

SEGMENT ACCESSORIES



THE COMPANY

With an expertise focussed within the tunnelling industry, Technical Tunnelling Components (TTC) is a company with an enviable heritage.

2009 saw the amalgamation of two very respected companies - Bosworth Plastics and Tunnelling Accessories as they came together to form TTC.

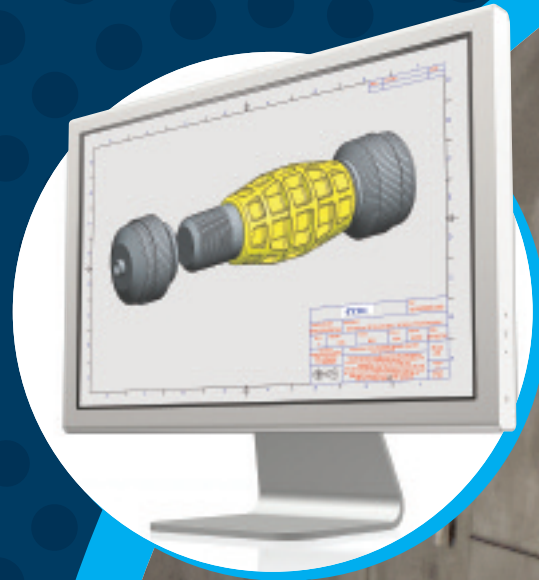
This dynamic partnership brought an unrivalled know-how from the precast industry, first hand tunnelling practices and plastics manufacture and design.

Add in computer simulation, sophisticated 3D modelling to produce actual prototypes and an in-house design capability and TTC became a 'one stop shop' for the supply of all segment accessories.

TTC has the flexibility to manufacture both standard and bespoke parts, working closely with clients to develop unique solutions for challenging tunnelling projects.

With a range of specially developed products, including the patented Dowellock system, TTC really can offer an expertise unrivalled in the marketplace.

TTC products have been used on many respected design projects around the world and to maintain this market penetration, the company continues to research and develop new products to offer continued and innovative solutions to the precast segmental tunnel market.





DOWELOCK



Dowelock is an award winning tunnel segment connection and alignment system. The Dowelock system is a method of connecting two concrete segmental tunnel rings together in the circumferential joint. It is designed to be used with compressible Elastomeric or Hydrophilic gaskets.

The system has three major functions:

CONNECTION

The Dowelock pin is inserted into two housing and collet assemblies which are cast into the adjacent tunnel segments to be joined together.

- This patented method of locking the devices together allows the pins to be inserted into the collets with minimal insertion forces.
- Prevents damage to the very part of the interlocking system that is relied upon to resist the loads applied by the gaskets.
- Dowelock also has the lowest extension figures for a system used in this application, helping to maintain the integrity of the primary sealing system.

ALIGNMENT

The tapered centre of the Dowelock pin helps to align the segments as they are pushed together, this helps to prevent build problems and gasket misalignment.

SHEAR

The standard Dowelock pin has a steel core which gives good resistance to external shear forces. The pin is adaptable and should greater shear forces be expected, the central steel core can be increased in size and grade to resist greater shear forces. The pin can also be used without its housings and collets as a shear pin without any connection properties.

If the situation arises where segments may need removing, TTC can manufacture the pin without the steel core which makes it easier to cut through but still retains connection, alignment and its shear capabilities during the build.

For more information on the revolutionary Dowelock system, email: info@ttcltd.org

BOLTING SYSTEMS

CONNECTION BOLTS

Connection bolts come in varying shapes and sizes and can be used to permanently connect tunnel segments together on both the radial and circumferential joints.

STRAIGHT BOLTS AND SOCKETS

TTC manufacture a range of both metric threaded socket bolts and sockets as well as a range of fast-thread spear bolts and sockets:

- These bolts can be supplied in a variety of diameters and lengths to suit each individual contract's requirements.
- They can be manufactured in virtually any grade but most commonly, mild steel (ASTM A307) or high tensile grade 8.8 (ASTM A325). TTC also manufacture bolts to specific contract requirements.
- All TTC's bolts can be supplied in a variety of coatings but are most commonly self-colour, zinc-plated, galvanised and sherardized.

