



## Advanced Construction Materials Series – Ready Mix Concrete : PSDAS Technical Visit to Concrete Batching Plant

for

HKIE

25<sup>th</sup> June 2011

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## Agenda

- Part 1: Safety Induction
- Part 2: Concrete Industry and Sustainability
- Part 3: Introduction to ACL & KWC JV Lam Tei Plant
  - Background
  - Facilities
  - Quality Control
- Part 4: Introduction to HKC Yuen Long Plant
  - Facilities
  - Quality Control
- Part 5 : Plant Visit
- Part 6: Q&A

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## Safety Induction

- Part 1: Safety Induction
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## Part 2

## Concrete Industry and Sustainability

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## Concrete Industry

- Concrete supply to major construction works including Chep Lap Kok Airport, Tsing Ma Bridge, Stonecutters Bridge, IFC, ICC, MTRC Projects – XRL, West Rail, Spur Line, WIL, SIL etc.
- Annual concrete consumption up to 4 million m<sup>3</sup>.
- Concrete batching plant can minimize construction site pollution in all aspects including air, noise, water and waste.

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## Sustainability

- Stages in the life of concrete

Production of Concrete Constituents

Production of Concrete

Life Cycle

Demolition

Considerations:

- Are the materials renewable?
- Are they scarce?
- Are they important to global environment?
- How much energy is required in the production process?
- How much waste is produced during the manufacturing?
- What impact do these wastes have on the environment?

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### Sustainability

- Environmental friendly throughout the production process.
- Minimize the environmental pollution with full compliance to environment concerns.
- Produce high performance & durable concrete to extend the concrete lifetime which can minimize the incurred maintenance cost.
- Adopt secondary cementitious materials including PFA, GGBS which is by-products from power station as well as iron mining plant to reduce the CO2 emission.
- Adopt high performance admixture to minimize the consumption of cementitious materials.

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### Sustainability

- Adopt most efficient logistic arrangement to minimize the traffic impact and CO2 emission. Example: concrete plant erected inside a quarry to eliminate the materials transportation.
- Excess (return) concrete to be recycled to retrieve the aggregate for further use e.g. for roadbase materials
- Recycle water for yard cleaning.

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### Part 3

#### Lam Tei Concrete Batching Plant

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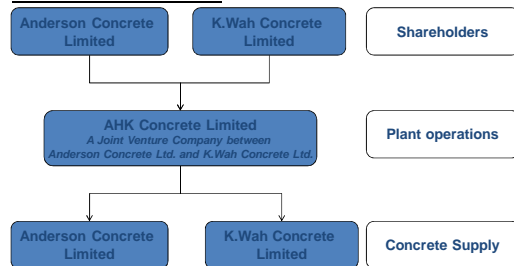
### Plant Location



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### About Lam Tei Plant



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### Lam Tei Plant



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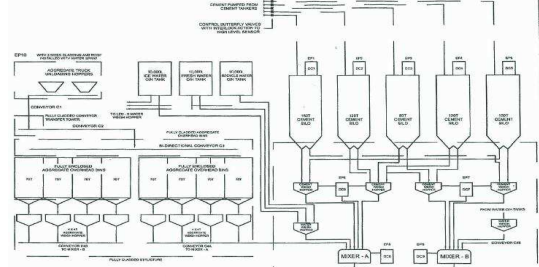
## Production Facilities



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## Operational Schematic of AHC Lam Tei Concrete Batching Plants



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## Production Facilities

- Aggregate directly feed from AHK Quarry to the concrete batching plant



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## Production Facilities

- Aggregate in different size fed to its corresponding weight hopper by conveyor



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## Production Facilities

- Aggregate in weigh hoppers delivered to central mixer through conveyors



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## Production Facilities

- Cementitious materials delivered in tankers and then transferred to storage silo through enclosed pipeline.



