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ROBOTS AND AUTOMATION

The Smart Machine Strategy and the future of concrete construction and repair

WHY SHOTCRETE INSPECTORS MATTER

Shotcrete (sprayed concrete) is deceptively simple to watch and yet it is hard to fully appreciate the quality of the placement. The spray of concrete looks like progress as long as it hangs on the wall, ceiling or tunnel face, but beneath the surface there are critical decisions – concrete mixture proportioning, velocity of the spray, rebound removal, thickness, cover, curing and embedment of the reinforcement – that determine whether a section will last or fail. **Charles Hanskat** of the **American Shotcrete Association** explains why the industry needs skilled inspectors and what the American Concrete Institute (ACI) Shotcrete Inspector Certification aims to deliver.

Unlike cast-in-situ concrete, shotcrete is applied pneumatically at high velocity, often at full thickness in structural vertical walls or sloped sections and layer by layer in overhead applications. Shotcreter (formerly referred to as 'nozzleman') technique, rebound and in-situ compaction all affect compaction and strength. The temperature of the concrete, proper equipment, placement techniques and curing can influence long-term serviceability and durability. Small errors – insufficient embedment, improper concrete consistency (slump) or improper construction joint treatment – can lead to major defects, including delamination and voids. Many of these defects are preventable but only with consistent, competent inspection during placement and cure. One of shotcrete's biggest advantages is that a knowledgeable person can visually ascertain the quality of the placement during shooting. The concrete quality is not hidden inside a form, with defects only found days later upon removing the formwork. And if the inspector is fully knowledgeable about the details required for quality placement, they are an important part of the construction team, making sure concrete is placed correctly with the designed strength, serviceability and longevity required.

WHAT INSPECTORS ACTUALLY DO

A competent shotcrete inspector performs a set of practical, technical tasks: check that the approved concrete and placement procedures are followed; verify reinforcement and anchor placement; watch shotcreter technique and concrete

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consistency; confirm as-placed thickness and cover; monitor environmental conditions and curing; witness and document testing (slump, air content, compressive-strength sampling where applicable); and confirm rebound removal and surface finishing. Beyond technical checks of the project specification requirements, inspectors keep detailed records, including images, and communicate clearly with contractors, the engineer and owners – preventing misaligned expectations that often lead to disputes.

THE RETURN ON INSPECTION

Well-executed inspections prevent rework, reduce latent defects, ensure the concrete sections meet design requirements and ultimately protect owner value. Catching problems early – incorrect nozzle angles, concrete too dry (or too wet), inadequate coverage, or unapproved concrete mixtures – avoids expensive repairs or, worse, structural consequences. For owners and engineers, an inspector who enforces the project specifications keeps the project on schedule and within budget. For contractors, an inspector who understands field realities can provide practical feedback directly to the field crew that improves workmanship rather than merely policing it. Everybody wins when inspections are competent and collaborative.

WHY CREDENTIALING MATTERS

Experience is essential, but experience alone is inconsistent. A formal certification by an internationally recognised group creates a baseline – a common body of knowledge, standardised terminology and objective assessment. Certification signals to owners, contractors and engineers that an inspector understands both the theory (materials science, relevant Codes, testing principles) and practice (placement techniques, surface preparation, acceptance criteria, site safety). It reduces reliance on “I’ve been doing it for 20 years” credentials and provides firms with a measurable way to compare candidates.

The ACI’s creation of a Shotcrete Inspector Certification Programme addresses a clear gap. Quality shotcrete placement has many details that differ from poured concrete. The programme formalises inspector training and assessment for shotcrete specifically – recognising the technique’s unique challenges and the need for specialist knowledge rather than generic concrete inspection skills.

At a high level, the likely benefits of an ACI-backed certification include:

- standardisation – a consistent set of reference documents and a comprehensive written exam ensure inspectors are evaluated against the same technical expectations across projects and regions
- proven experience – the certification requires a minimum of three years of documented shotcrete experience
- credibility – ACI’s reputation in concrete standards and its multitude of widely accepted concrete certifications gives the credential recognition with owners and specifying engineers
- higher competency – certification encourages structured study and practical training, improving field performance and decision-making
- improved project outcomes – knowledgeable inspectors can catch defects early, reduce disputes and support durable, sustainable construction.

HOW PROJECT TEAMS SHOULD USE CERTIFIED INSPECTORS

Owners and specifiers should require a certified shotcrete inspector (or equivalent qualified person) in project specifications where shotcrete is structural or difficult to repair. Contractors can benefit by including inspectors in preconstruction planning and construction of mock-ups. ACI-certified inspectors’ observations often serve as the primary quality assurance for a project.

PRACTICAL CAVEATS AND NEXT STEPS

Certification is not a panacea. A credential doesn’t replace on-the-job judgement, continuing education, or good communication between field crews and the design team. Inspectors still need practical experience and construction teams should pair certification with a culture that values quality over speed. In addition, it is important to confirm inspection roles, responsibilities and escalation paths early – who stops work, who authorises fixes and how disagreements are resolved.

BOTTOM LINE

Shotcrete delivers unique benefits – rapid placement, flexibility on complex geometries and adaptability to repairs – but it also raises unique quality and durability requirements. Credentialed inspectors are the most efficient way to turn those risks back into acceptable performance.

The American Shotcrete Association offers a full-day seminar to support the ACI Shotcrete Inspector Certification, “Quality Shotcrete, Know It When You See It”, designed to help concrete inspectors learn the visual aspects of quality shotcrete placement. Contractors attending the seminar (both self-performing and subcontracting shotcrete placement) gain an understanding of what to look for during placement.

Certification gives the industry a shared standard and a credible pathway to establish baseline competence. And, given human nature, if the shotcreter knows the inspector is knowledgeable about the quality aspects of shotcrete placement, they may do a better job, since they know they are, in some ways, being graded during shotcreting. C

Further information:

ACI Shotcrete Inspector Certification programme: *https://tinyurl.com/3nwhwu4z*.
ASA’s Inspector options: *https://tinyurl.com/2s3m9rzx*.