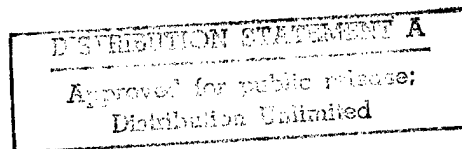


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10 November 1983



# China Report

SCIENCE AND TECHNOLOGY

No. 214

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10 November 1983

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No. 214

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## APPLIED SCIENCES

### NEW 'HONEYBEE' MICROLIGHTS MAKE THEIR DEBUT IN BEIJING

Hangzhou ZHEJIANG RIBAO in Chinese 11 Sep 83 p 3

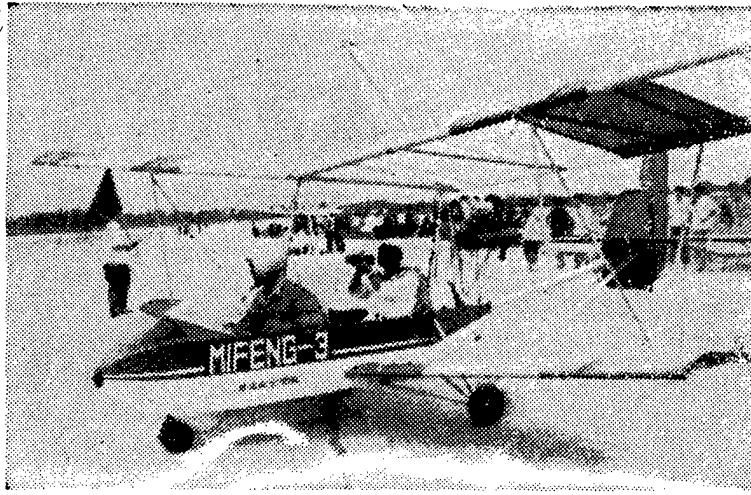
[Text] This afternoon [10 September], this reporter took a ride in the "Honeybee-3", a newly developed Chinese microlight aircraft, through the blue skies over Beijing. After an all-systems check had been conducted, the two-place aircraft proceeded to make its formal flight demonstration.

The graceful, agile aircraft only weights a little over 100 kilos and can be handled easily on the ground by one person. Taking to the air after a 70-meter roll down the runway, I experienced an exceptionally smooth flight while riding in the open-cockpit fuselage.

According to the flight test people, this Chinese-produced aircraft has a simple structure, short take-off and landing ability, and good low-altitude, low-speed handling. It is especially well suited to seeding operations in grasslands, fields, and forests, for spraying pesticides, and for rescue missions, delivering mail, and aerial photography.

At the same time, a single-seat version, the "Honeybee-2", also made a demonstration flight. Both the "Honeybee-2" and the "Honeybee-3" were designed by Hu Jizhong [5170 4949 1813], a lecturer at the Beijing Aeronautical Institute.

The head of the Beijing Aeronautical Institute, Zeng Chuanjun [2582 0278 6874], told me that it was so easy to fly a microlight aircraft that any senior middle school student could fly one after only a week's instruction. The aircraft's price tag is low--they cost about as much as a truck--and you could buy one for about the same price as a large piece of farm machinery.



The "Honeybee-2" (single place) and the "Honeybee-3" (two place) microlight aircraft, both developed by the Beijing Aeronautical Institute, put on a flight demonstration in Beijing on 10 September.

CSO: 4008/32

## APPLIED SCIENCES

### RECENT ADVANCES IN PLACER DRILLING TECHNOLOGY, VIEWS ON FUTURE WORK

Beijing TANKUANG GONGCHENG [EXPLORATION ENGINEERING] in Chinese, No 2, 1983 pp 9-10 [Article by Zhang Zhimin (1728 1807/3046)]

[Text] China's placer resources are rather abundant. Over 20 provinces throughout the nation are endowed with them and there is a long history of prospecting. But because prospecting in the past was intermittent, technology developed slowly. For a long time, we have lacked specialized equipment, sample taking tools have been backward, and drilling and sample taking tools have been backward, and drilling and sample taking technology have been inadequate. But since 1975, when Vice Premier Wang Chen personally took charge of gold geology work, all levels of leadership have given daily increasing attention to the exploration of placer resources, expanded the painstaking efforts of those who do sand drilling work, developed equipment, extensively studied technology, and brought about new developments in placer drilling technology. Presently, geology departments and the capital construction engineering corps system have already started operating nearly 200 drills, and a good number of provinces are just now beginning drilling preparations. In developing placer exploration, we have already set up a placer technology team with a set scope, and there have also been certain advances in placer exploration equipment and technology.