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## Production Facilities

- Cementitious Materials Storage Silos



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## Production Facilities

- Cementitious Materials Hopper



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## Production Facilities

- Enclosed Materials Feeding System to feed cementitious materials to central mixer for batching



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## Production Facilities

- Concrete Admixtures Storage Area

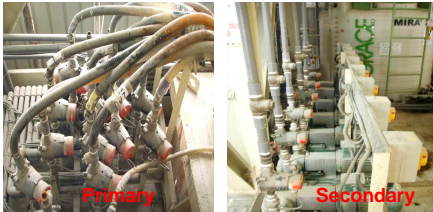


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## Production Facilities

- Double flowmeter system adopted to countercheck the admixture flow



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## Production Facilities

- Concrete batching plant equipped with high efficient mixers



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### Production Facilities

- 4m<sup>3</sup> Twin Shaft Mixers equipped in the concrete batching plant



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### Production Facilities

- Ice storage tank with automatic conveying system
- Ice facilities installed in the batching plant to achieve concrete temperature requirements



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### Production Facilities

- Automatic Ice Transfer System



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### Production Facilities

- Ice day tank inside the batching tower for batching



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### Production Facilities

- Ice delivered from ice hopper to central mixer through conveyors



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### Production Facilities

- Moisture content measuring device to measure aggregate moisture content
- Moisture probe installed at the fine aggregate bin to measure the real time moisture content for adjustment



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## Production Facilities

- Discharge from central mixer into mixer truck

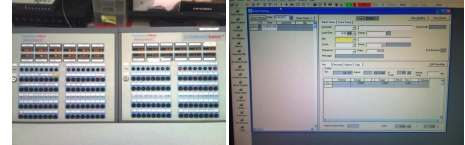


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## Production Facilities

- Fully automatic batching computer and batching process to ensure:
- Consistent of concrete quality
- High productivity
- Traceability



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## Production Facilities

- Operation of Batching Process



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## Process Control

- Concrete batching plant implement and govern by the following management system
  - QSPSC: Issue 7 2009 Production Certificate Scheme
  - ISO9001: 2008 Quality Management System
  - ISO14001: 2004 Environmental Management System
  - OHSAS18001: 2007 Occupational Health and Safety Management System

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## Plant and Equipment

- Calibrated externally and internally regularly
- Properly maintained in accordance to maintenance schedule

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## Plant and Equipment

- Batching tolerance (fully comply with QSPSC requirements)

Materials	Tolerance
Cement, PFA, GGBS, PPFAC	± 2%
Silica Fume	-0% to +5%
Aggregate	± 2%
Water	± 2%
Admixture	± 5%

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### Process Control

- Batching in accordance to mix design proportions
- Aggregate moisture content tested either by oven dried method or automatic moisture detection device (moisture probe) and to be adjusted by automatic batching computer.
- All batched quantities properly recorded and documented.

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### QA/QC

- Raw Materials

Control of purchased materials quality to assure the materials conform to requirements.

Cement: BSEN197 – 1: 2000 and/or BS12  
PFA: BS3892: 1982 and/or BSEN450-1  
GGBS: BS6699: 1992  
CSF: CAN/CSA A23.5-M86 / BSEN13263-1: 2000  
Aggregate: BS882: 1992  
Admixture: BS5075: Part 1 and/or BSEN934-2

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### QA/QC

- Cement
- Chemical Test – Conducted by HOKLAS Laboratory in yearly basis
- Physical Test - Sampled twice per week for Vicat Test (Setting time), Fineness (Blaine air permeability), 2 & 28 days prism strength

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### QA/QC

- PFA
- Chemical Test – Conducted by HOKLAS Laboratory in yearly basis
- Physical Test - Sampled twice per week or for 1000m3 concrete production for determination of moisture content, loss on ignition and fineness (45µm sieve)

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### QA/QC

- Silica Fume
- Performance certificate from supplier for every 100MT delivery of 3000m3 concrete production
- PPFAC
- Same testing frequency as OPC
- GGBS
- Physical Test – Sample and test once per week or for 1000m3 concrete production
- Chemical Test – Sample and test twice per year

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### QA/QC

- Aggregate
- Sample in daily basis for
  - Grading
  - Silt content
- Sample in monthly basis for
  - 10% fine value
- Sample in 6 months basis for
  - Flakiness & elongation index
  - Relative density
  - Water absorption
- Control of alkali silica reaction

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## QA/QC

- Concrete
- Sampling and testing include:
  - Workability test (Slump test, flow table test...)
  - Temperature check (for temperature controlled concrete)
  - QC cubes casting
  - Other specified test

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## QA/QC

- Concrete testing – Slump test



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## QA/QC

- Concrete testing – cube making for testing compressive strength



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## Part 4

### Hong Kong Concrete Yuen Long Plant

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## Part 5

### Concrete Batching Plant Visit

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## Part 6

### Q&A

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