

SINGAPORE

EXISTING PROGRAMMES

Technical education in Singapore is the responsibility of the Department of Technical Education, created within the Ministry of Education in 1968. This, in itself, indicates a realization on the part of the Government of the vital importance of technical education in any country, no matter what its size. The Department of Technical Education also implements the programmes and policies of industrial training. An Industrial Training Board was created on 1 April 1973, superseding the previous National Industrial Training Council.

Technician education is conducted in the Singapore Polytechnic, with the Singapore Technical Institute and the Ngee Ann Technical College also running technician courses. The workshops and laboratories of the Singapore Technical Institute are used for conducting teacher training courses and refresher courses. In my opinion, all three institutions have excellent instructional facilities, and the faculty is very effective. Details of facilities by institutions and level of courses are given under a separate heading.

In Singapore, training facilities are not exactly commensurate with requirements. The curriculum of technician education is generally devoid of practical training, but it is flexible enough to meet the requirements of industry in Singapore.

During my discussions with the authorities in charge of technical education and training I was given to understand that, in the next phase of development, they will take effective steps to up-grade the skills of technicians and craftsmen, and create effective working arrangements with industry so that theory is cross-fertilized with actual processes of production, design and construction.

CRAFTSMAN TRAINING AND INDUSTRIAL TRAINING

Industrial Training Institutes are being set up, administered by the Industrial Training Board, which also runs the Singapore Technical Institute.

The Industrial Training Board (ITB) was established on 1 April 1973 to centralize, co-ordinate and promote all forms of industrial training in Singapore on a national basis. The ITB took over from the Technical Education Department responsibility for the administration of twelve training institutions, comprising the Singapore Technical Institute (a tertiary technical institution), eight vocational institutes (including one government-aided institute) offering training in the metal, woodworking, electricity, electronics and building trades; one vocational institute offering courses in manual and applied arts; the Hotel and Catering Training School; and the School of Printing.

The other major functions of the ITB are the promotion of apprenticeship training, and the establishment of trade testing on a national basis. The ITB's scope of responsibility includes the training of workers already employed in

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industry, for example, day-release, block-release and sandwich programmes, off-the-job industrial training (OJIT), group training for small firms, and special programmes to meet the needs of individual firms. The accent in the ITB's programmes is on developing skills geared to increasingly high-level technology for the industrial development of Singapore. Engineering is expected to be its central pre-occupation for some time to come.

ARRANGEMENTS FOR MANPOWER PLANNING AND TECHNICAL EDUCATION

The Development Plan provides for the promotion of technology-intensive industries. Such industries will necessarily need a large number of properly-trained technicians. It is felt that the Government will have to pool all its resources and direct its policies and programmes towards the creation of good facilities for the training of such technicians. The training aspect is very important, and the authorities may be required to seek the help of more developed countries for specialized training, particularly in narrow specialities and emerging technologies. The future needs of manpower are determined through periodical surveys carried out by the government on the one hand and by the institutions on the other. The surveys are comprehensive enough to cover the types of training and the specialized fields of training which industry will find useful in a given period.

Some important recent studies which came to my notice during discussions with officials and which have particular reference to manpower planning are: (i) 150 years of Education in Singapore; (ii) Higher Education and Development in South East Asia (UNESCO); (iii) Interim Report on the Singapore 4 Project, Technical Teacher Education and Vocational Training (ILO Chief Technical Adviser); (iv) Education in Singapore; (v) Ship Building Survey; (vi) Manpower Requirements in New Industries; (vii) Manpower Requirements in the Hotel Industry; (viii) Higher-Level Manpower Study; (ix) Manpower in Singapore's Large Manufacturing Firms; and (x) Technical Education Department - Second Annual Report.

It is gratifying to note that organized manpower studies have been attempted periodically. But the time at my disposal was short and the various study reports were not readily available, so it was not possible to know exactly how many training places would be required in the next few years to provide both for students on courses and for employees on an in-service/post-qualification training programmes and how many places are wanted in other countries.

After the visit to the three technician institutions of Singapore, I concluded that the quality of technical training is well up to the mark especially in that the material resources of all three institutions are well developed and exploited. With its pattern of growth, industry will certainly find the end products of these institutions extremely useful.

