C A A
Technologies

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SpanDeck®

CAA Technologies Pte Ltd

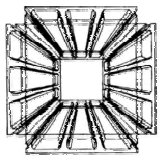
Prestress & Precast Investment

October

2004

Agenda

- **Introduction to CAA Technologies**
- CAA Technologies' Capabilities
- Geographic presence
- Discussion



CAA Technologies is the prestress & precast division of the Spandeck Engineering Group

Holding Companies

Chi Associates Consulting Pte Ltd

VSL Taiwan

Diversified Construction Company

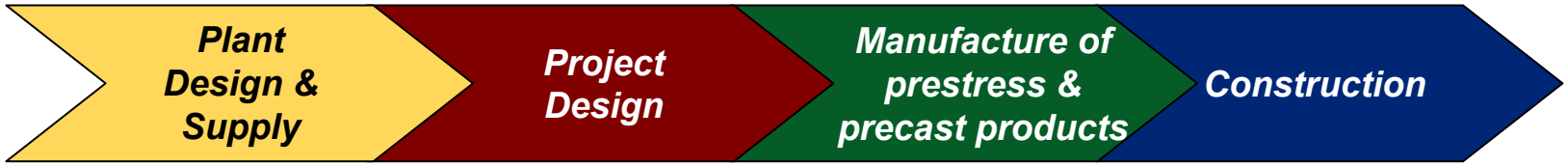
Spandeck Engineering (S) Pte Ltd

Provider of prestress & Precast technology solutions

CAA Technologies Pte Ltd (International)

CAA Technologies Pte Ltd (Others Location)

CAA Technologies is a full service prestress & precast provider capable of providing “end-to-end” services



- Specification of precast & Prestress plants
- Provide CAA Post-tensioning system
- Manufacture of hollow core equipment

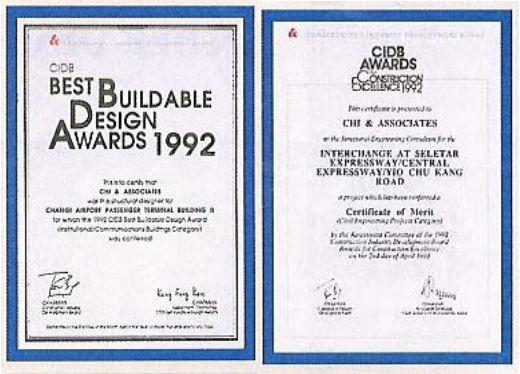
- Integrated design for prestress and precast methodologies
- Buildable desgins

- Production of a wide variety of prestress system products & precast products including hollow core, double-tee, columns, beams, planks, wall panels etc.

- Provision of construction management services to integrate the prestress & precast method of construction

With these capabilities, CAA Technologies is a one-stop prestress and precast solutions service provider

Many of CAAT's and Spandeck's prestress & precast projects have won awards for buildability, construction excellence and quality



Awarded :

* CIDB BEST BUILDABLE DESIGN AWARDS

* ISO 9000 CERTIFICATION

ISO 9000
PSB

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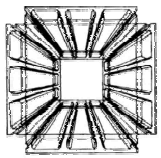
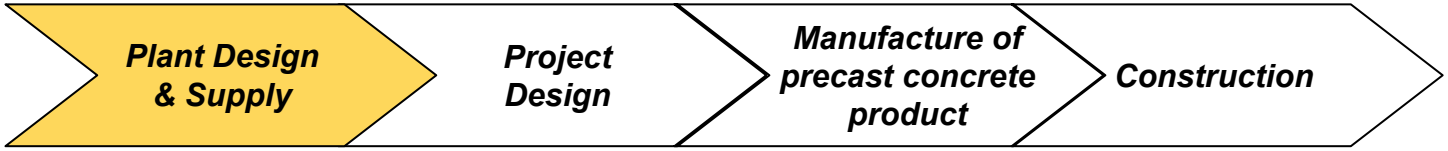
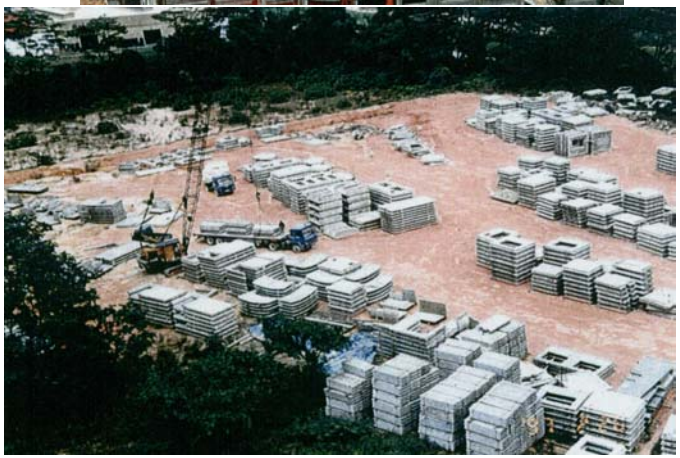


CAAT is not only capable of setting up precast plants, but also manufactures precast equipment



Setup of precast yards

- Changi Airport Terminal 2
- KL International Airport
- Fully precast housing projects (1000+ units)
- Commercial projects



