TRENCHLESS ASIA 2026
THAILAND

CHANNELINE: BEYOND THE ORDINARY

MARC CIOCHETTO
CHANNELINE INTERNATIONAL

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Introduction to Channeline

Marc Ciochetto

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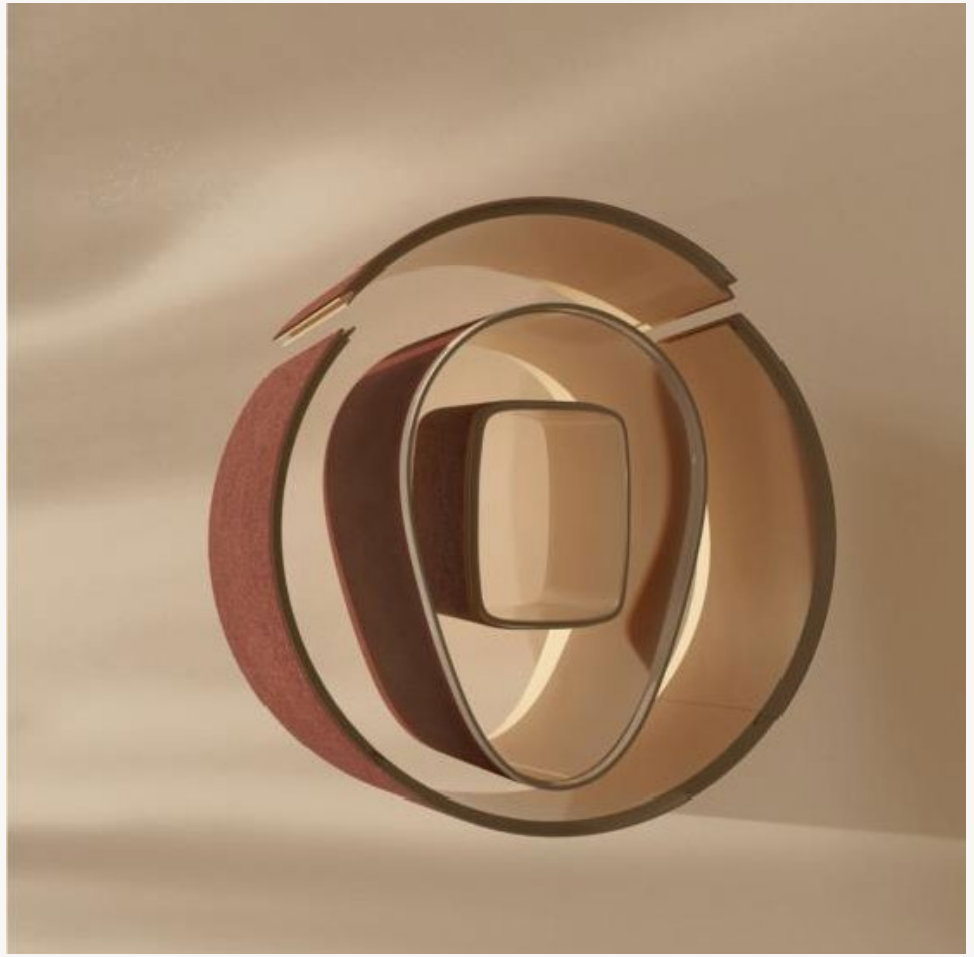
01

About Channeline

About Channeline

- Developed in 1984 in the UK
- First to specialize in non-circular profiles
- Custom built, bespoke structural GRP lining system
- Liners have been installed in over 38 countries worldwide



A grouted-in-place panel lining system

- Channeline is a Glass Reinforced Plastic (GRP) or Fiber Reinforced Polymer (FRP) grouted-in-place panel lining system
- Any shape, size or profile
- Can be utilized to structurally rehabilitate any host pipe material

GRP sandwich composite I-beam construction

- Inner corrosion barrier consists of 1.5mm (0.6") of isophthalic, vinyl ester or epoxy resin — can also be designed with superior abrasion-resistant material
- Consolidated, bi-directional fibreglass mat and resin
- Center core consists of silica sand and resin
- Second layer of fibreglass mat and resin
- The result is a flexible but structural liner that will resist live loads, dead loads and hydrostatic pressure

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Why choose Channeline?

Why?

- Proven track record — 38 years of history with no known failures
- 500+ projects completed globally over a 38-year period
- Liner can be custom built to fit through existing access shafts
- Fully structural 150-year design
- Leak-tight jointing system (tested and certified)
- Productive and low-tech installation
- Local representation and technical support

Why?