IDENTIFICATION OF TRAINING NEEDS

The success of the electronics industry in Singapore during the early part of Phase Two demonstrated to international investment circles that Singapore workers have very high skill potential because of their good educational base. Many training needs were identified when the industry began to integrate both vertically and horizontally. When, subsequently, the precision engineering and machine building industries also took an active interest in Singapore, specific additional skills were required. The result was that training programmes were organized and implemented by the Government or by individual companies, depending on requirements and available organization. Among the Government projects were:

(a) Industrial Training Centre

Initially, to orientate the large numbers of young female workers to factory life, an Industrial Training Centre was set up and financed by the Government. The Centre conducted short residential courses on industrial orientation to inculcate in the workers a sense of team work, quality consciousness, good work attitudes and industrial discipline.

(b) Light Industries Services Unit

The integration of the electronics industry was aided by the establishment of a Light Industries Services Unit with UNDP assistance to provide supporting services and train workers. During the later stages, these services and training programmes were expanded with French, Japanese, and British government assistance.

(c) Technical Education Department

To step up technical and vocational training, a Technical Education Department was organized within the Ministry of Education to concentrate on the long-term development of vocational and technical institutes.

(d) Singapore Institute of Management

To promote management training, the Singapore Institute of Management was set up in 1966 as an independent institute. Some governmental assistance was given during the formative stage.

(e) National Productivity Centre

To promote labour productivity in industries, the National Productivity Centre was established in 1967.

(f) Hotel and Catering Training School

To cater for training requirements associated with the rapid growth of the tourism industry, the Hotel and Catering Training School was set up.

Many projects were spontaneously implemented by private industries. These were invariably related to their own formation or expansion plans. To enable some of them to select the most effective training method, the Government provided some financial assistance. The Government-owned Keppel Shipyard established its own training school with a capacity for training 360 apprentices off-the-job. Jurong Shipyard and Shipbuilders, which now build 90,000 ton dwt tankers, sent large numbers of young Singaporeans to Japan for training in shipbuilding and repair skills. During the implementation of the Rollei project to make cameras and projectors, 450 Singaporeans were sent to Germany for training in precision engineering skills. They have now returned to Singapore to assist in the training of over 5,000 other workers in the manufacture of cameras, projectors and other photographic equipment. On the other hand, Wild, which makes precision survey instruments, trains most of its skilled workers in Singapore and resorts to overseas training only for a few key personnel. Generally, this 'quick start' manpower concept was supported by the Economic Development Board under the Industrial Development Scholarships Scheme. Under this scheme, many other international companies which were setting up plants in Singapore sent their key personnel abroad for in-plant training. Timex, a watch-manufacturing company, on the other hand, implemented an apprenticeship programme for tool and die makers in connection with its project to make precision tools and dies for watch manufacturing. Philips, the Dutch electrical firm, introduced an apprenticeship training programme for machinists in connection with its machine factory project.

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With the coming of more and more precision engineering and machine building industries to Singapore, a pilot scheme for overseas industrial training was evolved. Under this scheme, apprentices were attached to reputable companies in Germany and Switzerland for long-term training to reach the respective national apprenticeship standards. These return as fully-trained workers to expedite new projects.

To sustain a higher economic growth under near-full employment conditions, policies will have to emphasize the optimal use of manpower. The following measures will improve the quality of manpower:

- (a) Greater technical orientation will be given in the schools.
- (b) The Industrial Training Board will continue to develop a long-term industrial training programme.
- (c) The Singapore Polytechnic and Ngee Ann Technical College will be expanded to meet the projected demand for technicians to sustain the economic growth at its present rate.
- (d) The University of Singapore will increase its output of professional engineers and accountants.
- (e) The Industrial Development Scholarships Scheme will be expanded to enable top apprentices and technicians to be given opportunities for further training locally and abroad.
- (f) A Joint Government-Industry Training Scheme has been introduced for high-skill occupations requiring long apprenticeship training. Under this scheme, specialized courses in tool and die making, precision mechanics and precision metal machining are conducted.
- (g) To encourage private industries in the growth sector to train their personnel, preferably in excess of their own requirement, an Industrial Training Grant Scheme has been introduced. Under this scheme, training programmes approved by the Economic Development Board may receive grants up to \$ 69,000 per trainee.
- (h) The Overseas Training Programme previously run on a pilot basis has been expanded to train more skilled workers in occupations relating to new industrial projects being promoted or under implementation in Singapore.