HDB Choa Chu Kang N6C9

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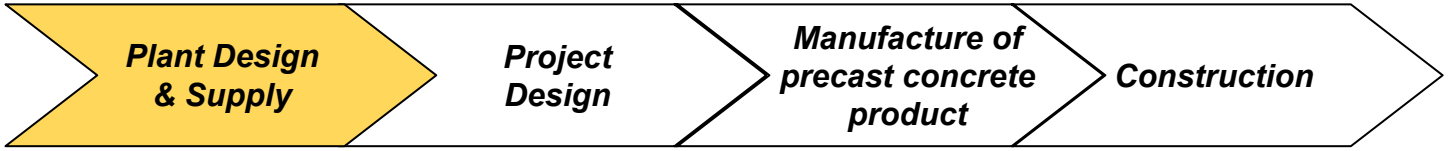
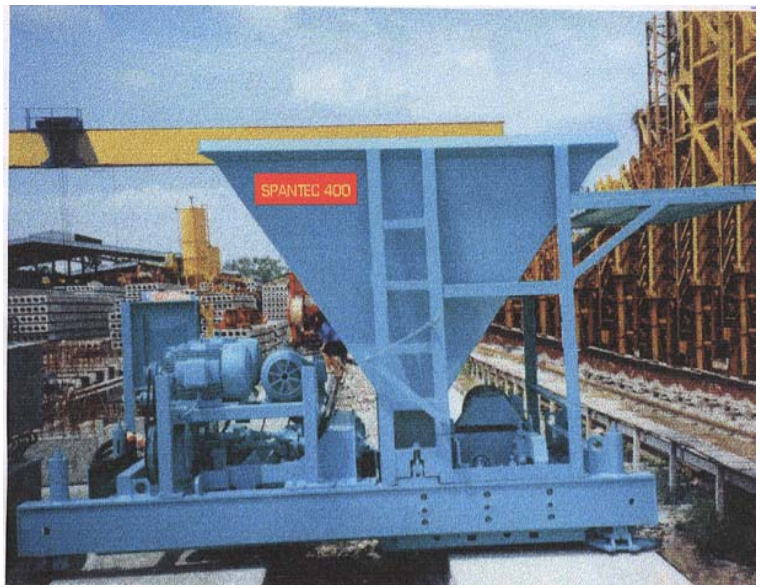
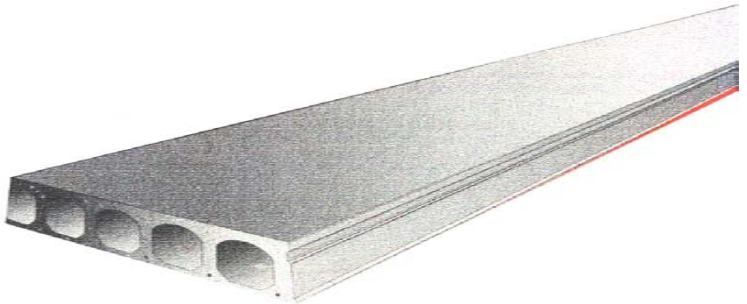
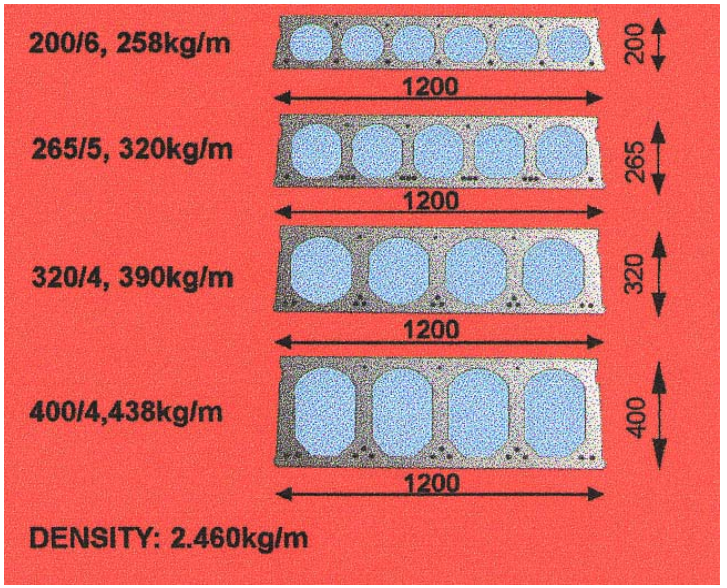


Manufacture of precast equipment

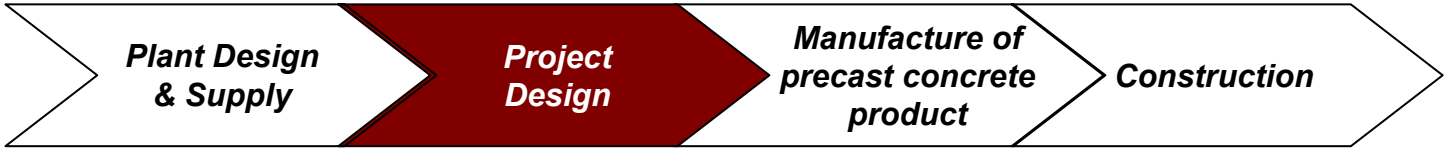


CAA Tech hollow core machine





CAAT has created savings and value for clients through its innovative designs



Junction 8 project

Time & cost savings using precast / top-down construction

Junction 8

- **CIDB (BCA) Best Buildable Design**
- **Top-down construction (Precast superstructure)**
- **Flat prestressed beams to meet height constraints**

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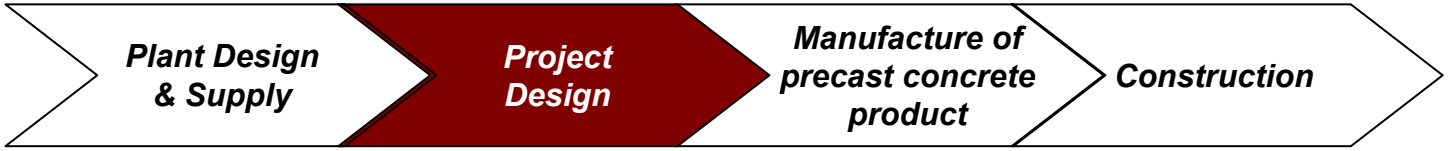

