

Proposal for development of petrol chemical plant on jurong island



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Capital input for construction and maintenance of a petrochemical plant is high because of the large amounts of electricity and water id needed to heat up raw materials used in the petrochemical industry from which hydrocarbons are extracted. The main raw materials would be naphtha and kerosene, which are obtained from oil refineries. A highly skill labour force is required to run the advance machinery.

Processes

In the plant, crackers are used to break up large hydrocarbons in refined oil products like naphtha and gasoline. In the cracker, hydrocarbons heated by steam pass over the hot catalyst powered alumina-silica gel. The catalyst provides a huge surface on which the hydrocarbons break up into smaller more useful hydrocarbons. After crackling, the compounds are separated by fractionation. Some of these compounds are joined with other chemicals.

Outputs

Processed basic petrochemicals such as ethylene, propylene, butadiene, benzene, isoprene, and xylenes, which are the building blocks for innumerable chemical products pning the range of the plastic, rubber, and synthetic fiber industries.

Information about suitable location

The proposed location, Jurong Island, formed by land reclamation to merge seven offshore islands off the southern coast of Singapore (figure1), is a highly integrated world-class petrochemical complex. Their total is home to leading petrochemical companies like Chevron, Sumitomo and Mobil.

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Figure 1 Location of Jurong Island Figure 2 Map of Jurong Island

[d1]Central to the industry cluster concept and development of Jurong Island as an integrated complex is the sharing of common facilities. These include marine facilities, such as jetties and other berthing facilities; services such as warehousing, waste treatment, fire fighting, medical and emergency response; a common service corridor and infrastructure such as roads and drains.

Connected to mainland Singapore by 2.6 kilometre causeway, Jurong Island is only a ten minutes journey from furthest part of Jurong Island to the mainland. There are also bus services plying the entire island.

, which is the amenity centre found on the island itself as the community and transportation hub for Jurong Island customers. The amenity centre houses facilities like an air-conditioned foodcourt, an alfresco restaurant, a medical centre, a hardware store and a convenience store.

The Chemical Logistics Hub, called Banyan Logistics Hub, is a 80-hectare facility on Jurong Island to serve companies there. It will have berths, jetties and other marine facilities that provide linkage to the chemical plants via the common service corridors. Logistics services like storage tanks, chemical warehouses, tank cleaning, cleaning and maintenance, drumming, and waste treatment facilities will also be available. The Institute of Chemical Engineering Sciences (ICES) which will be situated on Jurong Island and to be is expected to be completed in early 2003.

Reasons for Choice of Location

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There are many key factors for the choice of location. Singapore is well positioned to play a key role in the growth of Asia-Pacific's petrochemical industry with an integrated hub on Jurong Island. Many multinational companies are already enjoying the benefits of locating on Jurong Island. Thus Singapore's Jurong Island would thus be the choice location for the petrochemical plant.

Jurong Island was formed by reclaiming the channels between the seven islands in phases, and extending beyond into additional sea space to form one big island. When completed, it will form a land area of about 2, 650 hectares from an initial mass of less than 1, 000 hectares. This will provide flat land for the building of the plant and also allow future expansion.

Also the company will easy access to their customers worldwide, because of Singapore's strategic location, world-class transportation and logistics, telecommunication and IT infrastructure.

Singapore also has a highly skilled labour force which are specialized in the field of petrochemisty. Productivity of Singaporean workers are high as they are noted to have good working attitude and aptitude which would positively affect total production and therefore profit. Furthermore there are many regulation patenting to strikes and work stoppages to Singapore thus there would be no worry for decline of productivity because of this. Moreover Chemical ProcessTechnologyCentre which will be ready in early 2003 will be situated on Jurong Island, will feature a production plant to provide practical training for students from the polytechnics and technical institutes so as to produce process technicians that are equipped with the latest technical skill

sets to complement their academic knowledge, enabling them to meet future challenges of petrochemical industries.

The Chemical Logistics Hub located on Jurong Island itself will provide shipping infrastructure other marine facilities would provide linkage to the chemical plants via the common service corridors. Logistics services like storage tanks, chemical warehouses, tank cleaning, cleaning and maintenance, drumming, and waste treatment facilities will also be available. This will help facilitate transportation thus making it more efficient and cost efficient. Furthermore it would save start up cost as we would not need to incur extra cost in building these facilities.

Singapore also offers an extremely pro-business environment. The government is highly supportive of set up of petrochemical plants and offer financial assistance such as tax incentives, innovation grants and low cost loans which will lower the start up cost.

Being a petrochemical hub with 70 companies investing more than S\$21 billion in oil refining, petrochemical manufacturing and specialty chemical manufacturing and supporting facilities on Jurong Island.

There is a linkage among the companies located in Jurong Island. The oil refinery plants (e. g. Shell), which are also located on Jurong Island, will provide feedstock (e. g. Naphtha) for the petrochemical plant. The plants' outputs (processed petrochemicals) to end-users in the vicinity or to ports to be exported to other neighboring countries in South East Asia. The siting of the related industries in close proximity results in an invisible network of

partnership that connects companies on the island, Jurong Island's vertical
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integration will save about 25 to 30 per cent off capital outlay and 10 to 15 per cent logistics cost. Furthermore Jurong Island is located along tanker routes and the availability of infrastructure such as ports means the plants outputs can be shipped out easily

Future plans for Expansion

As the number of petrochemical plants are set up, competition from various companies will increase (Table 1). To maintain competitiveness and to expand, we must firstly maximise the output of the current plant.

