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SPECIAL ISSUE

2.5 Billion Loans for Returned Overseas Students

China Development Bank has recently launched a special loan

worth RMB 2.5 billion, to support returned overseas Chinese students to start their business at home. The special loan, to be released at a platform designated by the management committee of the Dalian High Tech Industrial Park, will be mainly used to support returned overseas Chinese students establishing an emerging high tech business possessing proprietary products, or bringing up new jobs to the society. It will also be used to support the establishment of a range of public technical service platforms for such endeavors.

TANG Ruoni, president, Dalian Branch of China Development Bank, and Yi Jun, director of the high tech park management committee, jointly signed on June 30 a cooperation agreement for releasing the RMB 2.5-billion loans, an event arranged for the 2006 business week for returned overseas Chinese students in Liaoning (Dalian).

The Dalian High Tech Industrial Park has attracted more than 500 returned overseas Chinese students to start their businesses. The number of the high tech business in the park has gone over 500.

INTERNATIONAL COOPERATION

China-Italy Energy Saving Building

Not long ago, an energy saving building, jointly constructed by the Chinese Ministry of Science and Technology and the Italian Ministry for the Environment and Territory, applauded a ribbon cutting ceremony at the Tsinghua University. XU Guanhua, Chinese Minister of Science and Technology attended the inauguration.

The energy saving building is an intelligent office structure designed for teaching and research purpose, integrated with a line of innovative concepts concerning ecology, environmental protection, and energy efficiency. As a new master building for the Department of Environmental Science and Engineering, part of the University, the structure is designed by a renowned Italian architect. In a shape of C, the 40-m tall building covers an area of 20,000 m², with ten floors above the ground, and two basement floors.

The building is built with a range of state-of-the-art technologies, materials, and equipment, including natural ventilation, natural light, a surrounding structure having low energy consumption, solar power generation, reclaimed water utilization, green building materials, and intelligent control. It is a harmonious integration of human, architecture, environment, science, and technology.

With solar energy and natural gas as the major energy sources, the building is equipped with a gas generator, and a cogeneration system for heating-electricity-cooling applications. In winters, the residue heat produced by the generator can be used for heating, while the same heat can be used to drive a cooling system in summers. A preliminary estimation shows that the building has a reduced energy consumption by 70%, compared with the building of the same size.

RESEARCH AND DEVELOPMENT

Enhanced High Performance Computer

Thanks to some 4-year painstaking efforts, Chinese scientists have created a national network to support grid computation and associated applications, using an ensemble computing power providing 18 trillion floating-point operations per second. The efforts has resulted in two high performance computers for grid application, a set of grid software supporting the operation and applied development of the national grid network, and 11 application grids for four sectors, including resources and environment, scientific research, service industry, and manufacturing industry.

Up to date, the SHUGUANG 4000A super-server has registered an 11.2 trillion floating-point operations per second, with a Linpack test reaching 8.1 trillion floating-point operations per second, and an efficiency score of 71.56%. As a major national trunk grid knot physically installed at the Shanghai Super Computation Center, the system sat in 10th place among 500 top high performance computers registered in June 2004. Legend's SHENTENG 6800 supercomputer reports 5.324 trillion floating-point operations per second, with a Linpack test result reaching 4.183 trillion operations per second, and an efficiency

score as high as 78.5%. Physically located at the Computer Network Information Center, a part of the Chinese Academy of Sciences, the system ranked in 14th place among TOP 500 high performance computers registered in November 2003.

CNGrid GOSv1.0, a grid system software that made its debut at the end of 2003, is designed with a line of basic functions, including grid service packaging, tasks dispatching, and resources management. It allows inter-connectivity between loosely distributed grid knots, and makes them an integrated operational grid environment. V2.0, the latest version built on v1.0 and v1.1, was officially launched in August 2005, which realized a three-tier structure made up of grid community, address bus, and grid resources. The state-of-the-art version allows a stable inter-connectivity and resources sharing among 8 trunk knots, including Hong Kong.