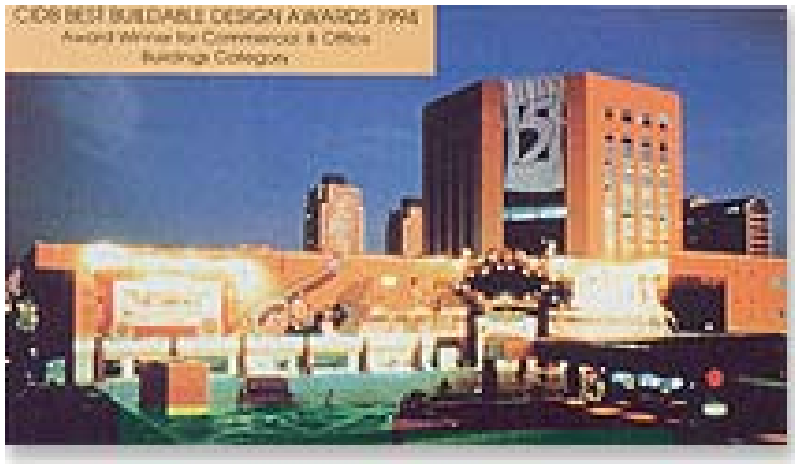

Junction 8 project

Time & cost savings using precast / top-down construction

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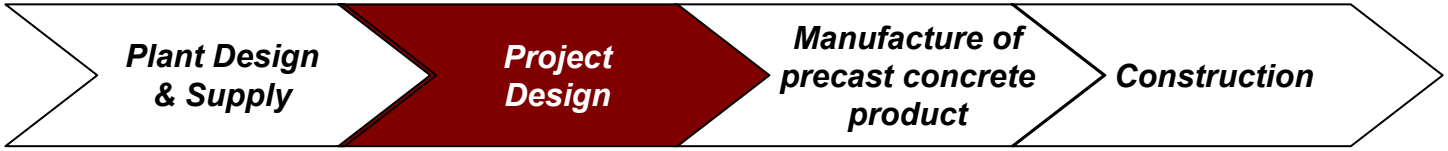
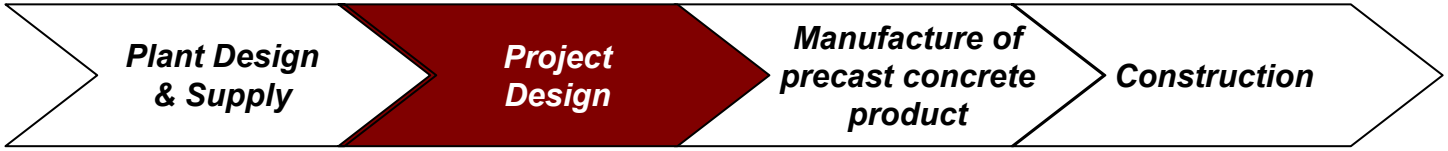


Tomson Pacific (Taiwan)

- Provided precast design
  - Reduced span-depth ratio allowing construction of additional floor in height-constrained area
- Supply of hollow core slabs (200,000m^2)
- Supply from on-site casting yard and Singapore

Tomson Pacific (Taiwan)

CAAT has created savings and value for clients through its innovative designs



Drive-up factories at Woodlands Link
Fast track construction with precast columns/beams double-T

TOP January 1997

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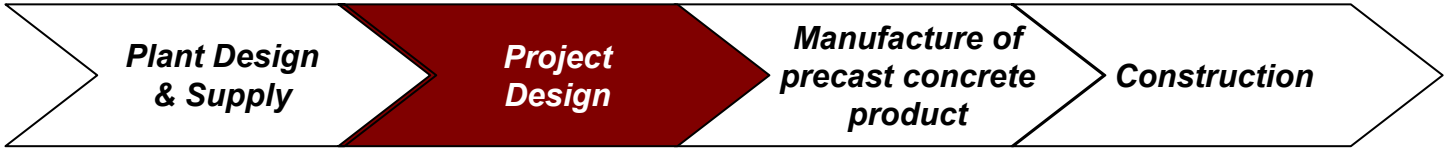
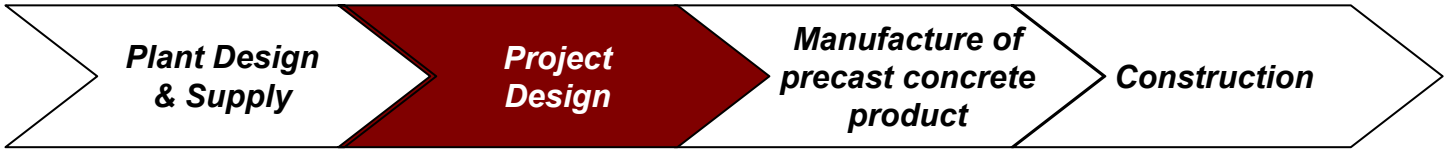
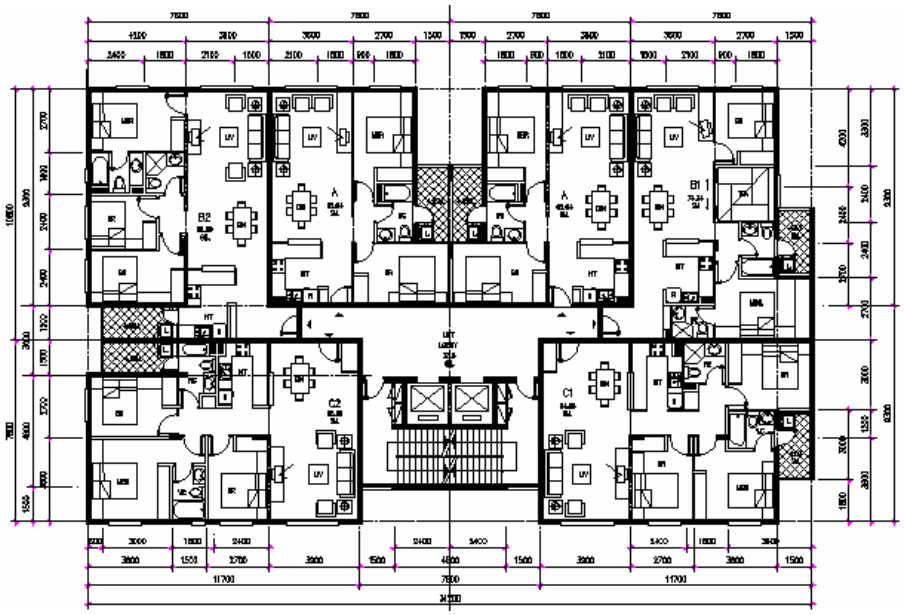


