

Solutions for tunnelling and mining

# Sprayed Concrete

Expanding Horizons

Underground

 **MEYCO**



## Introduction

### «True partnership»

MEYCO Global Underground Construction, part of BASF Construction Chemicals, is a world leader in the provision of reliable, customer oriented product solutions focused on your needs in the tunnelling and mining industries.

BASF recognises that your success is founded on delivering solutions that meet or exceed your customers' valuable needs. By integrating with you from project start-up and understanding the issues that are important to you, we can contribute to your success.

### «Save time and cost»

As many underground projects attract international contractor and design teams, our global presence permits seamless transfer of technology and services to any of your projects, anywhere in the world.

Sprayed concrete is widely used for ground support in tunnelling, mining, hydropower construction and slope stabilization. As the world leader, BASF gives you not only cost effective products, but also technical services that are tailored to your needs.

### «Customised solutions»

■ A one-stop shop offering you both admixture technologies and equipment for high quality sprayed concrete application

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■ Professional and competent technical services, provided by a team of international and local tunnelling specialists, who are ready to be with you 24 hours a day, 7 days a week, helping you with product training, technical advice, job site supervision, trouble shooting and quality control

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■ Innovative solutions through continual product development dedicated to tunnelling needs

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■ Technical consulting at every project stage, from planning to completion, keeping you well informed about our technologies all the time

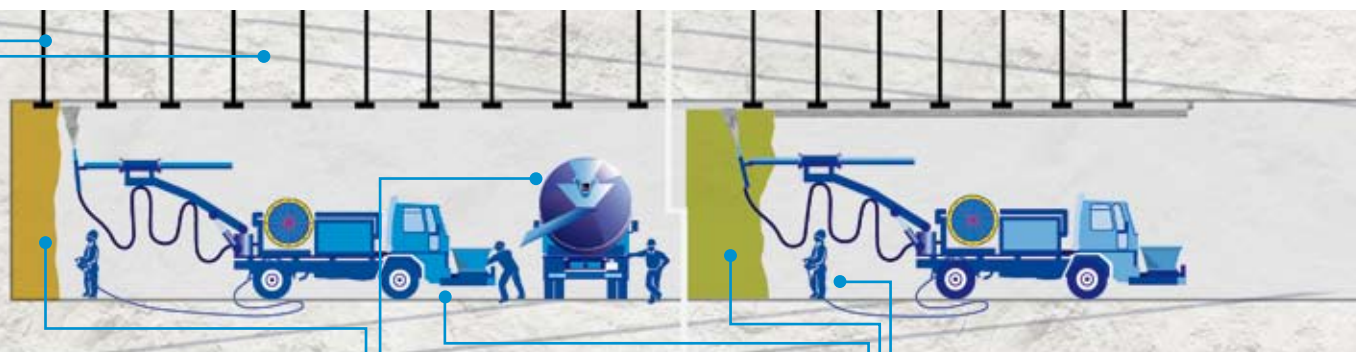
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■ Laboratory resources at your disposal to carry out project specific testing, helping you with product selection so that you get it right the first time

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■ Our world-known reputation and reliability to give you the confidence you require from a technology supplier

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#### Pre/Post Injection

- RHEOCER® microcements
- MEYCO® MP acrylic and polyurethane resins
- MEYCO® MP colloidal silica

#### Rock Bolting/Anchoring

- MEYCO® FIX Flowcable

#### Concrete mix design

- Superplasticizers
- DELVO®CRETE hydration control additives
- MEYCO® TCC 735 Concrete Improver
- MEYCO® MS (Micro and Nano silica)

#### Sprayed concrete accelerators

- Alkali-free liquid accelerators: MEYCO® SA

#### Training & Service

- **Spray-applied waterproofing membranes**
- MASTERSEAL® 345

#### Equipment

- Full range of spraying mobiles for large or small applications
- Tailor-made spraying systems

## Solutions

### «Computer & laser controlled robotic spraying»

- MEYCO® SA range of **alkali-free accelerators** providing excellent early and long term strength, and highly durable concrete. A family of products is available to suit your site conditions

- GLENIUM® and RHEOBUILD® range of **high performing superplasticizers** allowing you to achieve very low w/c in the concrete mix, and high and extended workability

- DELVO®CRETE **hydration control** admixtures allowing you to prolong the workability of your concrete mix to suit site logistics

- MEYCO® TCC **bond improving** admixtures added at the batching plant that internally cure the sprayed concrete immediately after spraying