IMPORTANT STEPS TOWARDS ORGANIZED MANPOWER PLANNING

The development of industries in Singapore will not be quick. Therefore the facilities and type of technician training available at present will be found more than sufficient except for technology-intensive industry which might need technician training in emerging technologies and specialized fields. Neither the present requirements for such technicians nor projections for the next few years were readily available. Projections of manpower requirement by occupations have, however, been attempted to cover five years ending 1978.

SALIENT FEATURES OF TECHNICAL EDUCATION IN SINGAPORE

- (a) Technician training is imparted on both a part-time and a full-time basis.

- (b) Practical training is not compulsory in the curriculum of all technician education simply because of lack of training facilities in industry.
- (c) The Ngee Ann Technical College offers technician programmes in Mechanical Engineering and Electronics Engineering.
- (d) The Marine Engineering course run in the Singapore Polytechnic is re-inforced with extensive compulsory practical training which is imparted in ship-yards and ship-building industries and lasts for one year.
- (e) Because there are many employment opportunities for technicians, a contribution from industry is not required. The students get on-the-job training in accordance with the requirements of particular industries.
- (f) Forty to 50% of the population of Singapore is below 16 years of age. These young people need vocational training of one sort or another. The Ngee Ann Technical College meets some of these needs.
- (g) The Department of Technical Education and the Industrial Training Board are both capable of providing good facilities for the basic training required locally. They have, however, also made limited use of facilities available in India, Japan, Philippines and elsewhere, particularly in such skills as tool and die making, precision machinery skills, cane, rattan work, and teacher training programmes.
- (h) Technical and vocational education in Singapore is very expensive. The Government is well aware of this and hopes to reduce the per capita cost of technical education. It proposes to encourage private employers to run their own training programmes, and may be ready to provide financial assistance, if need be. This will not only accelerate the supply of technical personnel but also reduce the per capita cost of technical education and influence the quality of the product.

SUITABILITY OF TRAINING

Singapore has limited resources for further industrial development. The facilities available for technician training in three institutions are satisfactory both in quality and quantity for the development needs so far envisaged. The country will need specially-trained personnel in narrow specialities and emerging technologies when it embarks upon its plans for the establishment of technology-intensive industries. For such needs, the existing facilities will be found inadequate. It will be necessary either to import expertise and manpower from other countries or to retrain people already in employment.

INDUSTRY, TRAINING, TECHNICAL INSTITUTIONS

Singapore needs engineers in large numbers. Engineers occupy top positions in industry, Government departments and technical institutions by virtue of their creative ability in design, production and construction. Because the field of an engineer is so vast, one person cannot specialize in all types of work. This is recognized in the courses for the first degree in engineering given by the Faculty of Engineering of the University of Singapore. Courses are offered in Civil Engineering, Mechanical and Production Engineering, Electrical Engineering, Industrial and Systems Engineering. The duration of a degree course is four years divided into eight semesters.

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During the first two years, all engineering students follow a common two-year course. In the third and fourth years, special subjects pertaining to the relevant branches are taught. The students do practical work in workshops and laboratories. They also attend theory classes for about 30 hours per week. During long vacations full-time practical training in industry is undertaken.

In Singapore, technician courses are conducted at two levels: diploma courses, which are of three years' duration, and certificate courses, which are of two years' duration. The technician diploma courses are designed to prepare engineering technicians particularly in specialized engineering fields and applied technologies. The training is more theoretical than that of the certificate course, since the products are required to assist their senior partners - the professional engineers - in design and production work. Diploma-level courses are run in the Singapore Polytechnic and the Ngee Ann Technical College. The certificate-level technician courses are run at the Singapore Technical Institute. Their aim is to produce shop-floor supervisory personnel, and professional staff for technical schools and industrial training schools. These people are required to have less specialized theoretical knowledge, but a better understanding of the processes and practices of production and manufacture. Such technicians, therefore, attain craftsman skill.

All technician trainees are required to study science, maths, and industrial management in addition to the usual technical subjects relevant to the discipline. Normally, 30 hours' theoretical training per week is given in addition to practical study in workshops and laboratories. The long vacations are used for industrial training. The marine engineering course envisages practical training as an integral part of the syllabus. One year's practical training is organized in shipyards or engineering workshops. The nature of the training and the objectives differ from course to course. Vacation training is imparted in the workshops of the Ngee Ann Technical College.