- Fully customizable sizing — no off-the-shelf moulds
- In-house Research and Development department
- In-house testing and compliance laboratories
- Tangible lining system, manufactured under strict QA/QC protocols
- Low carbon footprint construction
- 10-year materials warranty
- Compliant with ASTM D3262, ISO 16611 and WIS 4-34-02

Manufactured bends, curves and transitions

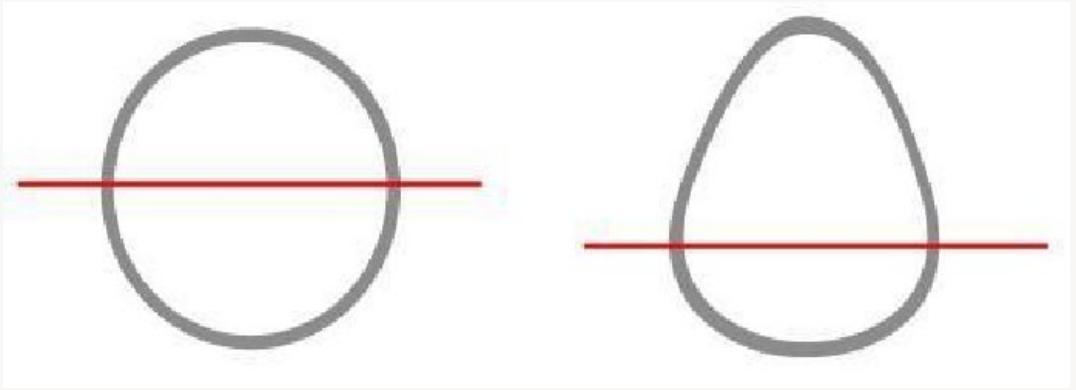
- To build custom bends, curves or transitions, Channeline request a laser or LIDAR scan supplied in AutoCAD/.dwg format, so we can model the existing host pipe and offer best-fit solutions
- Bends, curves and transitions are factory built and dry fitted prior to shipping to site
- This ensures that all lining systems have closed joints and will fit into the existing structure
- Bends, curves and transitions can be produced in all profiles, whether circular or non-circular

Large diameter multi-segmental

Flat-pack large diameter, circular and non-circular

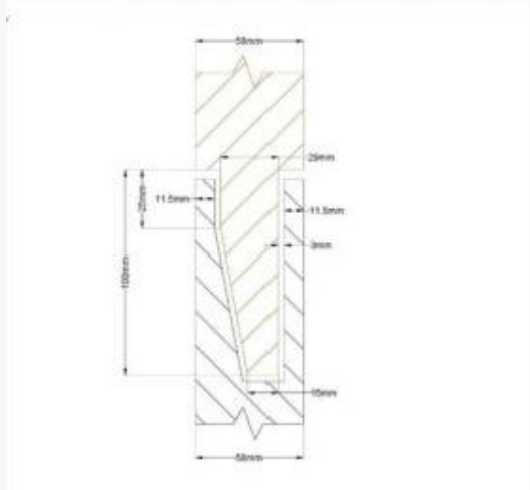
Tongue and groove jointing

- Tongue and groove joints are positioned at a point where bending moments acting on the liner are at zero
- For most circular shapes this zero-bending-moment position is normally at springline; however, for non-circular pipes this varies according to geometry