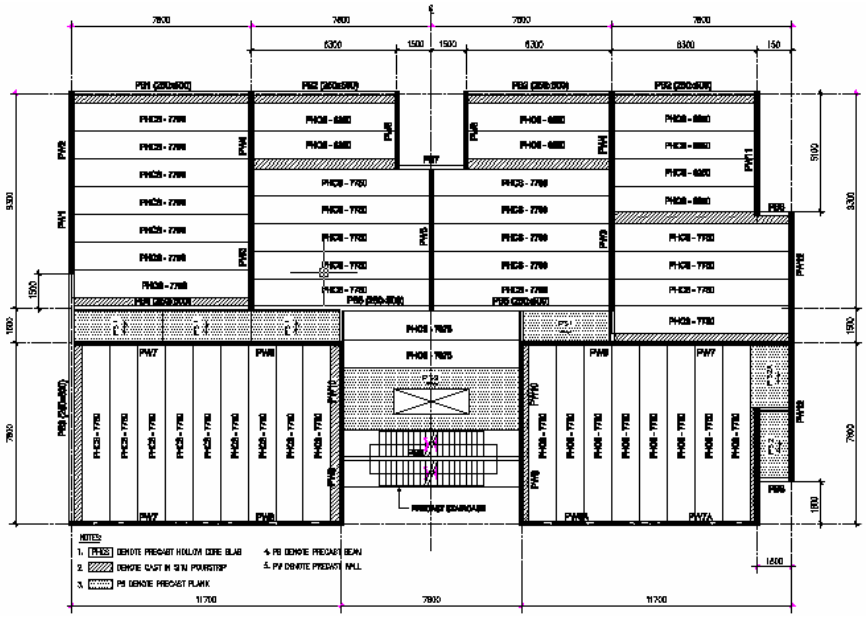
Highway Bridge Design

CAAT has created savings and value for clients through its innovative designs



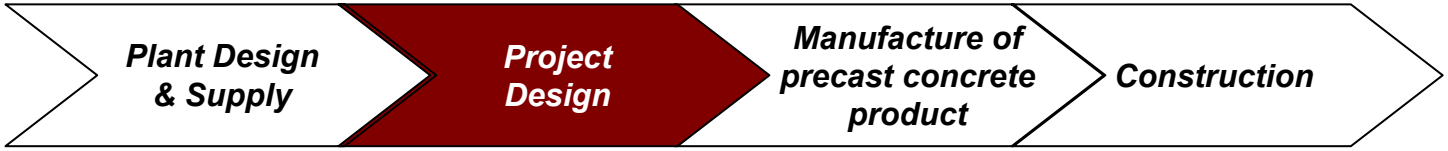


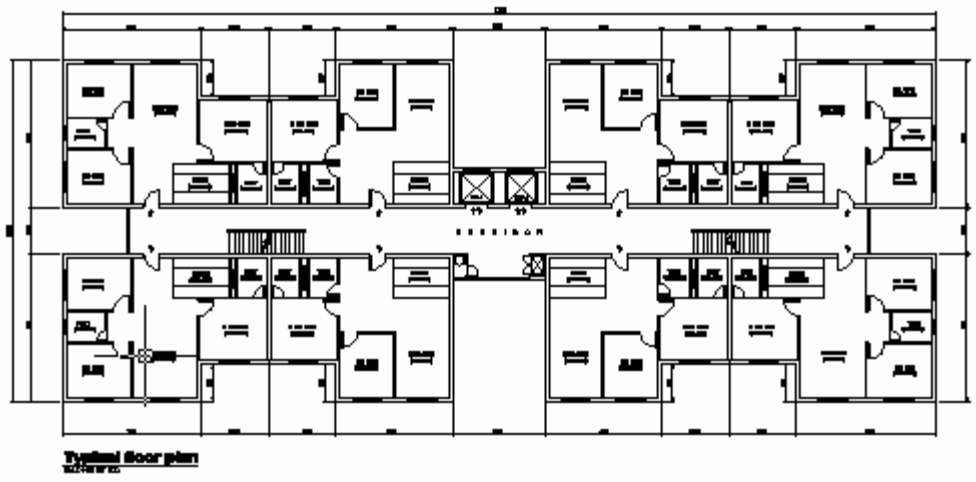
Proposed Architectural Layout



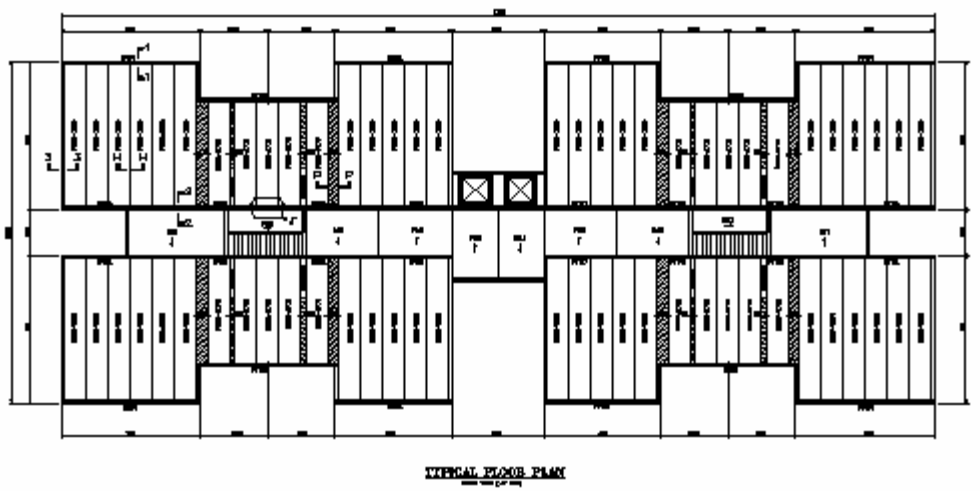
Proposed Structural Layout

CAAT has created savings and value for clients through its innovative designs



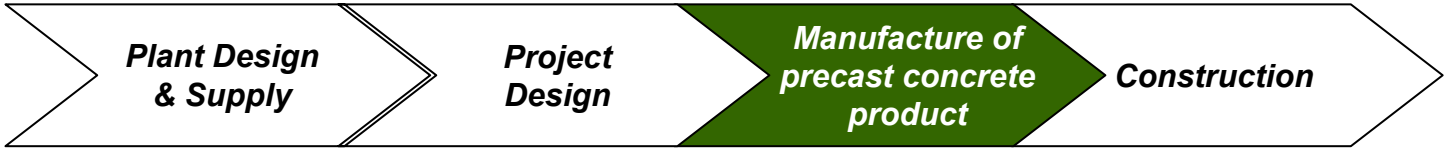


Proposed Architectural Layout



Proposed Structural Layout

CAAT is capable of manufacturing a wide variety of products, but concentrates on high value-added products



