



Case Study - Buildings

High Rise Buildings Concrete Column SHM
Singapore, 2004-2006





Aim	To provide a structural health monitoring function to high-rise residential buildings in Singapore by measurement of compression loads within concrete supporting pillars.
Location	Singapore
System Integrator	Smart Fibres, Ltd
End Customer	CPG Laboratories Pte Ltd
Date	2004-2006
Instrumentation	(1) Micron Optics, sm125 Optical Sensing Interrogator (Smart Fibres, W4)
Sensors	Smart Fibres SmartBar rebar sensor
Software	Smart Fibres' SmartSoft
FBG Technology Benefit	SmartBar, optical fibre sensors embedded within 2m concrete reinforcement bars. Important for severe weather conditions or seismic activity.

SmartBar sensor attached to rebar cage before concrete pouring.



- Sensor installation – SmartBar, optical fibre sensors embedded within 2m concrete reinforcement bars were strapped to the column rebar cages prior to concrete pouring. The sensors were accessed by fibre optic cables through a junction box assembly embedded within the concrete.

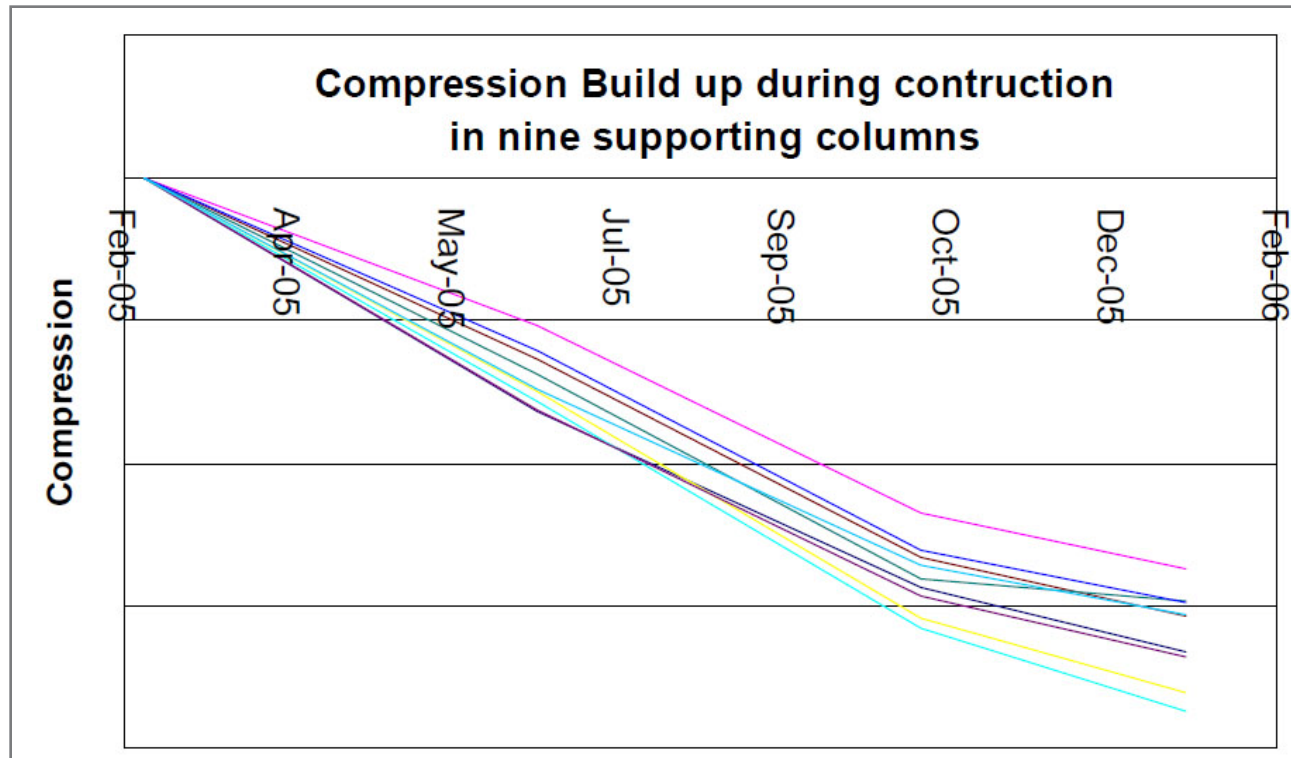


Completed pillar with sensor access panel.



SmartBar Sensor cables exiting pillar.

- Data was collected to monitor the internal strains during concrete curing and then the build up of loading on the supporting pillars during the various stages of construction. The plot shows nine columns of one typical block during the first 12 months of construction.





- Results
 - § Throughout the lifetime of the building, valuable information about its structural health will be determined from the sensors.
 - § The customer finds it is particularly important after extreme events such as severe weather conditions. The informative validation of construction loads, ongoing SH seismic activity.
 - § An FBG was selected to meet the technical requirements of: long-term stability, concrete embeddable and multiplex-able.
 - § During construction, a portable battery supplied the electrical power. After construction, connected to main site.

- Acknowledgements
 - § CPG Laboratories Pte Ltd
 - § Smart Fibres Ltd, UK
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