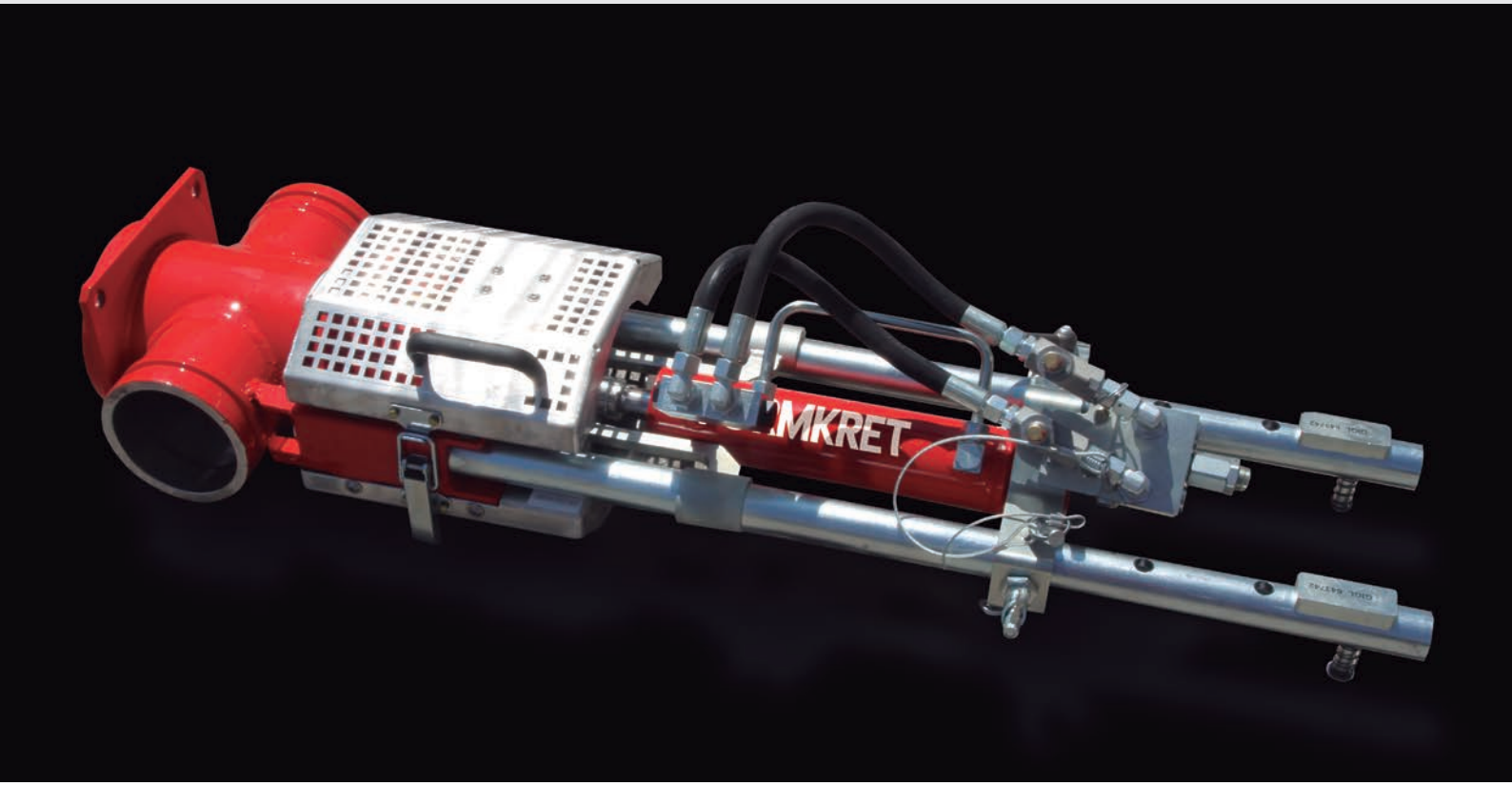
Putzmeister



Formkret

Integrated secondary concrete lining solutions for tunnels

Value-added Engineering

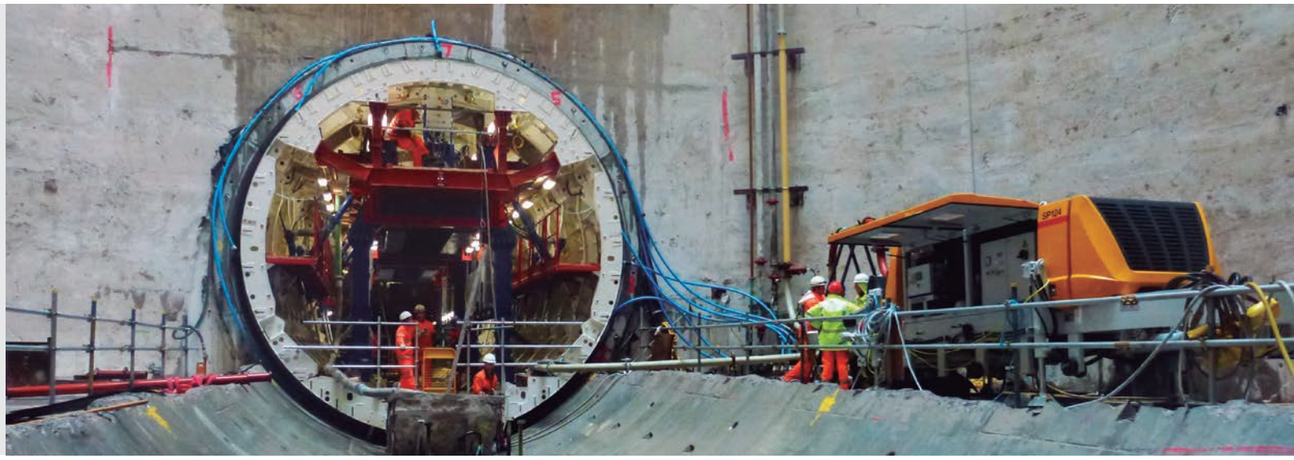
State-of-the-art Secondary Concrete Lining Solutions

Final tunnel lining with concrete formwork (cast-in-place concrete lining for large or complex tunnel sections) is currently a manual, labor-intensive process.

The state-of-the-art automated formwork filling system Putzmeister Formkret is designed to enhance safety, reduce workforce-related costs and project timelines, while allowing other work to be carried out onsite simultaneously.

