

GCP Applied Technologies

The right choice for HS2

The right choice for you

Visit us at gcpat.com

GCP Applied Technologies is a leading global provider of construction products technologies that include additives for cement and concrete, VERIFI® in-transit concrete management system, high-performance waterproofing products, and specialty systems.

More information is available at www.gcpat.com



Ultimate Solutions

For HS2 Infrastructure

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate, and is offered for consideration, investigation and verification by the user, but we do not warrant the results to be obtained. Please read all statements, recommendations, and suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation, or suggestion is intended for any use that would infringe any patent, copyright, or other third party right.

GCP APPLIED TECHNOLOGIES, ELIMINATOR, VERIFI, SINTA, TYTRO, DE NEEF, PREPRUFE, INTEGRITANK, Advanced Bond Technology, ZipLap and Blue 360 are trademarks which may be registered in the United States and/or other countries, of GCP Applied Technologies Inc. This trademark list has been compiled using available published information as of the publication date and may not accurately reflect current trademark ownership or status. These products may be covered by patents or patents pending.

© Copyright 2018 GCP Applied Technologies Inc. All rights reserved. | VERIFI XXX-0818
GCP Applied Technologies Inc., 62 Whittemore Avenue, Cambridge, MA 02140 USA. In the UK, 580/581 Ipswich Road, Berkshire, Slough, SL1 4EQ

**CONCRETE, WATERPROOFING
AND INJECTION SYSTEMS**

Advancing construction technologies with a commitment to sustainability

GCP Applied Technologies is dedicated to developing high-performance products and advancing construction technologies that simplify the complexities of construction worldwide.

This has been built upon decades of experience in the construction and building materials industry. The company has developed innovative products that have been proven on some of the world's most iconic structures and complex railway systems.

We operate on six continents with manufacturing, R&D and technical services sites in more than 57 countries ready to support you at all stages of the project. The company's 2,000 employees serve customers in more than 100 countries worldwide with local operations, technical teams and distributors.

REDUCE

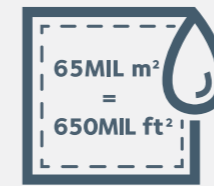
Our cement additives and water reduction admixtures reduce CO₂ by 70 million tons annually, the equivalent of taking more than 10 million cars off the road.

ENABLE

Our specialty building materials impact the built environment with water and energy efficiencies, improved indoor air quality, durability and fire safety.

CONTROL

VERIFI® provides process control benefits, including conserving drum rotations, reducing concrete waste and eliminating the need for over-designed concrete mixes.



Approx. 65 million m² of PREPRUFE® waterproofing membrane applied globally



Durability products that increase the service life of structures by up to five times*

*Based on average modelling with GCP

Blue360SM Advantage

We help our customers solve complex construction challenges in below ground infrastructure and tunnelling, residential and commercial buildings, bridges and highways.



DESIGN

End-to-end expert project consulting and product selection support



FIELD

Expert technical support services, job site support, application support and training



INTELLIGENCE

Harnessing the power of data to transform the built environment



PRODUCT PERFORMANCE

A portfolio of products, services and technologies that provide business solutions to our customers; leading R&D expertise



SUSTAINABILITY

Products and services combine to create more durable and efficient structures



Helping you make the right choice

PROVEN TRACK RECORD

A large scale and highly complex project requires a comprehensive view of needs and a partner with a proven record of success on similar projects. GCP has a long-standing track record on tunnelling and railway projects including:

- Crossrail, UK
- High-speed Haramain Railway, Saudi Arabia
- The Doha Metro, Qatar
- Seoul Metro, South Korea
- Shanghai Metro, China
- San Francisco Bart, US
- High speed Shinkansen railway, Japan
- West Connex Motorway, Australia

SUPPORT WHERE AND WHEN YOU NEED IT

As construction continues to evolve, it is critical to work with professionals who understand the complexities of product compatibility. Our team of product and technical experts work side-by-side with architects and engineers from early design to project completion:

- Design review and specification guidance
- Bid support and submittal reviews
- Pre-installation meetings, job-site and technical support

Our products have a long history of success

GCP's expansive portfolio of concrete, cement additives, building materials and construction technologies are designed for civil engineering and the concrete sector. Proven performance, flexibility and application efficiency in confining and challenging conditions are the hallmarks of our products.