Wall Panels

Columns

Hollow Core Slabs

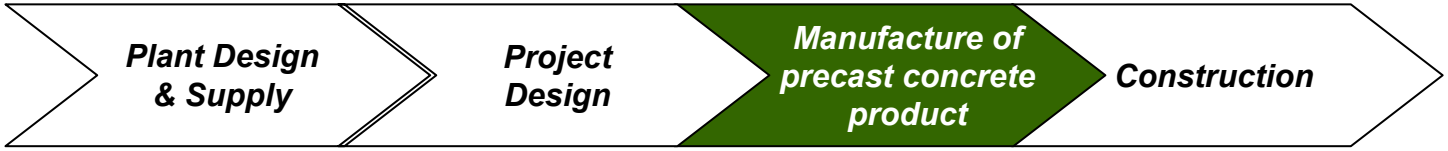
Mass transit girders

ACOTEC Lightweight wall panels

Stadium / Theatre

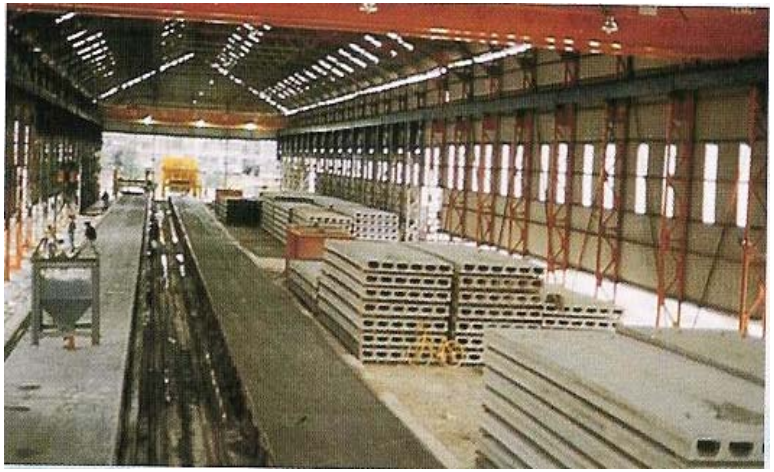
Isometric Components

Hollow core production



Presence

- Singapore
- Taiwan
- Vietnam
- Ability to setup temporary yards for large projects
  - Changi Airport Terminal 2
  - KL International Airport
  - Tomson Pacific - Taiwan



CAAT offers total post-tensioning service,from fist concept to final installation. Design and engineer the entire post-tensioning system

威佳工業工程股份有限公司
VSL SYSTEMS (TAIWAN) LTD.

Our Services

Services provided by VSL Systems (Taiwan) Ltd., include the following:

- Free Design and Technical Assistance
- VSL Strand Systems for Pre and Post-Tensioning
- VSL Bar Systems
- Full Installation Services for Bonded and Unbonded Techniques
- Ground Anchoring
- Grouting
- Heavy Lifting
- Travelling Formwork
- Maurer Bridge Bearings
- Expansion Joints
- Precast Concrete Beams and Columns
- Precast Prestressed Hollow Core Slabs

However the company will from time to time introduce additional specialist building techniques where professional engineering direction and control are important in providing a fully comprehensive service.

Plant Design & Supply → *Project Design* → ***Manufacture of post-tensioning product*** → *Construction*

VSL Systems (Taiwan) Ltd. Introduction

Country, people and economy

Taiwan, also called Formosa, is an island in the South China Sea. With an area of 36,000km², it is slightly smaller than Switzerland, but its population of about 19 million, or three times that of Switzerland, makes it one of the most densely populated countries in the world. Politically, the country is known as the Republic of China, Taipei being its capital.

During the 70's Taiwan had one of the world's fastest growing economies, but in recent years the pace of expansion has slowed down. More than 50% of GNP is generated by industry, while the agricultural sector has fallen to less than 10%. Nevertheless, the country is substantially self-sufficient in basic foodstuffs. Exports (mainly textiles, metals, machinery, electronics and wood products) account for more than half of GNP.

Post-tensioning in Taiwan

The application of post-tensioning in the civil engineering field started in Taiwan about 30 years ago. There are some internationally well-known systems which were adopted in the country before the VSL system was introduced. Competition is, therefore, naturally intense, but with the efforts of the local VSL Representative and the characteristics of the system, VSL has come to be widely recognized by local architects and engineering consultants.

VSL Engineers (Taiwan)

This company was established in Taipei in 1980. Since then it has completed more than 70 projects of all kinds, including buildings, bridges and anchor jobs.

CAAT offers total post-tensioning service,from fist concept to final installation. Design and engineer the entire post-tensioning system

VSL Systems (Taiwan) Ltd. Completed Post-tensioning Project

Chai-Yi Culture Centre: Five-storey building with post-tensioned beams / Kulturzentrum Chai-Yi: Fünfstöckiges Gebäude mit vorgespannten Balken / Centre culturel Chai-Yi: Immeuble de 5 étages avec poutres précontraintes
嘉義文化康樂中心

Dah-Du Road Viaduct, Taipei

This is a 180m long, 6-span bridge built from June 1982 to August 1983. Seventy-five tonnes of strand were used for precast I-beams. Ground anchors were also used for increasing the stability of the protection for road cut slopes.

Dah-Du Road Viaduct in Taipei with post-tensioned I-beams / Dah-Du Strassenbrücke in Taipeh mit vorgespannten I-Balken / Pont routier Dah-Du à Taipei avec poutres I précontraintes
大漢路高架橋

Gymnasium in Chong Cheng Memorial Sports Park, Taipei

This structure was presented in the VSL News Letter of November 1982 in regard to the lifting of the roof. The lifting was carried out by VSL INTERNATIONAL at the end of November 1983.

Science Department Building, Chung-Li

This five-storey building of Chung-Yuan University includes classrooms, laboratories and offices and was built between December 1983 and May 1984. All the simply-supported and continuous beams were prestressed with VSL tendons 5–4 and 5–7.

Science Department Building of Chung-Yuan University, Chung-Li / Gebäude der wissenschaftlichen Abteilung der Chung-Yuan Universität in Chung-Li / Bâtiment du département de la science de l'Université Chung-Yuan à Chung-Li
中原大學理學院大樓

World Trade Centre, Taipei

VSTw (as VSL Engineers [Taiwan] are called for short) are working on this project, supplying materials and renting out equipment. The project has been under construction since November 1983. EC 5–19 anchorages are being used here for the first time in Taiwan.

The Hsin-Kuang Building under construction / Das Hsin-Kuang Gebäude im Bauzustand / Le bâtiment Hsin-Kuang en construction
新光產物保險大樓

Hsin-Kuang Building, Kao-Hsiung

This seventeen-storey office building, comprising 18,000m² of slabs, has been under construction since January 1984. 84 tonnes of prestressing steel are required for post-tensioned beams.

Gymnasium in Chong Cheng Memorial Sports Park after lifting of the roof / Die Sporthalle im Chong Cheng Memorial Sports Park nach der Hebung des Daches / Le palais des sports du parc mémorial Chong Cheng après levage du toit
中正紀念體育館

World Trade Centre, Taipei, under construction since November 1983 / Welthandelszentrum in Taipeh, im Bau seit November 1983 / Centre mondial du commerce à Taipei, en construction depuis novembre 1983
台北世貿中心展覽館

The future of VSL in Taiwan

As stated above, VSTw have to face hard competition. In addition, the slower growth of the economy in the country has also an impact on the construction industry. However, in the coming years the demand for post-tensioning work should increase again and thus VSTw is optimistic about the future.