B3G Mobile Telecommunication Succeeds

With the support of the National 863 Program, and nearly 3-year painstaking efforts, Chinese scientists have landed major progresses in developing a B3G mobile telecommunication system. The efforts has resulted in a range of key technologies, including cooperation distributed wireless honeycomb structure, GMC/OFDM multi-address technology, IDMA local configuration technology, U-MIMO based multi-antenna self-adaptive technology, and quick antenna selecting technology. Researchers also completed the development of an experimental FDD/TDD system with the basic characteristics of a B3G system, and realized a 100Mbps wireless transmission and high definition image display in a mobile environment.

In addition, the project has produced 186 international or domestic invention patents, and more than 100 standardization proposals that have been submitted to 3GPP, 3GPP2, and CCSA. A number of S&T technologies have been adopted as international standards. China has inked bilateral cooperation accords with the EU, Korea and Japan in the field, and attracted numerous overseas enterprises and research institutes to be part of the FuTURE program. China supports domestic research institutes to be part of the EU's 6th framework project, such as WINNER, and other international efforts involving the development of future mobile telecommunication technologies, including Magnet and MOCCA. Chinese scientists have secured a

range of cooperative projects with multinationals, and made the FuTURE program an influential initiative for developing new generation mobile telecommunication technologies in the world.

In-Vitro Cancer Drug Evaluation

With the support of a major special project involving innovative drugs and the modernization of traditional Chinese medicine, an initiative under the National 863 Program, for pre-clinical evaluation of cancer drugs has recently passed an approval review.

Researchers have established a technical platform for the in-vitro evaluation of the drugs treating liver cancer, lung cancer, and gastrointestinal cancers. They also established series evaluation models and corresponding drug effects evaluation standards for tumor blood vessel inhibitors at cellular, tissue, and in vivo levels, in addition to seven molecular receptors or non-receptor PTK models, and high PTK expression tumor cell models. In the course of establishing these platforms, researchers have worked out standardized operational procedures for 23 drug effect models and associated tests.

Up to date, three findings derived from the efforts have found commercial applications, enjoying a direct economic return over RMB 20 million. Researchers have completed pre-clinical effect evaluation of some 60 new drugs, with one granted with a production permit, and 3 others approved for clinical trials. The models have also been used to evaluate the cancer fighting effects of several thousand composites, and screen out eight new drug candidates for research institutes or pharmacies, with some of them having passed the approval of the National New Drug Review Center for clinical trials.

Key Technologies for Deep Water Oil-Gas

Application of geophysical technologies for deep water oil-gas prospecting, a project undertaken by the Guangzhou Marine Geological Survey Bureau under the National 863 Program, has worked out three major key technologies, involving long-array and large volume epicenter data collection, complex tectonics and middle and deeper level seismic data processing, and non-well constrained reservoir prediction. Researchers have developed a sea-floor seismograph and associated data

collection technologies that meet the needs of deep water oil-gas prospecting, through screening and optimizing the systematic parameters derived from the middle and deeper level seismic prospecting, the large volume epicenter triggering system, and the long array cable receiving system. They tested the deep-water oil-gas prospecting technologies, through numerous field experiments for the long cable and large volume seismic data collection technology at a single-boat, and the OBS sea-floor seismograph. The effort helps to gather the experience for using OBS technologies at the deep-water sediment basins over the northern continental rims of South China Sea. The long cable and large volume seismic data collection technology heralds a successful application in deep water oil-gas prospecting at an intermediately deep level. The proprietary high frequency sea-floor seismograph and OBS technology also made their first successful trials in deep water oil-gas prospecting.

World Largest Body Cell Bank for Animals

A body cell bank for animals and poultry, the largest of its kind in the world, was recently established at the compound of the Institute of Animal Husbandry, a part of the Chinese Academy of Agricultural Sciences. Thanks to 5-year efforts, the Institute has created the body cell bank for major or endangered domestic animals, and a technical platform for testing and studying the biological characteristics of the body cells cultivated in-vitro. The endeavor has worked out a new approach for collecting, screening, preserving, and utilizing animal species. Up to date, 43 major or endangered domestic animal species, including white yak, Jining blue goat, and Beijing Fatty Chicken, and 6 wild animals, such as wolf and mink, have their body cells preserved at the technical platforms. Having a collection of 21,417 body cells from domestic and wild animals, the bank provides valuable basic elements for life studies, through in-vitro cultivated cells. The bank plans to share its resources with the public in the future.