- MEYCO® MS range of additives based on **micro- and colloidal- silica** technologies that further enhance the strength and durability of your sprayed concrete

- **Steel and structural plastic fibres**

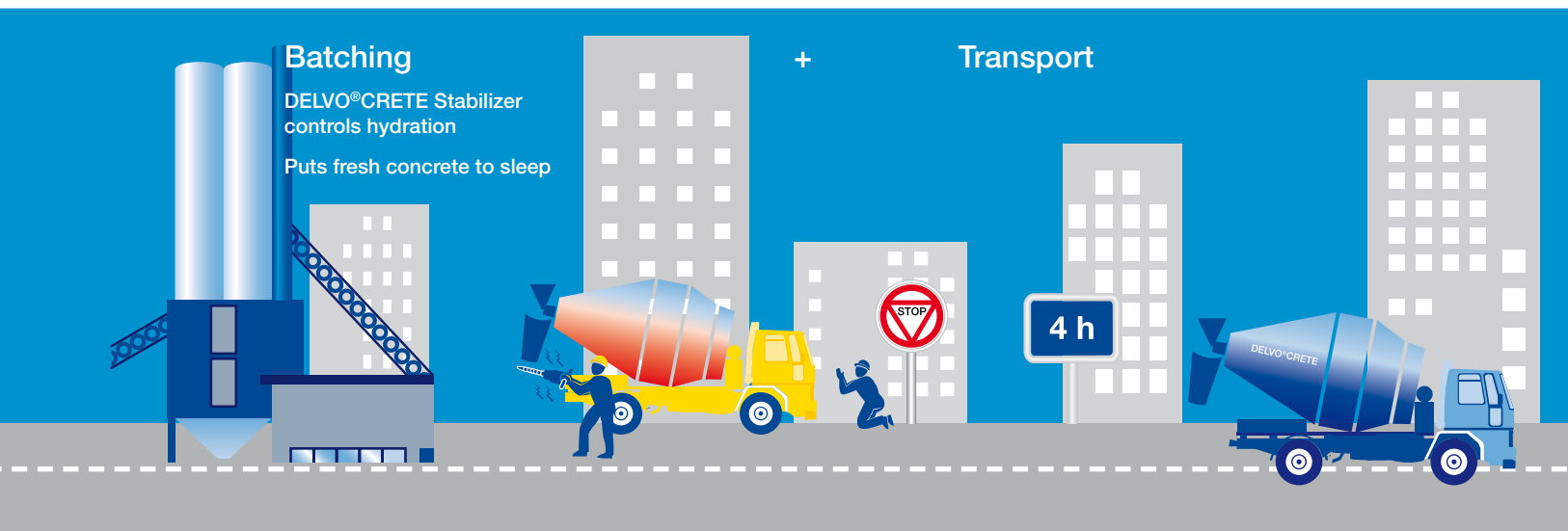
- State of the art **sprayed concrete pumps and robotic spraying manipulators**, for high quality and reliable concrete spraying

- MEYCO® Robojet Logica **laser guided spraying robots**, giving unprecedented thickness control and quality assurance

- **Injection** solutions and **spray-applied waterproofing membranes**, giving you opportunities for monolithic, single shell lining construction

### «Single shell sprayed concrete lining»

### «Improve workplace safety»



## Mix Design

«Low health risk to operators»

A wide range of admixtures and additives are available during the concrete batching in order to ensure that demanding specifications are reached or exceeded.

«Mix design development support»

### Products

### Benefits

- Conventional Superplasticizers
- High performance superplasticizers based on polycarboxylate technologies

- RHEOBUILD®
- GLENIUM®

- Lower w/c ratios, allowing
- Excellent early strength development
- High long term strength
- Improved durability
- Reduced accelerator consumption
- Reduced bleeding and segregation

- Pumping aid
- Pumping primer

- MEYCO® TCC780
- MEYCO® Fix Lube

- Enhanced concrete pumping
- Especially useful for crushed or poorly graded aggregates

- Hydration control

- DELVO®CRETE stabilizers

- Giving concrete a pot life of up to 72 hours
- Allowing total site logistic flexibility

- Bond improver/internal curing aid

- MEYCO® TCC735

- Improved bonding of sprayed concrete
- Curing the concrete internally

- Structural fibres

- MEYCO® SP structural plastic fibres
- Steel fibres

- Improved impact resistance
- Improved ductility
- Replacing labour intensive mesh reinforcement

- Other improvers

- MEYCO® MS micro- and colloidal- silica

- For very high strength concrete
- Improved setting and early strength
- Improved durability
- Improved watertightness

## Intermediate storage

4-72 hours

+

## Application

Wake up the sprayed concrete with MEYCO® SA range of alkali-free accelerators.