Tsong Wei Building, Taipei

This is a residential and office building of 16 storeys, in which 8400m² of slab area have been post-tensioned with unbonded VSL tendons. In some zones the tendons are unidirectional, in others they run in two directions. Construction lasted from May to December 1981.

Tsong Wei Building, Taipei 崇偉大廈

Hsin Kong Insurance Building, Taipei

In this 12-storey building, which is of semicircular form, beams of 14 to 16m span have been prestressed by grouted VSL tendons.

Hsin Kong Insurance Building, Taipei
新光人壽保險大廈

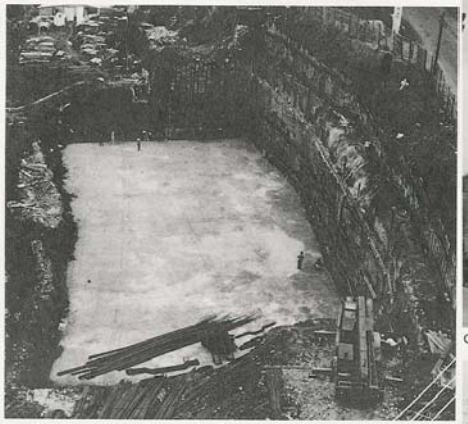
China Trust Building, Taipei

This is a 12-storey residential and office building on the Linsen N. Road. The slabs, with a total area of 7100m², have been post-tensioned orthogonally with VSL monostrand tendons. The work lasted from December 1980 to September 1981.

Yuang-Hsiang Apartment, Taipei

The excavation for this multi-storey structure is adjacent along one side to a heavily used road. Since the site area slopes down to a stream, the 14m deep and 90m long slope excavation had to be secured by temporary VSL soil anchors. These anchors comprise 3 to 7 strands Ø 13mm, so that the anchor force is 300 to 800kN.

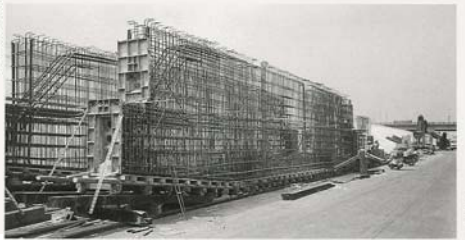
China Trust Building, Taipei 中國信託大廈



Excavation for the Yuang-Hsiang apartment building / Baugrube des Yuang-Hsiang Apartment Buildings / Fouille de l'immeuble Yuang-Hsiang
圓山大樓地下室開挖

Pan-Chio Highway Bridge.
板橋特一號道路高架橋

Chung-Yang Bridge during erection. 重陽大橋台北引道部份



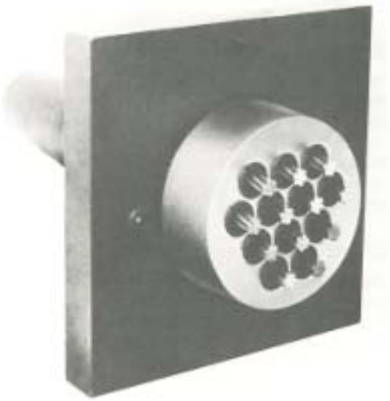
Chung-Hsing Bridge precast pier assembly.
中興橋預鑄橋墩

CAAT offers total post-tensioning service,from fist concept to final installation. Design and engineer the entire post-tensioning system

Post-tensioning Service and Capabilites

- Monostrand Post-tensioning systems
- Multistrand Post-tensioning systems
- Tie-backs and soil anchors
- Stressing equipment
- On-site installation
- Design and engineering of Post-tensioning systems
- Cost estimating and redesign to make budget

Monostrand system



Multistrand system

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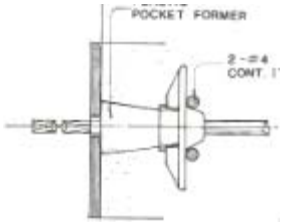
Plant Design & Supply → *Project Design* → ***Manufacture of post-tensioning product*** → *Construction*

Monostrand Assembly Anchorage & Wedge

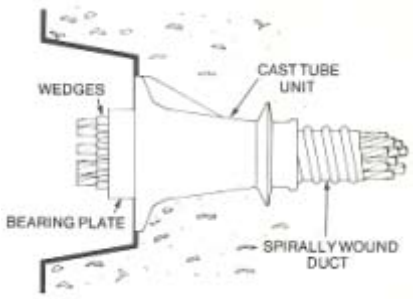


Monostrand Assembly Anchorage & Wedge

Wedge

4-strand Anchorage

Multistrand Assembly Anchorage & Wedge

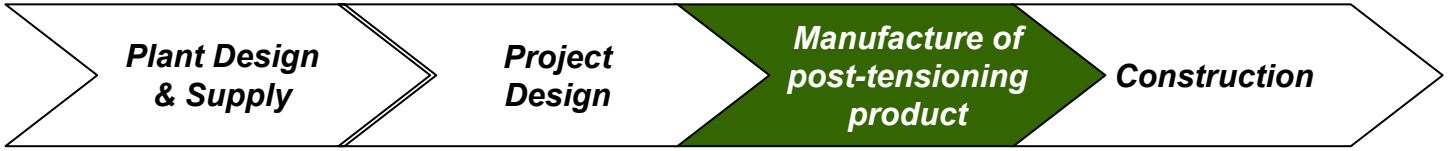


Multistrand Assembly Anchorage & Wedge

Multistrand Anchorage

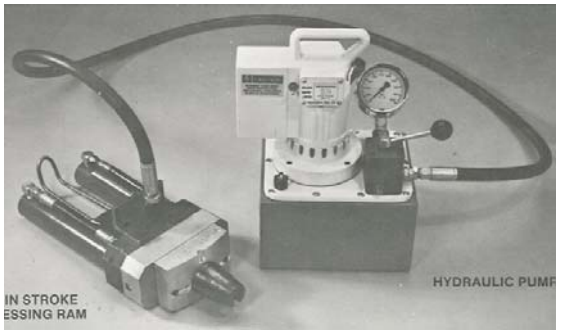
Mulistrand Anchorage

CAAT offers total post-tensioning service,from fist concept to final installation. Design and engineer the entire post-tensioning system