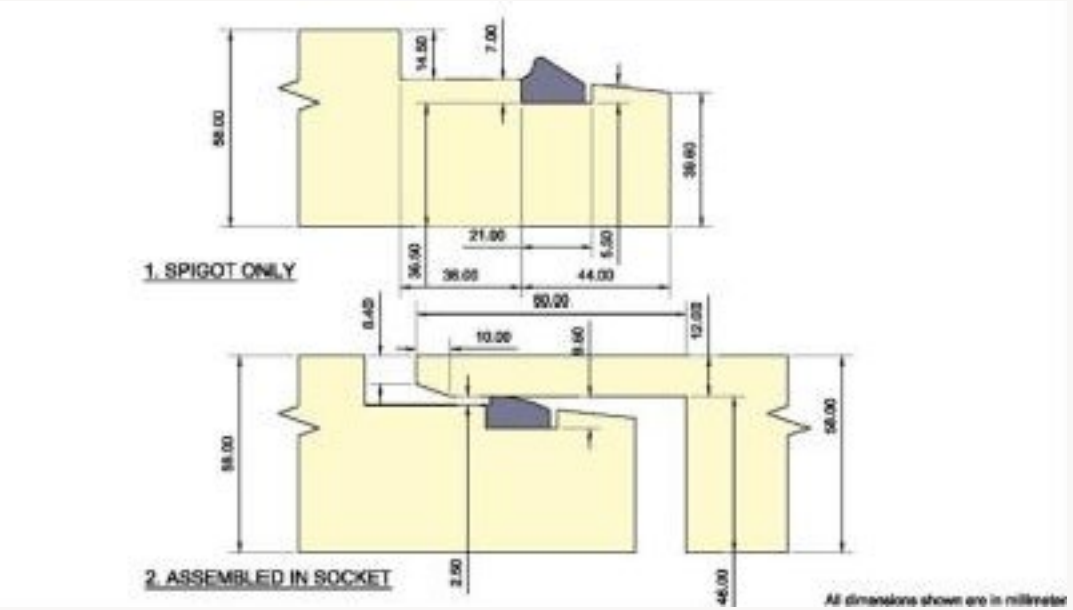
Proprietary jointing system

- The 2-piece segmental liner is joined using Channeline's proprietary tongue and groove jointing system
- This joint has been in use for well over 20 years and has been approved by the Water Research Centre UK and the Bureau of Engineering of Los Angeles
- Third-party jointing system testing:
  - ASTM D2412 — Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
  - ASTM D4161 — Standard Specification for Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals



Socket, spigot and radial joints

- GRP panels are supplied with a socket and spigot joint, used in conjunction with a gasket or construction sealant
- GRP two-piece and multi-piece lining units come with a tapered tongue and groove longitudinal joint and a bell and spigot radial joint
- Joints using Hamilton Kent Tylox 5SORT solid rubber gaskets are regularly tested in accordance with ASTM D4161 to 2.2 bar (33.359 psi)
- Channeline have successfully performed modified gasket joint tests (no reference standard available) to 15 bar (217.56 psi)



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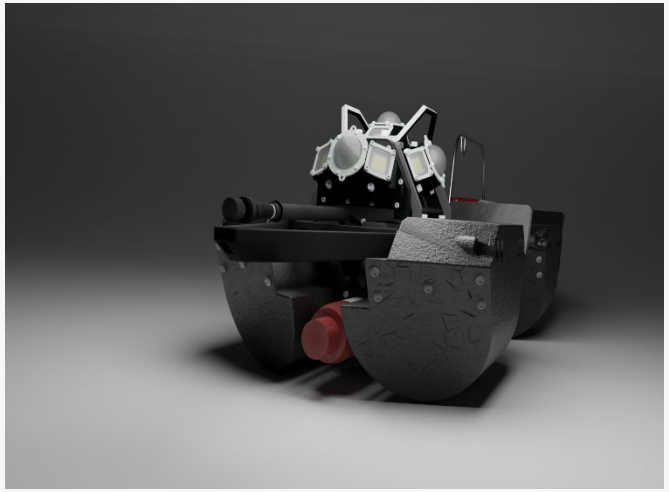
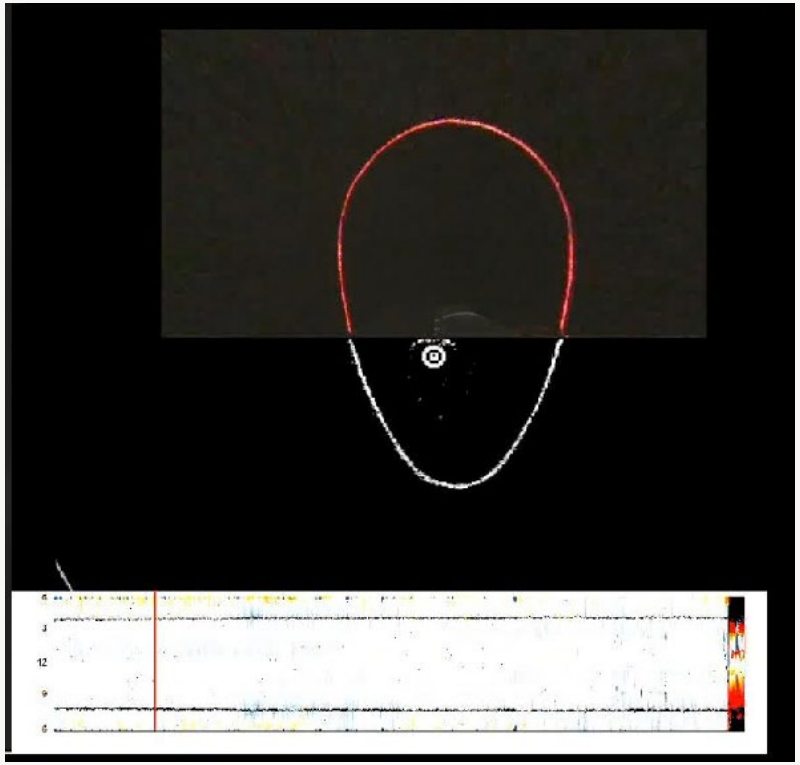
Liner design

