TYTRO®
Shotcrete System

ADVANCED. EFFICIENT. RELIABLE.
Focused on providing our customers the highest level of performance and support

Built on talent, technology, and trust, GCP Applied Technologies is a leading global supplier of specialty construction chemicals and building materials. GCP provides innovative materials, systems and services that strengthen, enhance and protect structures.

GCP’s comprehensive portfolio of solutions for the mining and infrastructure tunneling industries includes admixtures for shotcrete and concrete, injection technologies for ground improvement, and proprietary fiber reinforcement systems.

From the smallest to the largest, the simplest to the most complex underground projects, every project has its own individual challenges. By combining their technical expertise in shotcrete mix design optimization, on-site monitoring systems, and ground control technologies that are right for the project, our technical specialists around the world work to provide solutions for our customers to overcome their geotechnical challenges.
Delivering LOWER INSTALLED COST, reduced cycle times and superior performance.

GCP Applied Technologies introduces its state-of-the-art TYTRO® Shotcrete System to help customers reduce shotcrete operating costs, minimize excavation downtime, achieve desired technical performance, and meet the highest safety standards.

Our field teams provide support to help our customers integrate our advanced TYTRO® technologies into their shotcrete production and ground support operations for increased safety, efficiency, and productivity.

**> Advanced full shotcrete system for ground support** – Our complete system has been formulated to achieve faster early strength, enhanced bond to rock substrate, larger thickness in one pass, and minimum rebound and dust.

**> Efficient shotcrete mixes for optimal installed cost** – Our world-class laboratory resources and technical specialists acknowledge the need in customized mix designs to achieve performance requirements and ensure that our customers get the most technically suitable, optimized, and cost-effective mix designs for every project to meet the target performance.

**> Reliable technical service and support** – Independent of location, we deploy the best mix of our global and field service team to assist our customers worldwide in optimizing their mixes as well as providing site support and training.
TYTRO® shotcrete system offers specialty shotcrete admixtures that are formulated for shotcrete mixes to achieve high performance characteristics and meet project requirements. Due to their synergetic benefit, they are formulated to be used together.

ADVANTAGES OF TYTRO® SA

> Efficient dosage rate – Highly active formulation for low dosages
> Reduced excavation downtime – Increased adhesion and faster setting to allow for earlier finishing
> Improved early strength – Without compromising later age strength
> Reduced cycle times – Quicker setting action and increased layer thickness
> Minimum material waste – Lower rebound and dust
> Safer and healthier to handle – Non-alkaline formulation
> Robust and easy to dispense – Liquid product; easily measured and dosed
TYTRO® RC innovative rheology control admixtures are designed to reduce our customers’ installed material cost when used as a replacement for silica fume or other pozzolanic materials.

TYTRO® RC products provide superior bond to rock substrate, faster strength development, enhanced sprayability and pumpability characteristics, and minimum rebound and dust in tunnels and underground mining shotcrete applications.

Featuring the latest in nanotechnology, TYTRO® RC products contain a liquid dispersion of discrete, spherical, uniformly distributed nanometric particles of amorphous silica for use in shotcrete.

TYTRO® RC vs. Traditional Pozzolanic Materials

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<tr>
<th>TYTRO® RC</th>
<th>SILICA FUME</th>
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<td>Nanometric</td>
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<td>Engineered Material</td>
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TYTRO® RC vs. SILICA FUME

- Highly dosage-efficient – Very low dosage rates to meet performance specifications
- Enhanced sprayability – Improved cohesion
- Lower rebound and dust – Minimum material waste
- Reduced cycle times – Larger layer thickness in a single pass
- Faster early strength
- Comparable later strength and durability – High resistance to water penetration due to reduced permeability
- Safer and healthier to handle
- Robust and easier to dispense and dose
- More consistent quality
- Easier to store – Free up silo space

LOWER INSTALLED COST

THICKER PASSES WITH LESS REBOUND AND DUST

UP TO 60% LOWER COST THAN SILICA FUME
ENHANCED USABILITY
LONG-TERM DURABILITY AND SUPERIOR TOUGHNESS

FIBER REINFORCEMENT

STRUX® macro-synthetic fibers are high performing proprietary engineered copolymer fibers used as a replacement for steel fibers and wire mesh reinforcement in underground shotcrete construction. STRUX® is added to shotcrete to provide toughness, impact, and fatigue properties. In addition to its superior crack control and resistance, STRUX® also eliminates corrosion issues or safety concerns associated with the use of steel fibers. Depending on the project requirements, STRUX® offers the following macro-synthetic fibers:

INTRODUCING STRUX® BT50

GCP introduces the latest generation STRUX® BT50 macro-fiber featuring a patented design developed for underground shotcrete applications. Its advanced packaging condenses the fibers in an aligned format, improving dispersion in the shotcrete mix compared to traditional loose fiber packaging.

The improved dispersion resulting from the aligned fibers reduces balling, and the alignment of the fibers prevents individual fibers from curling and becoming tangled prior to use, thereby enhancing placement.

STRUX® BT50 vs COMPETING MACRO-SYNTHETIC FIBERS

- Low cost per Joule
- Higher post-crack energy absorption at equal dosage rate
- Superior dispersion properties
- Reduced balling
- Lower impact on slump

STRUX® BT50 vs STEEL FIBERS

- More dosage-efficient – Low dosage rate required to meet 450 Joule Q-Chart specification
- Long term durability – Corrosion free
- Reduced cycle times
- Superior dispersion
- Safer and lighter to handle
- Reduced fire damage – Lower spalling risk
- Reduced wear on concrete pumps and hoses

STRUX® BT50 vs STEEL MESH

- Reduced cycle times
- Lower labor and installed material cost
- Enhanced Safety
Through our TYTRO® Shotcrete Excellence Program, we help our customers achieve rapid, significant, measurable improvements in productivity and performance across mix design optimization:

- reduce shotcrete operating costs
- minimize excavation downtime
- reduce rebound and dust
- meet highest technical and safety standards

For more information on our TYTRO® Shotcrete Excellence Program please contact us by email at: Shotcrete.excellenceprogram@gcpat.com
We help our customers achieve safe and efficient shotcrete operations by combining our market-leading technologies and mix design and optimization skills with hands-on technical application expertise.

Our technical specialists combine the comprehensive concrete technology understanding with strong technical application expertise in the mining and infrastructure tunneling industries worldwide.

Our field teams serve hundreds of underground construction customers from leading mining companies to top tunneling contractors and have deepened our expertise in solving our customers’ toughest ground control challenges from diagnosis to implementation.

Training and Education
GCP offers a variety of approaches to learning, from tailored, on-site product training to online webinars. Our team integrates insights from years of experience and knowledge into our curricula, and helps our customers translate their learning into their daily operations for lasting shotcrete performance improvement.

Site Support
Our field teams work on-site with customers to help them move beyond mix recommendations and trials—to achieve performance improvement and measurable productivity results. They work side-by-side with our global industry and technology experts, and partner closely with our customers to help them produce results—rapid, significant, measurable improvements in productivity, cost, quality, and safety. Our support offering is flexible and designed to meet specific customer needs.

Quality Control
Our field technical specialists work intensively with customers to obtain lasting and substantial performance improvement through the implementation and monitoring of comprehensive quality control programs. They offer a suite of advanced tools ranging from rapid early strength diagnostic tools to on-site calorimetric systems for optimal hydration control.
GLOBAL UNDERGROUND CONSTRUCTION TEAM

Many miles of tunnels span the globe. So does our team. Whatever your underground construction needs, we have you covered.
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gcp applied technologies