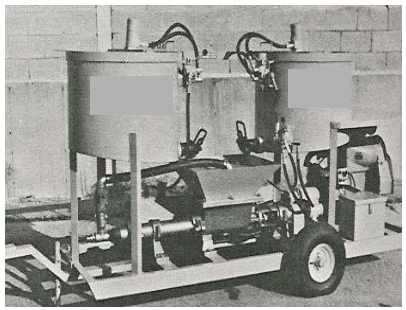


Strands Pipe

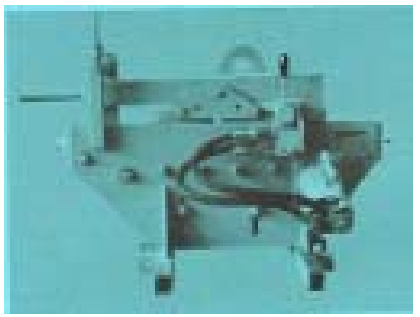
Multistrands stressing jack



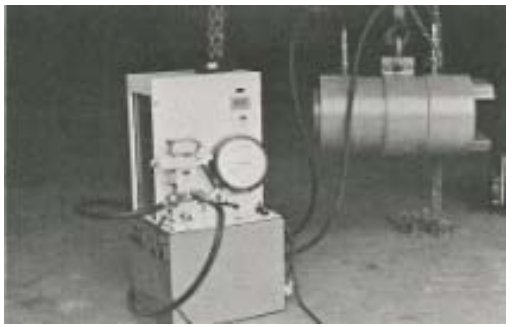
Monostrand stressing jack and hydraulic pump



Grout mixer and pump

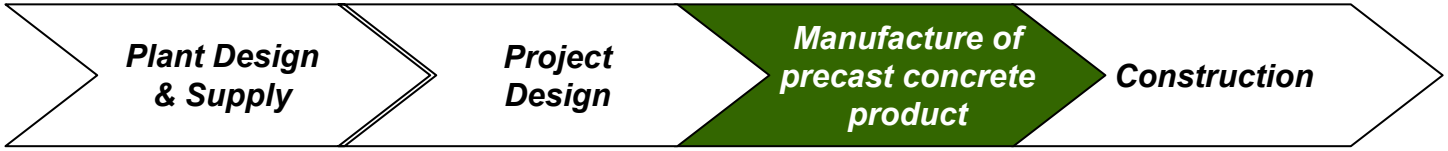


Strands pull machine



Multistrands stressing jack and hydraulic pump

ACOTEC System



Machine produced Lightweight partition panels

Capacity to produce 500 pcs (750m²) per day

Curtain walls

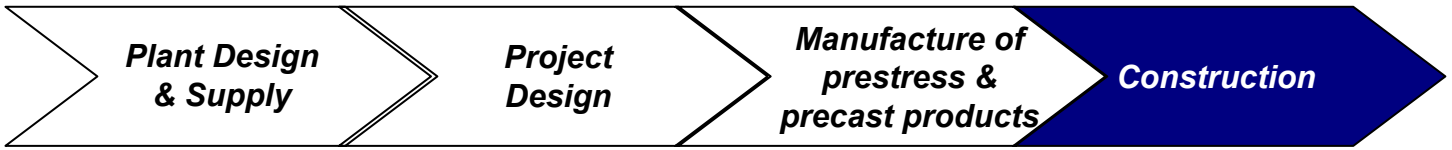
Plant Design & Supply → Project Design → **Manufacture of precast concrete product** → Construction

CAAT's capabilities has given it the ability to innovate and provide value-adding solutions

Changi Airport Terminal 2

Structural design-build project for Hyundai

- **Provided award winning structural design with prestree hollow core slabs spanning 15m**
- **Main contractor's structural bid was more than $5 million lower than the closest competitor (even though M&E was more than $3 million more expensive)**
- **Setup prestress & precast plant on site to supply 250,000m^2 of hollow core slabs**



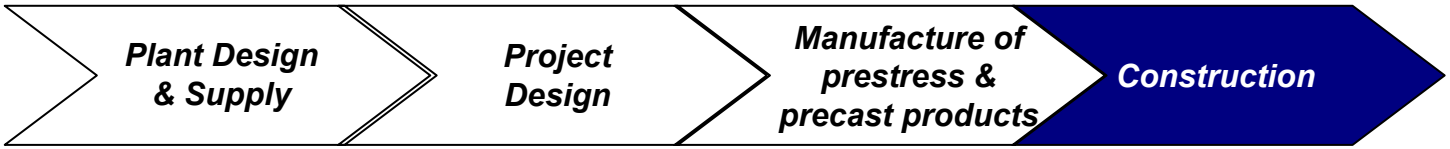
CAATs' unique design capabilities have provided saved clients with tremendous savings

This has given our clients tremendous savings over their competitors

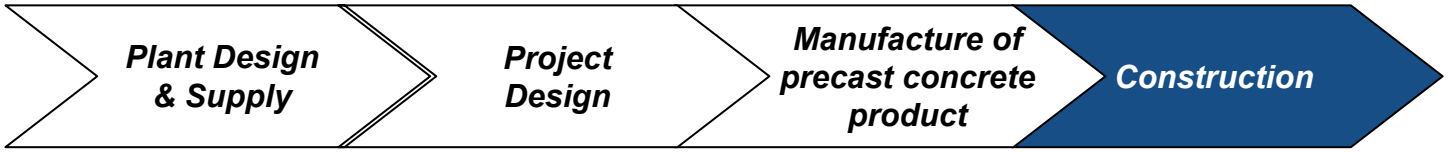
KL International Airport Short Term Carpark

Structural design-build project for Sungei Way Construction

- **Main contract worth MR178 million (Spandeck was JV partner with Sungei Way construction)**
- **Alternative design from post-tension into total precast structure**
- **Tremendous savings through 16m clear span prestress hollow core slabs**
- **Precast yard set-up on site**



CAAT is also capable of undertaking on-site construction when necessary to complement the precast works