## Alkali-free accelerators

### «Durable sprayed concrete»

The MEYCO® SA series of alkali-free accelerators have been developed in response to demand for high quality and durable sprayed concrete at low health and environmental risk. They are an essential part of modern sprayed concrete. Key benefits include:

- High performance with relatively low dosages
- Fast setting and constant early strength development allowing fast, high build rates
- Ability to apply sprayed concrete in areas with some water ingress
- Successful sprayed concrete application in ground freezing projects
- Gives highly durable sprayed concrete
- Wide range of products to suit local cements, conditions and site needs

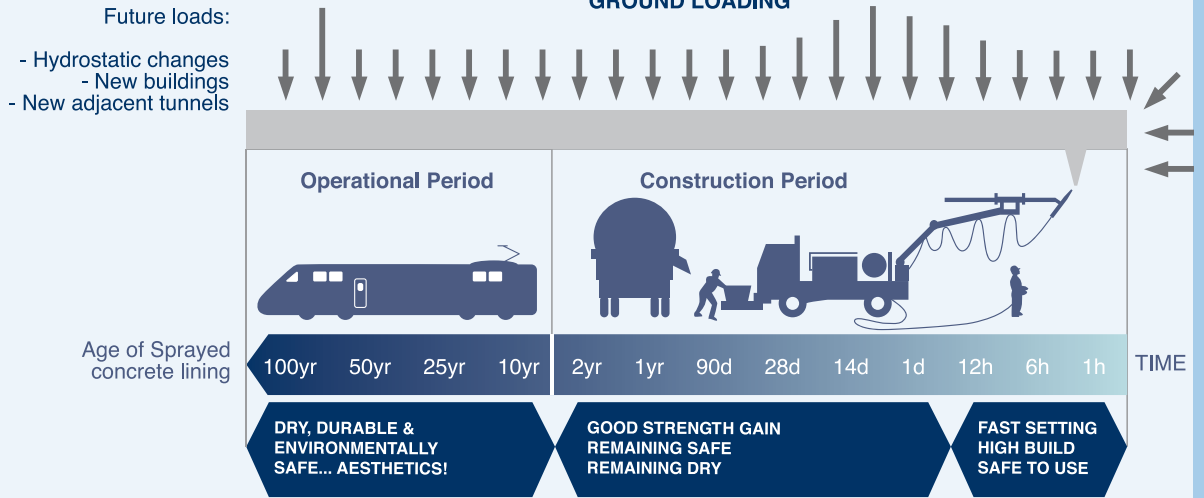
### «Process planning & set-up support»

MEYCO® SA series of alkali-free accelerators are probably the best known and proven products in the market.

The benefits of MEYCO® SA alkali-free accelerators are maximized when combined with our high performance GLENIUM® superplasticizers and DELVO®CRETE hydration control stabilizers. We recommend MEYCO® Equipment incorporating integrated dosing system in order to ensure accurate dosage control.