#### 1. Accomplishments and Progress in Recent Years

A. Developments in Equipment. Through several years' effort, most provinces no longer use Banjia and Huangpu drills which use manpower for impacting, and those areas which do still use the Banjia drill, also provide gasoline (diesel) engines for motive power, and the degree of mechanization has risen. The teams from many [geology] bureaus use various models such as the XJ-100, SH-30 and Longjiang 1 models as their primary engineering drills and core drills to substitute for sand drills in carrying out placer surveys and explorations, and have had good results and met the current pressing needs of placer exploration. Particularly at the end of the 1970s, the former Institute of Exploration Technology, the Heilongjiang Geological Bureau and other units developed the SZC-325 and SZC-168 model sand drill bits, and obtained rather good results in production tests conducted by Heilongjiang's Teams No Three and Five, Shaanxi's Team No

Seven, and Jiangxi's Team No 916, and in 1981 and 1982, respectively, these drills were appraised and put into production, thus filling a gap in China's specialized equipment for placer exploration. They thus played an active role in eliminating the backwardness in placer drilling equipment.

B. Drilling Technology and Methods Have Been Upgraded. Apart from the traditional casing impact drilling methods, which we ought to use, through local trials and explorations, we have also developed a revolving casing method, a compound drilling method that uses a slowly revolving casing along with casing impact and a vibrating drilling method. In particular, the experience in recent years of attempting to use the compound drilling method that uses a slowly revolving casing along with casing impact in placer exploration and its successful application in large diameter placer drills has raised speed and efficiency. The trial use of the slowly revolving drilling method without using a flushing medium has also brought satisfactory geological results.

In the course of exploring places in the ever frozen layer, the Heilongjiang Provincial Geological Bureau used refitted draw-type slowly revolving drill bits and found placer gold and placer gold ore bodies, and also made many attempts in drilling technology.

Fujian's Team No Five also acquired quite a bit of experience in seashore placer exploration.

The Guangxi [Geological] Bureau tried a vibrating drill in placer gold mines, drilled over 4,000 meters, gaining experience and obtaining satisfactory geological results.

The Sichuan [Geological] Bureau carried out theoretical exploration into the technological problems of the ratio between pipe diameter and gravel, the pumping principle of the pump tube, and the height of samples. This is a significant piece of research work.

C. Increases in Drilling and Sampling Tools. Guangxi's Team No Four, while working in its placer gold mine area, addressed the difficult problems of taking sand samples in drifting sand and gravel layers, made innovations in the clay drill bit, "loose-leaf" bit, pump tube and other tools, and scored good results in their sample taking. Anhui's Team No 664 designed an impact sampler suitable to their base mine area's lake placer strata. As the outer casing advances, the inner casing takes a sample. While the sample is being taken, the outer casing does not move, but only lifts the inner casing. In this way it insures the accuracy of the strata position in the sample, and also preserves the original structure of the sand sample fairly well. The results of the trials have been good and it has speeded up the process.

D. Innovative Experiments in Developing Technology. The Institute of Mining Technology and Sichuan's Team No 401 experimented with using the three high molecular gouting materials made from cyanide coagulant, polyurethane epoxy, and "propyl" coagulant to solidify the sand samples and

to maintain the shaft. They made a number of attempts at placer drilling by using the new materials and the new technological methods. And there are also many units which have begun making analysis of the stratigraphic grain size, and then select the drilling technology and sampling methods in accordance with this analysis; they conducted platinum "casting" tests and computational analysis on some sampling tools and drilling methods to test and verify their reliability and to provide a theoretical basis for improving the sampling tools and methods. Although this research is only preliminary, it is a very good beginning.

