

Safety - Critical Fasteners For The Tunnelling Industry

Helping to connect the world



Brand Promises & Mission Statement:

Dependable.
Adaptable.
Sustainable.

The Cooper Turner Beck Group's mission is to lead the industry in delivering innovative, safety-critical fastening solutions that drive the globe towards a more resilient and more sustainable future.

Our dedication to quality, sustainability, and customer satisfaction underpins our end-to-end comprehensive service.

From development to manufacture and distribution, we work together to fasten a secure and sustainable future for generations tocome.

THE TUNNELLING SECTOR

Tunnelling is a key facet of infrastructure development. Whether constructed for transport or for water transfer, sewage management and storage purposes, Cooper Turner Beck products provide an integral part of the structure.

With more than 30 years of experience in the tunnelling business, Cooper Turner Beck is a key manufacturer and provider of an extensive range of segment accessories. Whether your need is a Bolt, Seal, Segment Packer or the Grouting System, we developed solutions dedicated to support this market.

We are experienced designers and manufacturers driven by the perpetual desire to improve our products and services.

Our manufacturing and distribution facilities in Europe, North America and Asia allow us to follow all the projects of our customers around the world.



CANADA Ashbridge's Project Coxwell Project 19th Line Project Toronto Project **EUROPE DENMARK** Copenhagen Metro **EIRE** Limerick Tunnel **EIRE** Dublin Port Terminal Tunnel **ITALY** Martignano Tunnel ITALY N2 Galleria Melide-Grancia

USA

Lower Olentangy Tunnel Shoreline Storage Tunnel Bergen Point Project Westerley Storage Tunnel Michigan DOT I-75 Tunnel Doan Valley Project First Tunnel Project Silver Lake Project Northgate Link N125 Project San Francisco Central Subway Blue Plains Tunnel Project **Euclid Creek Tunnel Projects** OARS Project Columbus Brooklyn to Staten Island Tunnel San Francisco Bay Tunnel Big Walnut Phase II U220 & U230 University Link Mercer Street Tunnel Portland Tunnel Project

SPAIN Col De Samporte

MEXICO

Guadalajara Metro

INDIA

AHMEDABAD Mega Project AGRA Metro AGCC-02 **BANGALORE** Metro RT04 **BANGALORE** Metro RT02-RT03 CHENNAI Metro UG01 & UG05 CHENNAI Metro TU-02 **DELHI** Metro DC-05 / 07 / 09 **DELHI** Meerut Project **KOLKATA** Metro Line **KANPUR** Metro **MUMBAI** Surya Water Project

PATNA Metro PC-03

Croydon Tunnel

Eva Tunnel

Heathrow Airport T5 Tunnel

Brighton Hove Sewer Tunnel

EGYPT Cairo Wastewater **EGYPT** El Salaam Project **ISRAEL** Express Railway Line to Jerusalem

MIDDLE EAST & AFRICA

Channel Tunnel Rail Link

Preston Storm Water Tunnel

Hinkley Point C Nuclear Project

Lower Lea Tunnel

FAR EAST

UNITED KINGDOM

HS2 C1 Project

Hendon Tunnel

Maida Vale Tunnel

Sheildhall Tunnel

SINGAPORE

CAG Project BHS Tunnel Thomson Line T216 JIPCT Project MRT NorthEast Line Senoko Gambas Cable Tunnel Kranji Tunnel **HONG KONG**

CAG ITBT Project APM Tunnel

XRL C825

Cross Harbour Strategic Relief Sewer MRT NorthEast Line

LAOS

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Connecting the world"

