Cured In Place Place Pipe

Engineering Solutions for pressure pipe applications

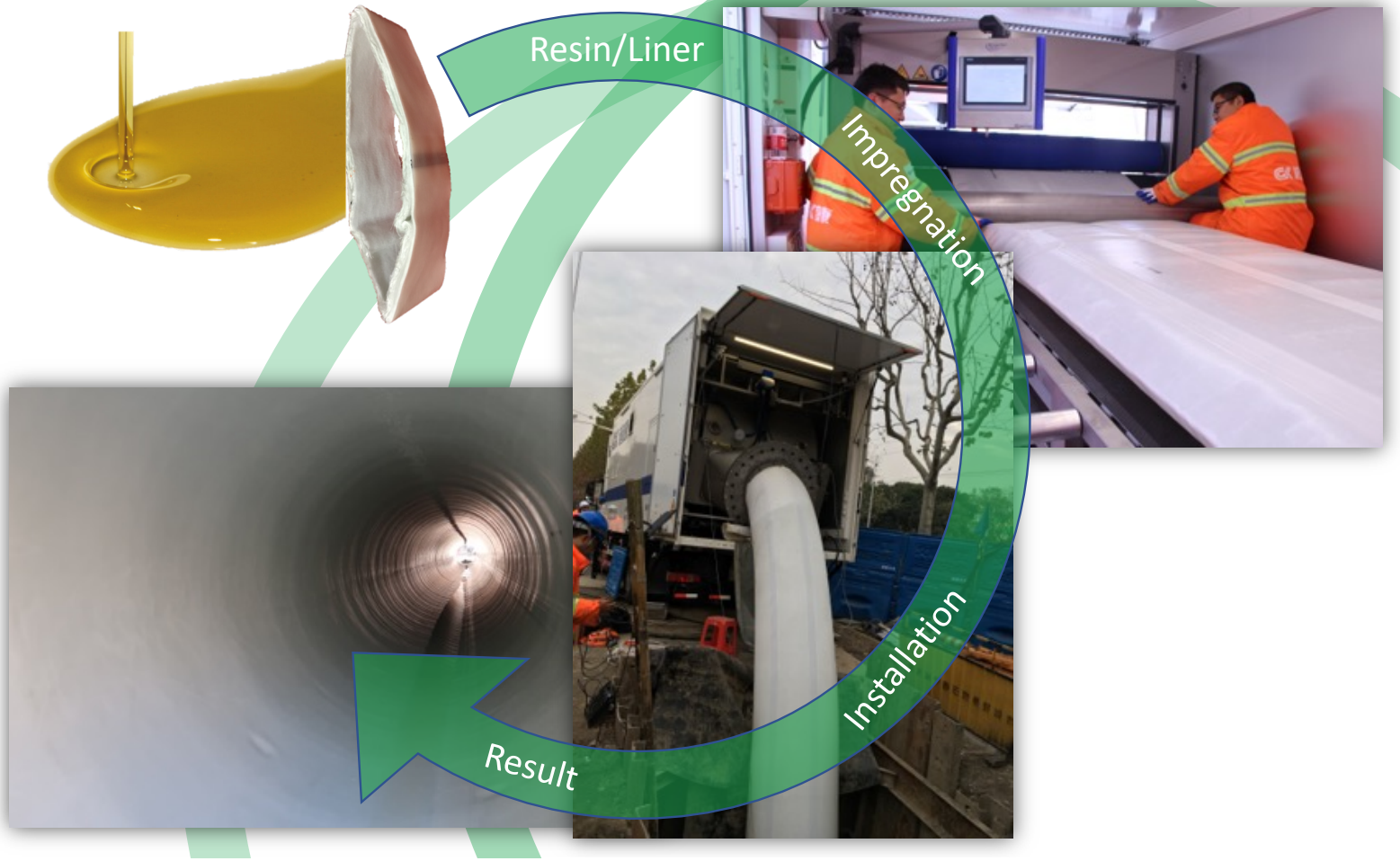
Presentation by
GiS® industry & project consulting
2019

CIPP
Engineering Solutions

GiS provides the entire engineering package for CIPP Solutions.