E. Strengthened Quality Control, and Attention to Economic Results. The Geological Bureaus of Heilongjiang, Shaanxi, Sichuan and other places have all formulated sand drilling quality standards and quality control methods based on many years of practical experiences, and this forms the basic work for standardizing sand drilling processes. In Heilongjiang, Shaanxi, Guangxi, the Gold Command Departments and other units have each drawn up operating instructions to facilitate a smooth production process. Shaanxi's Team No Seven, Suangxi's Team No Four and other units also stress economic results and make comparisons of the different methods. They make efforts to select a suitable exploration method for the base area, and use a relatively small amount of sample to obtain even more geological results and save exploration investment funds for the state.

To sum up, although our foundation for placer drilling is weak, through local efforts we have already achieved certain success and progress, and have laid the foundation for even faster development of placer drilling technology in the future.

## 2. Existing Problems

Although we have achieved certain success in recent years, generally speaking, placer drilling work is just at the beginning developmental stage, and the following problems still exist:

A. Present drilling technology cannot meet actual production requirements:

1) when drilling through deep gravel layers, present sand drilling and rock crushing tools have no power, and most can only move [up through] the shaft and strike again; 2) when drilling through loose sand layers, the rate of advance samples is not high and affects the extraction rate for sand samples; 3) when taking samples in layers submerged below water, it is easy to mix the sample or overshoot the sample due to the pumping action; 4) while drilling through frozen layers, sand samples obtained with present heating methods are all melted forms of previously frozen chunks. It is difficult to preserve the original structure, etc.

B. There is little drilling equipment for current use, and construction drill rigs and core drill rigs do not meet the need in the areas of drill shaft diameter, drilling capacity, degree of mechanization, multi-function use, etc. Many drill rigs only act as mechanized drilling machines, and most case raising still relies on human power. This involves a lot of labor, and it also wastes time and energy. Some can only strike and not revolve,

or they can revolve but not strike or vibrate. And these limitations in equipment greatly affect drilling techniques and the efficiency in sample taking.

C. Lacking new placer exploration standards; we still have not formulated national placer exploration regulations. Due to rising technological levels, the original regulations already are no longer applicable. The regulations formulated by the local areas are not uniform in their requirements, and there is an urgent need for rational, uniform regulations.

D. The sampling methods and variety of sampling tools are fairly limited; there are also no specialized plants for trial production; and there still is no standardization or serialization.

E. Scientific research work has not kept up, and leadership work has not been as timely and effective as that on core drilling, and some theories have still not been organized and researched.

### 3. Proposals for Future Work

A. Develop research and experiments for new placer drilling methods and technology. Placer drilling methods should develop in a number of technological directions. We must study and formulate uniform methods and standards for classifying soil strata and analyzing size, and formulate drilling techniques for different strata, study the basis for selecting sand drill diameters, study the factors that affect the rate of advance samples, study and test the effects of lift height and speed of impact hammers and pump tubes, etc. on the stability of the shaft walls and on the quality of sampling. It is vitally important to strengthen fundamental theoretical research on drilling technology and sand drilling in order to develop and manufacture modified equipment, supply a scientific basis, and raise the speed and quality of placer exploration.

B. We must strengthen planning and research on placer exploration equipment. We should actively develop specialized drill rigs suited to placer exploration with such features as light weight, ease of disassembly, and portability, along with corresponding sampling tools and accessory attachments. The drill rig should be capable of using both large and small-diameter drills to drill to varying depths. And we should gradually develop a series of these drill rigs. Everyone suggests that it would be best to have four series of  $\phi 130$ -150,  $\phi 168$ -219,  $\phi 325$ , and either  $\phi 800$  or  $\phi 1000$  mm, and everyone feels that we should put priority on design and research work for a light-duty sand drill. It would be appropriate to adopt a multi-functional, modular drill machine. We must not only consider rotation, impact and vibration, but also bear in mind the functions for exposing bedrock. And we should also study air lift, reverse circulation, continuous core-taking drill equipment, and constantly work on perfecting and fitting the previously evaluated model -168 and -325 sand drills.