Clients are given a one-stop solution for all their concrete-related needs in tunneling: after carrying out an in depth consultation regarding their site requirements, clients will be provided with a bespoke report outlining the technology solutions designed for their site, dealing with a sole provider of equipment and services.

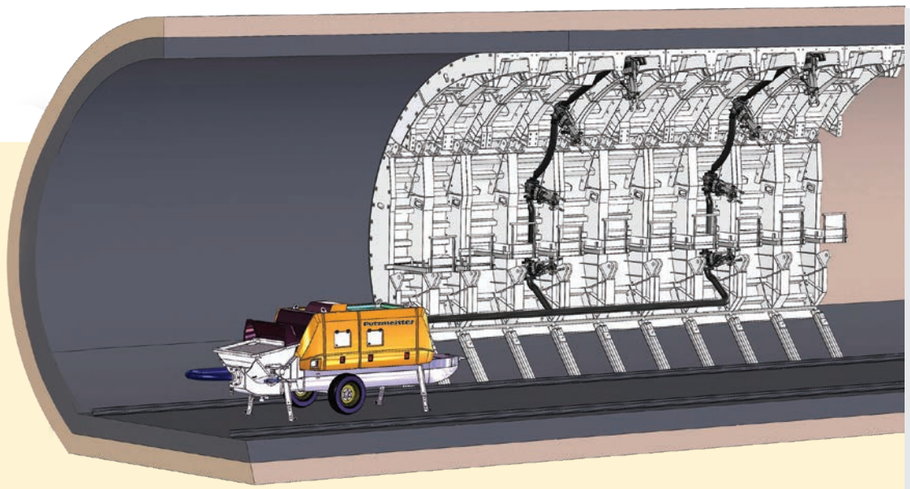
This integrated solution for concrete delivery in tunneling is an integral part of our premium services, and highlights our commitment to engineering excellence.