The focus is on specialised tailor made solutions for pressure pipe applications:

- Potable water
- Sewer mains
- Cooling mains
- Industrial pipes

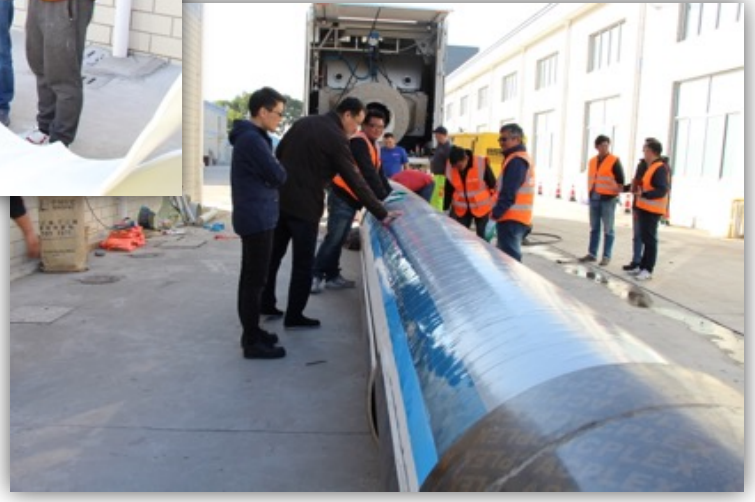


Pictures by courtesy of IBG Hydrotech – System IBB16

Training for engineers and operators “on the job”

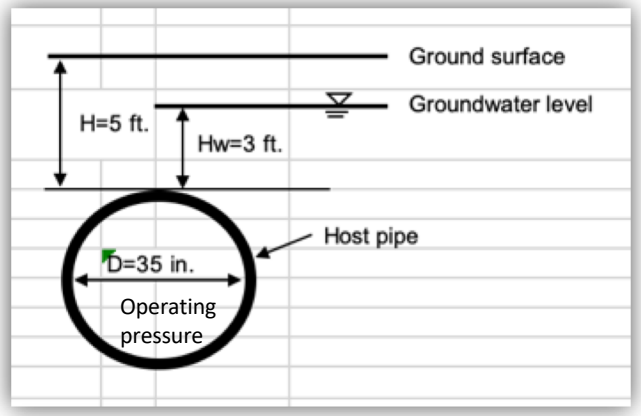
We plan and manage with you:

- Site assessment
- Design and Selection of Material
- Determining the best method for impregnation and installation



Pictures by courtesy of IBG Hydrotech – System IBB16

Job site assessment and static design per ASTM 1216-16



Assessment of conditions

Pipe material and age

Conditions: Incrustations, holes, corrosion, wall-thickness of pipe, joints, cracks…

Pipe-ovality, live load, hydrostatic pressure (ground-water)

Soil conditions: weight, fine-grained, coarse-grained, crushed rock…

Internal working-pressure

Partially deteriorated

Pipe may have as much as 10% distortion of the diameter in forms of ovality, offset joints or the like

- No external loads → **Case 1**: Inner coating/thin Lining bonded
- External loads → **Case 2**: Lining with inherent ring-stiffness to carry the external load applied on holes and joints

Fully deteriorated

The pipe is structurally unsound and incapable of carrying internal and external loads. Mostly characterized by loss of original shape, and heavy corrosion. Local burst of pipe may have already occurred.

