

HONG KONG: A REGIONAL CORE OF CHIP PRODUCTION

Hong Kong was the first offshore assembly site for the U.S. semiconductor industry. Today it is a regional core, testing circuits assembled elsewhere in the region and hosting a handful of chip design centers. By the time it rejoins China in 1997, it will probably be the centerpiece of China's fledgling high-Tech industry, fabricating wafers for the Chinese market.

Hong Kong is recognized, along with Singapore, Taiwan, and South Korea, as one of Asia's newly industrializing country's, but even today it is a mistake to call British territory a *country* when analyzing its growth as an exporter of high technology goods. Conservative Americans call Hong Kong a model for free market economic development, but Hong Kong is a unique enclave whose economic expansion is the direct result of intervention by two states.

Jeff Henderson, whose work on Scotland we reviewed earlier in *Global Electronics*, has written an excellent description and analysis of the Hong Kong electronics industry ("High Technology Production in Hong Kong and the Making of a Regional 'Core,'" paper for the Symposium on Technology Policy in the Americas, Stanford University, December, 1988). We summarize here some of his findings and data, and we look forward to the paper's incorporation in Henderson's forthcoming book.

Conditions for Growth

Hong Kong became a colony of Great Britain in 1841. For the first hundred years, it thrived as a trading and financial center, linking China with the Western world. Until the 1950's however, manufacturing played a small part in Hong Kong's economy, and producers used traditional manufacturing methods.

Hong Kong emerged as a textile and garment center after the Chinese revolution of 1949. Refugee capitalists from Shanghai brought their capital and expertise to the British-held colony—in some cases redirecting modern equipment that was

en route to Shanghai—and employed refugee labor. Hong Kong's entrepot trade collapsed as the U.S. embargoed Chinese goods and China began to look more toward the Soviet Union. The traders linked up with the new manufacturers. At the same time, the British textile industry foundered, opening the door to preferentially treated imports from Hong Kong.

By the time Japan-based Sony looked abroad for cheap manufacturing in the late 1950's, Hong Kong had the skills and infrastructure necessary to support any type of labor intensive assembly. In 1959 Sony contracted with locally owned Champagne Engineering Corporation to assemble transistor radios. "By 1961, twelve firms were producing radios in the territory, of whom two were joint-venture operations with U.S. companies," undercutting the Japanese with their cheap labor and overhead costs.

When Fairchild looked abroad in 1961 for a cheap place to assemble transistors, Hong Kong was an obvious choice. The plant was so successful that it set a pattern for the industry. Every major U.S. merchant semiconductor company established assembly plants in Hong Kong and other low-wage havens.

Hong Kong turned out to be a profitable site for electronics assembly for many reasons. Labor unions, for example, have not focused on workplace issues. Instead of organizing strikes, they have directed their energy to political support of China's two main parties, the mainland-based Communists and the Kuomintang, which governs Taiwan.

Most important, the colonial government and the People's Republic of China have chosen to subsidize the social wage of Hong Kong workers, providing as much as half their living costs and allowing manufacturers to pay internationally competitive rates.

Right-wing economists suggest that Hong Kong has grown economically because the government is not directly involved in the
(continued on page 2)

economy. Indeed, there are no trade restrictions, taxes are low, and the government is not directly involved in the capital market or the funding of research and development.

They miss a much more fundamental form of state economic power. "... in Hong Kong, the government owns over 95 percent of *all* land." By adding lease revenue to its budget, the colonial government has been able to subsidize the housing of most of the territory's working class.

At the same time, China has chosen to subsidize Hong Kong by providing food and other commodities at prices well below "those on the open market."

The Upgrading of Chip Work

Hong Kong was the first offshore chip assembly center, and through the early 1970's it was also the biggest. At the high point, eight U.S. chipmakers in Hong Kong employed about 15,000 workers, including 4,500 at Fairchild.

Semiconductor manufacturers did not pull out of Hong Kong. Rather they evolved. Firms shifted assembly to lower-wage countries in Southeast Asia, such as Malaysia and the Philippines. Hong Kong became a center for regional administration and testing, a more sophisticated process requiring a greater proportion of engineers and technical workers than assembly. More recently, as chip design has become more automated, a few companies have set up design centers in Hong Kong.