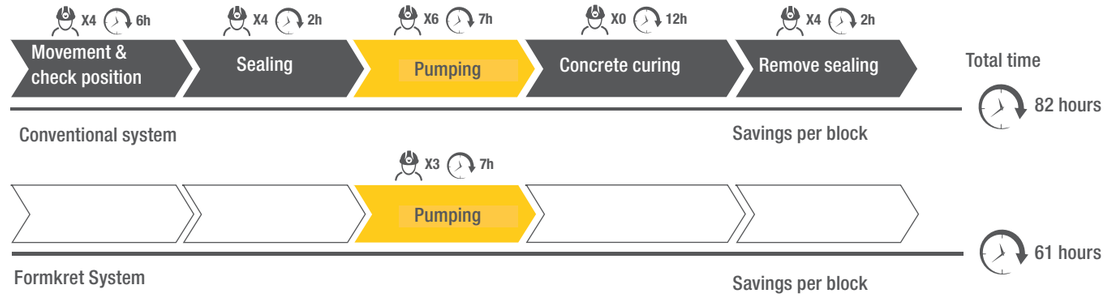
Putzmeister BSA 1408 E

All needed accessories

FORMKRET



Save 21 hours per block



Automated formwork filling: Safety, Speed, Savings, Simultaneity

The automated concrete pour means the process requires less manual work, enhancing worksite safety and speeding up the overall process.

Formwork installation time is shortened, as the structure can be easily placed and aligns itself to the tunnel's geometry.

The integrated concrete delivery time eliminates need for manual hose switching, reducing worksite hazards and making it safer. The structure is then connected to the pump, which can be operated remotely.

Maintenance costs are also kept in check because of the use of pipes, which can withstand higher delivery pressures and have a longer service life than hoses.

In addition, the reduced overall footprint of the formwork structure means other equipment can work onsite simultaneously, optimizing the construction process.

Safety & environment

· Automation means reduced workforce onsite

Speed

· Faster overall tunnel construction
· Quicker hydrostatic filling process

Savings (time + costs)

· Reduced labor-related needs

Simultaneity

· Compact structure allows simultaneous work

Complete package

2-way valves: Formkret

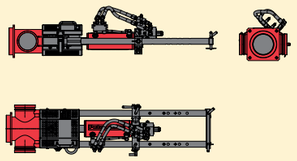
The Putzmeister Formkret system has been designed to optimize the support system in any type of tunnel construction that is completed using forms.

Formkret valves can be actuated remotely either hydraulically or electro-hydraulically, further increasing operator safety.

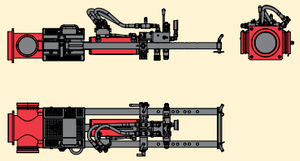
Their small dimensions have been carefully designed to adapt to all types of forms and can withstand the demanding conditions seen in this type of construction.

Data sheet

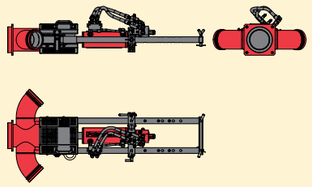
Straight hydraulically actuated valve



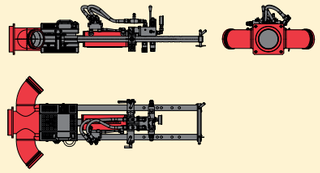
Straight electro-hydraulically actuated valve



Hydraulically actuated valve with 45º elbow



Electro-hydraulically actuated valve with 45º elbow



Dimensions (length / height / width)	
Straight Formkret hydraulically actuated valve	1450 / 361 / 362 mm
Straight Formkret electro-hydraulically actuated valve	1450 / 361 / 362 mm
Formkret hydraulically actuated valve with 45º elbow	1450 / 361 / 690 mm
Formkret electro-hydraulically actuated valve with 45º elbow	1450 / 361 / 690 mm
Maximum hydraulic pressure	200 bar
Maximum flow pressure	85 bar
Diameter of flow lines	125 mm
Maximum ambient temperature	-15 / 50 ºC

All needed accessories

The Formkret system is not only made up of bi-directional valves, but also includes a full line of accessories and add-ons to make sure you have a complete solution:

· Concrete pipes, elbows and couplings ***(*Photos 1, 2)***

Using pipe allows for much higher pressures and optimizes costs since it is more durable than hoses. Quality Putzmeister DN125 85 bar pipe should be used on this system.

We design your piping with the necessary elbows and couplings.

· Hydraulic diversion valve ***(*Photo 3)***

Optimizing available space on your project, we design a clean path that allows for other work to be performed simultaneously.

· Gate valves ***(*Photo 4)***

We optimize the use of Formkret valves, using only those that are strictly necessary, and we complete the design using knife gate valves, all inside the structure of your forms.

· Hoses ***(*Photo 5)***

Electro-hydraulically actuated valves are actuated remotely, increasing safety since the operator is located away from the danger zone.

· Remote control

Electro-hydraulically actuated valves are actuated remotely, increasing safety since the operator is located away from the danger zone.