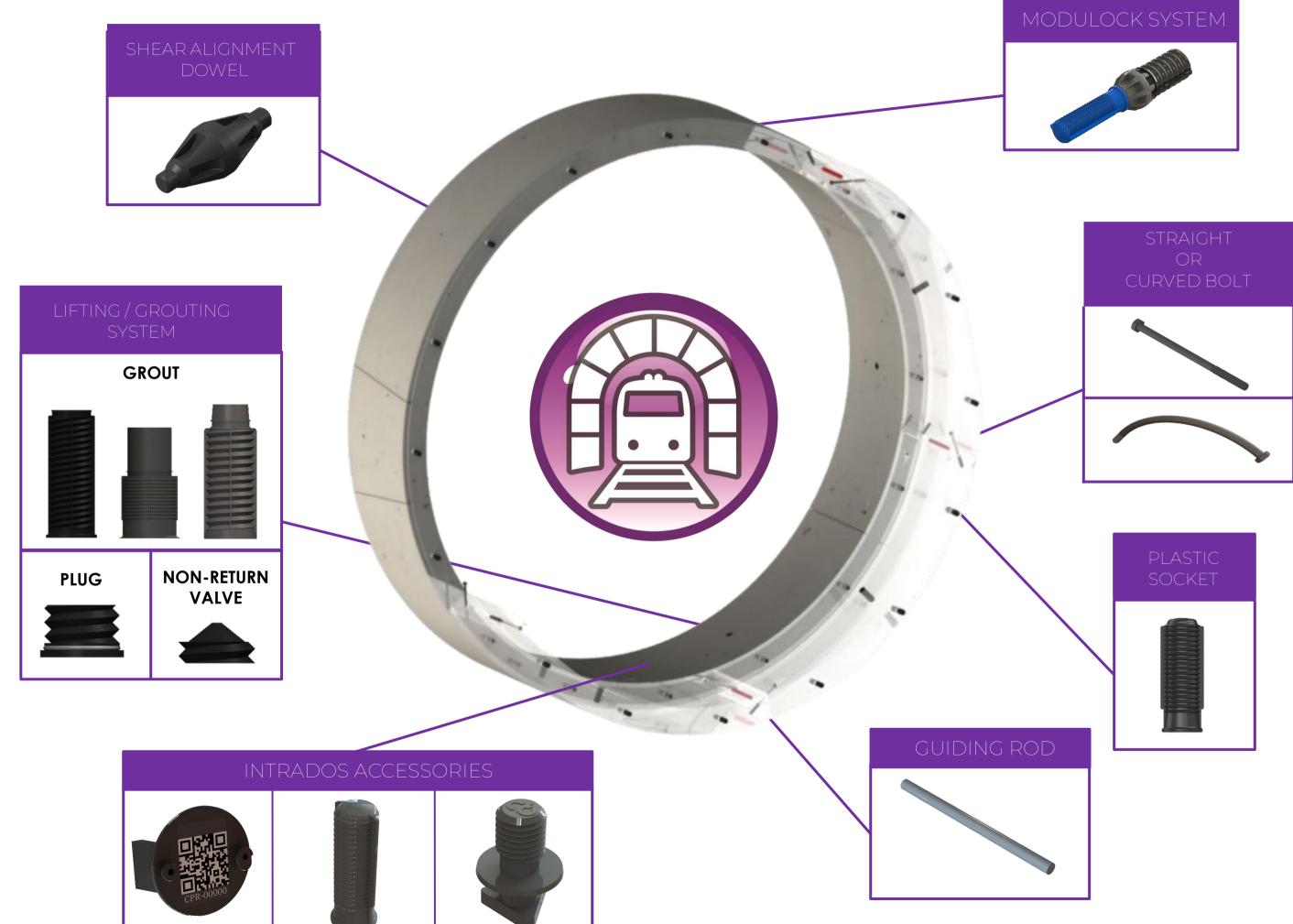
AUSTRALIA

BRISBANE

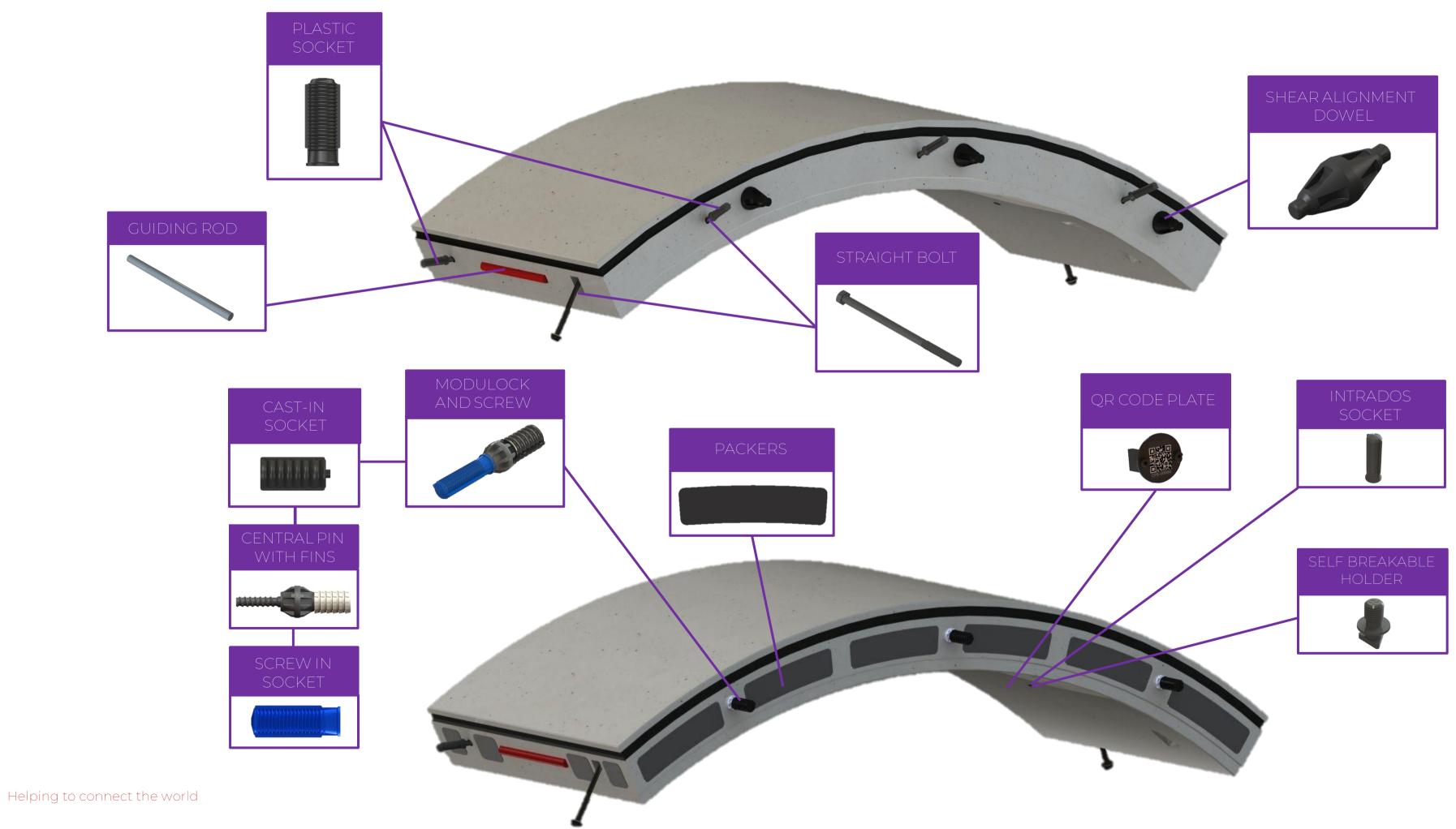
Airport Tunnel Link Western Harbour Tunnel Alkimos Desalination Plant