Craftsman training is provided in eight vocational institutes. The number of engineering trade courses is 34. These vocational institutes also run artisans' courses. The craftsman courses are so designed as to cover extensively the functions envisaged in a particular operation. Generally, the craftsman is required to perform a job either by hand or by a machine. His job may be intricate but it is, nevertheless, of a repetitive nature. He is required to possess manual skill and to receive direction from the technician supervisor.

An artisan is less versatile in his skill attainment than the craftsman, but he is required to acquire basic knowledge and skill for a particular trade.

The survey undertaken in Singapore shows that the demand for craftsmen artisans is steadily increasing. The main employees are in the ship-building, ship-repairing, oil exploitation, petroleum, textile, wood and wood products, metal and metal products industries.

The Singapore Polytechnic Act provides for the constitution of well-formed advisory committees consisting of representatives of the Polytechnic, Government departments, Singapore Academy of Science, professional bodies and major industries relating to the fields of engineering and technology for which the advisory committees have been formed.

In the Ngee Ann Technical College facilities are not provided for part-time courses. Facilities are, however, open for the conduct of day-release courses for persons already employed in industrial establishments. Due importance is given to the industrial training of students. The vacations falling in August/October are utilized for attaching students in their second and final years to various industrial and business organizations. This not only gives them an insight into the actual work process and methodology but also enables them to adjust effectively to future employment. This programme is called the Industrial and Business Orientation Programme. Details of courses in each institution are given in Appendix 2 on pages 87-88.

There is a central agency which looks after this programme. It consists of representatives of the Singapore Chinese Chamber of Commerce, the Singapore Manufacturers' Association, the Science Council of Singapore, the Ministry of Science and Technology, Industrial Training Boards, the Science Faculty of the University of Singapore, Nanyang University, Singapore Polytechnic, and the Ngee Ann Technical College. The programme is effectively and actively supported by leading industries and commercial establishments. This is an excellent method of pooling training places and is of maximum use to the economy.

TRAINING WITHIN INDUSTRY PROGRAMME

The Ministry of Labour has launched the TWI Programme which envisages improvement in the quality of supervisory training because it is universally recognized that good supervision pays rich dividends in any industry. The term "supervisor", in the TWI scheme, covers all persons who direct the work of craftsmen, artisans and other operatives. Thus supervisors occupy a key position in industry in providing a link between management and employees. They communicate with the management in matters of production and management policy, and also keep in touch with employees for the execution of orders and implementation of policies. The training of a supervisor is therefore vital.

Short courses of training are organized for supervisory personnel. The training is guided by definite principles of good supervision, and four training programmes are envisaged in the TWI scheme. These are: (i) job relations; (ii) job instruction; (iii) job methods; and (iv) job safety.

In the scheme, supervisory knowledge and skills have been analysed as follows: (i) knowledge of the work; (ii) knowledge of responsibilities; (iii) skill in leading; (iv) skill in instructing and communicating; (v) skill in improving methods; (vi) skill in preventing accidents.

Keeping this knowledge and these skills in view, the TWI programmes detailed below have been formulated. They are not intended to teach any specific knowledge of the work and the responsibilities since these differ from industry to industry and organization to organization.

- (a) A job relations programme aims to develop leadership qualities.
- (b) A job instruction and communication programme provides training in the skills of taking instructions and communicating them to the workers.
- (c) A job methods programme trains in the use of proper techniques for introducing improvements.
- (d) A job safety programme emphasizes the need, quality and type of safety methods to be enforced in a particular organization.
- (e) A discussion-leading programme aims at training the supervisor to adopt methods and media for discussions relating to jobs and to muster opinion of the workers in properly organized seminars.

A list of industries offering training places for the students of technical institutions is appended as Appendix 3, pages 89-92.

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REGIONAL TRAINING

Singapore has collaborated on an official basis with various international or regional agencies on regional manpower training projects. As a Colombo Plan donor country, Singapore provides more than 300 training places each year to other developing countries including Indonesia, South Korea, Malaysia, Philippines, South Vietnam, Sri Lanka and Thailand. Besides accepting trainees in port administration, library services, low-cost housing programmes and so on, Singapore is now providing host country facilities to the following regional manpower training institutions: the Colombo Plan Staff College for Technician Education, the Regional English Language Centre (RELC), and the Regional Institute of Higher Education (RIHED).