GCP invests in state-of-the-art R&D and technical facilities focused on new innovations. Our R&D team includes more than 200 chemists, engineers, geologists and materials scientists from around the world. In the UK, our R&D laboratories in Warrington work to identify local market needs and to "fine-tune" admixture technologies that optimise local concrete materials. Our technical support laboratory is equipped to simulate a full range of site conditions and materials. GCP's local area sales teams advise customers on product selection, trial planning and execution, and participate in proving and trouble shooting trials onsite.

Bridge deck waterproofing

The ELIMINATOR® system was developed with the UK Rail Industry to satisfy its need for an effective bridge deck waterproofing solution.

The Stirling Lloyd **ELIMINATOR®** Bridge Deck Waterproofing System



Four decades on, the ELIMINATOR® system continues to lead the way as the world’s most advanced, effective and durable waterproofing membrane. A fully reactive elastomeric system, the ELIMINATOR® membrane is based on unique advanced ESSELAC® acrylic resin technology.

Some resins will not bond to themselves after a delay in the works. The surface chemistry of the ELIMINATOR® system is such that the inter-coat adhesion is unaffected by time and any breaks in the works as a result of bad weather, for example, have no effect.

SYSTEM BENEFITS:

- Industry proven, protecting structures around the world in the most extreme climates
- Cold, spray-applied for fast and effective application with no need for hot trades
- Simple and effective sealing of complex, critical details and penetrations
- Applied in two separate colour-coded coats, aiding on-site quality assurance and the integrity of the waterproofing membrane prior to surfacing
- Highly durable, providing long-term road and rail bridge protection, resulting in lower maintenance costs

ELIMINATOR® SYSTEM COMPONENTS

Surfacing or Ballast

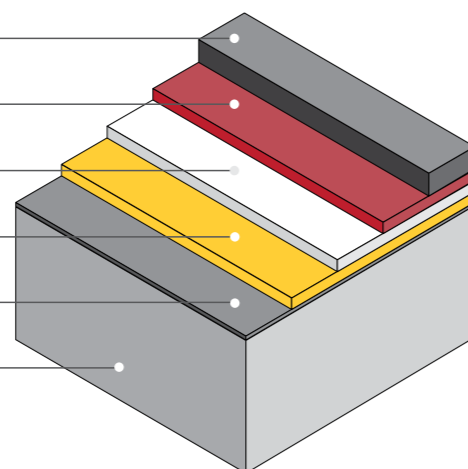
Bond / Tack Coat (Road system only)

ELIMINATOR® Membrane - 2nd coat (dependent on specification)

ELIMINATOR® Membrane - 1st coat

Primer

Deck



*Illustration not representative to scale or colour

Tailored specification for the best results

Early involvement at the design stage enables us to advise on product specification and material compatibility. Working together with bridge designers and engineers enables us to recommend solutions that will offer the best long-term protection.

Viaducts, railways and bridge systems are vulnerable to attack from water, ice, chloride and atmospheric pollutants, leading to deterioration and loss of structural integrity.

Substrate and surface materials, expansion, contraction, minimum and maximum application and service temperatures and traffic loading are all vital considerations in the design of a waterproofing solution for any bridge project.

The ELIMINATOR® system can be tailored to suit the needs of your project with a range of one- and two-coat systems, primers and bond coats for the best results.



Cut & cover tunnel waterproofing

PREPRUFE® Plus and INTEGRITANK® for a fully integrated solution to achieve dry tunnels.

PREPRUFE® Plus Pre-applied Waterproofing



The PREPRUFE® Plus waterproofing system with Advanced Bond Technology™ is engineered to protect underground structures from water ingress, corrosive soil, gas and moisture. It easily conforms to complex details to create an impermeable protective seal.