303 HDB flats – pilot total precast

Main Contractor: Spandeck Engineering

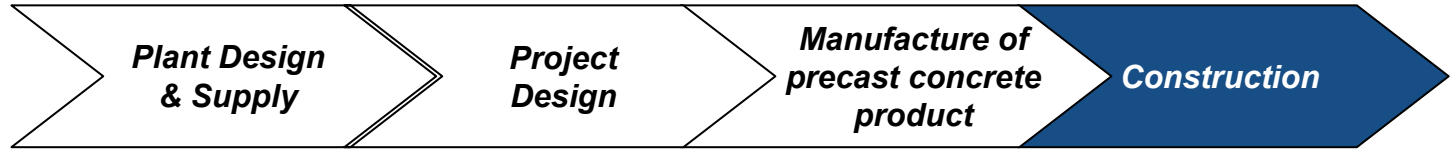
400+ HDB flats – pilot precast CD Shelter

Main Contractor: Spandeck Engineering

Sembawang Secondary School

Total precast alternative design
Main contractor: Spandeck Engeineering

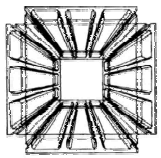
CAAT is also capable of undertaking on-site construction when necessary to complement the precast works



- 625 units of HDB flats
- Five 20-story blocks, Two 16-storey blocks
- Total precast (more then 25,000 precast elements – not including 13,000 light weight partition walls)
- Load bearing façade walls, planks, LW partitions)

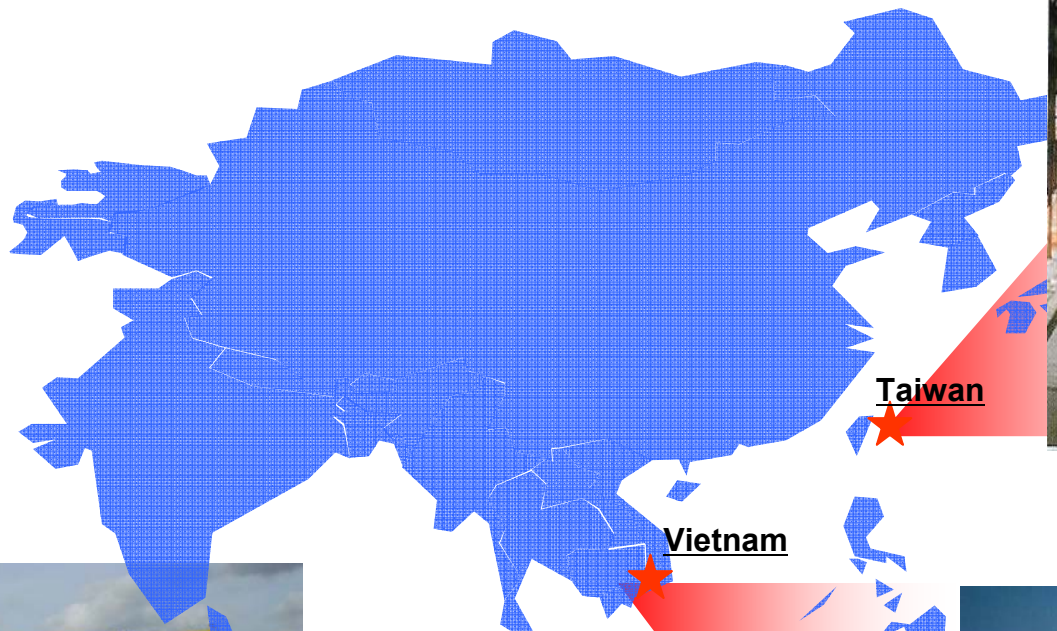
Agenda

- Introduction to CAA Technologies
- CAA Technologies' Capabilities
- **Geographic presence**
- Discussion



CAAT/Spandeck has executed projects in a number of cities throughout the region

… and hopes to expand the number of factories it operates from the current 3



CAAT's plant, established in 1983, is a pioneer in precast concrete in Singapore

Precast plant in Tuas, Singapore

Core competencies of Singapore plant

- **Approximately 2 Ha**
- **Manufacture of hollow core machinery**
- **Key design capabilities**
- **Sites available in Johor Bahru for expansion if needed**
- **Large general casting area equipped with 2X 20T gantry cranes that is easily adaptable to various products**

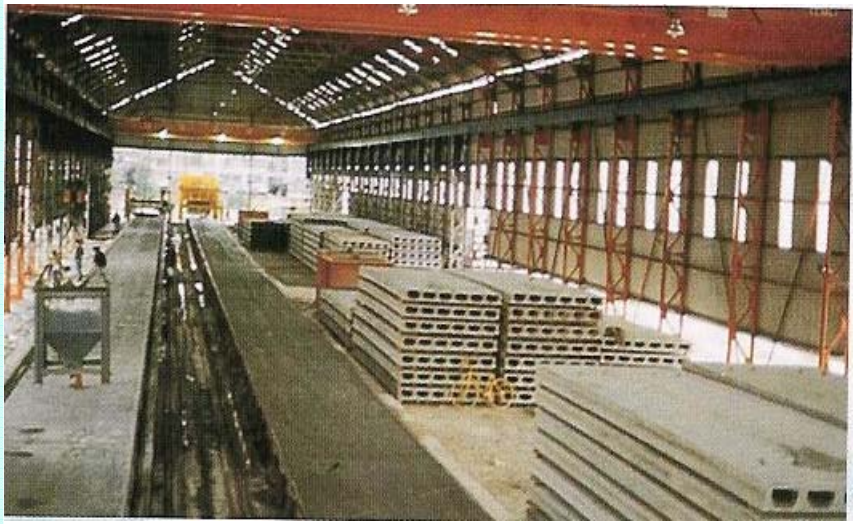
CAAT has just set a precast plant in Ho Chih Minh City, Vietnam

CAAT's new precast plant in Saigon South

Core competencies of Vietnam plant

- **Approved 100% foreign owned company in Vietnam**
- **Strategically located outside the city, close to major expressways in Saigon South**
- **Approximately 1 Ha**

CAAT's Taiwan plant is strategically located to supply projects throughout Taiwan



Precast plant in 南投， Taiwan

Key features of Taiwan Plant

- **Approximately 1.5 Ha, indoor plant**
- **Large production area for external wall facades**
- **ACOTEC Production plant (750 m^2 / day)**

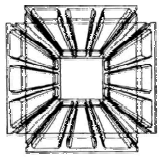
CAAT intends to expand through joint ventures and use of CAAT's core technology

CAAT's expansion strategy

- Joint venture
- Technology transfer includes:
  - Design
  - Provision of equipment
  - Post-tensioning system

Agenda

- Introduction to CAA Technologies
- CAA Technologies' Capabilities
- Geographic presence
- **Discussion**



Thank you! The End