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Innovation Pathway

Hainan Special Customs Operations to Boost Trade

Edited by WANG Xiaoxia

The Hainan Free Trade Port (FTP) in southern China officially launched island-wide special customs operations on December 18, a milestone in China's effort to expand high-level opening up and promote an open world economy.

The island-wide special customs operations aim to eliminate barriers with a two-tiered customs system, described as "freer access at the first line, regulated access at the second line and free flow within the island."

The "first line" is between Hainan and overseas markets, and the freer access allows overseas goods to enter the island more conveniently, with most of them benefiting from zero tariffs and faster clearance.

The "second line" defines the customs boundary between Hainan and the mainland, where goods will undergo standard customs oversight to ensure fairness and prevent smuggling.

After the special operations, zero-tariff products in the FTP will increase from 21 percent to 74 percent, while the number of tariff-free items in Hainan rises to around 6,600, covering nearly all production equipment and raw materials.

The Hainan FTP will implement more favorable zero-tariff policies, more lenient trade management measures, more simplified customs clearance procedures and more efficient and precise supervision, according to a Hainan provincial government official.

At a recent investment promotion event, Liu Xiaoming, the governor of Hainan, pointed out that choosing Hainan means choosing opportunities, and investing in Hainan means investing in the future.

Hainan's unique conditions, combined with open policies, are bolstering multiple industrial upgrades. The secure and orderly flow of data is helping develop digital industries, and the existing petrochemical industrial chain can be extended to develop high-end new materials and green chemical industries.

Hainan's Nanfan breeding base is a vital hub for research, testing, and producing new crop varieties and seeds. Its resources are expanding the modern seed industry.

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A view of the Yangpu Economic Development Zone at the Hainan Free Trade Port. (PHOTO: XINHUA)

STI Frontier

Tianquan Solver: Smart Brain for Major Grid System

By LU Zijian & ZHANG Jiaxing

Dubbed as the "core of industrial software," solvers are a key tool for finding solutions to complex mathematical programming problems. They are essential for deriving optimal operation solutions in sectors like energy, finance and logistics, according to Peng Chaoyi, technical lead of Tianquan at the Electric Power Dispatching and Control Center, China Southern Power Grid Co., Ltd. (CSG).

Developed by CSG, the Tianquan Solver is 14 percent faster than imported solvers in terms of computing performance. It has, to date, supported efficient computation for over 7,000 model nodes and more than two million clearing variables within the southern China regional electricity market (Guangdong, Guangxi, Yunnan, Guizhou and Hainan provinces and regions) since the market initiated continuous settlement.

Laying the foundation

An electricity pricing reform took place in 2015, and solvers became key to finding the most reasonable solution. Domestic solvers lagged behind at that time, and CSG decided to catch up.

Many domestic solvers used open source underlying codes that were not optimized, Peng said, adding that this was the biggest reason for the lagging performance.

To tackle this problem, the research team consulted experts from dozens of institutions in mathematics, computer science and electricity. They compiled vast experience, then abstracted these operational insights and physical principles into mathematical models, generating languages that solvers can understand.

In Peng's opinion, the biggest challenge was to find the balancing point and enhance the precision of "translating" the dispatching and operation experience. "Some of the experience was accumulated for years, and the decision needed to be split into different models without being too complicated," he said.

Based on comprehensively understanding the experience and back-and-forth discussions, Tianquan achieved the integration of power system expertise into the solution calculation process for the first time.

Practical test

However, getting the codes right was only the first step before Tianquan could make its mark in the power market. It took over 20,000 seconds (over five hours) for the solver to process its first case, and that was 11 times as long as imported solvers took, Zhou Huafeng, senior manager at the automation department of Electric Power Dispatching and Control Center, CSG, said.

To optimize Tianquan, the researchers first went through mountains of research papers and materials, but the approaches they found could only achieve small-scale optimization, which was almost ineffective for industrial-level applications.

They went back to the prototype of Tianquan, and made it do a large amount of case calculating.

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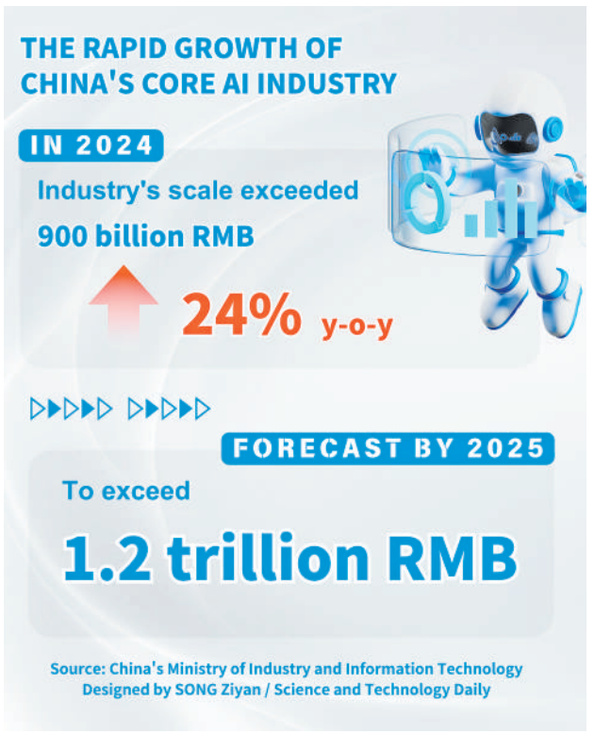
New Graphic