Placer drilling rigs need to be fitted with hydraulic pipe lifting units and hydraulic vibration units along with other auxiliary devices for taking samples, turning samples and changing drilling tools.

We still must design mechanized planning equipment in order to improve the primitive process, raise quality and improve working conditions.

It is suggested that the institutes of survey and prospecting should have a special topic group to carry out this type of work, and research academies and schools should cooperate in carrying out research and design work in these areas.

C. We should gradually realize standardization and serialization for sampling tools, pipe materials and auxiliary tools, and arrange for factories to have uniform production and supply to the end user.

D. Based on investigation and research, we should act jointly with the concerned geological departments to set down new regulations for placer exploration and uniform standards for sand drilling and drilling quality as soon as possible. We ought to organize our energies to formulate placer exploration regulations as soon as possible. We have a good number of teams which have accumulated a great deal of experience, and already possesses the requirements for setting down placer exploration regulations which are suitable to China's present circumstances.

E. We must strengthen a training program in placer drilling technology, to well in disseminating technical information, and, at the appropriate time, convene a meeting for exchanging experiences. We propose that we do a good job with the import of technologies, investigation and exchange work.

F. We must pay due attention to research on the economic results of technology and seek to achieve the best technological results with the least cost.

12452

CSO: 4008/122

## APPLIED SCIENCES

### ASIAN CONGRESS OF FLUID MECHANICS OPENS IN BEIJING

OW251300 Beijing XINHUA in English 1142 GMT 25 Oct 83

[Text] Beijing, 25 Oct (XINHUA)--China will strengthen research on application of fluid mechanics, especially hydrodynamics and hydraulics, for development of water conservancy, hydroelectric and related projects.

This was stated by Professor Lin Tongji, vice-president of the Chinese Mechanics Society and chairman of the organizing committee of the second Asian Congress of Fluid Mechanics that opened here today.

Professor Lin Tongji, who is also deputy director of the Institute of Mechanics under the Chinese Academy of Sciences, said in an interview with XINHUA that China has made remarkable progress in fluid mechanics in the past 34 years. He noted that in the fields such as high-speed and high-temperature aeromechanics, turbulence and vortex, China's research has reached quite high levels. This has paved the way for development in aviation and space, ship-building, and water conservancy.

China has built over 80,000 dams to control rivers and develop hydraulic power since the founding of the People's Republic. These have an aggregate water storage of about 400 billion cubic meters. The Longyangxia Hydro-electric Station dam on the Yellow River is 157 meters in height, the highest built so far in the country. Dams 240 meters in height and over are now being designed. Discharge from these dams may exceed 30,000 cubic meters per second at velocities as high as 50 meters per second.

According to the professor, Chinese scientists have started studying some new problems in fluid mechanics encountered in construction of offshore oil platforms, superfine powder metallurgy and transport of coal slurry.

The Second Asian Congress of Fluid Mechanics is sponsored by the China Association for Science and Technology under the direction of the Asian Fluid Mechanics Committee.

Attending the congress are 200 experts from a dozen countries and regions. Some European and American guests are also present. Nearly 200 papers are to be presented, covering nearly the entire field of fluid mechanics and some frontier subjects.

Present at the opening ceremony were Zhou Peiyuan, president of the host association, Hiroshi Sato, professor of Tokyo University and chairman of the Asian Fluid Mechanics Committee.

The five-day congress will run through October 29.

CSO: 4010/07

## APPLIED SCIENCES

### BRIEFS

SHANGHAI UNIVERSITIES OFFER TECHNICAL SERVICES--Shanghai, 26 Oct (XINHUA)--Shanghai universities have signed 700 technical service contracts with enterprises in 10 provinces and cities over the past few years to help in retooling and modernization. The technical services offered cover a wide range of, among other things, construction engineering, electronics and energy conservation. Sources at the bureau of higher [word indistinct] here said 30 contracts have fruitful results which have brought extra profits of more than 11 million yuan to the related enterprises. Meanwhile, the universities have also helped train more than 10,000 technicians for such enterprises. The universities and colleges of Shanghai, which number 45, have also benefited from the exchange, the bureau spokesman said. The East China Textile Engineering Institute has in return updated 50 courses with new technical achievements which have resulted from 17 technical service contracts. [Text] [OW261317 Beijing XINHUA in English 1121 GMT 26 Oct 83]