TUNNEL SEGMENT LINING ACCESSORIES

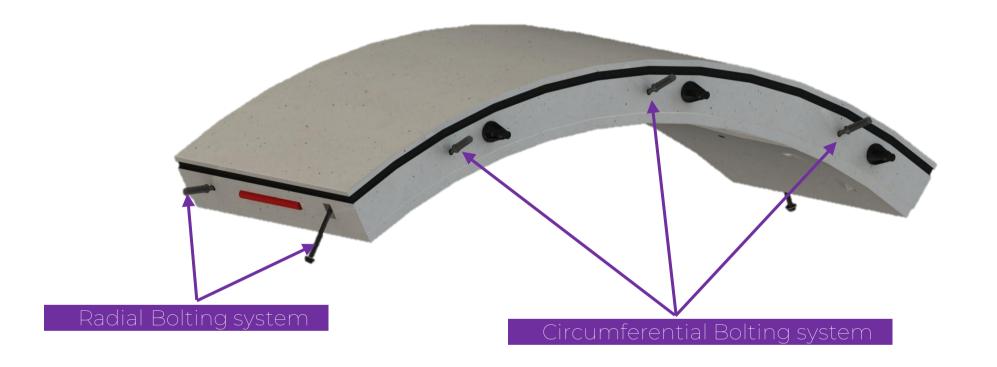






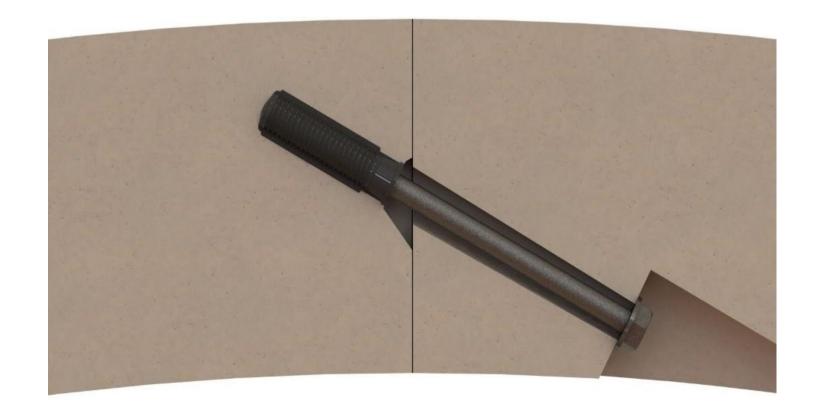


This system can be used in radial and circumferential side.



Hex Head Straight Bolting System and Plastic Socket

- Bolts and the accompanying 'cast-in' sockets are used as connectors to fix tunnel segments—together and can be used in both radial and circumferential sides of the segment. Bolt is screwed—into the socket in order to ensure the correct geometry of the ring but also to compress correctly the gasket.
- Additional accessories like washers and grommets can be installed in order to ensure the accuracy of the connection. Cooper Turner Beck manufacture the complete range of bolts in various lengths, diameters and material properties.





Cooper & Turner - Standard Straight Bolts					
Item	Drawing	Material	Finish		
From M12 to M27	Length to define Thread length to define	Steel Grade (4.6/8.8/ A325/) Stainless Steel (A2/SS304/ A4/SS316)	Raw Steel / Hot Dip Galvanized / Sherardized		

	Cooper & Turner - Standard Plastic S	ockets	
Item	Drawing	Material	Pull-Out Resistance
From M12 to M27	Length to define	ABS PA6+30%GF	FROM 50 to More than 400 kN





Curved bolts are used to permanently fix tunnel segments together through a radius hole. They can be applied to both radial and circumferential joints.

Additional accessories like washers and nuts are also offered by Cooper Turner Beck.

We adapt the lengths, the diameters and the materials to the needs of our customers.