## Expectations of permanent sprayed concrete

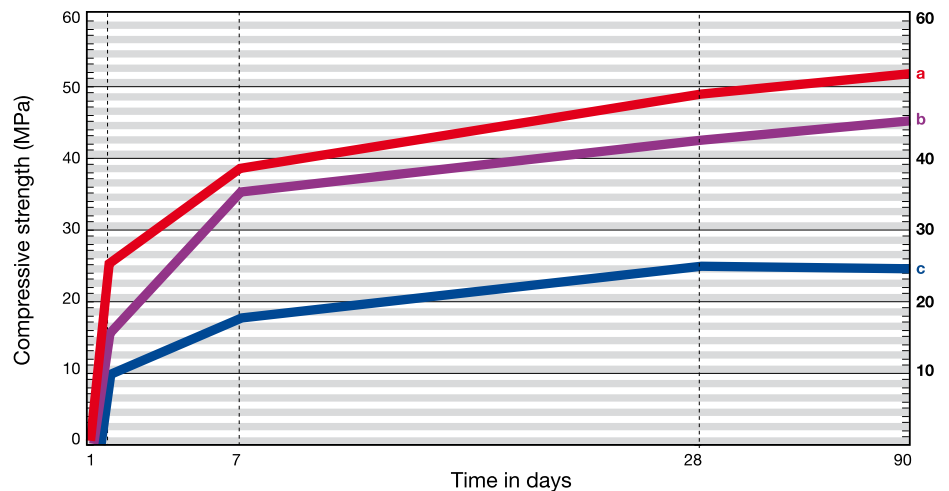
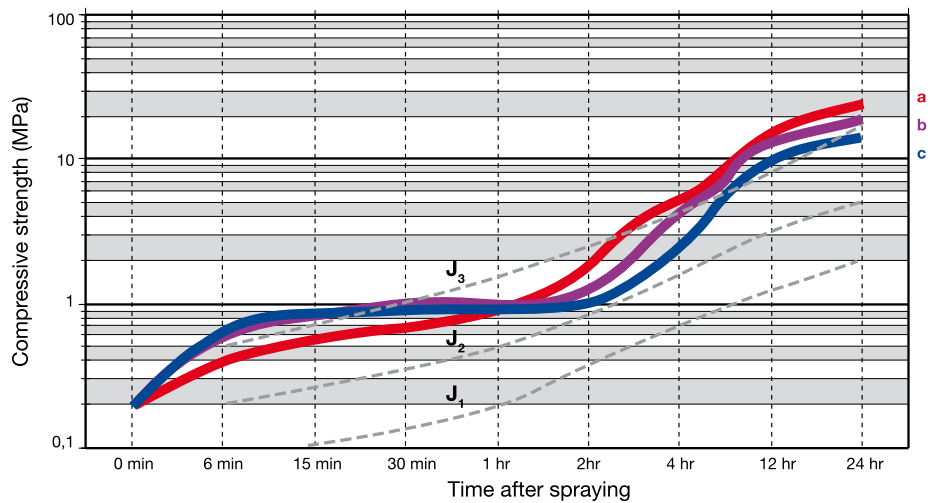


## Alkali-free accelerators

Concrete properties are normally determined by mix design parameters, such as w/c ratio, cement content, fillers, among others. For sprayed concrete, the choice of accelerators also plays a vital role, both for early/long term strength development, and for durability properties.

CEM I R 42.5. w/c=0.42

- a – MEYCO® SA product A
- b – MEYCO® SA product B
- c – Typical aluminate accelerator



## Equipment

MEYCO® Maxima



MEYCO® Roadrunner



MEYCO® Oruga



MEYCO® Suprema



MEYCO® Potenza



MEYCO® Logica



- MEYCO® Logica technology: Spray robotic boom incorporating laser guided automated application technology
- Fully equipped and modular spraying mobiles for the tunneling and mining industries: MEYCO® Potenza, MEYCO® Cobra, MEYCO® Road-runner
- Complete range of spraying manipulators, static or mobile: MEYCO® Robojet, MEYCO® Oruga, MEYCO® Rama 4 or 6, MEYCO® Robojet Minima
- Tailor made spray equipment for TBM, shaft platforms or special projects according to customer requirements
- MEYCO® Suprema – low pulsation double piston pump with integrated dosing technology and data logging system
- MEYCO® Altera – Lower range double piston pump with integrated dosing technology
- Dry spray equipment: the well proven rotor machines MEYCO® Piccola and MEYCO® GM
- Accelerator dosing pumps and sprayed concrete dosing units
- Accessory and spare parts



