor extensive data about the operational status, location and work of their machinery in real time. From the agricultural sector comes the technology of autonomous agricultural equipment, already on sale and in use in Japan. Responding to the needs of society to better mobilize under-utilized resources, Yanmar has made forays into the sharing economy with a construction equipment platform in the Turkish market and a strategic partnership in GetMyBoat, a leading boat rental platform operating globally. Meanwhile, research continues into various electric drive systems designed to fulfill the needs of industry and consumers in the new century. Current efforts include diesel hybrid engines for boats and hydrogen fuel cell-powered boats in Japan.

Worldwide research and development centers

Yanmar is continuously developing technologies in the areas of food production and energy conversion. Using minimal resources and delivering the best possible results - this is the core of solutions needed to provide society with a more prosperous outlook in the future. These are created at Yanmar’s six research centers, which focus on fundamental research around the world, supporting all of the company’s practice-oriented businesses.

Three of these centers are located in Japan. The Research & Development Center (Maibara, Shiga Prefecture), the core center of the Yanmar Group, explores automatic driving, robotics and energy technologies. While the Bio Innovation Center, Kurashiki Laboratory (Kurashiki, Okayama Prefecture), is developing sustainable food production systems in cooperation with domestic and foreign facilities, the Bio Innovation Center Marine Farm (Kunisaki, Oita Prefecture) deals with

2

eFuzion





modern technologies for the fishing industry. Focusing on the Asian market, Yanmar Kota Kinabalu R&D Center (Kota, Kinabalu, Malaysia) produces and analyzes biofuels and researches technologies for fisheries and agriculture. Meanwhile, the Yanmar (Shandong) R&D Center (Shandong, China) is working with leading Chinese companies and research institutes on solutions for energy conservation, food production and clean energy. In Europe, Yanmar R&D Europe (Tuscany, Italy) is collaborating with local universities in researching evaluation technologies for future forms of energy such as local energy networks, advanced simulation and robot control technology, and was instrumental in the development of the eFuzion concept.

Cutting-edge technology from global research and development

Yanmar's R&D competencies span five areas. Y-Robotics engineers work on field robotics to work autonomously and automatically in a complex environment. Measurement detection technology, intelligent control technology and system control, as well as mechanization and mechanical technology, will help people to work with greater precision and safety, and less effort. Y-Energy is engaged in the research and development of next-generation drives that use different energy sources for hybrid drives and electric motors. The spectrum covers motor and hybrid technology, power electronics/energy transmission technology, technology for electric and heat storage, hydrogen/heat and energy management technology. Y-Cultivation focuses on biotechnologies for agriculture and fisheries. The use of breeding and propagation technologies, biological monitoring and evaluation technology as well as environmental control technology serve to improve product yield and quality. Y-Quality researchers build and develop basic technologies with which high-quality products can be designed, manufactured and evaluated. They concern ergonomics, materials, design, evaluation and prediction, as well as diagnostic and security technology. The products are designed for maximum safety and high capacity utilization, so that customers can work effectively without interruption. The Y-Experience area develops technologies that help customers make better use of their time. These include remote, cognitive technology, automated driving technology, automatic response technology and the complete range of IoT technology.

Yanmar Construction Equipment

Today Yanmar is a leading global player in the industrial machinery industry. In the construction equipment sector, Yanmar was first to market with the launch of the first mini excavator in 1968 and its invention of the revolutionary zero-tail excavator in 1993. Yanmar now leads the European market in compact construction machinery. Yanmar Construction Equipment Europe employs over 800

3

eFuzion





YANMAR

people at two production plants in Crailsheim, Germany and Bezannes, France, to deliver a range of products and services to the European market.



Yanmar eFuzion.jpg
Photos: © YANMAR Co. Ltd.



Yanmar eCubator.jpg

About YANMAR

With its beginnings in Osaka, Japan, in 1912, Yanmar was the first to succeed in making a compact diesel engine with a practical size in 1933. With industrial diesel engines as the cornerstone of its enterprise, Yanmar then continued to expand its product range, services, and expertise to deliver total solutions as an industrial equipment manufacturer. As a provider of small and large engines, agricultural machinery and facilities, construction equipment, energy systems, marine equipment, machine tools, and components, Yanmar's global business operations extend across seven business units.

For more information, please visit <https://www.yanmar.com/global/about/>

4

eFuzion