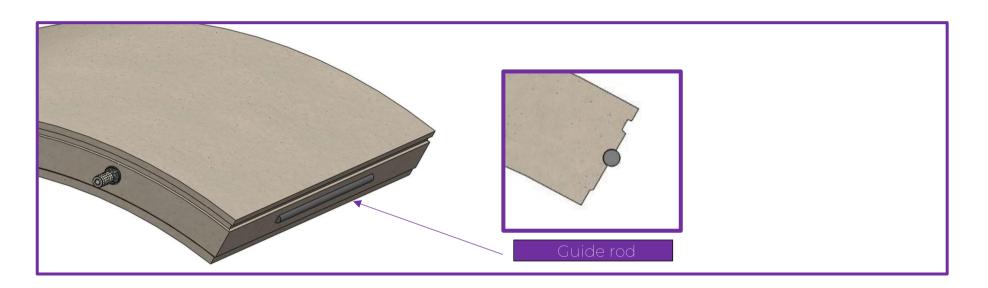


	Cooper & Turner – Standard Curved Bolts					
Item	Drawing	Material	Finish			
From M16 to M27	Thread length Th	Steel Grade (4.6/8.8/ A325/) Stainless Steel (A2/SS304/A4/ SS316)	Raw Steel / Hot Dip Galvanized / Sherardized			





Guide rods are extruded cylindrical plastic part that come in a variety of diameters and lengths to suit different ring sizes. They can be glued or clipped into cast semi-circular grooves in the radial side of the concrete segment.



Cooper & Turner – Guide Rods						
Item	Drawing	Material				
Glued Guide Rod		Recycled PVC Recycled PE				
Clip Guide Rod	© to define Length to define Spacing to define	Recycled PVC Recycled PE				
Anchored Guide Rod	Ø to define Length to define	Recycled PVC Recycled PE				

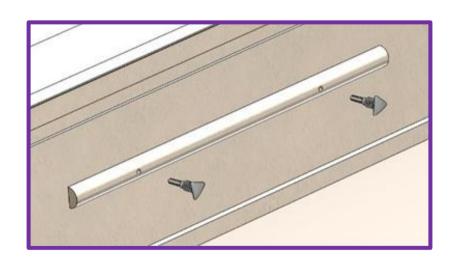




The guide rods are typically glued into their concrete recesses.

However, the Cooper Turner Beck clip guide rods provide a more efficient alternative by securing the rods with plastic studs.

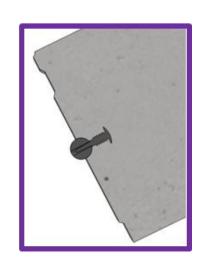
These studs can be installed in the segment mould while the other accessories are installed, saving time.





Then after the segment casting, the guide rods can be easily clipped on the studs protruding from the segment



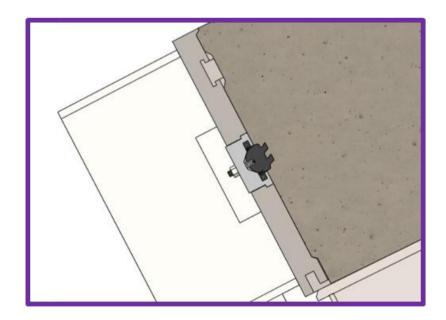


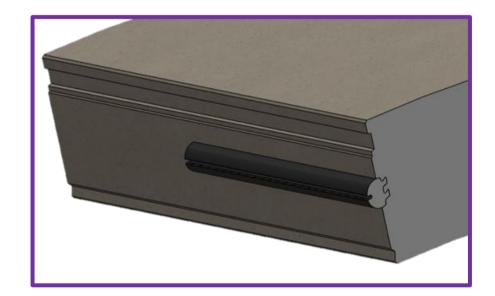
Anchored Guide Rods

Through discussion with pre-casters, Cooper Turner Beck's experienced technical department has developed a new type of guide rod that reduces installation time.

The anchored guide rod is clipped directly into the mould before concrete casting. Once the concrete is dry, thanks to its shape, the guide rod is perfectly positioned and anchored in the segment.

The best solution to save time and money.





Helping to connect the world



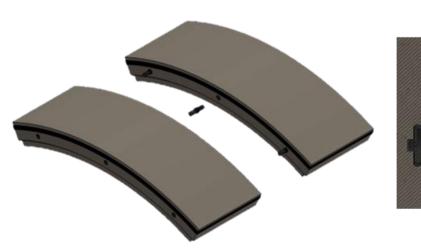
MODULOCK and Screw System

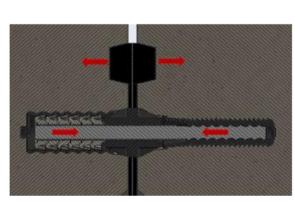
MODULOCK is the circumferential connector developed by Cooper Turner Beck.

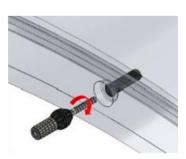
Thanks to our unique clip-on fins, we ensure an easy and firm connection between segments, and perfect compression of the gasket.

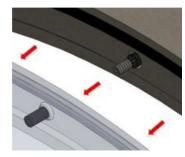
The shape of our product and its shear capacity facilitate the centering of the segments on the circumferential joints. Thanks to its experience, Cooper Turner Beck has developed a full range of MODULOCK in order to be in line with the different needs of our customers.

Our product is, for sure, the most modular connector on the market.