The patented, non-absorbent membrane surface coating resists dirt and contaminants and withstands up to eight weeks of UV exposure onsite. The membrane is immediately trafficable without protection layers, allowing contractors to install rebar the same day.

The PREPRUFE® Plus membrane is fast and easy to install with just two operators. The system is a proven solution for the most challenging site conditions as well as straightforward projects in climates worldwide.

The PREPRUFE® Plus waterproofing system forms a protective barrier for the life of the structure and is recognised as one of the most advanced and unique waterproofing solutions available for below ground structures.

SYSTEM BENEFITS:

- Bonds directly to poured concrete
- Composed of durable and flexible HDPE geomembrane
- High resistance to chemicals, gas and moisture – Achieved by the HDPE geomembrane and the integral continuous waterproofing seal
- Schedule acceleration – Immediately trafficable membrane and same-day rebar installation
- Limited damage, dirt and contamination – Patented, non-absorbent and smooth surface coating, allowing up to eight weeks (six weeks for hot climate) of UV protection

INTEGRITANK® Post-applied Waterproofing



INTEGRITANK® fully bonded, seamless, tough and durable spray applied waterproofing system.

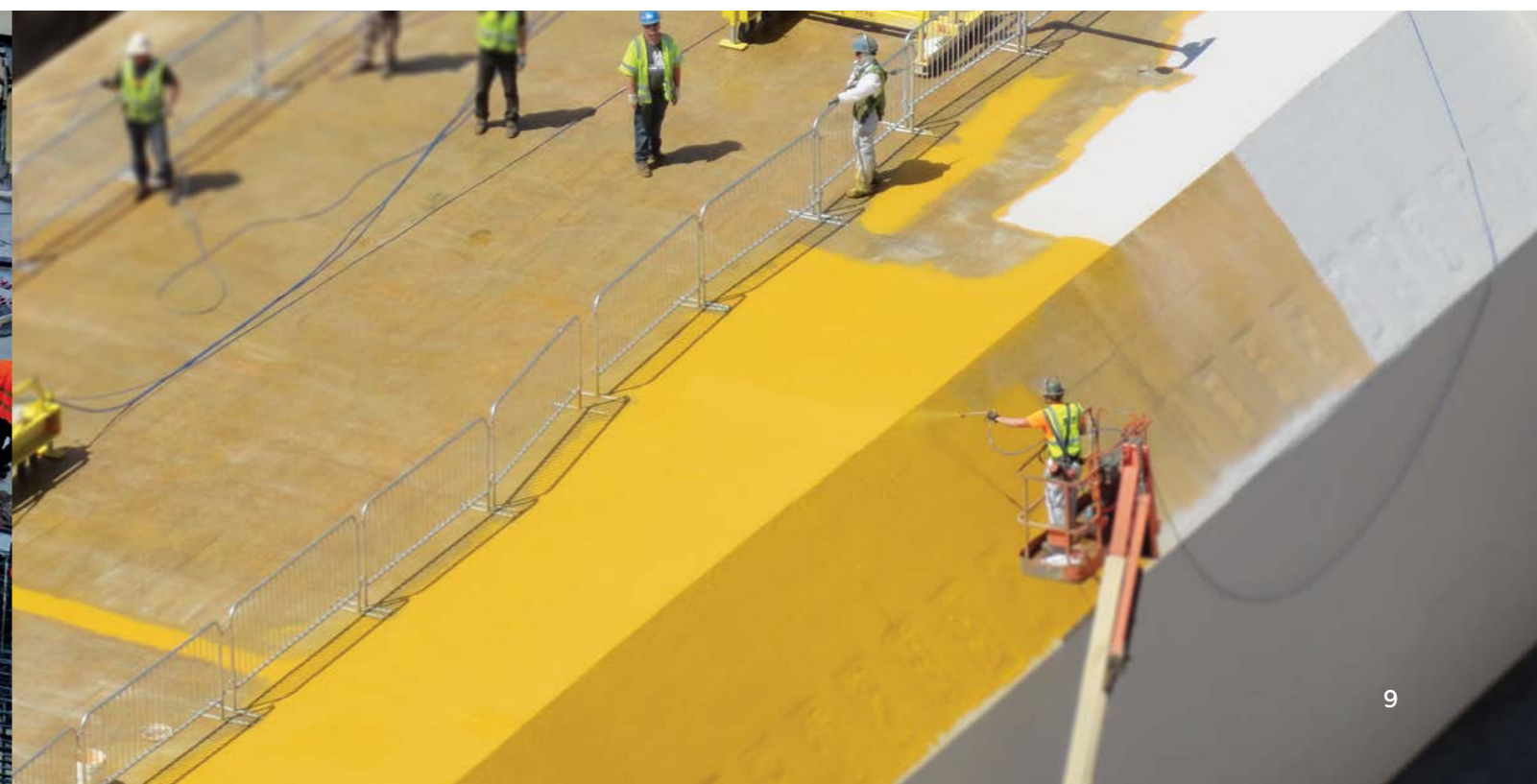
The INTEGRITANK® system is a fully reactive, elastomeric, cold spray-applied waterproofing system developed to outlast the design life of the tunnel.