Liner design

- Design for circular pipe liners is typically done using AWWA M45
- Non-circular pipes have historically been designed using the WRc Sewerage Rehabilitation Manual or finite element analysis
- Liner can be designed as a composite structure (acting with host pipe and grout), a standalone lining, or direct-bury piping
- All live loads (traffic, railway), soil and tunnel loads, and hydrostatic pressure are taken into account
- The MOP 145 (CLinTSL) software uses NC pipe geometry and arc angles along with actual limit states to design a wall thickness based on actual site conditions

Sizing and proofing: multi-sensor inspection (MSI)





Sizing and proofing: the manual method

- Taking precise measurements at short intervals along the pipe length
- Building a physical template
- Transporting the template through the host pipe
- Best suited to straight runs, minor curves or bends
- Where man-entry is not possible, steel mandrels can be pulled / winched through the host pipe

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Product range

Standard liner

- Manufactured with a socket and spigot joint, with adequate clearance and tolerance such that one panel connects easily into the next when positioned into the host structure
- For logistical efficiency, Channeline panels are usually manufactured in 2.4m / 8ft long solid sections — shorter lengths can be made if desired
- Optional in-line jointing can be facilitated where it is necessary to provide a liner of maximum external diameter and minimum annular gap

Multi-segmental liner

- Panels are manufactured in two or more longitudinal sections, then bonded on site — above or below ground — using our patented tapered tongue and groove longitudinal joint and a bell and spigot radial joint, positioned at the points of intersection
- The ideal solution where transportation problems, access difficulties (for example entry only via manholes), or particularly large structures make it hard to produce and install the product in one panel

Curved liner

- A truly unique solution for lining bends of any size and shape
- Our jointing method allows for the manual alignment of each sequential panel installation to accommodate small direction changes and offsets quickly and easily — perfect for smaller curves or unintentional direction changes
- Where more severe direction changes and short-radius bends are encountered, we can provide computer modeling and the fabrication of custom-built short sectional or lobster-type bend sections

Slip liner

- Allows for slip-line installation (non-man-entry) in live flow conditions
- Straight line lengths of 1,000m (3,280ft) and more can be accommodated in a single jacking process
- In-line high-strength joints with solid wall gaskets ensure easy connection and a reliable pressure-tight seal
- Optional mounted centralizing skids simplify the correct positioning and jacking of the liner
- Also available in a multi-segmental version

Crown and invert

- Enable the structural rehabilitation of existing buried assets where either a crown or invert is required
- A cost-efficient alternative to rehabilitating the entire diameter of the host structure, while still achieving Channeline's service life of 150 years
- In circumstances of hydrogen sulfide gas corrosion of the crown, this product provides a fully-structural rehabilitation solution
- The design, manufacture and supply of a GRP rail system to support the crown can also be provided

Manhole

- Custom designed and manufactured to accommodate any size and shape of manhole possible, creating an exact match for an existing structure
- The top transition section can be manufactured in a cone, eccentric or concentric shape, or any other shape as requested
- Can also be designed and produced in multiple panel sections for ease of handling, transportation and installation

Transition liner

- Able to facilitate seamless shifts between changes in a pipeline — whether in diameter, shape, angle or slope — thanks to our custom design and manufacturing processes
- Decreases turbulence within the pipeline and continues to ensure optimal setup, cross-sectional area and flow effectiveness

Lateral connections and fittings

- Custom-made lateral connections and fittings to precisely fit the design of the host structure. Fittings include:
  - Concentric reducers
  - Eccentric reducers
  - Dished ends
  - Y-pieces
  - Reducing tees

Custom

- Channeline can produce any of our products at any size and shape, and combine a number of products into one solution. We also offer a number of additional product enhancements, such as:
  - Anti-slip grit
  - Precision grout ports
  - Mounted centralizing skids
  - GRP rail mounting system
  - Convenient hoisting points
  - Ecological enhancements like fish baffles and wildlife walkways

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Hydraulic capacity

Hydraulic capacity

- Channeline gives an improvement to flow capacity and hydraulic self-cleaning ability of between 12% and 20%, typically using a Manning coefficient value of “n” 0.009
- In some environmentally sensitive areas, such as fish-bearing creeks, it is necessary to slow down the flow
- This can be done by applying a non-slip surface to the liner invert
- Fish baffles can also be incorporated into the invert

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Manufacturing process

Manufacturing process

- Manufacturing begins within 1–2 weeks from issue of purchase order and signed-off drawings
- Pipe will start to arrive on site within 10 to 12 weeks
- Panels are shipped via sea container

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Installation

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Pipe jacking with flow — Los Angeles

