



the Airport Passenger Terminal building at the peak of construction (April 96)

## Terminal 1, HKIA

# The world's single largest building project

The 1.2 km airport terminal building (Terminal 1) at Chek Lap Kok is the world's single largest building project; equivalent to 35 football pitches. With a total floor plan area of about 515,000 sq m, the contract value to create such a building was HK\$10.1 billion. It is not an easy task to build such a state-of-the-art airport terminal from scratch in less than three years. The contract for construction of the prestigious airport terminal building was awarded to the British-Chinese-Japanese Joint Venture (BCJ JV) in January 1995, but work on forming the winning international consortium had begun nearly three years earlier.

It would have been a mammoth undertaking for any one company both in the size of the project itself and the financial risk involved. Therefore, the BCJ JV was formed. The BCJ JV comprises: AMEC International Construction; Balfour Beatty International; China State Construction Engineering Corporation; Kumagai Gumi (HK), and Maeda Corporation.

BCJ's contract includes 89 lifts, 2.5 km of moving walkways, 74 aircraft loading bridges and 248 check-in desks. The terminal's full length is over 1.8 km and a third of the building is below ground.

By June 1995, the concrete frame was progressing rapidly. Pouring exceeded 11,700 cu m of concrete per week at the peak, with a labour force of 2,500 working 24 hours a day, seven days a week - one of the fastest concrete productions in the world. There is a third of a million cu m of concrete in the terminal building frame. The terminal building has a highly sophisticated steel roof, comprising 129 modules, each weighing up to 140 tonnes. Erecting the roof module was an exciting task. Due to the time constraints, modularisation of certain aspects of the building with



The airport island is constructed on reclamation



The original Lam Chau Island and Chek Lap Kok Island before airport reclamation



The Airport Passenger Terminal and its Y-shaped concourse taking shape (Dec 97)

Photo: Andy Mou



Photo: Artlink

the foundation stage of the passenger terminal building  
upper photo: (Dec 94) lower photo: (Jan 95)



Photo: Artlink

fabrication and assembly on site was successfully executed at Chek Lap Kok.

From its peak (1995-1997), the project involved 5000 people (average 3,500 to 4,000) onsite. The project encompassed over sixty primary subcontractors and the workers were multi-nationals who worked for individual contractors.

Due to the scale of the electrical and mechanical services associated with the terminal building, it was decided to let the main e&m works to a separate contract. Therefore, the \$2 billion contract encompassing all four main services - mechanical, electrical, fire protection and hydraulic systems - was let to AEH Joint Venture.

All contractors on site had a duty to co-ordinate with each other, but the Airport Authority was the single co-ordinator for the entire scheme, with the duty and responsibility to make decisions, arbitrate in disputes and give instructions. While the main policy decision had been made early on, thus minimising the scale of last-minute change, some changes were seen even as the services were being installed. Commercial decisions continued to have an impact on the engineering side, and the terminal building remained a "live" structure throughout its construction.



Photo: BCI JV

The first roof module being lifted and installed by the special crawler crane (Jan 96)



Photo: Airlink

At the peak of construction, there was a total of 23 tower cranes operating at the same time (Dec 95)



Photo: BCI JV

Roof module lifted by Demag CC4000 crawler crane



Photo: Dragages

Building materials and equipment were delivered to the airport island by ship



Photo: BCJV

the tapered flow of the passenger terminal uses an aerodynamic concept to direct passengers



Photo: Artlink



construction process of the Y-shaped airport wing



Photo: Artlink

**Zip-up roof arrangement**



Photo: BCJV

**Overview of the launching system**



Photo: Artlink

**The formwork & falsework for the terminal's wall & slab construction**



Photo: BCJV

**Roof module lifting slings in determination for lifts**



Photo: Artlink

**Fabricated module being lifted from jig**

## Fascinating Facts and Figures

- Hong Kong's new airport is one of the world's more impressive "fast-track" infrastructure projects, with just seven years between design inception in 1991 and airport operation in 1998.
- The new airport is the only airport in the world to have every gate - terminal and remote - capable of taking a 747 aircraft or larger. Its aviation fuel hydrant system can serve any size aircraft.
- The northern second runway, due for completion by the end of 1998, has a Category III rating, the second highest. As soon as this is operational, 24-hour Chek Lap Kok will be capable of handling some 50 aircraft movements per hour, increasing eventually to almost 80 movements per hour. Chek Lap Kok will have an ultimate design capacity of 87 million passengers and 9 million tonnes of air cargo per year.
- The site preparation project was the largest to be carried out over such a short time. Work started in December 1992. The airport platform was completed in 31 months, in June 1995.
- The \$10.1 billion (US\$1.29 billion) contract for construction of the passenger terminal, awarded in January 1996, was the Airport Core Programme's largest. Prior to this, the \$9.04 billion (US\$1.16 billion) site preparation contract was the largest, as well as being the largest civil engineering contract ever awarded in Hong Kong.
- The airport platform covers 1,248 hectares, the same area as London's Heathrow, and is over five kilometres long, approximately the length of Hong Kong's Kowloon Peninsula. It comprises 938 hectares of reclaimed land and 310 hectares from the two original islands of Chek Lap Kok and Lam Chau.
- The reclamation contract made Hong Kong home to the largest commercial dredger fleet ever assembled. Marine operations moved the equivalent volume of an Empire State building every five days. Around 347 million cu m of material (rock and sand) was moved in preparing the site, equivalent in volume to about 325 Empire State buildings.
- For the site preparation, more than 60 US-made 147-tonne trucks were used. Each truck tyre costs \$300,000 (US\$40,000).
- Covering an area of 515,000 sq m, the 1.2 kilometre passenger terminal complex took 13 million man-days to build. If one man built it, it would take him 35,000 years. When the north-west concourse extension is completed in 1999 the terminal will have a gross floor area of 550,000 sq m with 30,000 sq m being retail space.
- Key quantity of materials used in the construction of the passenger terminal and apron are close to Guinness Book of Records figures. They include one million cu m of concrete; 500,000 cu m of flexible pavement; 100,000 tonnes of reinforcement; 53,150 sq m of glass cladding; 840,200 sq m of ceiling and wall finishes and 391,602 sq m of floor finishes, not to mention 5,000 km of low voltage cables and 400 km of pipework. The terminal has more than 100,000 light fittings, 5,500 doors, 2.5 km of moving walkways, 94 lifts and 115,000 sq m of carpet.
- More than 20,000 people worked onsite at peak of construction. In 1997, there were more than 8,000 vehicles registered onsite.