It provides a tough, durable, fully bonded membrane, resistant to backfill, hydrostatic pressure and long-term immersion in water. The INTEGRITANK® membrane can be combined with the PREPRUFE® Plus system to deliver a complete solution for cut and cover tunnelling.

With a successful track record of protecting both immersed tube and cut & cover tunnels around the world, the INTEGRITANK® system has set new standards in tunnel waterproofing performance. Prior to submersion or backfill, the membrane can be electrically tested, post-application to ensure a defect free finish is achieved.

SYSTEM BENEFITS:

- Schedule flexibility – Rapid and reliable coverage; fast curing
- Seamless, liquid spray-applied – No weak and vulnerable joints, more effective waterproofing, especially at details, corners and penetrations
- Excellent crack bridging capabilities
- Quality assurance – 100% of the surface tested electronically to ensure no defects; two separate colour-coded coats



Bored tunnels, precast concrete

High-quality, durable tunnel segmental linings.

STRUX® Macrosynthetic Fibres

Steel-free high strength, high modulus engineered macrosynthetic fibres for crack control and structural reinforcement of precast concrete tunnel segmental linings.

SYSTEM BENEFITS:

- Improves impact resistance, durability and long-term crack control properties by equally distributing structural fibres throughout the entire concrete matrix
- Eliminates corrosion inherent with steel reinforcement
- Eliminates lifting and bending of heavy rebar cage and its inherent labour and reduces production cycles by 20-30%
- Quick, easy and safe application



CHARACTERISTICS	STRUX® 90 /40	STRUX® 85 /50
Base material	Polypropylene / Polyethylene	Polypropylene / Polyethylene
Length	40 mm (1.57")	50 mm (1.97")
Specific gravity	0.92	0.92
Tensile strength*	620 MPa (90 ksi)	580 MPa (84 ksi)
Modulus of elasticity**	9.5 GPa (1,378 ksi)	9.0 GPa (1,305 ksi)
Shape	Rectangular	Rectangular
No. fibres per kg	180,000	83,000
Melting point	590°C (320 °F)	160°C (320 °F)
Ignition point	590°C (1,094 °F)	590°C (1,094 °F)
Packaging	Loose fibre bags	Loose fibre bags

*Measured at a strain rate of 10% per min.

** Elastic modulus is derived from a straight line between the stress-strain coordinates at 10% and 30% of the maximum strength of the fibre

ADVA® CAST Admixtures

Lowers water/cement ratio for high early and final compressive strength in precast concrete.