VIDEO — PLAY DURING PRESENTATION

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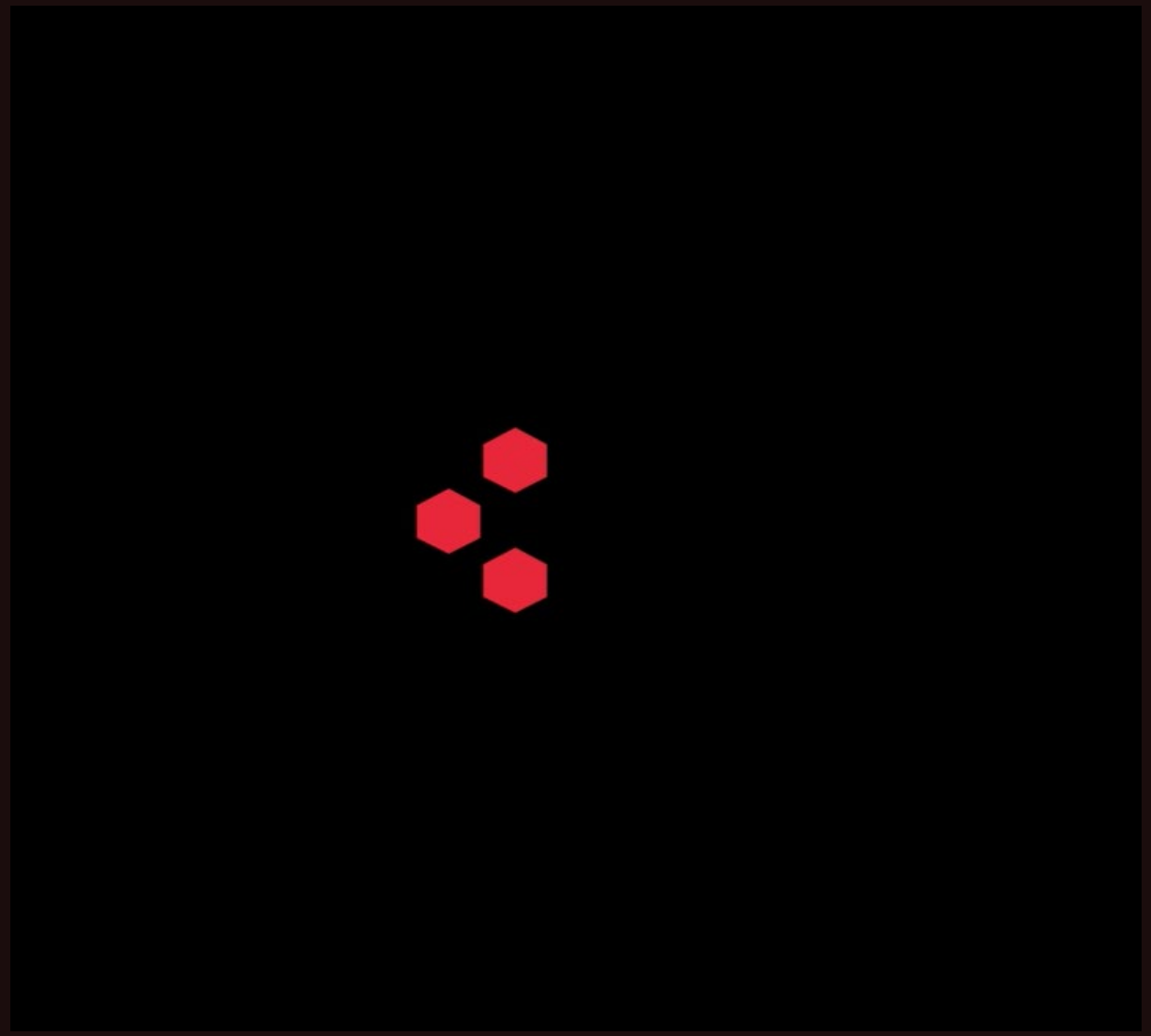
Carried in place



VIDEO — PLAY DURING PRESENTATION

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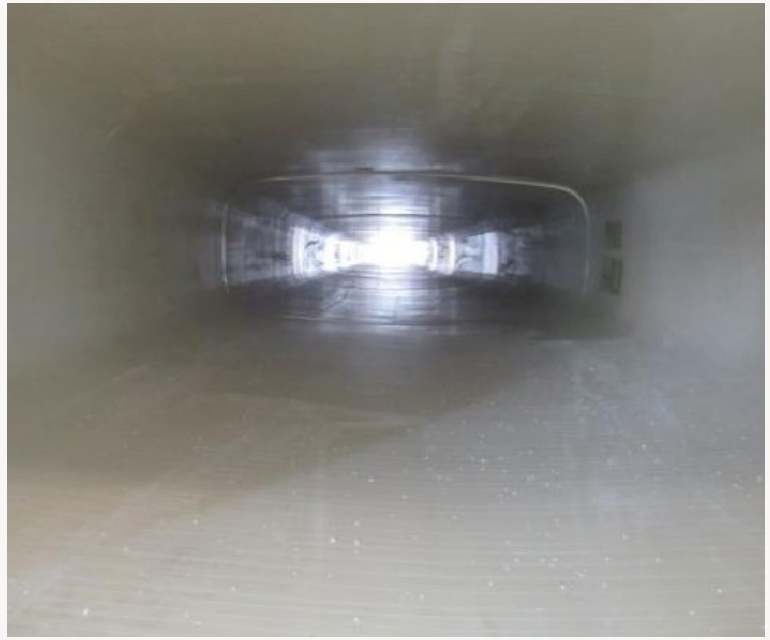
Project experience

