



Putzmeister



Training Solutions Putzmeister Underground



TRAINING SOLUTIONS PUTZMEISTER UNDERGROUND

WE PROVIDE THE TRAINING YOU NEED TO OPERATE OUR EQUIPMENT SAFELY AND CONFIDENTLY, AS WELL AS IN THE APPLICATION OF SHOTCRETE.

SHARING OUR EXPERIENCE AND EXPERTISE

For over 35 years, we've been designing, developing, and manufacturing concrete spraying equipment and related products and services for use in mines and tunnels worldwide.

Our extensive experience, close collaboration with our clients, and continuous investment in development have made us one of the leading innovators in this field.

But all of this would be of little value if we didn't share it with our clients. We believe that we improve more when we work together, which is why we share our expertise through our training courses.

SAFETY, QUALITY, AND OPTIMISATION

We stand by the belief that **“success comes to those who prepare”**. This is why our courses are tailored to meet the specific needs of each client. The focus is always on maximising the benefits of our technology, working as safely and

efficiently as possible. Investing in training not only increases on-site safety but also optimises processes, enhancing quality while reducing operational costs and downtime.

CERTIFICATION

Upon completing our courses, you will receive the Putzmeister Underground certification, confirming that you have successfully acquired our knowledge.

COMMISSIONING

We take great care in delivering our equipment. Every time a new equipment arrives on-site, one of our technicians or partners or dealers will come to explain its key features and operation to your operators.

With a strong focus on service and safety, this practical introduction is included in the purchase price and lasts two days. During this time, we cover the equipment's features, how to start it, basic safety operations, how to use the maintenance manuals, and essential daily and periodic maintenance tasks that must be performed. In short, we ensure you're familiar with the **fundamentals of operation, safety, and maintenance programmes to get the best performance from your new equipment.**

EXTENDED COMMISSIONING

Should you wish to extend this service, we offer customised packages based on the desired duration.

- **Purpose:**
Basic knowledge of the new Putzmeister equipment
- **Who is the commissioning aimed at:**
Employees who will be working with the equipment
- **Methodology:**
100% practical
- **Duration:**
2 days included, can be extended on request
- **Location:**
Customer jobsite



What we offer

SERVICE & MAINTENANCE TRAINING

Following the manufacturer's recommendations, whatever the product, is not just for the sake of it, it is based on our experience and is our way of ensuring that our equipment works and remains fully functional over time.

In this course, which is mainly aimed at service and maintenance personnel responsible for the upkeep of Putzmeister equipment, we communicate the skills and knowledge required to ensure the optimal functioning of equipment, as well as the optimal functioning of all security systems.

The course has three principal focus points:

1. Upkeep of parts: Of course, we talk about general equipment maintenance, but we also consider each component important. Following a brief description of the parts that make up the equipment, we detail how to carry out its proper maintenance in accordance with hours of service, as well as if the machine has been in storage over extended periods.

2. Troubleshooting: You will learn how to understand the alarm system in the event of equipment failure and the possible solutions to said problems.

3. Cleaning the equipment: Properly functioning equipment relies on regular cleaning. To prevent the premature aging of equipment, we will review existing cleaning techniques.

- **Purpose:**
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- **Who is the course aimed at:**
- Service and maintenance personnel

- **Methodology:**
- Combines theory and practice modules

- **Duration:**
- 2 days

- **Location:**
- Up to the customer

CONTENT

CONCRETE SPRAYING EQUIPMENT

GENERAL MAINTENANCE AND COMPONENTS MAINTENANCE:

- Concrete pump
- Spraying arm
- Hydraulic system
- Lubrication and maintenance intervals
- Air – water – additive system
- Chassis
- Diesel engine, catalyst and particle filter
- Cable reel
- Additive pump
- Gearbox
- Tyres
- Axles
- Brakes
- Fuel tank
- Battery
- Radiator

- Compressor
- High-pressure cleaner
- Fireproofing system
- Safety devices

TROUBLESHOOTING

- Electric system
- Hydraulic system
- Pump system
- Spraying arm
- Alarms
- Air system (compressor)
- Additive system (additive pump)
- Greasing system (greasing pump)
- Control remote

CLEANING

- Recommended tools
- Pump system: hopper, transport cylinder, "S" tube, concrete pipes.
- Cleaning process with air and water
- Additive system: additive pump /additive line



MIXKRET; LOW-PROFILE MIXERS

GENERAL MAINTENANCE AND COMPONENTS MAINTENANCE:

- Hydraulic system
- Lubrication and maintenance intervals
- Chassis
- Diesel engine, catalyst and particle filter
- Continuously variable engine transmission
- Tyres
- Axles
- Brakes
- Fuel tank
- Battery
- Radiator

- Mixin drum
- Driving cabin
- Water circuits
- Additive system
- Inclinometer
- Fireproofing system
- Safety devices

Troubleshooting

- Electric system
- Hydraulic system
- Engine
- Axles
- Heat and A/C

CLEANING

- Tips for cleaning the mixing drum
- General tips for cleaning



What we offer

EQUIPMENT OPERATION TRAINING

Our courses cover the mechanics and operation of Putzmeister's mechanized concrete spraying equipment and low-profile mixers for mining, offering an in-depth look that explores both theory and practice **to ensure the safest working environment, as well as the most efficient performance.**

In underground mining, safety comes first. Our courses especially highlight all the checks and inspections required for machine operation, safety instructions during its use as well as solutions for critical situations on site. The course also includes a basic module for problem-solving and preventive maintenance to avoid downtime and keep equipment in the best possible shape to extend its working life.