SYSTEM BENEFITS:

- Yields high range water reduction
- Shortens setting time
- Produces strong and durable precast concrete
- Reduces heat energy costs
- Improves surface texture of cast parts



SINTA® Polypropylene Fibres

Monofilament, high-performance polypropylene fibre additives to control cracking in cementitious materials.

SYSTEM BENEFITS:

- Inhibits formation of small cracks occurring through plastic shrinkage, premature drying and early thermal changes
- Utilises the intrinsic properties of hardened cementitious material
- Provides overall higher quality of concrete



Sprayed concrete tunnel linings

TYTRO® sprayed concrete system accelerates cycle times, optimises installation costs and achieves superior performance.

TYTRO® Advanced Sprayed Concrete System

ADVANCED ADMIXTURE SYSTEM

Our complete system provides superior bond to rock substrate, faster early strength development, enhanced sprayability and pumpability characteristics and minimum rebound.

MIX DESIGN OPTIMISED TO PROJECT NEEDS

Our world-class underground technical specialists provide mix designs customised to achieve the most technically suitable, optimised and cost-effective mix designs for the needs of each project.

EXPERT FIELD TECHNICAL SUPPORT

Our field teams work on-site with tunnel contractors to help them move beyond mix recommendations and trials—to achieve performance improvements and measurable operational results.

SYSTEM BENEFITS:

- Lower installed cost - Mix design optimised to meet the specific project requirements
- Dosage efficiency - Low dosage rates to meet performance specifications
- Reduced excavation downtime - Faster early strength
- Reduced cycle times - Enhanced bond to substrate and larger thickness in one pass
- Long-term durability - Corrosion-free and high resistance to water penetration

PRODUCT RANGE:

TYTRO® WR	High-range water reducing admixtures that provide superior flow, prolonged slump life, excellent plasticity and maximum strength performance
TYTRO® HC	Cement hydration admixture that allows for optimal logistical operations by extending the working life of shotcrete by up to 72 hours
TYTRO® AE	Air entraining admixture formulated for use in shotcrete mixes to protect against damage from freeze/thaw cycles
TYTRO® RC	Innovative nanotechnology-based rheology control admixture for enhanced sprayability, reduced rebound and faster early strength
TYTRO® SA	Latest generation of high-performance, alkali-free set accelerators designed to provide high early strength at low dosage rates
STRUX®	High performing co-polymer fibres used as a replacement for steel fibres and wire mesh

TYTRO® RC vs. Traditional Pozzolanic Materials

Featuring the latest in nanotechnology, innovative TYTRO® RC rheology control admixtures are designed to reduce the installed material cost when used as a replacement for traditional pozzolanic materials:

- Highly dosage-efficient
- Enhanced sprayability – Improved adhesion onto substrate and between layers
- Rebound rates down to single digits
- Larger layer thickness in a single pass
- Comparable later strength and durability
- Robust and easier to dispense and dose
- High resistance to water penetration due to reduced permeability
- More consistent quality
- Easier to store – Frees up silo space

Ground injections

Full range of injection resins and field technical support for pre-excitation grouting, ground consolidation and water control.

TYTRO® Ground Injections

Based on DE NEEF® technology, the TYTRO® range of ground injection resins are fast-acting solutions that penetrate fine cracks in rock and fine grain soils for efficient ground water control, tunnel face stability and improved safety during all phases of tunnel construction.

PRODUCT RANGE:

Ground Stabilization and Consolidation – Solutions to secure the tunnel face before and during excavation

- TYTRO® DN single component water-reactive polyurethane resins
- TYTRO® SI foaming and non-foaming urea-silicate resins
- TYTRO® AC high-performance, two-component acrylate resins
- TYTRO® MC high grade micro-fine cements for pre-injection

High Water Flows – Solutions to prevent or reduce water inflows into the tunnel during construction

- TYTRO® DN foaming, water-reactive, single component and two-component polyurethane resins

SYSTEM BENEFITS:

- Fast acting, easy to install and durable injection solutions
- Backed by experienced field engineers who provide training, support and troubleshooting
- A network of qualified distributors and approved installers ready to support at short notice

Leak sealing injections

DE NEEF® full range of leak sealing and water control injections for underground structures in operation.