Rehabilitation of CL-42 egg sewer @ Tawariki Street, New Zealand

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 1468.0mm x (W) 947.0mm x (L) 2.0m	10.8m	16mm	6	1	One piece egg with slipline joint

Rehabilitation of box culvert @ Australia

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 425.0mm x (W) 1040.0mm x (L) 2.0m	42.0m	30mm	21	1	One piece box culvert with slipline joint



Rehabilitation of rail culverts @ Australia

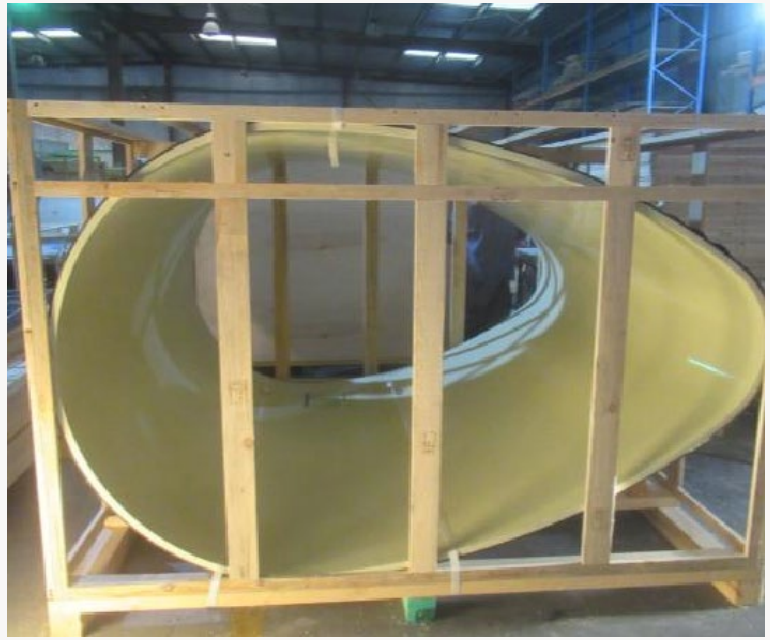
Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 1482.0mm x (W) 1422.0mm x (L) 2.4m	28.0m	34mm	12	1	One piece box culvert with slipline joint

Rehabilitation of NSOOS arch sewer @ Australia

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 1618.0mm x (W) 3250.0m x (L) 2.2m	52.8m	40mm	24	1	One piece crown

Rehabilitation of Orakei main @ Auckland, New Zealand

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 2150.1mm x (W) 1362.8mm x (L) 2.2m	125.0m	41mm	57	3	One piece egg with slipline joint



Rehabilitation of box culvert @ Newcastle, Australia

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 901.0mm x (W) 1306.0mm x (L) 2.4m	132.0m	22mm	55	3	One piece box culvert with slipline joint (Profile 1)
(H) 902.0mm x (W) 1442.0mm x (L) 2.4m	105.6m	24mm	44	3	One piece box culvert with slipline joint (Profile 2)

Rehabilitation of Orakei main @ Auckland, New Zealand

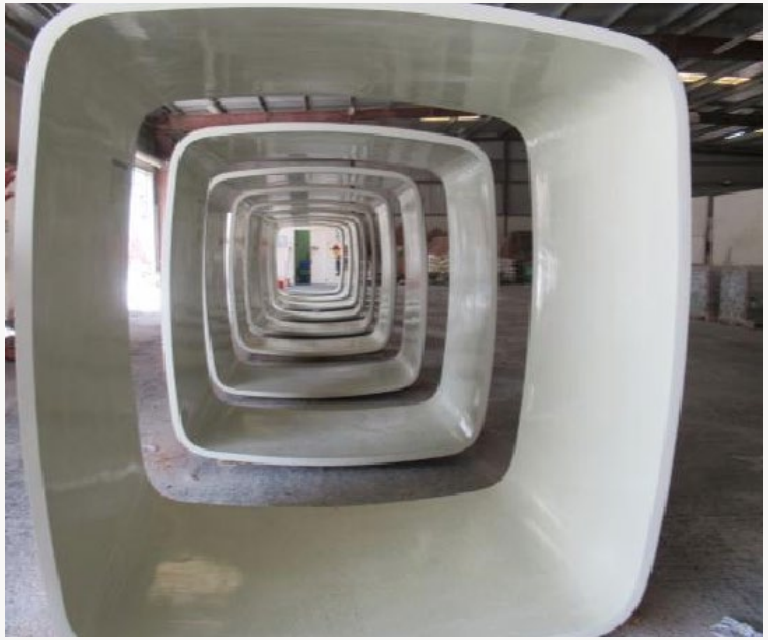
Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 2152.1mm x (W) 1364.8mm x (L) 2.2m	173.0m	47mm	79	4	One piece egg with slipline joint