Ramping of production capacity automation machinery improve procedures

Second third shifts

Merger and acquisition

Extensive research into making production more cost and labour efficient, R&D work to develop more efficient production procedures, continuing to improve standards and skills of workers

Proposal for Development of Wafer Fabrication Plant in Pasir Ris Wafer Fab Park

To process bare wafers made locally and distributed its products worldwide

Proposal for development of Wafer Fabrication Plant in Pasir Ris

Wafer Fab Park

Brief Information

Input

Capital input for Wafer fabrication is high because of the expensive start up cost huge investments with an average direct investment of US\$1 billion per fab. Raw material is silicon. LA pool of skilled labour is needed to run machines and to manufacture wafer. Engineers and researchers needed for R&D. High consumption of water and electricity.

Processes

Wafer fabrication refers to the multiple processes that a wafer goes through to become an integrated circuit product. A wafer, usually composed of silicon, is the base material for integrated circuits. Silicon is processed into cylinder shaped ingot and then sliced and polished into mirror-like wafers of uniform thickness. These go through highly precise and complex manufacturing processes such as oxidation, diffusion, thin film deposition, ion implantation, patterning, cleaning and etching.

Outputs

The finished wafer contains hundreds of chips which go through additional processes to become finished integrated circuit products. These integrated circuits are inputs for electronics and computer industries.

Information about suitable location

The proposed location, Pasir Ris Wafer Fab Park is located in the eastern region of Singapore, close to the Tampines Regional Centre and the Tampines Wafer Fab Park and served by the Pasir Ris MRT and Tampines

Expressway. About 16.2 ha of the 59.1 ha site has been allocated. Industry luminaries have staked their chips here, including United Microelectronics Corporation (UMC), the world's second largest foundry and Systems on Silicon Manufacturing (SSMC).

Figure 1 Site Map of Pasir Ris Wafer Fab Park

The park is fully equipped with specialized infrastructure such as an adequate and uninterrupted supply of electricity and water and a vibration-free environment. The JTC Tampines Dormitory for foreign workers nearby offers 400 units - which can house up to 4800 workers to provide convenient and comfortable accommodation for foreign workers. The park is located only a ten minutes drive from the airport.

Reasons for Choice of Location

Singapore is a world-class electronics hub with global leadership in manufacturing solutions and in the creation and management of new products, applications and markets. The electronics industry in Singapore has the highest output in the manufacturing sector, accounting for 55% (or \$70.1 billion) of manufacturing's total output in 2001. Thus the outlook of starting up a wafer fabrication plant in Singapore is promising. The semiconductor industry will be one of the key sectors driving growth in the electronics industry in the future. Its focus will be on integrated circuit (IC) design; wafer fabrication*; and testing and assembly.

Singapore, with different economic and resource conditions from its neighbors, undertook reforms and infrastructure development that would

make it an attractive location for regional offices of multinational corporations and increasingly high value-added manufacturing.

Singapore-based MNCs are given incentives, such as tax and financial incentives and As the industry uses more new and sophisticated equipment and technology and automated manufacturing processes, the new jobs created require skilled workers, that is, workers with post-secondary educational qualifications and above. In 1999, 5, 000 jobs were created in the electronics industry, of which 42% were jobs that required skilled workers.

To meet the needs of the industry for skilled manpower, the Economic Development Board (EDB) works with the Institutes of Higher Learning (IHLs) and research institutes/centres, to carry out research and implement training programmes. In addition, companies are also encouraged to extend their resources to the IHLs to expose students of the state-of-the-art equipment and technology.

One of the largest IT markets (\$7. 5 billion) in the APAC region. Highly developed businessculture. Very open to outsourcing and well established Indian business presence-over 300 Indian business houses and 90, 000 NRIs based out of here. Is India's eighth-largest investor with direct equity investments of about \$1. 3 billion at end-2001. India's investment in Singapore has also grown by 14% over the past decade.

Adequate facilities, within wafer fabrication park, company will have advantage of being able to share ideas and information with other

companies. Share maintenance and support services and basic amenities such as roads and power.

Singapore headquarters of national and international banks.

Wafer fabrication very capital intensive, development agencies in Singapore provide financial help, schemes for loans to start up company help to pay for set up cost.

In terms of product positioning, Singapore is more innovative and advanced. Its lands, infrastructure and facilities for wafer fab are all allocated in a certain area so companies can actually start working upon moving in to the building in either of the three wafer fab parks.

However, when it comes to living environment, Singapore excels: It has no crime to speak of, offers excellent transportation and telecommunications infrastructure, has high-quality English-language schooling, and is generally a more "westernized" environment for overseas skilled workers. As testament to that, you'll find Germans, Japanese, Koreans, Americans, Taiwanese and mainland Chinese all working in Singapore's semiconductor sector. Good for foreign talent ie Italian and French.

Excellent airport, near airport efficient exporting of wafers worldwide.

Pasir Ris has industry luminaries United Microelectronics Corporation (UMC), the world's second largest foundry chance of working with large company.

Future plans for expansion

Is the heart of Southeast Asia and ideal for tapping into closer markets like China, Malaysia, and Australia. APAC headquarters of most MNCs based out of here. Big business opportunity in that sector. But base still in Singapore.

Carry out R&D work to develop new, more sophisticated value-added products and more efficient methods of production in fields of wafer fabrication. Turn more to mechanization and automation to achieve higher productivity.

Set up wafer fabrication plants overseas in countries with lower labour cost such as Taiwan and China while still having hq in Singapore.

Must be committed to carrying out product development and manufacturing activities in Singapore.

Make Singapore base for manufacturing wafers and headquarters services to satellite factories in the region go into partnership with EDB in risk-sharing partnership to invest in overseas projects.

Company to retrain workers to equip themselves with certified and critical high-end skills needed by in production of wafer fabrication, obtain grants from Skills development fund to send employees for critical skills training.