What's new with chemical versus mechanical anchors

In February 2017 the Construction Fixings Association (CFA) explored the differences between chemical and mechanical post-installed anchors in a popular white paper. Since then, advancements in technology and best practices have transformed how these fasteners are designed, installed and tested. Here Peter Reynolds, technical manager at the CFA, and Mirka Valovicova of fischer UK, share insights on how these changes are shaping the industry.

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Innovation and regulation are driving these changes, new anchors require less hole cleaning, use safer resins, and last up to 100 years – while simpler installation methods and advanced modelling software are making design and selection easier. Meanwhile, stricter regulations, including The Building Safety Act 2022 and Eurocode 2 Part 4, now enforce mandatory anchor design standards.

As construction continues to evolve, these developments are setting new benchmarks for safety, durability, and performance, ensuring stronger, longer lasting connections.

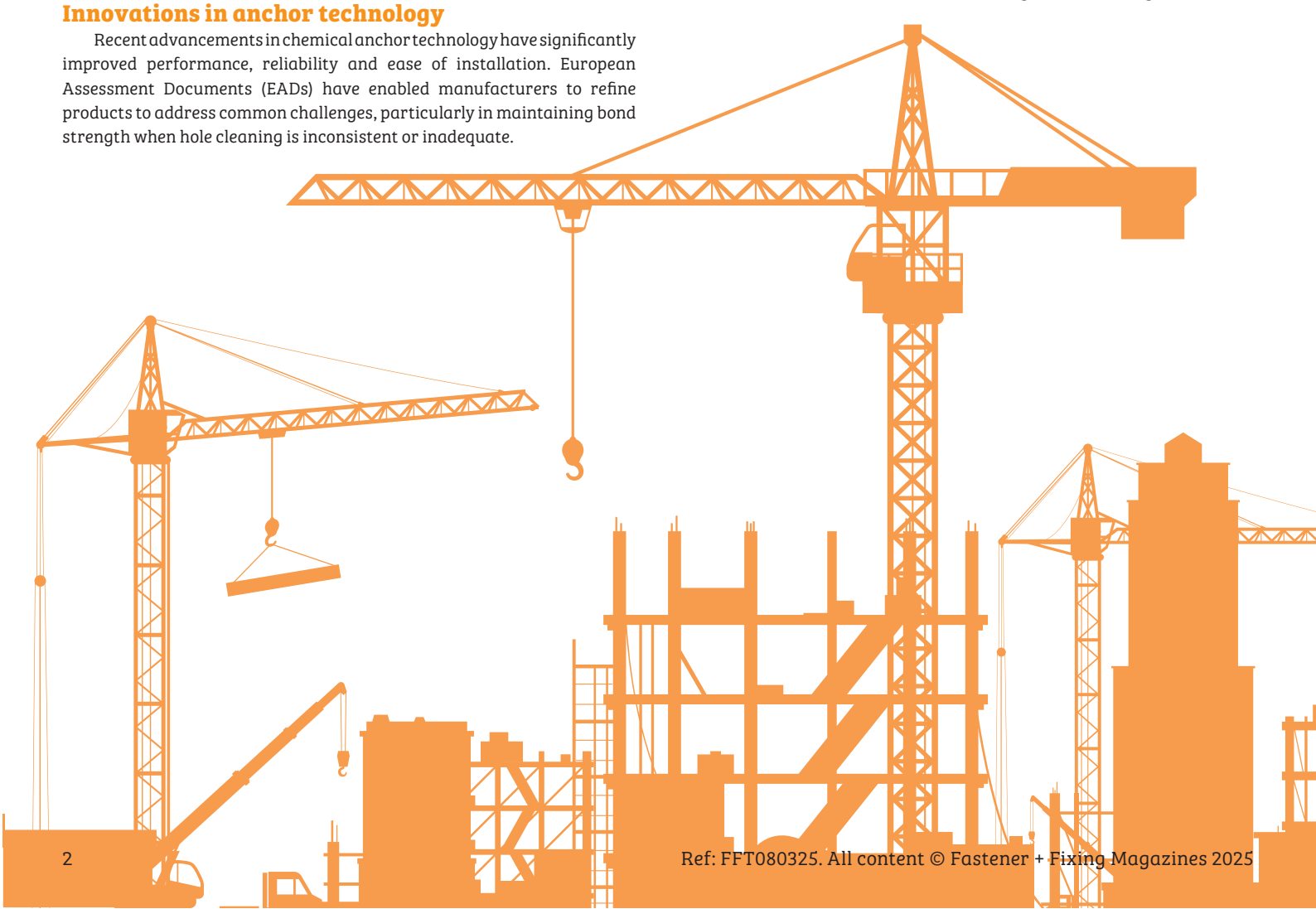
Innovations in anchor technology

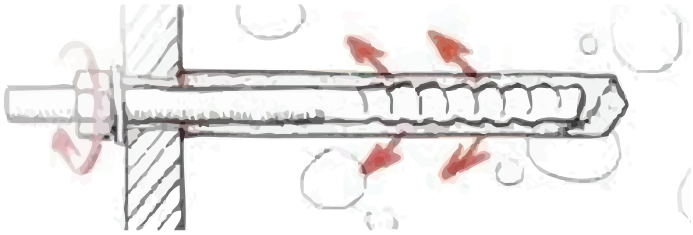
Recent advancements in chemical anchor technology have significantly improved performance, reliability and ease of installation. European Assessment Documents (EADs) have enabled manufacturers to refine products to address common challenges, particularly in maintaining bond strength when hole cleaning is inconsistent or inadequate.

One of the most significant breakthroughs is the development of chemical anchors that require no hole cleaning. By reducing the risk of installation errors, these anchors offer enhanced reliability in demanding applications. They incorporate specially designed rods that apply stress at an angle against the hole wall, improving load transfer and long-term performance, compared to conventional chemical fasteners.

Capsule-type system and hollow drill bits

Another innovation is the introduction of capsule-type systems, which eliminate the need for hole cleaning while allowing installation





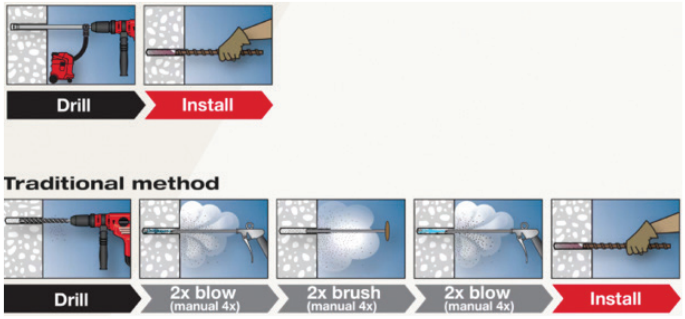
Resin injection anchors where no hole cleaning is required – loading stresses are directed outwards towards the hole wall

with standard threaded rods. These systems have been independently tested, with European Technical Assessments (ETA), confirming they perform as well as traditionally cleaned anchors, providing a more efficient alternative for high volume or safety critical applications – while reducing human error.

Hollow drill bits with vacuum extraction systems offer another solution by removing dust and debris as the hole is drilled. This method offers both enhanced reliability and also improved installer health and safety, by removing the drilling dust safely and effectively. By simplifying installation and minimising risk, these innovations contribute to improved efficiency, safety and performance across a wide range of construction projects.

