

## THE LEAD/ACID BATTERY INDUSTRY IN TAIWAN

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### Introduction

No bugles blew, no spotlights swept the night sky, no alarms sounded. The population of Taiwan reached 20 million surreptitiously. Survival has now become extremely difficult in this small island of some 36 000 square kilometres.

### Economic climate

During the past four decades, substantial changes have taken place in many areas of Taiwan's economy. The country has turned from an agricultural-based economy to an industrial-based economy. In 1952, industry had an 18.0% share of the net domestic product (NDP), agriculture 35.9%, and services 46.1%. In 1984, the industry share of the NDP rose to 50.6%, agriculture declined to 6.5% and services to 42.9%. The average annual growth rate of industrial production over the past three decades has been 13.2%, whilst the economic growth rate has averaged 3.7%.

In 1985, the gross national product (GNP) amounted to NT\$ 2394 billion at current prices, representing an increase of 4.73% in real terms over the preceding year. The *per capita* income stood at NT\$ 114 330 (U.S.\$ 2868), showing a rise of 2.65%. Reviewing the GNP structure through expenditures, private consumption amounted to 51.26%, government consumption reached 16.63%, gross domestic capital formation stood at 18.99%, the balance of trade between exports and imports was 12.61%, inventories were negative at -1.08%, and the remaining 1.59% went to the net factor income from abroad. Total two-way trade in 1985 was valued at U.S.\$ 50 823.4 million, showing a decrease of 3.0%, or U.S.\$ 1592.1 million. Of the total, exports recorded a negligible growth of 0.9% to U.S.\$ 30 716.8 million, while imports dropped 8.4% to U.S.\$ 20 106.0 million. Industrial production had suffered from the fall in export demand, and showed an increase of only 1.21% in 1985. A breakdown of the growth of major sectors in industry for the whole year shows that mining went down 7.6%, manufacturing inched up 1.01%, public utilities topped the growth list by rising 6.21%, and housing construction climbed 3.30%.

## Lead production and usage

The consumption of primary lead in Taiwan is about 35 000 t per year. One third is virgin lead imported from overseas countries (mainly Australia), and about two thirds comes from local, secondary lead smelters. About 16 000 t of the lead is used for making lead/acid batteries, 12 000 t for chemicals such as stabilizers and pigments, and 7000 t for other materials, including solder, wire and cable, sheet and tube, hardware, etc. There has been neither a significant increase nor a significant decrease in lead usage in Taiwan during recent years.

Secondary lead production in 1985 was about 50 000 t, half was for export and half for local consumption. It is anticipated that this figure will increase to about 60 000 t in 1986. The biggest supplier, THAI PING, now produces about 3000 t per month (45% for export, 55% for local consumption), output will increase to 3500 t per month after September, 1986. The second largest supplier is ACME which processes about 1500 t per month (40% for export, 60% for local consumption). Six other small plants provide, in total, about 7000 t per year. The Taiwan Environmental Protection Bureau has commenced a strict supervision of pollution problems. This action has prevented new plants from being built unless pollution controls are incorporated. With the strengthening of the Japanese yen, many SPL and lead alloy orders have come to Taiwan. It appears that 1986 will be a prosperous year for Taiwanese secondary lead smelters.

The imports of battery and lead scrap to Taiwan were 48 218, 56 773 and 54 839 t in 1983, 1984 and 1985, respectively. The figure for January to May, 1986 is 34 077 t, and is expected to be over 80 000 t by the end of the year. These imports come mainly from the U.S.A. and the Middle East, with lesser amounts from Australia and Singapore. Locally collected scrap is around 10 000 t per year.

## Battery production

There are about 30 battery makers in Taiwan. Government statistics for battery manufacturing over the past ten years are given in Table 1. It can be seen that the output increased steadily between 1976 and 1980. However, due to keen competition from overseas, there was a decline in production in 1981 and 1982. Following improvements in manufacturing efficiency, production levels commenced an upward movement again in 1983. As a result, output in 1985 was almost double that of 1978.

The composition of the market in 1985 was  $2.5 \times 10^6$  motorcycle batteries,  $0.83 \times 10^6$  automotive batteries, and  $1.0 \times 10^6$  maintenance-free batteries. Sales amounted to NT\$  $1.4 \times 10^9$ , 54% of these were generated from exports. From January to April, 1986, battery production has been  $2.1 \times 10^6$  units with a total value of NT\$  $680 \times 10^6$ , including NT\$  $403 \times 10^6$  from exports. It is estimated that around  $5 \times 10^6$  batteries

TABLE 1

Battery production (all types) in Taiwan

Year	Production
1976	794 000
1977	1 161 000
1978	2 200 000
1979	3 164 000
1980	3 962 000
1981	3 415 000
1982	3 023 000
1983	3 919 000
1984	4 102 000
1985	4 336 000

will have been made by the end of 1986, of which 50% will be for export to mainly Japan and South-East Asia.

Maintenance-free batteries using lead-calcium alloys have been manufactured in Taiwan during the past three years. Metallurgical problems have been overcome through technical help from primary lead suppliers (*e.g.*, The Broken Hill Associated Smelters Pty Ltd) and through dedicated investigations by local battery companies. A high value is placed on quality control in making maintenance-free batteries. The "MIT" mark of the Taiwanese industry has now become recognized throughout the world as a symbol of battery reliability.

A current topic of concern is the fact that the export price of Taiwanese automotive batteries is about 10% higher than that of equivalent Korean products. In order to reduce costs and increase competitiveness, it is necessary to unify small-scale plants, upgrade both management and technical operations, and improve financial structures. The Taiwanese battery makers look forward optimistically to achieving these goals.