→ **Case 3**: Combination of felt/glass or fully glass to carry totally the applied external and internal loads

Assessment → Design

Pictures by courtesy of IBG Hydrotech – System IBB16

Job site assessment and static design per ASTM 1216-16

$$t_1 = \frac{D}{\left(\left[\frac{2 \cdot K \cdot E_L \cdot C}{(1-\upsilon^2) \cdot N \cdot (P_w + P_V)}\right]^{1/3}\right) + 1}$$ 6, Equation X1.1

$$1.5 \cdot \frac{q}{100} \cdot \left(1 + \frac{q}{100}\right) \cdot SDR^2 - 0.5 \cdot \left(1 + \frac{q}{100}\right) \cdot SDR - \frac{\sigma_L}{P \cdot N} = 0$$ TM F1216, Equation X1.2

$$t = \left[\frac{(q_t \cdot N)^2 \cdot D^3 \cdot 12}{32 \cdot R_w \cdot B' \cdot M_{sn} \cdot E_L \cdot C}\right]^{1/3}$$ ASTM F1216, Equation X1.3

$t = D/(E/0.093 \cdot 12)^{1/3}$ ASTM F1216, Equation X1.4

$t_{pr} = D/([(D/d)^2 \cdot (5.33 \cdot \sigma_L/PN)]^{1/2} + 1)$ ASTM F1216, Equation X1.6

If $d/D > 1.83 \cdot (t_{pr}/D)^{½}$ (ASTM F1216 Equation X1.5) liner is in ring tension or hoop stress and fully deteriorated pressure pipe condition applies (Equation X1.7)

$t_{pr2} = D/((2 \cdot \sigma_{TL}/PN) + 2)$ ASTM F1216, Equation X1.7

Use this equation for all above ground pressure pipe applications

Design

Definition of Lining composition and properties

Wall thickness of CIPP Lining
As per required load case

Pictures by courtesy of IBG Hydrotech – System IBB16

Material and application

We design for you the most efficient and best performing solution.

Liner material

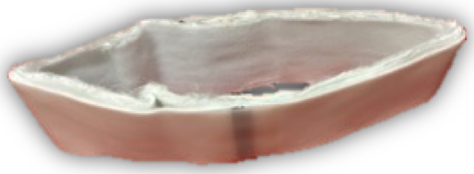
- Felt
- Felt/Glass
- Glass
- Coating

Resins

- Epoxy
- Polyester
- Vinylester

Equipment

- Mobile / Factory Impregnation units
- Pressure drum / Steamer
- Water boiler / Water column equipment

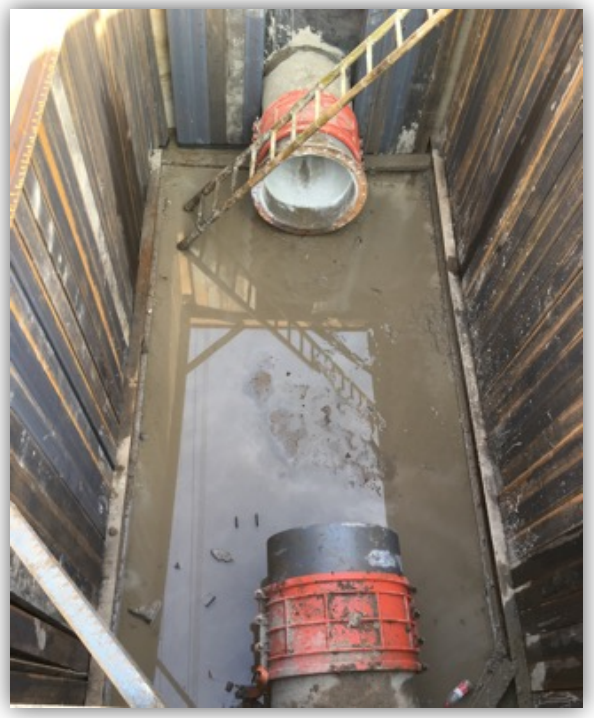


Pictures by courtesy of IBG Hydrotech – System IBB16

On site – pipe engineering

We know how to handle working pits, pipe engineering and know the ”IN and OUTS” of a CIPP pressure pipe application.

Liner End-sealing, Pipe re-connection and pressure testing require in-depth knowledge vital for a successful application.



Pictures by courtesy of IBG Hydrotech – System IBB16

Global-i-Solution is an international consulting firm for industry & project consulting. As such it enables its clients in matters of production, construction and manufacturing solutions.