科技日報

RESPONSIBLE AI DEVELOPMENT BENEFITS THE WORLD

PAGE 3 | INSIGHTS

BARRY MARSHALL, WHO BUSTED THE ULCER MYTH

PAGE 4 | LIFE IN CHINA

Science and Technology Daily

VOL.4-NO.152 AUGUST 3-4, 2024

Homegrown Drilling Method Sets World Records

By Staff Reporters

In 2022, the Hong Kong International Airport saw its number of passengers rise significantly with the addition of a third runway.

The third runway is supported by a crucial oil pipeline like a major artery. However, few know about the world records behind this pipeline. It was constructed by a Chinese private company that used non- excavating directional drilling equipment and technology to drill a distance of 5,200 meters beneath the seabed at depths of over 100 meters — a world-first achievement.

Using "minimally invasive surgery" method

In 2015, the airport planned to build the third runway through land reclamation. This meant a new seabed oil pipeline would have to be built as the existing one would be buried. A budget of over one billion HKD (about 929 million RMB) was earmarked for the project, which saw numerous companies vie for it, including Huayuan Science and Technology Co.

"This is a tough nut to crack," Huayuan chairman Shi Zhanhua said when he reviewed the engineering plans. The project involved building a 5,200- meter horizontal pipeline that would have to cross over 200 meters of rubble, mud layers, hard granite, and alternating rock fracture zones under the sea. The proximity to the runway and a wildlife sanctuary made it more complex.

Many bidders proposed intermediate land reclamation to connect the ends, but this solution was rejected due to its higher costs and environmental disruption.

Huayuan's technical team decided to use a basic non-excavating horizontal directional drilling method, a method it had developed in 1996. Before that, only foreign countries had the know-how.

The traditional excavation method means directly digging into the surface or tunneling under the sea to lay pipelines. "It is akin to incision- suture surgery, with large wounds and slow recovery," Shi explained to *Science and Technology Daily*. "In contrast, non- excavating horizontal drilling is like minimally invasive surgery. It leaves a 'small wound' and also ensures 'fast recovery.'"

The "shaking hands" construction method

Since the project presented unprecedented technical and equipment demands, Shi said, "We must find a new approach."

The team decided to drill from opposite sides. Conventional single- ended drilling loses thrust over long distances, whereas bi- directional drilling enables covering significantly more ground.

"It is like two people shaking hands," explained Huayuan team member Rong Hailong. "Drilling from both ends simultaneously and meeting in the middle greatly increases the drilling length."

The team made repeated experiments in a 10m x 10m test site, ingeniously designing a plan to drill 5,200 meters without slurry leakage.

There were other hurdles during drilling.

"It was extremely challenging to align the two drill heads over several kilometers, much like threading two needles in a house over 100 square meters," Shi said.

See page 4

The first batch of China-built medium-frequency antennas of the Square Kilometer Array (SKA) was shipped to South Africa on July 31, marking a significant step for the construction of the world's largest radio telescope array. The photo shows that China-built medium-frequency antennas of the SKA undergo test verification. (PHOTO: XINHUA)

WEEKLY REVIEW

Highest Energy Gamma-Ray Spectral Line Detected

On July 25, researchers from the Institute of High Energy Physics of the Chinese Academy of Sciences reported their discovery of a gamma-ray spectral line. The energy of this line in the main phase of gamma-ray burst (GRB) reached up to 37 million electron volts, which is the highest gamma-ray line observed in the universe. This research is of great value for further study of GRB emission mechanisms and astrophysical jets.

Two Pioneering Satellites Put into Use

China put an atmospheric environment monitoring satellite and a terrestrial ecosystem carbon monitoring satellite into use on July 25. The former is the world's first high-precision remote sensing satellite employing laser active detection technology, while the latter is the world's first remote sensing satellite for forest carbon sinks, which combines both active and passive observations. These satellites are intended to support the goals of carbon peaking and neutrality.

High-performance Plastic-based Thermoelectric Material

A high- performance plastic-based thermoelectric material has been developed by Chinese researchers. This material utilizes temperature differences to generate electricity and is characterized by lightness and softness. It holds great potential for applications in the field of wearable devices.

World's First Atomic-scale Quantum Sensor

An international research team from Germany's Forschungszentrum Jülich and Korea's IBS Center for Quantum Nanoscience has developed a quantum sensor capable of detecting minute magnetic fields at the atomic length scale. This work marks an important milestone in the field of quantum technology and is expected to have far- reaching implications for various scientific disciplines.

JWST Images Super-Jupiter Planet

The James Webb Space Telescope (JWST) has imaged a super- Jupiter planet located approximately 12 light-years away from Earth. This Jupiter-like giant is one of the coldest exoplanets directly detected by human beings so far. Unlike the previously identified planet b, this one is more likely to be the only giant planet in the system.