## Composite lining

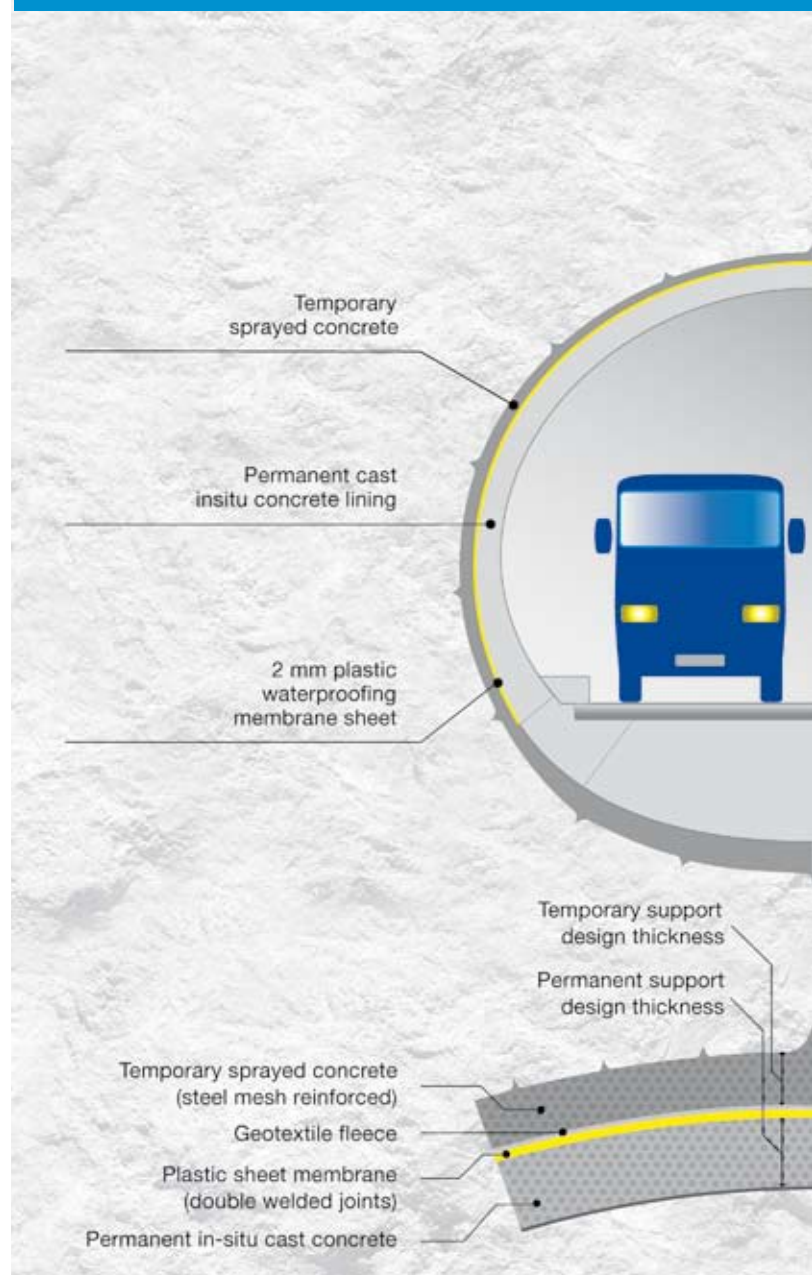
### Sprayed Concrete Composite Lining Concept

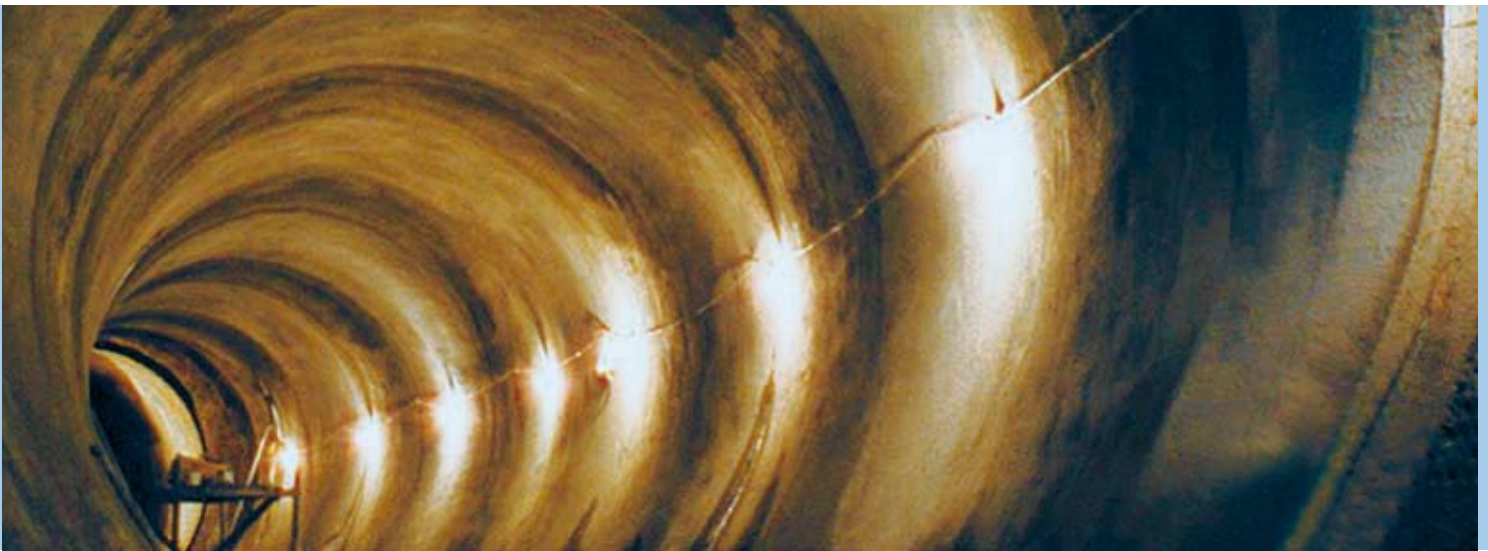
- Primary rock support with sprayed concrete. High quality of the sprayed concrete is achieved by
  - **Robotic wet-mix spraying** for consistent high quality
  - Use of **alkali-free accelerators** to ensure both short and long term strength development
  - Use of **high performance superplasticisers** to ensure low permeability and high strength development
  - Internal curing with **MEYCO® TCC 735**