Rehabilitation of box culvert @ Australia

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 731.0mm x (W) 1636.0mm x (L) 1.0m	13.0m	32mm	13	1	One piece box culvert
(H) 291.0mm x (W) 1676.0mm x (L) 1.0m	12.5m	32mm	13	1	One piece box culvert

Rehabilitation of Amarina avenue box culvert @ Brisbane, Australia

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H)1892.0mm x (W) 1852.0mm x (L) 1.2m	36.2m	64mm	31	4	One piece box with slipline joint



Rehabilitation of box culvert @ Thagoona Haigslea , Australia

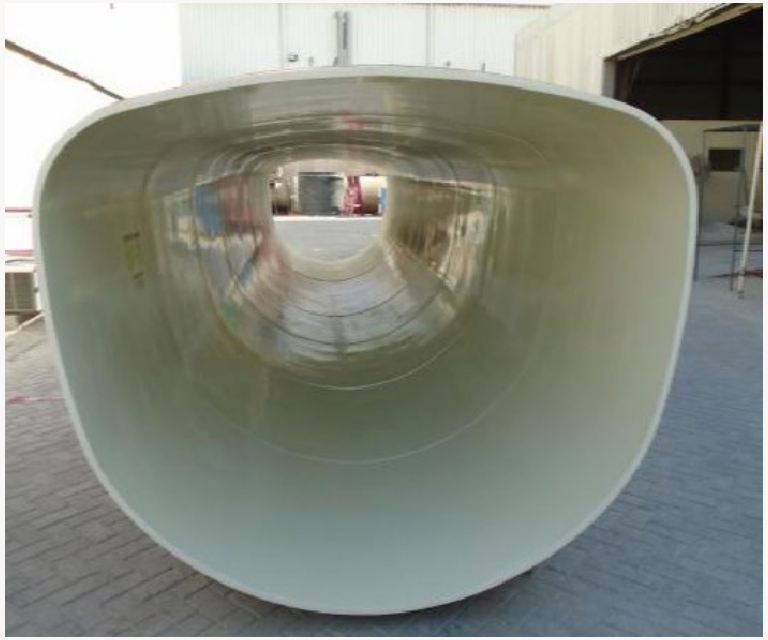
Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 765.0mm x (W) 1000.0mm x (L) 2.0m	49.5m	50mm	25	2	One piece box culverts

Rehabilitation of egg sewer @ Hawthorn, Australia (Phase 2)

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 954.0mm x (W) 606.0mm x (L) 0.6m	291.0m	25mm	470	6	One piece egg (Profile 1)

Rehabilitation of Brisbane Corso box culvert @ Australia

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 1666.0mm x (W)1916.0mm x (L) 1.2m	12.0m	42mm	10	2	One piece inverted arch



Rehabilitation of elliptical culvert @ Australia

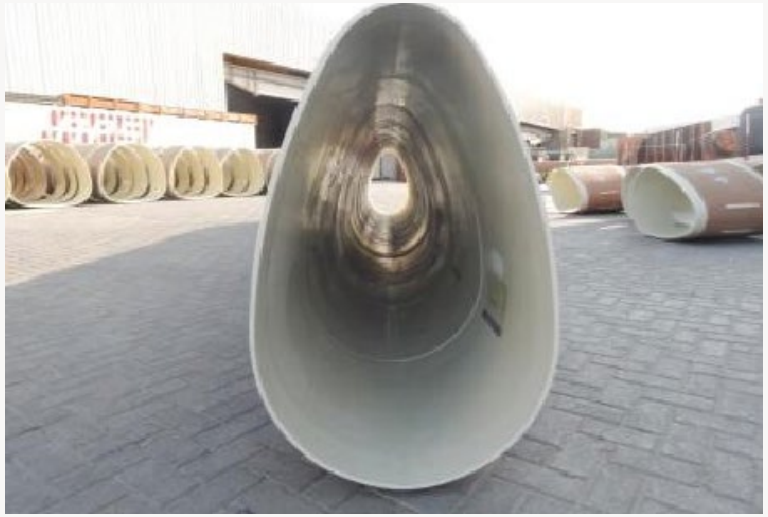
Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 1864.0mm x (W) 2464.0mm x (L) 2.0m	13m	7	1	1	One piece ellipse with slipline joint