Starting from 2001, researchers have worked on 5 areas relating to the preservation of animals' genetic resources, survey and dynamic information analysis and the establishment of a relevant network, protection of endangered species, genetic biodiversity assessment, and the establishment of a cellular bank. The effort has accelerated the establishment of a genetic

resource bank for major and endangered animal species.

World Advanced Permafrost Study

Chinese scientists started their study of permafrost from the 1960s. The many-year's comprehensive and multidisciplinary research of the permafrost along the Qinghai-Tibet highway constitutes a beginning for China's systematic study and understanding of permafrost. The construction of the Qinghai-Tibet highway, the placement of fiber-optic cables across Lanzhou, Xining, and Lhasa, and the spreading of an oil pipeline from G'ermu to Lhasa, has advanced the theoretical study to an internationally advanced level. The construction of the Qinghai-Tibet railway makes the largest test ground for permafrost studies in the world, and makes China in a world leading position.

To address the problems caused by permafrost, Chinese scientists proposed a guideline "reducing the temperature, reducing the thermal inflow penetrating the base soil, securing the thermal stability of permafrost, and ensuring the stability of engineering quality above the ground". Different measures are adopted to address different permafrost conditions. For example, stone sheets are used as the basic road base, and smashed stones as a side protection, across the relatively stable permafrost section, taking advantage of the convectional heat exchange in such permafrost structures. In the meanwhile, an engineering application of source-free gravitational thermosyphon technology, or thermosyphon embankment is used. For extremely unstable permafrost sections, a bridge is used to replace engineering structures. As a result, the total length of bridges across the Qinghai-Tibet railway is extended from originally planned 50 km to more than 120 km.

Key Breakthroughs for Oil Prospecting

The National 863 Program has created a research topic in the field of resources and environment technologies, to work on the key technologies for establishing a super large floating oil producing and storing system in shallow waters, an effort to facilitate the development of the Bohai Oilfield. With the concerted efforts of project contractors, including the Research Center of China National Offshore Oil Corp., Shanghai Jiaotong University, and No. 708 Institute, a part of the China State

Shipbuilding Corp., a range of in-depth theoretical studies and modeling tests were carried out, concerning dynamic properties of water and collision resistance of a large FPSO system in shallow or deeper water. Researchers discovered a shallow water effect in the movement and payload of a large FPSO, and proposed an optimized structure design method based on the results of collision resistance analysis, and Robustness analysis. The development has not only led to a breakthrough for shallow water boat design by introducing an innovative concept, but also changed conventional wisdom concerning boat applications in shallow waters. The finding will facilitate the full utilization of marine engineering facilities, and raise the economic and social benefits. The new technology promises a fine application perspective, as it has landed a breakthrough in the key technologies needed for the development of the Bohai Oilfield.

Progresses for Cold Sheet Milling

Not long ago, new technologies for continuous cold steel sheet casting and milling, an initiative under the National Key Technology Program during the 10th five-year period, successfully rolled out three types of non-oriented cold milled electrical sheets ($\text{Si+Al}(\%) = 0.5$ ”, “ $\text{Si+Al}(\%) = 1.0$ ”, and “ $\text{Si+Al}(\%) = 1.5$), and two types of oriented cold milled electrical sheets (35Q145 and 30Q130) , from an internationally advanced demonstration production line for consecutive cold casting and milling.

Manufacturing electrical sheets, using a continuous cold casting and milling process, can simplify the traditional process from continuous casting to holding, and further to hot milling, which brings up numerous merits, including energy efficiency, environmental pollution reduction, and a noticeably raised quality of electrical sheets. The development tells a successful story of proprietary systematic technologies and theories concerning consecutive cold casting and milling, and makes China one of the few countries in the world possessing the technologies. Commercial applications of the finding will materialize the industrial policies of “wiping out hot milled electrical sheets, and the ‘cold’ replacing the ‘hot’”, and create a solid ground for energy efficiency, reducing the environmental pollution, and having more localized electrical sheet products.

Comments or inquiries on editorial matters
or Newsletter content should be directed to:

Mr. Mao Zhongying, Department of International Cooperation,
MOST 15B, Fuxing Road Beijing 100862, PR China Tel:
(8610)58881360 Fax: (8610) 58881364

<http://www.most.gov.cn>