It covers, in a practical way, **all the procedures of the work cycle:** checks and inspections before start-up, the actual start-up, driving, machine set-up, applications, basic maintenance and towing of the equipment, working procedure, troubleshooting and breakdowns including jamming and towing, and finally basic maintenance.

In short, this is the course that every machine operator with a basic level of knowledge should take

- **Purpose:**
Ensure the most efficient performance of the equipment in the safest working environment
- **Who is the course aimed at:**
Operators of concrete spraying equipment or concrete mixers
- **Methodology:**
Combines theory and practice modules, although most of the weight lies on the practical part (75 %)
- **Duration:**
3 days
- **Location:**
Up to the customer

CONTENT

CONCRETE SPRAYING EQUIPMENT

- Technical characteristics of the equipment
- Use of the technical documentation
- Assembly of the transport lines
- Checks and inspections before start-up
- Equipment start-up
- Driving
- Safe machine set-up
- Remote control and spraying arm movements
- Display and electric panel operation

- Diesel and electric operating modes
- Operation of the main systems and components
 - Pumping system
 - Additive system
 - Air system
 - Water system
- Work process: concrete spraying
- Blockages and cleaning
- Towing of the equipment
- Maintenance protocol

- Safety instructions and systems
- Problem-solvings: breakdowns, etc



MIXKRET; LOW-PROFILE MIXERS

- Technical characteristics of the equipment
- Use of the technical documentation
- Checks and inspections before the start-up
- Equipment start-up
- Driving
- Safe machine set-up
- Display and control panel operation
- Operation of the main systems and components:
 - Additive system
 - Water system
- Work process: Loading, transport and unloading

- Cleaning
- Towing of the equipment
- Maintenance protocol
- Safety instructions and systems
- Trouble-shooting



What we offer



SHOTCRETE OPERATOR TRAINING

Shotcrete application is a key element in tunnel construction and underground mining, enabling progress to be made with the work front under safe conditions. Proper application ensures higher quality and durability, which is largely dependent on the operator's skills and technique.

A skilled shotcrete operator not only enjoys a safer working environment but also optimises the project's cost-efficiency and time management. Poor spraying techniques, on the other hand, lead to increased material wastage through rebound and may compromise both structural integrity and operator safety.

That's why operator training is vital. Operators need the right **experience, knowledge, and skills** to perform their tasks effectively.

Our shotcrete application training courses cover the **entire shotcrete cycle in detail**, from concrete technology to everything you need to know about concrete spraying equipment, quality standards and results, application techniques, troubleshooting, transport, finishing methods, industry standards, and testing.

Depending on the shotcrete operator's skill level, we offer two courses:

BASIC SHOTCRETE OPERATOR TRAINING

For novice operators looking to start their development in this technique. We'll cover the fundamentals in this discipline so that they can start working. However, we recommend further training and gaining hands-on experience.

ADVANCED SHOTCRETE OPERATOR TRAINING

For experienced professionals in the tunnelling and mining sectors who want to specialise and enhance their knowledge in robotic shotcrete application.

Both courses include a practical element, where participants will have the chance to apply their newly acquired skills by working on a real shotcrete project using a Putzmeister concrete spraying equipment.

* The materials used will be quoted based on requirements.

Additionally, these courses are led by our highly experienced specialists, some with over 35 years of hands-on experience applying shotcrete in tunnels and mines worldwide. This is a valuable opportunity for our participants to benefit from their knowledge.

- **Purpose:**
Specialise or improve concrete spraying techniques
- **Who is the course aimed at:**
Shotcrete operators (nozzlemen)
- **Methodology:**
Combines theory and practice modules, incluye práctica en un tajo real
- **Duration:**
5 days
- **Location:**
Up to the customer



CONTENT

THEORETICAL PART

1. CONCRETE TECHNOLOGY

- Design and components of the shotcrete mixture
- Bulk material
- Arids
- Additives
- Aggregates
- Accelerators
- Fibers
- Water

2. CONCRETE SPRAYING EQUIPMENT

- Spraying machines
- Spraying arm
- Nozzle and spraying head
- Concrete pump
- Additive dosage system
- Software
- Compressor
- Remote control (cable/wireless)
- Auxiliary systems