Forum Assists Integration of Sci-tech & Industrial Innovation

By Staff Reporters

The 2025 Enterprise Science and Technology Innovation Development Forum, jointly held by *Science and Technology Daily (S&T Daily)* and the Federation of Guangdong Academicians (FGA), in Shenzhen, Guangdong province in south China, discussed how to tackle barriers in integrating sci-tech innovation and industrial innovation.

"Only when research and industry join hands can innovation truly thrive," Guo Renzhong, academician of the Chinese Academy of Engineering and president of FGA, said, adding that the FGA has compiled a total of 345 industrialization requirements from academician teams, and served nearly 1,000 enterprises and public institutions.

Commercialization of sci-tech achievements is a key factor to promote the integrated development of sci-tech innovation and industrial innovation. Shenzhen has pioneered a system to serve the commercialization process.

Wang Hui, director of the Shenzhen Technology Promotion Center for New Quality Productive Forces, said the city has taken the lead nationwide in certifying senior professional technical managers, with 302 individuals currently holding the designation.

These technical managers are not only well-versed in cutting-edge science and technology, but are also familiar with industries and capital. They connect different stakeholders and provide comprehensive and professional support for technology commercialization in terms of early-stage startup service, scenario exploration and financing.

The attendees reiterated the principal role of enterprises in promoting the integration of sci-tech and industrial innovation.

Enterprises span both technological innovation and industrial innovation phases, so an outstanding enterprise must effectively manage the integration of both dimensions, according to Lin Xiaodong, vice president of ZTE.

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International Cooperation

Sino-Thai Joint Lab for Quantum Tech Launched

Edited by WANG Xiaoxia

This year marks the 50th anniversary of China-Thailand diplomatic relations, and the long friendship has seen an increasing level of sci-tech cooperation and exchanges between the two countries.

China and Thailand launched a joint lab for quantum science and technology during the recent Sino-Thai Symposium on Quantum Science and Technology in Bangkok, which was attended by nearly 100 experts from the University of Science and Technology of China (USTC), Thailand's Chulalongkorn University (Chula) and 10 other universities.

The USTC-Chula Joint Lab for Quantum Science and Technology was officially inaugurated, and the two universities signed a memorandum of understanding, reaching consensus on jointly promoting cooperation in quantum technology, AI chemistry and other areas.

Zhang Jianwei, Chinese ambassador to Thailand, said China is willing to enhance exchanges and cooperation with Thailand under the framework of the Belt and Road Initiative, jointly promote the development of quantum technology and industry, and bring more benefits to the people of both countries.

The cooperation on quantum technology between Thailand and China is crucial to improving the sci-tech strength of both countries, which is also in line with Thailand's economic development strategy with innovation as the main driver, said Supachai Pathumnakul, deputy permanent secretary for the Ministry of Higher Education, Science, Research and Innovation of Thailand.

WEEKLY REVIEW

Farthest Offshore Wind Farm Gets Full Grid Connection

China's most offshore wind project — the Three Gorges Jiangsu Dafeng 800 MW offshore wind farm — achieved full grid connection on December 15. The project comprises four sites with the farthest point extending 85.5 kilometers offshore. It is expected to generate over 2.8 billion kW of electricity annually, which equates to saving approximately 860,000 tonnes of standard coal and reducing carbon dioxide emissions by about 2.37 million tonnes.

First Level-3 Autonomous Driving Permits Issued

The Ministry of Industry and Information Technology released China's first Level-3 autonomous driving vehicle permits for two models that will conduct pilot operation on designated areas in Beijing and Chongqing. The approvals were given to Changan Automobile and BAIC Motor's Arcfox. The highest speed for their autonomous driving could reach 50 km/h and 80 km/h respectively.

World's First Human Heart-like Organoids Developed

Using donated human stem cells, a research team at Michigan State University has successfully developed the world's first human heart-like organoids to study atrial fibrillation (A-fib). These organoids exhibit A-fib characteristics when exposed to inflammatory environments. This breakthrough provides an unprecedented living human tissue model for studying arrhythmias, potentially breaking the 30-year impasse in new treatment development for this field.

Miniature New Device for High-precision Laser Manipulation

A joint research team from the University of Colorado Boulder and Sandia National Laboratories has developed an ultra-miniature optical phase modulator. Measuring one-hundredth the diameter of a human hair, this device manipulates laser frequencies with exceptional precision and minimal power consumption, laying a crucial foundation for future large-scale quantum computers.

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