Rehabilitation of box culvert MRC @ Australia

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 316.0mm x (W) 536.0mm x (L) 2.0m	33.6m	12mm	17	1	One piece box culvert with slipline joint

Rehabilitation of egg sewer @ Hawthorn, Australia

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 954.0mm x (W) 606.0mm x (L) 0.7m	746.6m	25mm	830	6	One piece egg
(H) 954.0mm x (W) 606.0mm x (L) 0. 6m	294.0m	25mm	261	6	One piece egg (Phase 2)



Rehabilitation of drainage tunnel @ Warrnambool, Australia

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 1700.0mm x (W) 890.0mm x (L) 1.5m	150.0m	24mm	100	3	Four piece liner

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Selected global projects

Rehabilitation of north outfall sewer unit 20 & 21@ Los Angeles, USA

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 1066.5mm x (W) 1185.7mm x (L) 2.4m	1121.7m	32mm	477	12	One piece semi elliptical with slipline joint

Rashbahari avenue Kolkota municipal corporation @ India

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 1885.0mm x (W) 1680.0mm x (L) 2.3m	469.2m	35mm	204	4	Crown invert
(H) 1885.0mm x (W) 1680.0mm x (L) 2.3m	469.2m	35mm	204	4	Two piece semi elliptical flat bottom

Rehabilitation of existing sewer @ Tsuen Wan SPS, Hong Kong

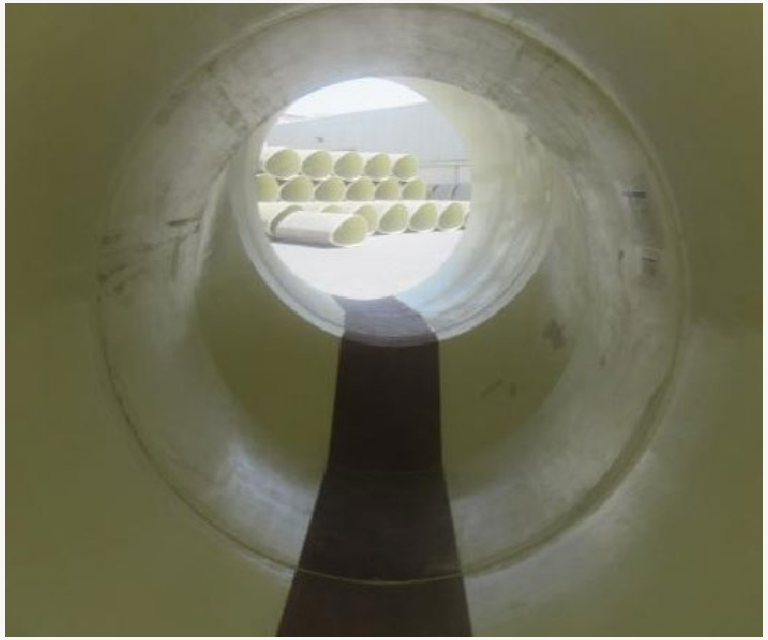
Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(ID) 1640.0m x (L) 1.0m	11.0m	30mm	11	1	One piece circular

Rehabilitation of box culvert @ Hyogo, Japan

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 776.0mm x (W) 276.0mm x (L) 0.8m	272.0m	12mm	340	6	One piece box culvert with slipline joint

Rehabilitation of CMP culvert no. 2 @ Utic , Malaysia

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(ID) 2000.0mm x (L) 2.2m	17.6m	50mm	8	1	One piece circular



Equate seawater cooling pipeline rehabilitation @ Kuwait

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(ID) 1280.0mm x (L) 2.3m	80.5m	16mm	35	3	One piece circular
(ID) 888.0mm x (L) 2.3m	25.3m	11mm	11	1	One piece circular

Langa interceptor rehabilitation project @ City of Capetown , South Africa

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 1050.0mm x (W) 680.0mm x (L) 2.3m	108.1m	14.3mm	47	3	One piece egg

Rehabilitation of SW4 tunnel @ Edmonton, Canada

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(ID) 2400.0mm x (L) 2.2m	1595.0m	44mm	725	11	One piece circular with slipline joint

Rehabilitation of circular sewer @ Pigeon House Road, Dublin, Ireland

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(ID) 1298.0mm x (L) 1.2m	819.6m	16mm	683	8	One piece circular
(ID) 1540.0mm x (L) 1.2m	633.6m	20mm	548	8	One piece circular

Rehabilitation of arch @ Aalst Statieplein , Belgium

Dimensions	Length	Wall thickness	Panels produced	Moulds produced	Profile and joint system
(H) 1290.0m x (W) 1150.0mm x (L) 2.3m	108.6m	22mm	59	2	One piece arch

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Questions

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