DE NEEF® Leak sealing solutions

An active leak means costly tunnel operational delays and costs. For decades, DE NEEF® solutions have led the way in stopping leaks where they start. Water leaks might occur after completing tunnel construction due to concrete cracks, defective waterproofing sheets or joint sealing gaskets. DE NEEF® injections cover the full range of products for permanent water sealing of tunnels.

PRODUCT RANGE:

Leak sealing injections

- DE NEEF® HA Cut AF and DE NEEF® HA Cut CFL AF phthalate-free, closed cell, one-component, low viscosity, hydrophobic, hydro-active, rigid polyurethane injection grout for cutting off gushing water leaks

Curtain injections

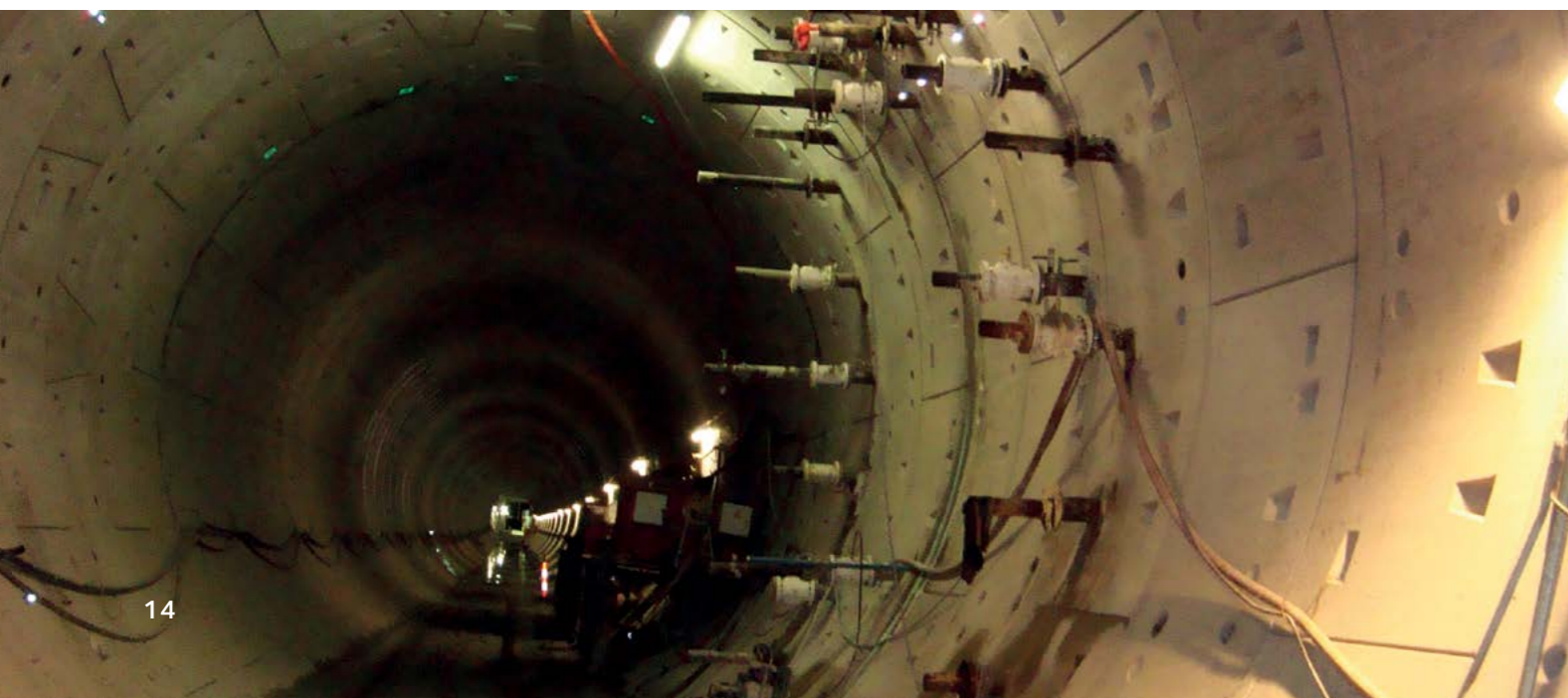
- DE NEEF® helacryl superflex methacrylic acrylate copolymer, combining the low viscosity of traditional acrylate resins with the elongation and adhesion associated with polyurethane resins

