

China: Bursting with Brainpower

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By Michael Kanellos

BEIJING--The abundance of manual labor is legendary in this country of 1 billion people, but brainpower is quickly catching up.

While many technology giants are expanding manufacturing plants in China, a significant number of multinationals are increasingly combing the mainland for engineers and researchers to handle projects for global applications that, in recent years, would have been performed in labs in the United States or Europe.

"I'm hiring Ph.D.s with years of experience for less than what it would cost to hire a new college grad out of Stanford," said Chief Executive Al Sisto of Phoenix Technologies, a software company in San Jose, Calif.

At first glance, the trend might appear to be a typical brain drain or a way for U.S. companies to hire foreign labor while skirting political obstacles related to the H-1B visa immigration controversy. But executives on both sides of the Pacific say the hiring is more of a massive talent search aimed at a new generation of engineers being churned out of China's schools.

Chinese university students are flocking to the industry for a combination of reasons, including comparatively high salaries, government policies that encourage technical education, and a booming domestic market. An estimated 700,000 engineers graduate annually from China's schools, and U.S. companies want to get the cream of the crop.

"We are putting our design centers where the talent is," Intel CEO Craig Barrett said when asked about the chipmaker's research centers in China and Russia. "We'll just chase the best talent."

There is no denying, however, that Chinese engineers cost far less than their American counterparts. Single-degree engineers in China generally make between \$4,800 and \$8,800 a year, depending on experience and the company, according to various sources, not including payments to housing, pension and medical funds that can raise the compensation figure by 50 percent.

Though penurious by U.S. standards, the engineer's salary is a goldmine in a country where the average city dweller makes \$4,300 or less. Those with advanced degrees generally earn substantially more but are still a bargain compared with Westerners, which means the labs in China will continue to grow.

Nevertheless, many U.S. multinationals say cost is a secondary consideration to their need to find talent, especially people who are fluent with the language and familiar with local conditions. For example, Sisto said the primary language is now Mandarin at Phoenix, the leading developer of BIOS (basic input-output operating system) software that allows hardware to speak to software. The company has 18 doctorate fellows on site at its offices in Nanjing, a city inland from Shanghai on the Yangtze River.

"In terms of raw talent, the master's and Ph.D. students (in China) are absolutely outstanding," said Dr. James Yeh, director of IBM's China Research Laboratory.

Work done by Chinese engineers for Western companies runs the gamut, said Wen-Hann Wang, who runs the Intel China Software Lab in Shanghai. Researchers in his lab, one of four Intel research groups in China, have worked on projects to enhance Linux (news - web sites) technology for Intel-based telecommunications servers, make the Palm operating system work with its Xscale chip, write software drivers for the Itanium processor, create applications for e-mailing videos, and perform BIOS and XML (Extensible Markup Language) research.

Besides general research, Chinese centers have carved out expertise in some fields. Microsoft, Intel and IBM have all shifted major portions of their "natural computer interface" research projects--such as handwriting or face-recognition and voice-activation systems--to China. While the work will eventually be incorporated worldwide, some of the results have particular domestic resonance.

"Especially in Chinese, the interface systems (keyboards) are not natural," Yeh said. "I will often ask audiences, 'When was the last time your mother sent you an e-mail?' The typical response is 'My brother helped her.'"

Research in cellular traffic is also strong. During Chinese New Year, cellular networks get swamped in a way that researchers from other countries might never likely experience or fathom. "We are here as a watch post for this market," Yeh added.

A lifetime of competition

Billion-dollar initiatives such as the 2/11 campaign and the Elite University Program have boosted the number and quality of local universities. Through the 2/11 campaign the government spread about \$2.2 billion among 100 universities, while the Elite University Program spread about \$1.2 billion among 10 top universities. Overall, 2.9 percent of the country's gross domestic product goes to education. The government wants every middle school and most primary schools to be connected with the Internet by 2005.

"Fudan, Beijing, Tsinghua--they are all famous universities," said F.C. Tseng, deputy CEO of Taiwan Semiconductor Manufacturing Co. "Less and less people are going to the U.S. for study."

Competition is the dominant theme when it comes to China's educational system. The state pays for elementary and middle school, but parents often supplement it with private tutoring, piano lessons and other teachings.

Not surprisingly, education is one of the strongest drivers behind PC sales here. It's not uncommon for younger children to start the day at 6 a.m. and go to bed at 1 a.m., said Carl Yao, a former high-tech executive in Boston who has returned to China to start businesses.

Many here believe that such strong ambitions are fueled by the desire to move beyond the repressive legacy of the Cultural Revolution. Red Flag Software CEO Liu Bo, for example, cites a mandatory assignment he received at the age of 15 to reap wheat 20 hours a day on a farm outside Beijing in 1974.

"The two years of hardship taught me to face difficulties," he said. "What could be worse?"

The resulting work ethic, voluntary or imposed, has led to intense competition within China's educational system. To get into college, students must pass a three-day exam, which takes place each July. Students are tested on physics, chemistry, geography, English, math and other topics.

A decade ago, only about 5 percent passed. Now, with the state building more colleges, about one out of seven gets into a university.

High scores can allow admission to top universities, which in turn can lead to the best graduate programs and jobs in multinationals. But even for those at the top of the academic pool, getting a premier job isn't easy.

The Intel China Software Lab gets 3,000 to 4,000 resumes a year, according to Wang, but only 35 get hired. IBM's lab receives 1,800 resumes from students with doctorates or master's degrees. It hires 12.

These labs have the most stringent hiring policies within their respective companies. Yeh said that the rejection-acceptance ratio is higher than at other IBM labs.

"We are working to provide an environment as good or better than any other labs around the world," he said.

To get the best recruits, companies form fairly close bonds with the select universities, creating grant programs, joint research projects, and local computer education initiatives for teachers and primary schools.

A quandary at the top

For all its engineering talent, however, China remains glaringly low in one important area: management.

"The universities mix science and engineering together and are more focused on science," Liu said. "We lack project managers, systems analysts and developed team leaders."

Like many local executives, Liu learned how to run projects at foreign companies. After graduating from college and working at a Chinese institute, he spent time at a Singaporean PC manufacturer, Informix, SCO and Microsoft.

The government is rapidly increasing investment in business degree programs and executive training, having recently created 62 M.B.A. programs, according to the China Education and Research Network.

Companies, in the meantime, are taking the initiative to fill the void. Intel and Phoenix, for instance, rotate Chinese engineers to U.S. offices for three-month exchanges and subsidize advanced degrees. Employees can also get free English language training.

"Here they need a huge injection of management," Wang said. "Growing people is a lot harder than growing technology."

ZDNet China's Danica Wang contributed to this report from Beijing.