Environmentally friendly resin formulations

As the industry moves toward more sustainable practices, manufacturers have focused on developing environmentally friendly resin formulations with reduced hazardous chemical content. Some of these resins now carry no hazard symbols, making them easier to store, transport and handle on-site – while lowering potential risks to workers.



Installation using suitable hollow drill bit and extraction system can also eliminate the need for further hole cleaning

Beyond safety, these formulations contribute to reducing the environmental impact of construction projects. By improving sustainability without compromising performance, these advancements support the industry's long-term goal of greener, more responsible building practices.

Anchor reliability for up to 100 years

Service life has become a key focus in anchor technology, with new systems tested to maintain reliability for up to 100 years. This development aligns with the needs of infrastructure and high profile projects where extended durability is a factor.

To meet growing performance demands in seismic, shock and dynamic situations, in both cracked and uncracked concrete, manufacturers have further developed anchors designed to handle the most extreme applications. Some systems also incorporate specialised washers and partial chemical injection techniques, ensuring reliability under extreme conditions.

Post-installed rebars have also evolved, they now use advanced resins that replicate the bond properties of cast-in reinforcement. This allows engineers to create continuous reinforcement where it was previously unavailable, simplifying installation while improving structural integrity and long-term reliability.

Approvals for seismic, shock and dynamic may also incorporate the use of special washers and chemical injection systems

Unified approach for rebar and anchors for flexible efficient design

The adoption of design method TR69 integrates rebar and anchor theory into a unified approach, providing engineers with greater flexibility while eliminating the need to navigate separate guidelines for cast-in and post-installed fasteners, for a more streamlined design process.

Additionally, mechanical anchors with variable embedment depths offer a new level of adaptability. Engineers can adjust anchor depth to match specific load requirements, reducing unnecessary drilling while maintaining strength. This feature maximises the number of viable fastening locations in cases where edge distances or spacing constraints must be considered. These developments enhance both precision and efficiency in modern construction. +