	MODULOCK FAMILY	
MODULOCK and Screw	MODULOCK High Shear Capacity	MODULOCK Removable

Screw side of the MODULOCK makes its installation easier without questioning the pull-out resistance of the system

- Pull-out resistance capacity: from 50 to 135 kN
- Shear resistance capacity: 160 kN
- Optimized displacement

The central part of the pin is reinforced in order to increase the shear resistance of the system

- No need to use bicones
- No need to cast specific segments
- Can be used with standard MODULOCK or MODULOCK and Screw sockets
- Shear resistance from 250 to more than 1000 kN

Specific soft fins that allow to **easily** remove the central connector

- Perfect for temporary rings in the shafts or in the stations
- No need to cast specific segments
- Can be used with MODULOCK and Screw sockets
- Pull out resistance from 3 to 5 kN (easy to remove with a crane)



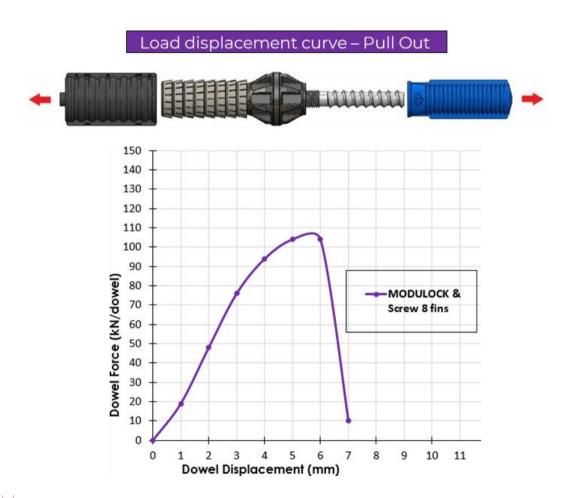
MODULOCK and Screw

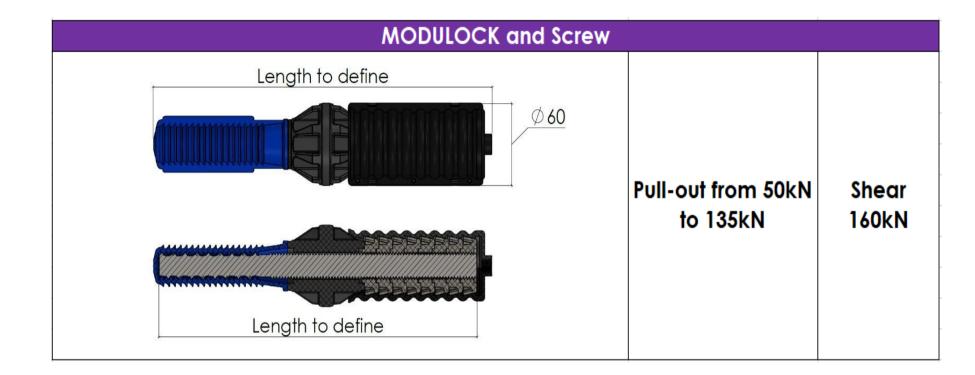
Ensure the alignment of the segments

Easy and quick installation – Thanks to the screw side, the operator can easily install the connector just before segment erection, eliminating any risk of misalignment.

Guarantee perfect gasket compression

For example, with the 8-fins solution: 80 kN with only 4 mm of displacement, ensuring that the gaskets remain fully compressed – currently the smallest displacement on the market.



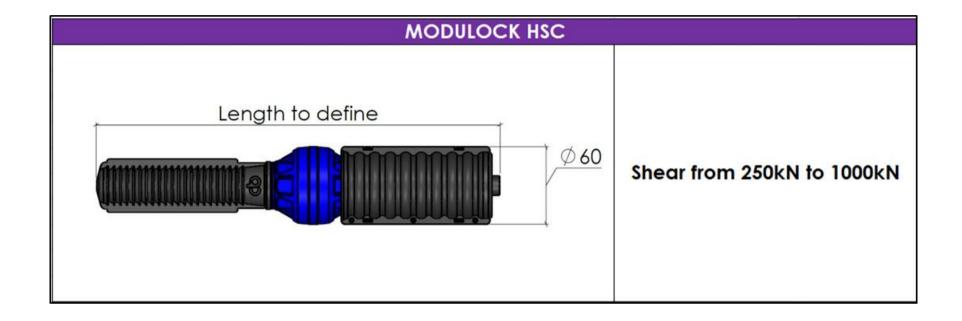






CIRCUMFERENTIAL CONNECTORS

MODULOCK High Shear Capacity (HSC)



In recent tunnel projects, circumferential joints need reinforcement at cross passages or shafts. Bicones are typically used alongside connectors to enhance ring resistance due to their high shear capacity.



However, bicones are costly and require special segments with dedicated recesses, demanding expensive custom molds for limited production. To address this, Cooper Turner Beck developed the HSC MODULOCK system, leveraging modularity for a more cost-effective solution.

This connector keeps the gasket perfectly compressed and features a central pin that enhances shear resistance without altering its shape. Its shear resistance increases from 250kN to over 1000kN.



Since it uses the same sockets as the standard MODULOCK system, no special molds or dedicated segments are needed. When high resistance is required, the HSC MODULOCK central pin can be installed on the segment and placed in the tunnel using the same procedure.

Its blue central part ensures easy identification, preventing installation errors.