Crack and joint repair

- DE NEEF® HA Flex LV AF next generation one-component injection resin with improved waterproofing performance

SYSTEM BENEFITS:

- Fast and effective leak sealing solutions
- Proven track record and history of successful projects around the world
- Supported by field technical teams
- Durable and long-lasting leak sealing



Monitor. Measure. Manage. Stop over designing your concrete

The VERIFI® in-transit concrete management system transforms ready-mix business operations and processes, making concrete production more profitable.

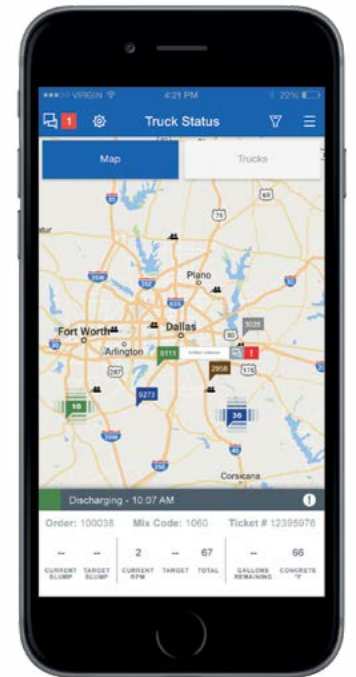
This technology advancement enables you to continuously monitor concrete properties on the truck, from the plant to the job site. VERIFI® sensors and controls on each ready-mix truck monitor, measure and manage multiple attributes. When the concrete slump is not on target, the system makes the necessary adjustments by adding the precise amount of water or admixtures. This results in increased concrete quality through real-time control and management of slump and monitoring of concrete temperature during transport.




The **VERIFI®** In-transit Concrete Management System

SYSTEM BENEFITS:

By delivering a more consistent product at a higher level of quality, ready-mix producers can realize significant business improvements including:

- Fewer loads rejected on site
- More loads delivered successfully per day
- Less admixtures used
- Faster truck turnaround
- Reduction of unused concrete
- Fewer jobs needing to be re-done
- Less cement used
- Measurable sustainability benefits



MONITORS	MEASURES	MANAGES
		
GPS Location	Slump	Slump
Delivery Phase	Temperature of Concrete	Concrete In-Transit
Truck Speed	Drum Speed and Direction	All Fluid Additions (Water & Admixture)



Support when you need it most

Our long and successful track record in the rail industry and waterproofing projects enables us to add value at all stages of the project.

Each project has its own particular requirements and our integrated offering of products, technologies and expertise, gives our customers a unique business advantage.

TAILORED SEMINARS

To ensure you have the latest knowledge on standards, technical expertise and best practice, we offer tailored seminars, specific to your training and project requirements.

DESIGN & SPECIFICATION SUPPORT

Early involvement in design and specification can improve the overall project design, implementation, long-term structural integrity and significantly reduce and in some cases eliminate ongoing maintenance costs.

IN-HOUSE RESEARCH AND MANUFACTURING FACILITIES

With the benefit of our experienced team, in house research and development and manufacturing capabilities, we have full traceability and control over all elements of manufacture and quality assurance.

FIELD SUPPORT

Our teams dedication doesn't end with the design phase. Throughout the project, we provide continuous support, serving as an expert resource to you, the contractor and subcontractors. Our team has one goal; to meet your project's vision and specs, on time and on budget.

Setting the standard for HS2