PHOTOSENSITIVE GLUE TECHNIQUE SYMPOSIUM--The Shaanxi Provincial Optical Society, on behalf of the China Optical Society, called a National Symposium on Photosensitive Glue Techniques from 29 April to 1 May 1983 in Xi'an. It was attended by more than 100 delegates representing nearly 60 organizations all over the country. The delegate of the producer [not named] of the GBN-501 photosensitive glue delivered a report on its production process and delegates of 10 other organizations, including the Xi'an Institute of Optical Devices, the Beijing College of Engineering, and the Nanjing Jiangnan Optical Instrument Plant, introduced their experiences in using this glue. More than 2 years of use has demonstrated the fact that in optical, mechanical, and high-or low-temperature resistant properties, the glue has reached a fairly advanced level. Problems of mild toxicity, difficulty in the technique of applying it to parts of certain shapes, etc., represent the major problems. [Text] [Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1983 p 363] 6248

CSO: 4009/223

AUTHOR: XU Wengan [1776 3306 1631]  
LI Baoxuan [2621 5508 5503]  
WANG Kexiu [3769 0344 4423]

ORG: None listed

TITLE: "The Steady State Burning Mechanism of Composite Solid Propellants Including Those With Negative Pressure Exponents

SOURCE: Beijing YUZHANG XUEBAO [JOURNAL OF THE CHINESE SOCIETY OF ASTRONAUTICS] in Chinese No 3, 30 Jul 83 p 19 [Abstract in English]

ABSTRACT: To study the steady state burning mechanism of AP-based composite solid propellants including those with negative pressure exponents, the scanning electron microscope was used to examine the extinguished combustion strands and single-frame microphotography of self-illumination or laser-shadow was used to observe the burning samples. It has been found that the covering of the molten binder over the oxidizer surface is not a particular phenomenon of PU propellant in the mesa burning region, but a general phenomenon taken place in extensive region. It was indicated that the local cover may not result in local extinction. Further, a new theoretical model is developed. The existence of cover of molten binder over the oxidizer surface and the condensed phase reaction and opposed gasification of covered AP are considered in the analysis. The model is developed for AP-based composite solid propellants can be used to explain plateau, mesa and normal burning behavior and to analyse the effect of initial temperature and AP particle size on burning behavior. Furthermore, the model will also be able to provide a basis for studying the erosive combustion and nonsteady combustion of composite solid propellants including mesa propellants

CSO: 4009/13

AUTHOR: LU Shengen [4151 7105 1869]  
BAO Bairong [7637 4102 1369]

ORG: None listed

TITLE: "The Influence of the Effective Bulk Resistance on the Conversion Error of Log-Antilog AC-to-DC Converters"

SOURCE: Beijing YUZHANG XUEBAO [JOURNAL OF THE CHINESE SOCIETY OF ASTRONAUTICS] in Chinese No 3, 30 Jul 83 p 42 [Abstract in English]

ABSTRACT: In this paper, the fundamental principle of log-antilog true rms-responding AC-to-DC converters is described primarily, then the influence of the effective bulk resistance  $r_B$  of the logging transistors on the conversion error is emphatically analysed, and the quantitative analysis is given for the combined influence of  $r_B$  and other factors (e.g. input signal amplitude, crest factor, temperature, etc.) on the nonlinear error. Finally, theoretic analysis is verified through experimental data. The conclusion of this paper has been used for the product (JZH-1 Model AC-to-DC Converter) which will be appraised. This paper points out the direction of reducing nonlinear error and offers the basis for design of partial components parameters.