- Chassis
- Equipment set-up
- Checks to be made before spraying
- Blockages and solutions
- Preventive maintenance
- Safety
- Responsibilities
- Future of concrete spraying

3. DESIGN REQUIREMENTS

- Quality criterio and results

4. APPLICATION

- What to bear in mind before spraying
- Spraying start-up process
- Application techniques
- Spraying stop process
- Problem solving

5. FINISHING AND CURING THE SURFACE

- What is curing?
- Concrete curing methods
- Finish types
- Finish tools

6. REGULATION AND TESTING

- Fresh and set concrete testing
- Test boards
- Penetration elements
- Test reports

7. HEALTH, SAFETY AND ENVIRONMENT

- Safety equipment
- Safety labels
- Environmental protection

PRACTICAL PART

During the practical part of the course, the participants will have the opportunity to practice the acquired skills by spraying concrete in a tunnel and/or slope with one of Putzmeister's concrete spraying system.

Special attention will be given to the mix design, the correct spraying techniques, quality control of the finish as well as the start-up, shutdown and cleaning of the equipment.

Participants will spray around 6 - 8 m³ each during the course, with around 3 m³ required to be reserved for the final assessment on the last day.

Should training be requested to take place at the client's site, the latter will assume the preparation and supply of the required material, including the spraying machine, compressor, shotcrete, additives, etc.

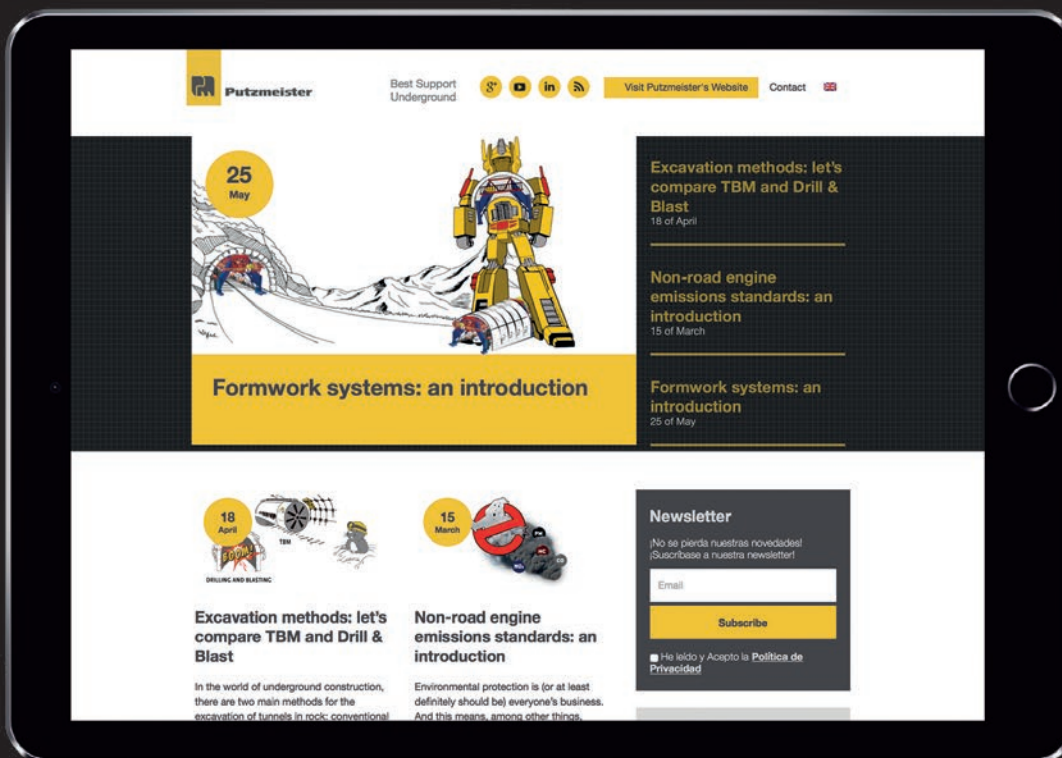
If training takes place at Putzmeister Ibérica facilities in Madrid, Spain, the company will provide the required materials and equipment.

Putzmeister Underground Technology

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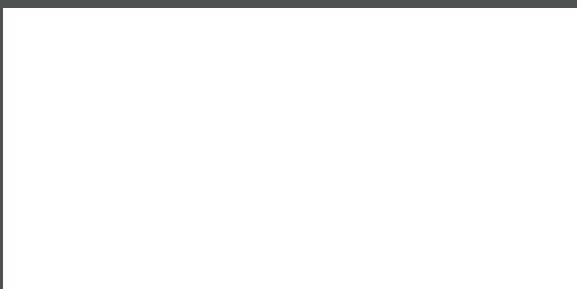
Shotcrete in underground mining and much more...



This is a merely informative, non-binding document. Maximum theoretical values listed. Specifications are subject to change without prior notice. Photos and drawings are for illustrative purposes only. For available options, please consult the factory.

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