The primary sprayed concrete forms part of the total lining design.

- A sprayable waterproofing membrane, such as **MASTERSEAL® 345**, is applied onto the primary sprayed concrete to ensure complete water tightness of the concrete lining.
- A secondary sprayed or cast concrete lining is applied, which acts together with the primary sprayed concrete to complete the total lining.
- The spray applied membrane facilitates perfect bonding between primary and secondary layer concrete, making the single shell concept a reality.

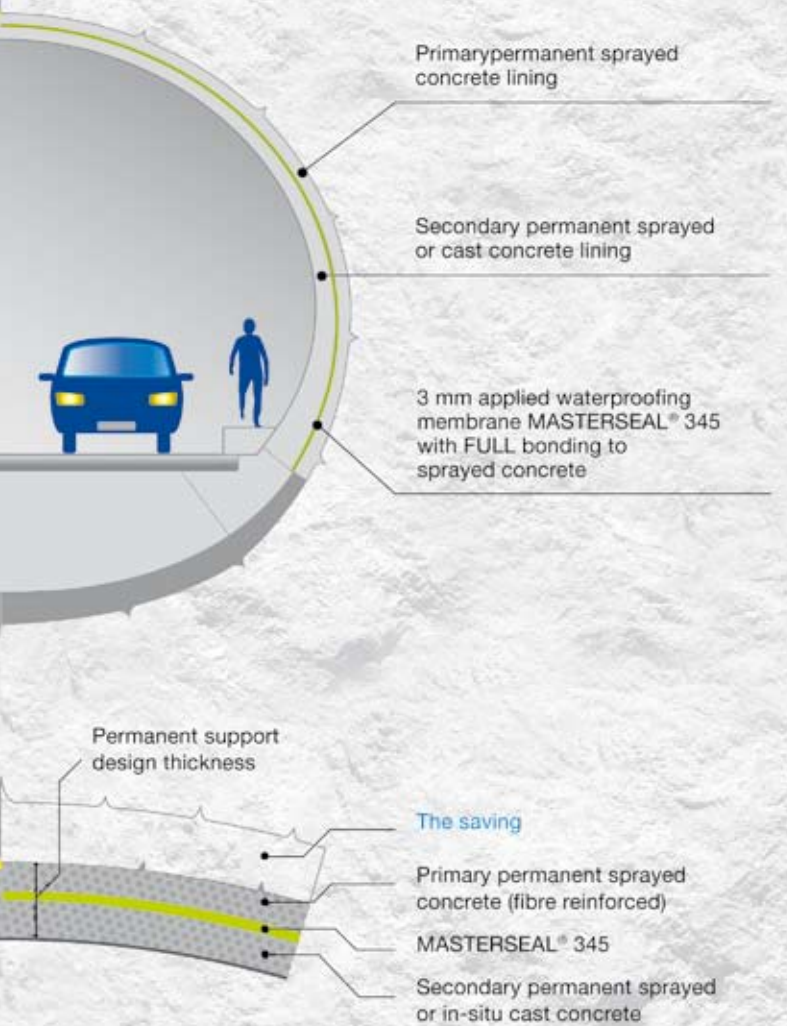
### Traditional technologies





## New technologies

- Wet-mix process
- Alkali-free accelerators
- Low w/c using superplasticiers
- Microsilica technology
- Fibre reinforcement
- Modern sprayed concrete equipment
- MASTERSEAL® 345 spray applied membrane



## Benefits of the single shell lining approach:

- Reduced excavation size
- Reduced overall lining thickness
- Less construction processes
- Reduced construction programme
- Less cost (typically between 15 and 20%) compared to double shell method

«Use our global experience!»

«Well proven concept»

«Single shell brings you cost and time savings»



## Available documentation on request:

- Reference list
- Project reports
- Design guidelines
- Method statements
- And more

**«together...  
...we do things better.»**



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