The Colombo Plan Staff College has already started functioning under its first Director, Dr. L. S. Chandrakant. The basis of the establishment of this College and the tasks it is required to accomplish are:

- (a) that the countries of the region wish to expand and to improve the quality of their systems of technician education; and
- (b) that, in these countries, there is an urgent need to increase the supply of well-trained technician teachers and to improve the quality of the teaching of those already in service.

From these premises, it is evident that the countries of the region face major problems in developing technician education and training. Two, however, are paramount. The first is the problem of increasing the supply of well-trained technician teacher educators and supporting and developing those already in service. The second is the problem of encouraging and assisting senior staff in technician education to play a more active part in in-service training and staff-development programmes. In the longer run, these problems will be best solved by the countries themselves. In the short run, it is believed that the Staff College can greatly assist by undertaking:

- (a) To provide, both at the College and in regional member countries, courses of further professional education and training for serving technician teacher educators, key technician teachers, persons responsible for the planning, development, administration and supervision of technician education and training, and persons in key supporting roles such as training officers, librarians and registrars.
- (b) To conduct study conferences for directors of technical education, principals, and other key personnel from education and industry, at which problems of technician teacher education and training and technician education and training may be examined.
- (c) To assist regional countries and institutions to undertake projects in the field of staff and curriculum development, and projects aimed at the effective utilization of resources for learning and teaching.
- (d) To promote, co-ordinate and undertake research into the special problems of technician teacher education and training, and technician education and training in the region.
- (e) To advise and assist member countries in developing their technician teacher education and training facilities and in making use of other facilities for technician teacher education and training within and outside the region.
- (f) To collect and disseminate information on technician education and training, and on technician teacher education and training.

APPENDIX 1: OFFICIALS MET AND VISITS UNDERTAKEN

Officials

Mr. I. K. McGregor	Director, Colombo Plan Bureau, Colombo
Mr. Gregorio P. Espinosa	Adviser on Intra-Regional Training, Colombo Plan Bureau
Mr. Chan Kai Yau	Deputy Director, Schools
Mr. Harbans Singh	Adviser, Technical Schools
Dr. Cheng Lim	Divisional Director, Personnel and Development, I.T.B.
Mr. Gwee Teck Yew	Divisional Director Training
Mr. V. P. W. Ager	Principal, Singapore Polytechnic
Mr. Tan Soo Yang	Co-ordinator of Diploma Course, Singapore Polytechnic
Mr. Khoo Kay Chai	Co-ordinator, Certificate Course, Singapore Polytechnic
Mr. I. W. K. Murch (and Staff)	Head of Production Engineering, Polytechnic
Dr. F. A. Varley	UNESCO Chief Technical Adviser, Polytechnic
Professor Lewis Au	Dean, Faculty of Engineering, University of Singapore
Mr. Allan Philips	Visiting Professor, Mech. Eng., Ngee Ann Technical College
Mr. Thomas Riley	Department of Electrical Engineering, Ngee Ann Technical College
Mrs. Teo Wong Mee Lin	Executive Officer, Ngee Ann Technical College
Mr. Chua Soo Tian	Chief Economic Development Board, Singapore Manpower Development Division
Mr. R. T. Tambyah	Principal, Singapore Technical Institute
Mr. Hee	Principal, Technical Teacher Training College
Mr. Kesavan Yoo Weng	Senior Officer, Industrial Training, E.D.B.
Mr. Lee Fong Seng	Interim Chief Adviser, Colombo Staff College
Mr. J. L. Cabot	Temp. Organizing Tutor, Colombo Plan Staff College
Mr. R. Baum	Executive Director, Singapore Employers Federation
Mr. L. W. Fook	Chief Inspector of Factories, Ministry of Labour
Mr. S. T. Tee	Public Relations Officer

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Some Institutions Visited

MoNair Centralized Workshop; Kim Seng Technical School; Jurong Vocational Institute, Tata Precision Training Centre; Singapore Polytechnic; Ngee Ann Technical College; Singapore Technical College; Rollei Training Centre

APPENDIX 2: EDUCATIONAL FACILITIES AT ENGINEER AND TECHNICIAN
LEVELS

ENGINEER LEVEL

University of Singapore, Bukit Timah Road, Singapore 10

Degrees (4 years) in:

Civil Engineering; Electrical Engineering; Mechanical and Production Engineering; Industrial and Systems Engineering

