



Science and Technology Daily

VOL.5-NO.196

JUNE 21-22, 2025

Championing the China-Central Asia Spirit

By LI Linxu & WANG Manxi

Chinese President Xi Jinping called on China and Central Asian countries to promote high-quality Belt and Road cooperation and forge ahead toward the goal of building a China-Central Asia community with a shared future under the guidance of the China-Central Asia Spirit.

Xi made the remarks in his keynote speech at the second China-Central Asia Summit in Astana, Kazakhstan, on Tuesday.

The cooperation between China and Central Asian countries is rooted in more than 2,000 years of friendly exchanges, cemented by solidarity and mutual trust cultivated through more than three decades of diplomatic ties, and taken forward via openness and win-win cooperation of the new era.

"Building on our collective efforts over the years, we have forged a China-Central Asia Spirit of 'mutual respect, mutual trust, mutual benefit, and mutual assistance for the joint pursuit of modernization through high-quality development'," Xi said.

Xi's announcement of the China-Central Asia Spirit was the most prominent highlight of the summit, according to Chinese Foreign Minister Wang Yi.

The spirit connotes four aspects of practices: practicing mutual respect and treating each other as equals; seeking to deepen mutual trust and enhancing mutual support; pursuing mutual benefit and win-win cooperation and striving for common development; and helping each other in time of need and standing together through thick and thin.

The summit saw a series of important outcomes with 55 cooperation documents reached and 31 cooperation measures and initiatives put forward.

One of the most important outcomes in this summit is the signing of a treaty on eternal good-neighborliness, friendship and cooperation by the heads of state of the six countries to enshrine the principle of everlasting friendship in the form of law, which demonstrates that political mutual trust between China and Central Asian countries has reached a new height. *See page 2*



The Turgusun hydropower station in Kazakhstan is built by Chinese company under the BRI framework. (PHOTO: XINHUA)

Innovation Frontier

Shantou Bay Undersea Tunnel: Engineering Miracle

By WANG Xiaoxia & HE Liang

The Shantou Bay undersea tunnel, the world's first single-hole double-track undersea tunnel, with a designed speed of 350 km per hour, has been broken through. The 9,781-meter-long tunnel is a project of the Shantou-Shanwei high-speed railway, giving a boost to regional economic development.

The tunnel was excavated from both ends by drilling, blasting and shield tunneling. During more than four years of arduous work, the engineering team overcame multiple challenges such as high-intensity earthquake zones, complex geological conditions, and extremely high water pressure.

Crossing 17 fault zones

Located in a high-intensity seismic zone, the tunnel crosses 17 fault zones and withstands an ultra-high water pressure of nearly one megapascal, said

Meng Qingyu, the tunnel's chief engineer from China Railway Design Corporation (CRDC).

It was impossible to make a detour, so the most effective solution was to reinforce the surrounding rock by grouting or applying a protective layer. To ensure safety, the CRDC team integrated the two measures and established a new technical route.

The engineering team built offshore grouting platforms on the main channel, and innovated the construction method. They first injected a circle of gel around the seabed rock to "bind" it, and then pressed ultra-fine cement into the rock to seal the cracks, transforming the loose rock into solid concrete. Months later, a protective layer measuring 36 meters wide and 45 meters long was completed, sheltering the thinnest part of the seabed stratum from broken rocks and high-pressure seawater.

However, the erosive power of seawater far exceeded prior expectations. After deliberation, engineers decided to use a concrete structure with a compressive strength of C50 in the first attempt of the high-speed railway undersea tunnel. They eventually mastered the necessary technique for preventing concrete from cracking.

Trio of geological challenges

Li Wei, the chief engineer of the Shantou-Shanwei High-speed Railway project of CRDC, is still awed by the trio of geological challenges faced during the shield tunneling.

First they encountered isolated rocks, then a strata of uneven hardness and softness, and finally rock as hard as steel. In a space of 100 meters, three huge isolated rocks blocked the path of the shield machine. A drilling and blasting system was adopted to break the rocks. *See page 3*

First Human Clinical Trial of Invasive BCI in China

By LIN Yuchen

A major breakthrough in neurotechnology has been achieved with the successful completion of China's first-in-human clinical trial of an invasive brain-computer interface (BCI) system. With that China becomes the second country in the world to reach the clinical stage in this field.

The trial was led by the Center for Excellence in Brain Science and Intelligence Technology (CEBSIT) of the Chinese Academy of Sciences, in collaboration with Fudan University's Huashan Hospital.