MODULOCK and screw

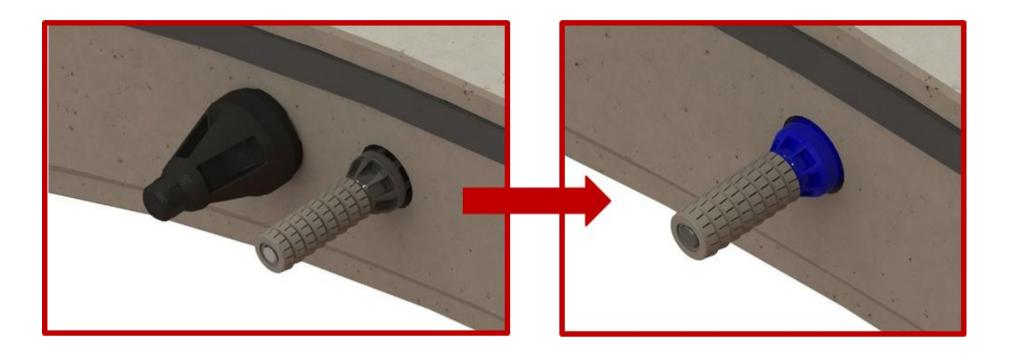


HSC MODULOCK System





HSC Advantages



- MODULOCK and screw HSC can be manufactured for all the circumferential connectors from the MODULOCK family. Whatever the quantity of fins required; we adapt our product to manufacture the equivalent HSC.
- No need to modify the design of the ring, even for the cross passages.
- No need to purchase dedicated segment's molds.
- Only need to purchase the exact quantity of central pins HSC required, only where important shear resistance is required; for the other areas, the standard MODULOCK and screw is sufficient.

The High Shear Capacity MODULOCK will save you time and money.



	Shear Resistance							
	MODULOCK FAMILY				Maria 1	NAME OF THE OWNER,		
			100kN	160kN	250kN	850kN	1000kN	
Resistance		Removable with cranes	MODULOCK Removable Central core PP	MODULOCK Removable Standard Central core PA6	1	1	1	
		65 kN Ultimate 50 kN @ 2,5mm	MODULOCK 5Fins Central core PP	MODULOCK 5Fins Standard Central core PA6	MODULOCK 5Fins Central core HSC 250	MODULOCK 5Fins Central core HSC MAX	MODULOCK 5Fins Central core HSC Steel	
Pull-Out		75 kN Ultimate 60 kN @ 3mm	MODULOCK 6Fins Central core PP	MODULOCK 6Fins Standard Central core PA6	MODULOCK 6Fins Central core HSC 250	MODULOCK 6Fins Central core HSC MAX	MODULOCK 6Fins Central core HSC Steel	
		105 kN Ultimate 80 kN @ 4mm	MODULOCK 8Fins Central core PP	MODULOCK 8Fins Standard Central core PA6	MODULOCK 8Fins Central core HSC 250	MODULOCK 8Fins Central core HSC MAX	MODULOCK 8Fins Central core HSC Steel	
		135 kN Ultimate 110 kN @ 5mm	MODULOCK 9Fins+ Central core PP	MODULOCK 9Fins+ Standard Central core PA6	MODULOCK 9Fins+ Central core HSC 250	MODULOCK 9Fins+ Central core HSC MAX	MODULOCK 9Fins+ Central core HSC Steel	

In addition to our family of products, C&T can develop a special MODULOCK to meet project requirements perfectly.

All our products also exist with both symmetrical clipped sides: the Standard MODULOCK









Alignment dowels are used in conjunction with a straight bolt or dowel connection system to assist alignment during the erection phase on the circumferential joint. They are placed into corresponding cast voids in the segments to guide the installation of the next segment and to increase the shear capacity at the openings.

They can be manufactured with or without steel bar reinforcement, depending on the shear resistance required.



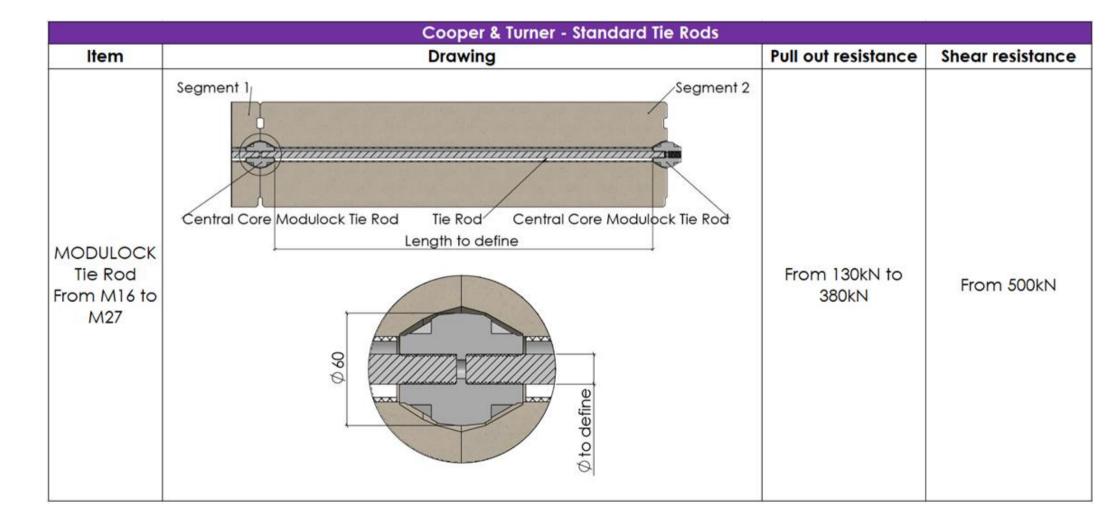
Cooper & Turner - Standard Alignment Dowels					
Item	Drawing	Material	Shear resistance		
Ø80x145	080	PP With Steel Rod	100 kN To 500 kN (Depending on design)		
Ø100x250	250	PP With Steel Rod	100 kN To 500 kN (Depending on design)		



Thanks to the modularity of our MODULOCK system, Cooper Turner Beck has adapted the central part of our connector to integrate a threaded insert, allowing it to be connected with threaded rods.