Henderson profiles the industry:

GLOBAL ELECTRONICS

edited by Lenny Siegel

Issue No. 89

published monthly by the Pacific Studies Center

222B View Street

Mountain View, CA

94041 - USA 415/969-1545

US ISSN 0739-0416

subscription rates (12 issues)

United States: \$12.00

Canada and Mexico: US\$14.00

Overseas: US\$17.00

all back issues are available

Copyright ©, January, 1989 - Mountain View, California

"better late than never"

Semiconductor Firms in Hong Kong, 1986 by Home Country

| Company | Processes | Employment |
|------------------------|-----------|---------------|
| USA | | |
| National Semiconductor | a,t | 1,000 |
| Motorola | d,r,t | 750 |
| Siliconix | a,d,t | 550 |
| Commodore | a,t | 200 |
| Sprague | r,t | 200 |
| Teledyne | a,t | 200 |
| Fairchild | t | 100 |
| Microsemiconductor | a,t | 100 |
| Zilog | d,r | 100 |
| HONG KONG | | |
| Semiconductor Devices | a,t | 900 |
| Swire Technologies | a,t | 500 |
| Micro Electronics | a,t,w | 400 |
| Elcap | a,t,w | 300 |
| RCL | a,t,w | 200 |
| Century Electronics | a | not available |
| JAPAN | | |
| Hitachi | a,d,t | 200 |
| Sanyo | a,t | 200 |
| Oki | d | 20 |
| NETHERLANDS | | |
| Philips | a,t | 500 |
| UNITED KINGDOM | | |
| Ferranti | a,d,t | 500 |
| CHINA (PRC) | | |
| Hua Ko | a,d,t,w | 300 |

Notes: a = assembly, d = design, t = testing, r = regional HQ, w = wafer fabrication. The Siliconix design center is a joint venture with Hong Kong owned Central Systems Design, and Ferranti's production is done in partnership with Semiconductor Devices.

Motorola is the U.S. firm with the most advanced operations in Hong Kong. It has never operated an assembly plant there, and its Hong Kong's facility is "probably the most advanced testing center in the developing world..." It employs 750 workers, of whom 300 are unskilled. Unskilled workers, all women, load chips into the channels that feed the complex testing equipment. Motorola also runs one of three U.S.-owned design centers in Hong Kong.

Wafers for the Lamps of China

Four Hong Kong-based firms now do wafer fabrication. One is wholly owned by the Chinese government; two others appear to be partnerships between China and Hong Kong residents. One is

Hong Kong-owned. Presently, they all depend upon designs and masks from California. Unlike South Korea's large wafer fabricators, the Hong Kong firms are confined to the low end of the market. They sell primarily to the Chinese consumer electronics industry and to the watch industry in Hong Kong.

Uncertainty surrounding the absorption of Hong Kong by China makes it difficult to predict what U.S.-owned firms will do. National Semiconductor plans to set up a plant within China. Hong Kong, concludes Henderson, "... will [likely] become the technological core and managerial control center of a domestic Chinese division of labor in semiconductor production. Design work, wafer fabrication (by Hong Kong and foreign firms), and testing will probably remain in Hong Kong while labor-intensive assembly processes will be increasingly relocated to China."

THE DECLINE OF ROLM

On December 13, IBM announced that it was selling Rolm, the Silicon Valley manufacturer of office telephone switching equipment, to Germany's Siemens A.G. The sale lifted Siemens to number one in the highly competitive worldwide office switch market. IBM is retaining 50 percent in a venture, with Siemens, to sell and service Rolm equipment.

Four years ago, when IBM communica Rolm for \$1.3 billion, they looked like an unbeatable team. But the magic three letters that had turned a mediocre personal computer into an industry standard did mean nothing in the telecommunications marketplace. Rolm, under IBM direction, had trouble introducing new products. In late 1987, IBM ended Rolm's status as a wholly owned subsidiary, and it integrated Rolm into its other operations, moving Rolm's manufacturing to IBM plants. Still Rolm continued to lose money at about \$100 million a year. Reports vary, but the consensus in the press is that IBM sold what is now known as Rolm Systems to Siemens at a substantial loss.

The conventional wisdom in Silicon Valley, shared by many Rolm employees, is that IBM quashed the creativity of a firm known for its casual environment. IBM didn't close Rolm's highly touted athletic facilities, but it did superimpose a bureaucratic review process at Rolm. Some of that can be attributed to IBM's stodgy corporate culture, but IBM, as a large firm,

needed to make sure that Rolm's products meshed properly with the rest of its product line.

But there is another explanation, equally valid. Rolm's founders sold out to IBM because the game had already changed. When Rolm first developed its switching systems, they easily outperformed the rest of the industry. Rolm sought IBM's capital, marketing expertise, and reputation because competition in its primary markets was getting much tougher.