· Cleaning kit ***(*Photo 6)***

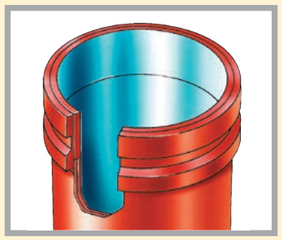
Once forms are filled, the entire system is easily cleaned by pushing sponge balls through the flow pipe using compressed air. Sponge balls, like any remaining material, are recovered without difficulty using a basket at the end of the flow pipe.

Putzmeister concrete pump

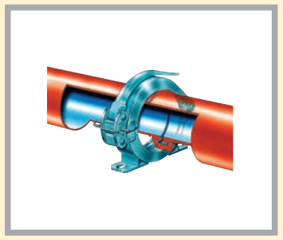
Putzmeister is famous for being the leading manufacturer of concrete pumps for more than 60 years. Our BSA Putzmeister stationary pumps are ideal for filling forms in tunnels while using the Formkret system. Once the formwork is fully set-up and secured in place, a Putzmeister BSA concrete pump is connected to the formwork: these pumps have an output capacity of up to 79 m³/h.

Output	79/53 m³/h*
Delivery pressure	71/106 bar*
Engine/motor power	110 kW
Hopper	RS 909
Capacity	approx. 600 l
Filling height	approx. 1.3 m
Remote control	Wireless / 10m cable

Values for hydraulic fluid being fed to piston-side.
All data maximum theoretica.



(1) Pipes and elbows
SK 125 - 5,5˝ 85 bar
Elbows 30º, 45º, 90º



(2) Couplings
SK-H lever coupling

(3) Hydraulic diversion valve
5/2 SK 125/5,5˝ 130bar

(4) Gate valve
GVM 2/2 ZX 125/5,0˝ 130bar

(5) Hoses
SK 125 - 5,5˝ 85bar

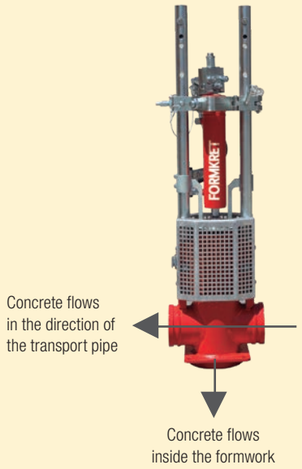
(6) Cleaning Kit: balls, sponge and balls retrievers

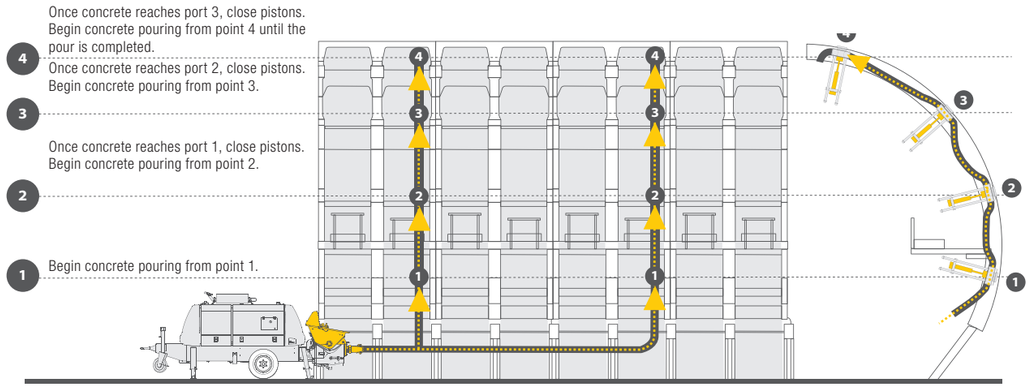
Concrete pour procedure: how it works

The Automated Formwork Filling System is regulated by a set of 2-way valves (Formkret) integrated in the formwork structure, and connected by a single delivery line that links the entire system in sequential rows.