Minimum admission qualifications: two Higher School Certificate passes at principal level in: (a) Mathematics or Pure Mathematics or Applied Mathematics; (b) Physics or Physical Science. Preference is given to candidates who have in addition obtained a pass in any of the following subjects either at principal or subsidiary level: Mathematics, Pure Mathematics, Applied Mathematics, Chemistry, Geometrical and Mechanical Drawing, Geometrical and Building Drawing, Metalwork/Metalwork (Engineering), Woodwork

TECHNICIAN LEVEL

Singapore Polytechnic, Prince Edward Road, Singapore 2

Diplomas (3 years) in:

Civil Engineering*; Electrical Engineering*; Mechanical Engineering*; Production Engineering*; Electronics and Telecommunications Engineering*; Building*; Chemical Process Technology

Other diplomas: Marine Engineering (4 years)*; Aeronautical Maintenance Engineering (1 year)*; and Architectural Draughtsmanship, Land Surveying, Ship Construction, and Structural Engineering (part-time only)

Certificates (2 years full-time only) in:

Draughtsmanship; Industrial Technician; Marine Radio Officers

Minimum educational qualifications for admission: (a) English Language; (b) Elementary or Additional Mathematics; (c) An appropriate Science Subject (Engineering Science, Physical Science, Physics). Preference is given to candidates who have in addition obtained Grade 7 or 8 in one or more of the following subjects: Geometrical and Mechanical Drawing, Metalwork or Metalwork (Engineering), Electricity and Electronics (for electrical engineering courses), Woodwork (for building and civil engineering courses), Chemistry (for chemical process courses), Geometrical and Building Drawing (for building and civil engineering courses).

Ngee Ann Technical College, 535 Clement Road, Singapore 21

Diplomas (3 years) in:

Mechanical Engineering; Electronics Engineering

Minimum educational qualifications for admission, in the Singapore-Cambridge GCE or equivalent examination, (a) Grade 7 or 8 in English Language, (b) 'O' Level pass in Mathematics, (c) 'O' Level pass in Physics, Science or Additional General Science, or an appropriate technical subject. Preference is given to candidates who have in addition obtained Grade 7 or 8 in one or more of the following subjects:

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Technical Drawing; Metalwork; Metalwork (Engineering); Electricity and Electronics.

Singapore Technical Institute, Circuit Road, Singapore 13

Certificates in:

Electronic Engineering^x and Electrical Engineering^x (1 year); Mechanical Engineering Drawing and Design, Mechanical Engineering, and Air-conditioning and Refrigeration (2 years)

Minimum educational qualifications for admission, in the Singapore-Cambridge GCE examinations, (a) Grade 7 or 8 in English Language, (b) 'O' Level pass in Mathematics, (c) Grade 7 or 8 in either Physics, Physical Science, Engineering Science or Additional General Science. Preference is given to bilingual candidates who have obtained Grade 7 or 8 in the appropriate technical subjects.

Technical stream candidates with Grade 7 or 8 in Metalwork and Technical Drawing qualify for admission to the last three courses above.

Day release courses are also available to applicants in relevant employment.

* Part-time courses are available to applicants in relevant employment.

^xOnly selected graduates of relevant trade courses will be admitted to these two courses as from 1975.