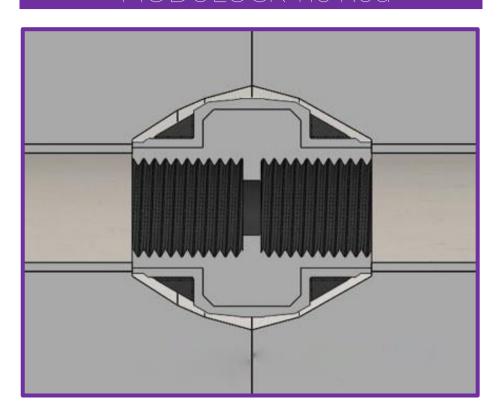
This special connector would have a shear resistance similar to the HSC-MAX (850 kN), as the central steel insert would have a similar outer diameter, and the pull-out resistance would be ensured by the threaded rods.

The advantage of this system is that it would require only few modifications to the molds. The concept is to use the MODULOCK socket holders to secure the PVC tube instead of the sockets.

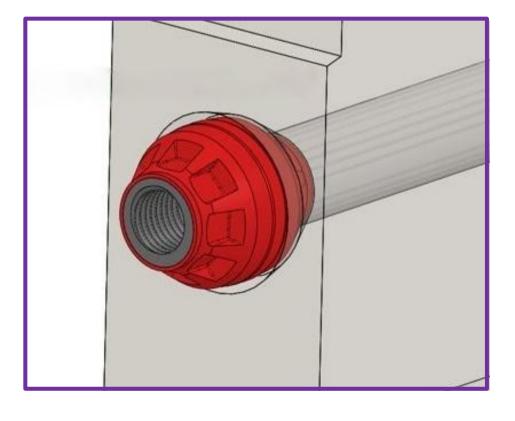


Helping to connect the world

MODULOCK Tie Roc



MODULOCK Tie Rod





Threaded Grout Lifting Sockets

Grout sockets are specially designed to allow secondary grouting work after installation of the segment.





Grouting injection

All our sockets can be also used as lifting sockets for the handling and installation of the concrete segments, thanks to a dedicated lifting pin installed on the TBM's erector.

Segment Lifting





A variety of designs can be supplied to suit any requirements.

Dedicated non-return valves and sealing plugs, with EPDM or hydrophilic O-ring, can be supplied.

Cooper Turner Beck can also manufacture a large range of steel grout sockets when it is required.

Hydrophilic band

Grout Socket

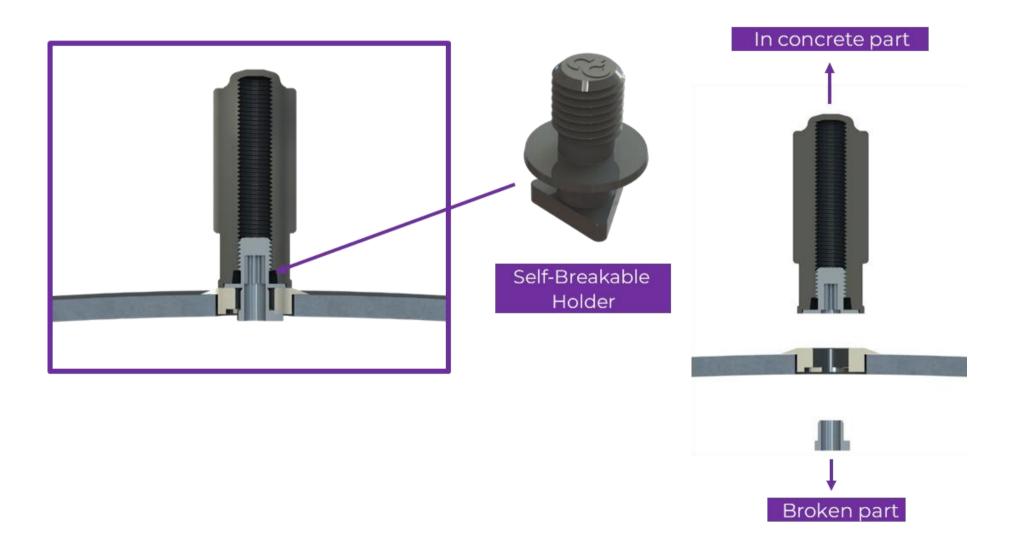
Grout Plug

Non-Return Valve



SELF-BREAKABLE HOLDER

Cooper Turner Beck also offers a self-breakable holder designed for the installation of intrados sockets at any location into the mould. Its innovative shape ensures that it breaks during demoulding, allowing the lower part to detach while the upper part remains in place, acting as a protective cap to protect the socket from water, dust or freezing.

