
ECS-003 - Bugs & Pinholes in RCC Columns and Walls

Engineering Investigation of Surface Bugs and Pinholes in Cast-in-Situ RCC Columns and Walls

Project: Multi-Storey Commercial Building

Client: Confidential

Date: August 2026

Engineering Case Study Background

This Engineering Case Study is based on an actual engineering investigation undertaken by DM Strategic Advisors (DMSA). Project and client details have been anonymised to maintain confidentiality.

The investigation was initiated after surface bugs and pinholes were observed on RCC columns and walls immediately after de-shuttering at multiple locations in a multi-storey commercial building.

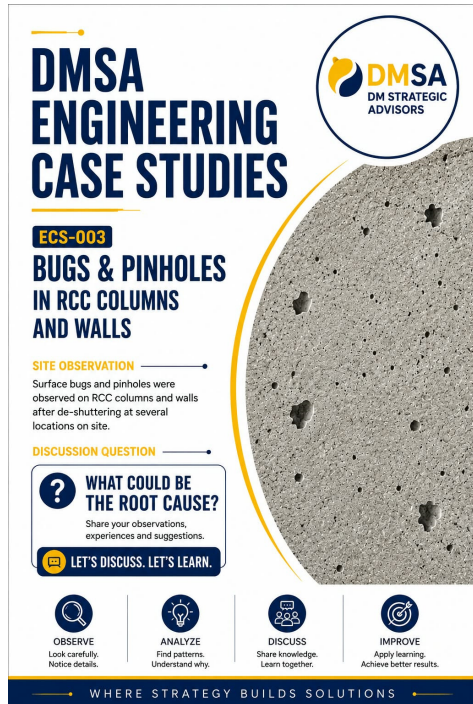
The objective of the investigation was to identify the probable engineering causes, distinguish cosmetic surface defects from structural defects, and recommend practical corrective and preventive measures for achieving consistent exposed concrete quality.

Site Observations

- Surface bugs and pinholes were observed at multiple locations on RCC columns and walls after de-shuttering.
- The defects were primarily superficial and concentrated near shutter joints, corners and exposed concrete faces.
- No major honeycombing or exposed reinforcement was observed during the visual inspection.
- Concrete quality appeared satisfactory except for the observed surface finish defects.

Engineering Observation

Bugs and pinholes are surface finish defects and should be minimised through proper concrete production, shutter preparation, concrete placement and vibration practices. Zero honeycombing should always be the engineering target, while zero pinholes should be pursued through disciplined process control rather than cosmetic repairs after de-shuttering.



Possible Root Causes

- Improper shutter release agent application.
- Damaged or uneven shutter surface.
- Leakage through shutter joints.
- Low concrete cohesiveness or slump variation.
- Improper vibration or under-vibration during placement.
- Air entrapment near shutter faces.
- Excessive free-fall during concrete placement.
- Congested reinforcement preventing proper concrete flow.

Engineering Investigation Checklist

- Inspect shutter surface condition before casting.
- Verify shutter release agent application.
- Check shutter joint sealing.
- Verify concrete slump at placement location.
- Observe concrete lift height.
- Review vibration sequence and spacing.
- Inspect congested reinforcement zones.
- Assess de-shuttering methodology.

Corrective Actions Recommended

- Clean shutter surfaces before every casting cycle.
- Apply a thin and uniform coat of shutter release agent.
- Seal shutter joints properly before concrete placement.
- Maintain approved slump at the placement point.
- Place concrete in controlled lifts.
- Use systematic vibration without touching the shutter surface.
- Avoid over-vibration and maintain proper vibration spacing.

Standard Operating Procedure (SOP)

Before Casting

- Inspect shutter alignment and cleanliness.
- Check shutter joints for leakage.
- Apply a uniform shutter release agent.
- Ensure shutter surfaces are free from dust and laitance.

During Casting

- Place concrete in 300–450 mm lifts.
- Insert the vibrator vertically.
- Maintain proper vibration spacing.
- Withdraw the vibrator slowly after compaction.
- Ensure overlap between successive vibration points.

After Casting

- Inspect the surface immediately after de-shuttering.
- Classify defects as pinholes, bugs or honeycombing.
- Repair minor pinholes only where required.
- Record observations for process improvement.

Engineering Recommendation

DMSA recommends implementing a Surface Finish Quality SOP for all exposed RCC columns and walls. Process discipline in shutter preparation, concrete placement, vibration practices and systematic de-shuttering produces significantly better exposed concrete surfaces than relying on cosmetic repairs.

Engineering Target

- Zero Honeycombing.
- Minimum Bugs & Pinholes in RCC Columns and Walls.
- Consistent Exposed Concrete Surface Finish through Process Control.

SM Engineering Insight

Surface bugs and pinholes should not be treated merely as aesthetic defects. They indicate opportunities to improve workmanship, shutter preparation, release agent application, vibration practices and concrete placement procedures. A disciplined casting process consistently delivers superior exposed concrete quality.

Disclaimer

This Engineering Case Study is based on visual observations made during a site investigation and is intended for technical knowledge sharing. The observations and recommendations are limited to the areas inspected and should not be interpreted as a structural safety certification or a substitute for project-specific assessment by the responsible design and project consultants.