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Neptune Orient Lines Ltd
OTJ Architects
Office Equipment Manufacturers (S)
Pte. Ltd
Ong & Ong Architects & Town
Planners
Orchard Motors (S) Pte. Ltd
P. N. Electronics (Pte.) Ltd
Pan Malaysian Group Architects
Paterson Simons Workshop &
Service Division
Philips Telecom
Philips Machine Factory
Phoenix Building Enterprise
Prima Ltd (Flour Mills)
R. E. Morris (Electrical Engineers)
Rheem Hume Pte. Ltd
Rediffusion (S) Pte. Ltd
Robin Shipyard (Pte.) Ltd
Rollei Singapore (Pte.) Ltd
Roxy Electric Industries (S) Pte. Ltd
Sanyo Industries (S) Pte. Ltd
Sembawang Shipyard (Pte.) Ltd
Shell Companies in Singapore
Shell Eastern Petroleum (Pte.) Ltd
Shanghai Kor Tong Furniture & Co
Setron Co, Ltd
Sing Oxygen Ltd
Singa Plastics Pte. Ltd
Singapore Airlines Ltd
Singapore Building Society Ltd
Singapore Cement Manufacturing
Co, Pte. Ltd
Singapore Electronic & Engineering
(Pte.) Ltd
Singapore Glass Manufacturers
Pte. Ltd
Singapore Motors Pte. Ltd
Singapore Nissan Motors (Pte.) Ltd
Singapore Nylon Corporation Pte. Ltd
Singapore Offset Printing (Pte.) Ltd
Singapore Oxygen Pte. Ltd
Singapore Polymer Corporation
Pte. Ltd
Singapore Semiconductor (Pte.) Ltd
Singapore Textile Industries Ltd
Singapore United Estates Pte. Ltd
Sperry Han(s) Pte. Ltd
Stten Sehested & Partners
Straits Times Press (M) Bhd
Suckling McDonald & Mohd. Isahak
Survey Services (S) Pte. Ltd
Swan & Maclaren
Swiss Associated Ind. (Pte.) Ltd
T. Y. Lin S. E. Asia Pte. Ltd
Tan Ee Ping & Associates
Tanco Plastic Containers Pte. Ltd
Tamco Electrical Engineering (S) Pte. Ltd
Taylor Woodrow-Dillingham Joint Venture
Texas Instruments Singapore (Pte.) Ltd
Thiess-Petrosea International Pte. Ltd
Times Press
Tropical Timber Industries Ltd
Union Carbide (S) Pte. Ltd
United Engineers (S) Pte. Ltd
United Surveyors
Victory Industrial Co, Pte. Ltd
Wah Eng Construction
Wang Coo-Kien & Co, Pte. Ltd
William Jacks (Electronic Supplies)
Wilyyn (Pte.) Ltd
Wood Working Industries Development
Centre
Zuelling (Gold Coin) Mills Ltd

Public Establishments

Anti Pollution Unit	Planning Department
Broadcasting Department	Port of Singapore Authority
Department of Civil Aviation	Public Utilities Board
Economic Development Board	Public Works Department
Engineering Industries Development Agency	Science Centre Board
Housing and Development Board	Singapore Institute of Standards and Industrial Research
Jurong Town Corporation	Singapore Telephone Board
Metrication Board	Survey Department
Ministry of Defence	Telecommunication Authority of Singapore

Establishments and Shipping Companies Offering Training to Marine Engineering Students

Vocation Training

Jurong Shipyard Ltd	Vosper Thronyard Pte. Ltd
Keppel Shipyard (Pte.) Ltd	Weng Chan Engineering Co, (Pte.) Ltd
Public Utilities Board	Westbank Shipyard Pte. Ltd
Sembawang Shipyard (Pte.) Ltd	Watt and Akkermans Sdn. Bhd.
Singapore Slipway and Engineering Co, Pte. Ltd	

Sea Training

Esso Asia Service Inc.	Ocean Fleets Ltd
Interocean Lines (SEA) Ltd	Shell Eastern Petroleum Ltd
Island Navigation Corporation Bhd.	Straits Steamship Co, Ltd
Malaysian International Shipping Corporation Bhd.	Thome & Co, Ltd
Neptune Orient Lines Ltd	Ocean Shipping and Enterprises (M) Pte. Ltd
	Guan Guan Shipping (Pte.) Ltd

Workshop Training

Jurong Shipyard Ltd	Singapore Slipway and Engineering Co, (Pte.) Ltd
Keppel Shipyard (Pte.) Ltd	Watt and Akkermans Sdn. Bhd.
Public Utilities Board	
Sembawang Shipyard (Pte.) Ltd	

Shipping Companies Providing Sea Training for Deck Cadets and Apprentices

Austasia Line Pte. Ltd	Neptune Orient Lines Ltd
Chip Hwa Shipping and Trading Co, Ltd	Ocean Fleets Ltd
	Ocean Shipping and Enterprises (M) Ltd

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East Asiatic Co, Ltd
Esso Asia Services Inc.
Guan Guan Shipping Pte. Ltd
Islan Navigation Corp. (SEA) Ltd

Shell Eastern Petroleum (Pte.) Ltd
H. C. Sleigh Ltd
Straits Steamship Co
Worldwide (Shipping) Ltd

Organizations Providing Practical Training for Marine Radio Officers

The Telecommunications Authority
of Singapore
Neptune Orient Lines Ltd

The Singapore Association Shipping
The Singapore Shipowners Association