Editor's Pick

Sci-tech Modernization Backbone of Chinese Modernization: Science and Technology Minister Yin Hejun

By LIU Yin, QI Liming, LIANG Yilian & WANG Jing

The recently concluded third plenary session of the 20th Communist Party of China (CPC) Central Committee called for deepening reform of the sci-tech system, improving the management of sci-tech programs, and reforming the mechanism for the transformation of sci- tech achievements. The plenary session reviewed and approved the *Resolution of the CPC Central Committee on Further Deepening Reform Comprehensively to Advance Chinese Modernization*, proposing integrated reform of the education, science and technology and talent systems.

In this exclusive interview, Science and Technology Minister Yin Hejun talks to *Science and Technology Daily* about constructing a mechanism to support comprehensive innovation, the challenges to deepen sci- tech reform, as well as how to promote deep integration of sci-tech innovation and industrial innovation through reform.

Sci- tech modernization is the key to Chinese modernization

Q: The plenary session proposed to construct a system and mechanism that will support comprehensive innovation and gave priority to reform of the sci-tech system. What does that involve?

Yin: China's success demonstrates that reform is a key factor in determining the future of our country. Since the 18th CPC National Congress (in 2012), Xi Jinping, General Secretary of the CPC Central Committee, with remarkable courage and insight, has personally designed, deployed, and promoted a series of major reforms, creating a new landscape for deepening reforms. The breadth, depth, and intensity of these reforms are unprecedented. The recent plenum, held amidst complex international and domestic situations and a new round of sci- tech revolution and industrial transformation, reflects the CPC Central Committee's determination and confidence in advancing reforms, signaling a new phase in the construction of Chinese modernization.

General Secretary Xi pointed out that the key to Chinese modernization lies in sci-tech modernization. Whether we can build a modern socialist country in all respects by the target date depends on achieving sci- tech self- reliance and self- strengthening. The CPC Central Committee places sci-tech innovation at the core of national development, implementing strategies to rejuvenate the country through science and education, strengthen it with talent, and drive development through innovation.

The 20th CPC National Congress (in 2022) laid out a strategic plan to build China into a strong sci-tech power by 2035. At this year's national science and technology conference, General Secretary Xi explained in depth why and how to build a strong sci-tech power, rallying the entire party and society. We must fully comprehend his strategic intentions, recognize that Chinese modernization must be supported by sci-tech modernization, and give full play to the foundational and strategic support role of technology.

This resolution integrated "education, science and technology, and talent advancement" in a single chapter, reflecting the high importance the CPC Central Committee gives to sci-tech innovation and its expectations. Sci-tech innovation has great potential to lead development but there are still many institutional shortcomings and weak points in its mechanism.

Reform of the sci- tech system is important for constructing a system and mechanism that supports comprehensive innovation and is a key measure to stimulate the innovative and creative vitality of entire society. To meet the new round of scientific and industrial revolution, accelerate China to become a strong sci-tech power, and ensure the development of new quality productive forces and high- quality development, we must strengthen the integration of sci-tech innovation and industrial innovation.

To enhance national competitiveness and respond to external risks and challenges, we must adhere to the dual drive of sci-tech innovation and institutional innovation, and accelerate high-level sci- tech self- reliance and self-strengthening.

Reform of the sci-tech system is a key part of comprehensively deepening reform

Q: China's sci- tech system reform has progressed significantly. The plenum focused on it as well. What's the next step in the reform? What are the prominent problems in the current sci-tech system reform?

Yin: Sci- tech system reform is a key part of comprehensively deepening reform. Since the third plenary session of the 18th CPC Central Committee (in 2013), a series of measures have been introduced, such as increasing R&D investment, accelerating the cultivation of young talents, and increasing support for start-ups, stimulating the innovative and entrepreneurial vitality of scientific researchers.

In response to new situations and requirements, the CPC Central Committee has strengthened centralized and unified leadership over science and technology work, established the Central Science and Technology Commission (CSTC), and reorganized the Ministry of Science and Technology (MOST), which meant a systematic restructuring of the national sci- tech leadership and management system.

Over the past year since the establishment of the CSTC, it has strengthened the coordination of policies, plans, and resources, improved the new type of whole-nation system, and accelerated the implementation of major national science and technology projects. It has overcome various barriers, cracking many tough nuts.

The effectiveness of national science and technology governance has been enhanced, decision- making efficiency has been improved, and China's sci-tech undertakings show a new atmosphere. China's Global Innovation Index ranking rose from 34th in 2012 to 12th in 2023, with our R&D expenditure ranking second in the world. Chinese researchers, high-level papers, and invention patents have been world- leading for many years.

See page 2

WECHAT ACCOUNT E-PAPER

Address: No. 15, Fuxing Road, Haidian District, Beijing, 100038. Telephone: 010-58884083 Price: 4.00 RMB **Visit: www.stdaily.com/English/index.shtml**
国内统一连续出版物号:CN11—0319 邮发代号:81—97 **Submit your article to: stweekly@stdaily.com**