No Battle of Giants

When IBM acquired Rolm, the pioneer in advanced digital office switches, it shook the entire high-tech world. At a time when IBM was also buying a substantial share of MCI, the long-distance communications carrier, it looked like the computer giant was ready to take on AT&T across the full range of high-tech product lines.

In fact, it looked like the civilized world was dividing into three parts: IBM, AT&T—which looked like it was moving full speed into the merchant computer and chip businesses—and beyond. Other companies, lacking their resources and stature, would dive for protection in minor market niches while the two giants battled.

The battle never materialized. Although AT&T had invented the transistor, developed the UNIX operating system, and pioneered many other related technologies, it remained an also-ran in the computer and components industries. However, in its main line of business, long distance communications, AT&T surprised most observers by maintaining most of its market share.

The key industries of high technology electronics—computers, chips, communications, and instruments—are dynamic. As long as semiconductor producers are able to increase the number of functions they can embed in a flake of silicon, new applications and production processes will continue to emerge. Many of the new ideas will come from new or young firms.

The aging giants—IBM and AT&T—will remain important, leading in the segments that they have long dominated. To grow in other branches of industry, however, they need to link up with a constantly changing array of other firms. AT&T's computer affiliate, for a few years closely tied to Olivetti, now depends on Sun Microsystems. Instead of being divided among two or more "teams" with permanent rosters, high-tech is now, and is likely in the future to remain, a confusing contest where the major players form, drop, and alter a complex web of floating strategic alliances.

KOREAN WORKERS ORGANIZE

News of worker militancy in South Korea continues to filter through the mass media hype of economic miracle and political change, but the alternate news channels move slowly. We don't hear how every struggle is resolved, but there is a clear pattern. Major U.S.-based high-tech firms, including those that claim to maintain an enlightened attitude toward the rights and needs of their workers, become aggressive when threatened with genuine union organizing.

It is possible that U.S. managers do not particularly like the anti-union tactics of the executives at their Korean subsidiaries. However, they tolerate violence in Korea, and at the same time, they set corporate profit objectives that leave Korean managers no alternatives if they are to keep Korean labor cheap.

Resistor (December, 1988), the newsletter of IBM Workers United in the U.S., provides a chronology of labor organizing at IBM Korea, covering August and early September. In August, fifteen employees formed a union, and within two days 300 workers, nearly half of the local workforce, joined.

The company responded with attacks on the union, and it refused to provide an office or permit union activities during working hours, standard practices in South Korea labor relations. Collective bargaining began in early September, but no agreement was reached.

The *Resistor* reports, "As it stands now, our co-workers in IBM Korea have set up a temporary union office in the main lobby of IBM Korea headquarters and have initiated a petition drive for recognition of their union."

The *Resistor* asks its readers to contact IBM Chairman Akers to remind him of his statement on

union organizing at the 1987 IBM stockholders' meeting: "The IBM Company management is not anti-union. IBM has always recognized the right of our employees to organize, or to refrain from organizing."

Meanwhile, the drive of workers at Motorola's South Korean plant for union representation has triggered violence, primarily by company-sponsored *kusadae*, or "save the company corps." Motorola employs about 5,000 workers in Seoul.

Originally, Motorola employees attempted to form a union during the wave of labor organization in the summer of 1987. The company fired organizers and the *kusadae* successfully broke up organizing efforts.

In December, 1988, however, Motorola workers officially registered a union with the Ministry of Labor, and they received recognition from the Federation of Korean Trade Unions. The company refused to bargain, so union members initiated a sit-in in the company canteen.

In response Motorola locked the canteen, turned on the air conditioning while cutting other utilities, locked other employees out of the factory, and sent *kusadae* in. The North American Coalition for Human Rights in Korea reports, "Many workers were reported as seriously injured in the process and five of the union members were kidnapped by the *kusadae*. As of December 29 they were still missing."

The union kept up its activity, but the Coalition reports that Motorola refused to negotiate in good faith. Then, the Coalition writes, "On December 30, while about 100 workers were engaged in a sit-in strike inside the factory, about 10 union members stormed the computer room and threatened to set it afire unless management recognized the union. They and 20 others were arrested by about 200 police..."

Address Correction Requested

BULK RATE
Non-Profit Organization
U.S. POSTAGE
PAID
PERMIT NO. 155
MOUNTAIN VIEW, CA

Pacific Studies Center
222B View Street
Mountain View, CA
94041 - USA