The participant — a man who lost all four limbs in a high-voltage electrical

accident — received the implant in March. The system has remained stable, with no signs of infection or electrode failure. After two to three weeks of training, the recipient is able to control a computer touchpad with accuracy comparable to that of an individual using hands.

The implant is one of the smallest and most flexible neural devices ever developed globally, measuring only 26 mm in diameter and less than six mm thick — comparable to the size of a coin. It has been designed to minimize the sensation of having a foreign body implanted in the brain and tissue damage.

Prior to the human trial, the system was tested on non-human primates using

CEBSIT's advanced macaque research platform.

Technologically, the system captures high-resolution neural signals at the single-neuron level in real time, enabling rapid decoding of motor intent. It incorporates an adaptive decoding algorithm that adjusts to the brain's dynamic signals, overcoming the limitations of traditional static models and enabling stable, low-latency performance across multiple days.

Upon regulatory approval, this system may offer transformative support for individuals with grave spinal cord injury, limb loss, or Amyotrophic Lateral Sclerosis, significantly enhancing their quality of life.

BRI Project Powers Green Development of Kazakhstan

International Cooperation

Edited by WANG Xiaoxia

In the green scenery of the Altai Mountains, the Turgusun hydropower plant in East Kazakhstan Oblast is an impressive sight.

Built by the China International Water and Electric Corporation (CWE), Turgusun is a key hydropower project under the Belt and Road Initiative. Construction began in 2017 and it has been operating since July 2021, helping ease local power shortage.

With an installed capacity of 24,900 kW, it can generate 79.8 million kWh of power and reduce 72,000 tonnes of carbon emissions on average annually, Sun Peng, deputy general manager of CWE Kazakhstan branch, said, adding that the power plant has assisted with meeting half of the local power gap.

During the construction of the hydropower station, more than 200 job opportunities were created for local residents, general manager Asset Maxut said, noting that this has not only promoted local economic and social development, but also further improved the ecological environment.

To protect the surrounding primeval forest, the construction team integrated environmental protection into the entire construction and operation process of the project. Thanks to the strict environmental standards, rare cold-water fish such as the taimen thrive in the Turgusun River.

This hydropower station shows the world that through technological cooperation and shared ideas, we can achieve a win-win situation for the economy, society and ecology despite the harsh environment, Maxut said.

Kalaubek Baimukhanbeto, technical advisor of the plant, said that with China's support, the country will continue to build new hydropower stations that are more modern, more environmentally friendly and have a larger installed capacity.

WEEKLY REVIEW

China's New-gen Manned Spacecraft Completes Escape Flight Test

China successfully conducted an escape flight test on its new-generation manned spacecraft Mengzhou at zero altitude on June 17, marking an important step forward in its manned lunar exploration program. This is China's second zero-altitude escape flight test, 27 years after the first one by the Shenzhou manned spacecraft in 1998.

China Tops Springer Nature's 2025 Research Leaders List

China has retained the top position and expanded its leading edge in research output, according to Springer Nature's recently released 2025 Research Leaders based on Nature Index data of 2024. Also, currently, eight of the top 10 leading institutions are Chinese institutions, up from seven in 2023.

Chinese Scientists Find New Anti-aging Cell Therapy

Scientists have developed senescence-resistant human mesenchymal progenitor cells (SRCs), which can enhance brain architecture and cognitive function and alleviate the reproductive system decline. The research results were published online in *Cell*.

Brain-Computer Interface to Help Man with ALS Speak

Scientists from the University of California, Davis have developed an investigational brain-computer interface that could restore the ability to hold real-time conversations of people who have lost the ability due to neurological conditions. This study was published in the journal *Nature*.

Scientists Detect Light Passing Through Entire Human Head

Researchers at the University of Glasgow have detected light that traveled all the way through an adult human head. Their study, published in *Neurophotonics*, shows that with the right setup, it is possible to measure photons that pass from one side of the head to the other, even across its widest point.

New Graphic

China-Central Asia Cooperation

China and Central Asian countries have made important progress in **industrial investment, green mining, technological innovation**, and other fields of cooperation.

Two years on

China's trade with
Central Asian countries
has grown by

35%

13 ministerial cooperation
platforms have been launched

Sister cities between China
and Central Asia reached
the milestone of

100
pairs

WECHAT ACCOUNT



E-PAPER

