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## Солнечный льдогенератор нового типа

Высокотехнологичное решение из Южной Германии – для немецко-индонезийского проекта

В будущем мелкие рыбные хозяйства неблагополучных регионов Индонезии смогут продавать свою продукцию по всей стране благодаря использованию непрерывных холодильных цепей. Это стало возможным за счет применения солнечного льдогенератора блочного льда. Такой льдогенератор нового типа был разработан в рамках многолетнего немецко-индонезийского сотрудничества. «Рыба не портится, лед вырабатывается абсолютно экологично, — сообщает Франк Штегмюллер из Германского общества международного сотрудничества (GIZ). — Это настоящая немецко-индонезийская история успеха».

Индонезия является мировым лидером по производству тунца и вторым по величине производителем рыбы в целом. Однако мелким рыбным хозяйствам, использующим экологичные способы ловли рыбы, часто не удается довести свою рыбу до потребителей из-за отсутствия возможности её охлаждения. В результате этого мелкие рыбные хозяйства практически не в состоянии конкурировать с крупными производителями рыбы; значительная часть рыбы портится, а рыбаки беднеют.

Политики Индонезии намерены принять меры по сохранению имеющихся запасов рыбы и обеспечить рыбакам из отдаленных областей стабильный доход. Решающую роль в этом играет непрерывное охлаждение пойманной рыбы. По инициативе и при поддержке GIZ началась разработка солнечного льдогенератора. Кроме того, совместно с несколькими индонезийскими, немецкими и европейскими компаниями было налажено производство льдогенераторов в самой Индонезии. В 2016 году началась разработка, в 2018 году была успешно запущена пилотная установка, а в нынешнем 2021 году в Индонезии будет введена в эксплуатацию первая промышленная установка.

Отвечая основной идее Индустрии 4.0, данная инновационная технология обеспечивает динамичное и автоматически адаптированное к имеющейся солнечной энергии производство до 1,2 т блочного льда в день. Для этого не требуются ни электропитание, ни дорогой аккумулятор большой емкости. Это позволяет вырабатывать блочный лед в местах, отдаленных от электросетей, и использовать его для охлаждения пойманной там рыбы. По словам господина Штегмюллера из GIZ: «Это обеспечивает стабильный доход рыбакам, ведущим экологическое хозяйство, именно в отдаленных, малообеспеченных регионах Индонезии».

Компоненты и ноу-хау были безвозмездно предоставлены на стадии разработки немецкими компаниями Bitzer, Ziehl-Abegg и BAE Batterien. За разработку и техническое сопровождение отвечали эксперты Дрезденского института вентиляционной и холодильной техники (ILK Dresden). Производство льдогенераторов осуществляется на индонезийском промышленном предприятии Selaras Mandiri Teknik (AIREF). Партнерами проекта являются также компании REC Solar, ATW Solar, Studer и Omron.



Индонезийская компания PT. Selaras Mandiri Teknik, расположенная в Джакарте и Сурабае, является ведущим специализированным производителем холодильной техники. Под марками Airef и Greenhalgh эта компания, а также ее дочерние компании Aiscool и Starr Panel предлагают высокоэффективные, отвечающие мировым стандартам решения в области холодильной техники для различных сфер промышленного применения. Компания Selaras Mandiri Teknik имеет годовой оборот \$12 млн, насчитывает 200 сотрудников и ведет свою деятельность в 7 странах мира.

Германское общество международного сотрудничества (GIZ) содействует международному сотрудничеству в области устойчивого развития с целью обеспечения достойного будущего во всем мире. Эта некоммерческая федеральная организация насчитывает около 20100 сотрудников в 120 странах мира, а ее годовой оборот, осуществляемый по поручению федеральных министерств Германии и других заказчиков, составляет около 3 млрд евро. С 1975 года GIZ оказывает поддержку немецко-индонезийскому сотрудничеству на месте в таких сферах, как энергия, охрана окружающей среды и профессиональное образование (данные за 2019 год).

Компания Ziehl-Abegg (Кюнцельзау, Германия) является одной из ведущих мировых компаний в сфере производства техники для вентиляции, техники автоматического регулирования и приводных систем. На предприятиях этой высокотехнологичной компании (все данные за 2019 год), расположенных в Южной Германии, заняты 2400 сотрудников. Во всем мире на предприятиях компании работают 4300 сотрудников. Оборот составляет 633 млн евро. Три четверти оборота приходится на экспорт.

## Productivity Master points the way to digitalization

Seamless connectivity of handling and software solutions developed by Festo

The Productivity Master, a modular demonstration system for personalised USB memory sticks from Festo, is showing how automation technology will evolve along the value chain when combined with digitalisation. Thanks to seamless connectivity, everything fits perfectly, from the mechanical and electric systems to the intelligence. The Festo automation platform provides an integrated and practical system to link all Festo engineering tools, components and solutions in hardware and software.