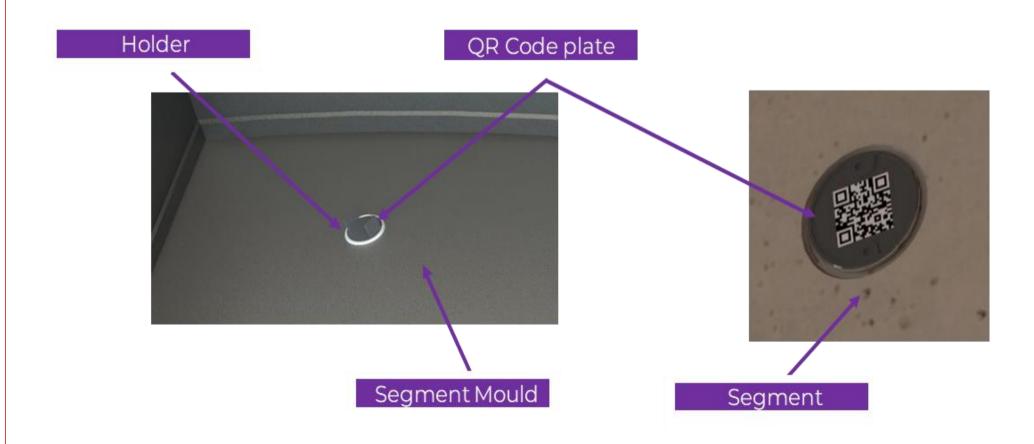


QR Code Plates

The Cooper Turner Beck QR Code Plates are used for the traceability of segments. It allows to have access to the reference of the segment, of ring, data of production, storage and many others...



The QR Code Plates are easy to install in the mould thanks to our unique design. After demoulding of the segment, the plate is visible on the intrados of the segment.



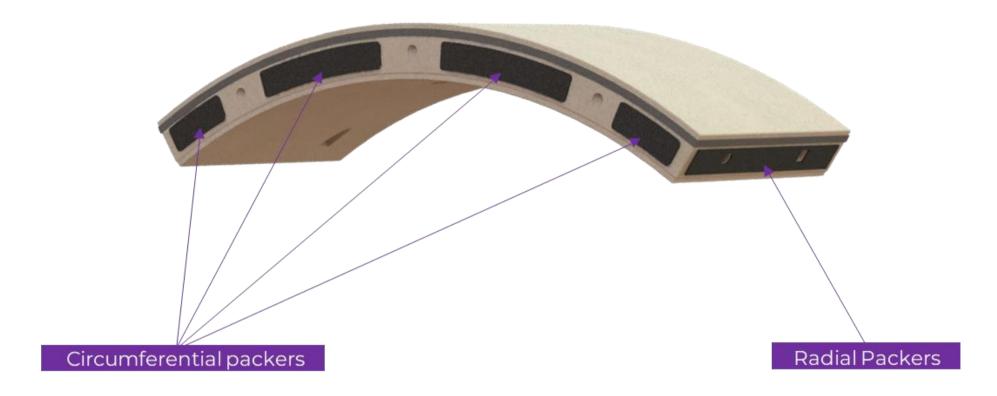


Packers for segmental linings are usually installed on the circumferential joints in order to transfer TBM's hydraulic loads between adjacent rings.

They can be manufactured in different raw materials and can be made self-adhesive.

The size and the shape of the packers are adjusted on demand.





Cooper & Turner – Packers					
Item	Drawing	Material			
Plastic Packers	Thick to define Length to define	LDPE Self- Adhesive PP Self- Adhesive			
Plywood Packers	Thick to define Length to define	Plywood			



All the Cooper Turner Beck's products have been designed and developed by experienced engineers specializing in the tunnelling market.

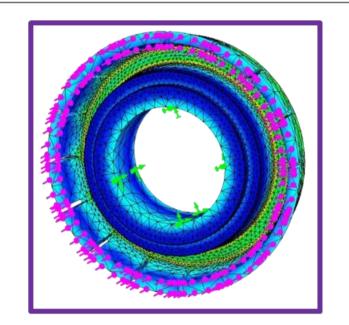
Our designers work on the constant improvement of our products, as well as on the design and the production of new testing processes and tools.

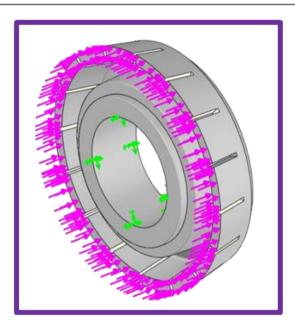
Our computer simulations are always confirmed by empiric tests made in laboratory.

Thanks to our quality department, all our products are subject to quality control during the design phase and throughout all our projects.

Cooper & Turner – Tunnelling Division

Design and Simulation





In-house and On-site Testing







END-TO-END CAPABILITIES

Consultancy

Our experts collaborate with clients to define project requirements, ensuring precision in design, material selection, and regulatory compliance.

Prototyping

We bring initial designs to life through rapid prototyping, allowing clients to assess performance and confirm specifications before full production.

Testing

Our ISO-certified testing ensures every product meets the highest safety and durability standards through comprehensive stress and environmental trials.

Manufacturing

Using advanced techniques like CNC machining and automation, we deliver complex, high-quality fasteners tailored to each client's needs.

Storage

Our strategically located warehouses support just-in-time delivery, with optimal storage conditions that maintain product integrity.

Distribution

With 21 global facilities, our distribution network ensures timely, cost-effective delivery to keep client projects on schedule.