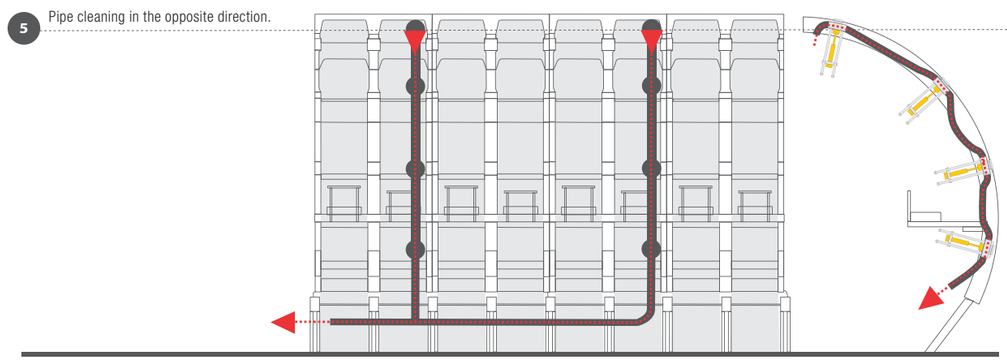
The concrete flow into the formwork is regulated by a diversion valve to ensure that the filling rate is synchronized on both sides. The diversion valve, regulated by the concrete pump, switches the concrete Flow automatically between both ‘halves’.

As the concrete reaches the optimal filling level in each row, the valves close, re-directing the concrete towards the delivery line, and allowing the formwork filling process to continue sequentially towards the next row. The operation of the 2-way valve is done automatically by radio remote-steered hydraulics.





Casting procedure



Cleaning phase

Full concreting range for tunnelling

Putzmeister Underground Technology

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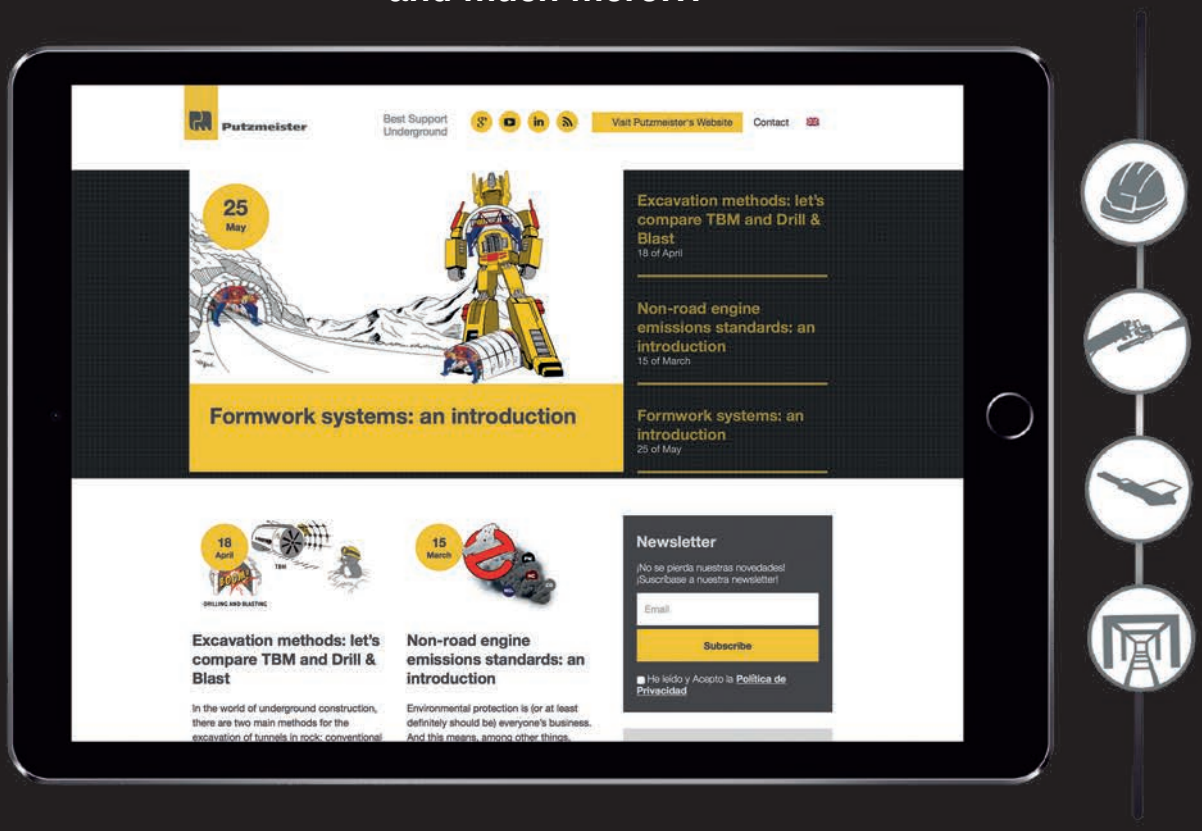

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