The plant achieves the automation balancing act between mass production and individualization of a finished product. The electrical products, the axis mechanics, the electric and the software are planned as a complete automation platform with seamless connectivity. With this consistency, users save a lot of time in their machines and systems – from planning to commissioning – and gain process reliability because everything fits together. Industry 4.0 included.

### Cloud-based concept

For example, the Productivity Master uses a cloud-based concept for registering and storing customer data complying with data protection regulations. This allows USB sticks to be produced with a personalized design as well as personalized data content. Customers could do this from home via the Internet without having to enter further data from other people on the supplier side.

Customers can use the same concept to reduce labour costs and coordinate the process from the home office. Festo's IoT gateway securely connects the machine to the cloud so that operators cannot only retrieve production data from the cloud, but also have access to the machine's diagnostic data, even if they are sitting hundreds of kilometres away in their home office.

### Mask production and vaccines

The pandemic year 2020 revealed just such a contrast between mass production and individualization or small series production in the examples of mask production and vaccine research. The latter is more focused on precise data collection. For mass produc-

tion, however, it is crucial to be able to use remote diagnostics and maintenance tools to maintain machine uptime as long as possible while protecting operator health. These are just about ideal conditions for cloud-based diagnostic tools.

It doesn't matter if the product weighs a few grams or 100 kg – being a technology-neutral company, Festo has the product range to do this, explains Nigel Dawson, Head of Business Development Electric Automation at Festo. While the Productivity Master features a mix of pneumatic and electric automation, from flow sensors to servo drives, from pneumatic slide units to electric Cartesian robots, it is the way these products are connected that enables true digitalization.

### Seamless connectivity

By leveraging industry-standard networks such as EtherCAT, OPC-UA, IO Link and MQTT, Festo can create a seamless data stream from individual sensors to remote IO, servo drives, controllers and the cloud. 'This technology-neutral approach has a major impact on energy efficiency and sustainability. We call this 'seamless connectivity', adds Dawson.

The machine was designed in record time. Useful here: Festo's state-of-the-art and unified engineering environment – project planning and management of the digital twins included. This allows designers and developers to work collaboratively worldwide. With the Festo Handling Guide Online HGO, users select and dimension 1D/2D or 3D gantries in just three steps. For quick and easy programming, configuration and commissioning in a shared virtual environment, they use the Festo Automation Suite.

### Digital Customer Journey

'Along the Digital Customer Journey, we enable customers to correctly and efficiently select and size their products online, add them to a shopping cart in a seamless process, view their pricing and delivery in real time, and track their products throughout the supply chain', says Dawson, describing this digital value chain. With developments in artificial intelligence (AI), Festo is expanding concepts such as digital nameplates, digital twinning and, of course, AI-driven predictions of machine conditions for remote maintenance.

### Four fully connected stations

Customers create the production order at the first station by registering with their name and perhaps a picture. A QR code identifies the visitors at the machine. A vision sensor SBSI from Festo registers the visitors and starts the production order. This is followed by stock management. This mechatronic complete solution, made up among other things of a planar surface gantry EXCM in size 40 for fast picking and placing of the USB memory stick, offers all the options from stock management and workpiece handling to the cloud.

The USB memory stick is then transported, printed, turned over and then passed on. The work steps at the second station involved are holding, moving, handling, rotating and positioning and identifying the workpiece position as well as identifying, separating, gripping and applying labels. Fast transfer to a label printer is carried out at station 3 by a highly dynamic linear gantry EXCT with dynamic servo motors EMMT-AS and servo drives CMMT-AS. The rotation functions are carried out by electric rotary drives ERMH.

The process is completed in station 4 where files are uploaded to the USB memory stick. This involves holding the workpiece, turning and carefully positioning the cap and press-fitting delicate parts. This is done using the attractively priced electric cylinders EPCO and rotary drives ERMO. The personalised USB memory sticks are then handed out to the visitors.

Festo is a global player and an independent family-owned company with headquarters in Esslingen am Neckar, Germany. The company supplies pneumatic and electrical automation technology to 300,000 customers of factory and process automation in over 35 industries. The products and services are available in 176 countries. With about 21,000 employees in over 250 branch offices in 61 countries worldwide, Festo achieved a turnover of around €3.07 billion in 2019. Each year around 8% of this turnover is invested in research and development.

In this learning company, 1.5% of turnover is invested in basic and further training. Yet training services are not only provided for Festo's own staff – Festo Didactic SE also supplies basic and further training programmes in the field of automation technology for customers, students and trainees.