CSO: 4009/13

AUTHOR: SHENG Zuming [4141 4371 6900]  
AO Ling [2407 2651]

ORG: None listed

TITLE: "Strength Analysis of Large Flanged Openings on Spherical Shells

SOURCE: Beijing YUHAN XUEBAO [JOURNAL OF THE CHINESE SOCIETY OF ASTRONAUTICS]  
in Chinese No 3, 30 Jul 83 p 54 [Abstract in English]

ABSTRACT: Through a large amount of calculations and experimental analysis, this paper negatives the maximum longitudinal surface stress with maximum stress point as the datum for strength analysis of flanged openings. Instead, according to the shell stress distributions and practicing experiences, the circumferential stress in the middle plane at the reference point is proposed as the datum for analyzing the strength of flanged openings, and a strength coefficient  $\phi$  of the structural material is introduced. A new method of analyzing the strength of flanged openings is thus presented.

This paper also presents a new position that the smaller  $r_0$  (bend radius of the flange) is the greater  $a_{A2\phi}$  (the circumferential stress concentration factor in the middle plane at the reference point) will be, and the longer  $l$  (theoretical length of the projecting pipe) is, the greater  $a_{A2\phi}$  will be.

The new method and new position have both been validated by experiments.

CSO: 4009/13

Measurement Techniques

AUTHOR: MENG Hongxun [1322 7703 8113]

ORG: Chongqing Industrial Automated Instruments Research Institute

TITLE: "First-Class, Standard Micro-Pressure Gauge Successfully Made"

SOURCE: Beijing JILIANG JISHU [MEASUREMENT TECHNIQUE] in Chinese No 4,  
18 Jul 83 p 63

ABSTRACT: A technical certification meeting recently called by the Chongqing Industrial Automated Instruments Research Institute to examine the standard micro-pressure gauge it had produced through successful research. With a measurement range of -20 to +20 mm H<sub>2</sub>O, the first such instrument made in China, its absolute accuracy was tested with the state's micro-pressure standard device by the Academy of Metrology and proved to be within 0.001 mm H<sub>2</sub>O; idle, its sensitivity was found to be within 0.002 mm H<sub>2</sub>O. A certificate has been issued to attest to its being a domestic first class standard instrument.

6248

CSO: 4009/220

AUTHOR: None

ORG: None

TITLE: "Fast, 50-Ton, High-Precision, Electronic Scale for Automatic Continuous Weighing of Motor Vehicles Successfully Made"

SOURCE: Beijing JILIANG JISHU [MEASUREMENT TECHNIQUE] in Chinese No 4,  
18 Jul 83 p 63

ABSTRACT: The Chinese Academy of Metrology has successfully produced a 50-ton electronic motor vehicle weighing device. Using a sensor to convert weight into electronic signals, it provides automatic, fast, and continuous weighing. The accuracy of this electronic scale, higher than 0.003 percent, places it in the 'world-class' category. The product has undergone the required technical certification.

6248

CSO: 4009/220

## Uranium Enrichment

AUTHOR: ZHOU Zhonghuai [0719 0112 2037]  
XU Lijun [1776 7787 0689]  
LIU Xingjun [0491 5281 0193]

ORG: All of Institute of Oceanography Chinese Academy of Sciences

TITLE: "Enrichment of Uranium From Seawater: II. Relationship Between the Preparation of the Composite Enrichment Agent Aluminum Hydroxide and Manganese Dioxide and the Enrichment Uranium"

SOURCE: Beijing HAIYANG KEXUE [JOURNAL OF MARINE SCIENCE] in Chinese No 5,  
9 Sep 83 pp 21-24

ABSTRACT: As a continuation of a previous study on the enrichment of uranium from seawater, this paper reports the improvement of the rate of return over previously used methods by the use of a composite enrichment agent. For every g of the aluminum-manganese agent, 200  $\mu$ g of uranium may be concentrated. Conditions for preparing the composite agent are introduced, including effects of the pH, the temperature, and the duration of aging of the precipitating solution, the density of the aluminum sulfate, the volume of the added potassium permanganate, the drying temperature, and the various conditions of the seawater, etc. In conclusion, optimal conditions for the enrichment of uranium from seawater are summarized. The paper includes data of enrichment experiments carried out in Lianyungang, Qingdao, etc.

6248

CSO: 4009/10

END