



Surface Cracking in RCC Columns

Engineering Investigation of Early-Age Cracking in High-Strength Mass Concrete Members

Project: 32-Storey Residential High-Rise Tower

Client: Confidential

Date: 26 March 2026

Engineering Case Study Background

This Engineering Case Study is based on an actual site investigation undertaken by SM Ecosystems. Client identity and project information have been anonymized. A site visit was carried out to investigate surface cracking in reinforced concrete columns. The columns measured approximately 2400 mm × 1500 mm and exhibited mass concrete behaviour. Mix: Cement 450 kg/m³, Fly Ash 140 kg/m³, Alccofine 45 kg/m³, Total Binder about 635 kg/m³, Water about 155 litres.

Site Observations

- Random surface cracks and hairline cracking were observed.
- Surface crazing and fine micro-cracks were visible.
- Vertical streak marks indicated paste-rich surface effects.
- No structural distress or load-related cracking was observed.

Engineering Assessment

The cracks were assessed as non-structural and attributed to

- high binder content,
- autogenous shrinkage,
- mass concrete thermal behaviour and
- curing practices.

Engineering Conclusion

The cracking was caused by

- high binder content,
- autogenous shrinkage
- and thermal gradients.

It does not affect structural capacity but should be treated to improve durability.



Engineering Recommendations

- Optimise mix design,
- reduce unnecessary binder content,
- control Alccofine dosage,
- follow staged curing,
- ensure proper compaction and
- execution control.

Repair and Treatment Measures

- Seal hairline cracks,
- repair moderate cracks with polymer-modified materials,
- inject epoxy where appropriate and
- apply a protective anti-carbonation coating.

Temperature Control Measures for Future Concreting

- Plan concreting during cooler hours,
- avoid peak afternoon temperatures,
- use cool aggregates,
- provide shading and
- monitor concrete temperature.

Engineering Outcome

- Mix optimisation,
- controlled curing and
- temperature management can significantly reduce similar cracking in future projects.

Key Engineering Learning

Early-age cracking should be investigated systematically before concluding that structural distress exists.

SM Engineering Insight

Concrete does not fail without a reason. Every crack has an engineering story behind it