## Innovative cobot ideas

New modular gearbox kit from igus



Cost-effective, lightweight plug & play combination consisting of gearbox, encoder, controller, force control system and motor for service robotics. The potential for service robotics is enormous: in kitchens and bars, in the area of nursing, or in agriculture and logistics, lightweight robots facilitate the automation of monotonous or non-ergonomic tasks. To make the implementation of such new concepts easy and, above all, cost-effective, igus is presenting a new modular gearbox kit for cobots at the Hannover Trade Show. The fully integrated tribo strain wave gear with motor, absolute-value encoder, force control system and controller is the main component of this kit.

'With our Low Cost Automation solutions, we enable design engineers to cost-effectively take part in the future of service robotics', says Stefan Niermann, who is responsible for the area of Low Cost Automation in the extended igus management structure. 'This opens up space for new ideas in the area of automation: robots that can dispense coffee in retail shops or clear out the dishwasher at home. Cobots, that can be used in the area of nursing as well as in industry – and everything made in Germany! The gearboxes play an especially important role in this context as they are the heart of any modern robot. For this reason, motion plastics specialist igus introduced a new generation of tribo strain wave gearboxes for movement on the 5th robot axis last year. Friction and wear are optimised by means of lubrication-free tribo-polymers. The use of plastics enables an extremely compact design and cost-effective production. The drygear strain wave gear can be

used along the last axis of an articulated arm, linear robot or delta robot, for example, in front of different gripper systems. The new modular gearbox kit for cobots that igus is showing at the Hannover Trade Show 2021, supplements the wide range of igus products in the area of Low Cost Automation. This plug & play solution facilitates the speedy implementation of exciting cobot ideas, without any thought being given to the power electronics.

### Fully integrated strain wave gear for low cost cobot applications

The modular gearbox kit in sizes 80 and 105 consists of tribo strain wave gear with integrated motor controller, force control electronics, absolute-value encoder and motor. In the gearbox, a tribo wave generator and a tribo flex ring with external teeth, as well as a brushless DC motor with external rotor are used. On the basis of the gearbox, an individual robot can also be designed

as a cobot with the help of joining links, thanks to the additional electronic components. 'For our lightweight strain wave gears, we see market opportunities in robots whose total weight is less than 8kg', clarifies Alexander Mühlens, head of Low Cost Automation at igus. 'This is because, where robotics in Low Cost Automation is concerned, the self weight is always important and not only the payload and a low price. Lightweight robots are easier to transport and can be used more efficiently on driverless transport systems, on 7th robot axes or, in the near future, even on drones.' The low weight is also a significant advantage when the systems are used in cobots, as smaller masses mean that lower forces are generated when collisions occur. HRC capabilities are possible thanks to the electronic components in the fully integrated strain wave gear. Thanks to absolute-value encoder technology, forces as well as torque can be determined and safely limited by means of the motor current. For this purpose, igus relies on a double encoder, in which a measurement is carried out in front of and behind the joint in order to detect forces and torque levels and react accordingly.

### The igus range of products in the area of Low Cost Automation is growing continuously

The new fully integrated strain wave gearboxes are to be used this year in the new version of the ReBeL, the igus service robot. As a result, this generation of robots will be considerably slimmer and, thanks to the integrated BLDC motors with power electronics, will be more cost-effective. Alexander Mühlens points out: 'Our goal is to offer the ReBeL on the market for 2,900 euros even for small order quantities. It should be able to carry 2kg, have a range of up to 650mm, as well as a self weight of less than 10kg and a minimum running time of 2 million cycles.' The cobot gearbox kit supple-

ments the wide portfolio of igus in the area of Low Cost Automation – from gearboxes and a large variety of robot kinematics to the control system. Low Cost Automation means cost-effective prices for new users and also automating as much as necessary. As a result, the investment pays for itself in just a few months. The new modular gearbox system will also be available on RBTX.com. On the online marketplace, interested parties can put together their robot kinematics with vision, safety or gripper components that matches their requirements and their budget exactly. The igus promise is that everything fits together, both on the hardware side and software side – in accordance with the igus 'Build or Buy' approach, namely putting together a robot oneself or obtaining a ready-made solution.

igus GmbH develops and produces motion plastics. These lubrication-free, high-performance polymers improve technology and reduce costs wherever things move. In energy supplies, highly flexible cables, plain and linear bearings as well as lead screw technology made of tribo-polymers, igus is the worldwide market leader. The family-run company based in Cologne, Germany, is represented in 35 countries and employs 3,800 people across the globe. In 2019, igus generated a turnover of €764 million. Research in the industry's largest test laboratories constantly yields innovations and more security for users. 234,000 articles are available from stock and the service life can be calculated online. In recent years, the company has expanded by creating internal startups, e.g. for ball bearings, robot drives, 3D printing, the RBTX platform for Lean Robotics and intelligent 'smart plastics' for Industry 4.0. Among the most important environmental investments are the 'change' programme – recycling of used e-chains – and the participation in an enterprise that produces oil from plastic waste. (Plastic2Oil).

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