The cast in plastic bolt sockets are manufactured to fit the bolts and are produced in a variety of lengths for each diameter. These too are manufactured in a range of materials to be able to offer the loading required by each individual contract.

CURVED BOLTS

Curved bolts and nuts are also used in the connection of segments in both the radial and circumferential joints.

- They can be manufactured in a range of sizes, lengths and radii to suit each individual contract.
- In addition, they can be made in any grade of material and coated to the individual contractor's specification.

All of the above bolts can be supplied with both steel and plastic washers, plastic, rubber and hydrophilic grommets where appropriate.

For more information on Bolting Systems, email: info@ttcltd.org



GROUT/LIFTING SOCKETS & ACCESSORIES

Grout/Lifting sockets can be used for a variety of precast applications. Designed to be bi-functional, these sockets can be used in conjunction with the TBM's segment erection system to lift segments into place in the ring, or for primary or secondary grouting through the segments.

They come in varying sizes and lengths to suite individual contract requirements. From the 80mm long socket for casting at the bottom of the shear cone for vacuum erectors to the extendable sockets that with the addition of a plastic tube can be extended to any desired length.

- They are manufactured in traditional triple start threads as well as single start threads, and can be manufactured with closed or open ends.

This range of sockets comes with a selection of accessories:

- **Grout Plugs** to close off the inside of the sockets, normally used with a sealing ring and which can resist pressures up to 20 bar.
- **Non Return Valves** for use during grouting to prevent the flow of grout back through the socket before the plug is inserted.
- **Hydrophilic Seals** can be applied to the outside of the socket to prevent water passing between the socket and the concrete segment.
- **End Caps** can be fitted to the open sockets or extension tubes to prevent ingress during casting. They can also be used to prevent any debris getting into the socket during storage.

For more information on Grouting and Lifting Sockets, email: info@ttcltd.org



SEGMENT PACKERS

Segment packers are placed between the concrete segments to help distribute the load evenly. They can also help prevent the cracking or 'spalling' of the concrete segments.

TTC manufacture segment packers from a wide range of materials including bituminous felt, polyethylene, hardboard and plywood. They can be produced in a variety of thickness to suit the individual application.

Segment packers come in a variety of shapes – square, rectangular, and curved, with or without holes to allow other accessories to pass through them. Certain segment packers can be supplied with a pre-coated self-adhesive backing.

For more information on Segment Packers, email: info@ttcltd.org



COMPLEMENTARY PRODUCTS

ALIGNMENT DOWELS

Plastic injected alignment dowels are used in conjunction with a straight bolt connection system to assist alignment in construction on the circumferential joint. They are placed into corresponding cast voids in the segments with the bolts passing through the centre of the dowel. They can be manufactured from a range of materials. This helps to maintain the integrity of the primary sealing system.

GUIDE RODS

Guide rods are extruded pieces of solid plastic that come in a variety of diameters and lengths to suit different ring sizes. They are glued into cast semi-circular grooves in the radial face of the concrete segment. Once erected, the rod seats in a similar cast groove in the corresponding segment to eradicate any misalignment in the connection.

HOLE FORMERS

Hole formers are small plastic sockets that are fixed into the moulds during the casting of the segments. When de-moulded these leave small holes in the segments for subsequent fixing of bracketing or other

temporary or permanent items either during or post construction. These negate the need for drilling multiple holes into the segments after erection.

SEGMENT SPACERS

Segment spacers are an inexpensive alternative to wooden blocks and are positioned between the segments while they are stacked in the casting yard or during delivery to the back of the TBM. They are hard wearing and re-useable and can mean significant cost savings over the course of a contract.

For more information on Complementary Products, email: info@ttcltd.org

In addition to all of the itemised products, TTC also manufacture and supply many other related items both standard and bespoke. These include; washers (in steel and plastic), grummets (in plastic and rubber) and varying ring seals (in nitrile and hydrophilic rubber). In-house manufacturing, adaptable tooling and design capability give TTC the flexibility to develop specialist, 'one off' products for clients from concept through the prototype stage to the finished product.



Technical Tunnelling Components Limited

Unit K | Radius Court | Tungsten Park | Coventry Road | Hinckley | Leicestershire LE10 3BE

Telephone: +44 (0)1455 234 401 | Fax: +44 (0) 1455 250 578 | Email: info@ttcltd.org

www.ttcltd.org

