



# ÉVALUATION DE L'ÉTAT DES TUYAUX SOUS PRESSION ET RÉHABILITATION - RÉHABILITATION DES TUYAUX DU BERCEAU À LA TOMBE (ÉVALUATION DE L'ÉTAT)

## DEON POHORILLE, ASOE



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COMPLETE TRENCHLESS SOLUTIONS

**ADVANCED PIPELINE LINER & INSPECTION SOLUTIONS**

ENSURING PIPELINE INTEGRITY  
THROUGH INNOVATION & GLOBAL LEARNING



WATER



HOT WATER



GAS



SEWER

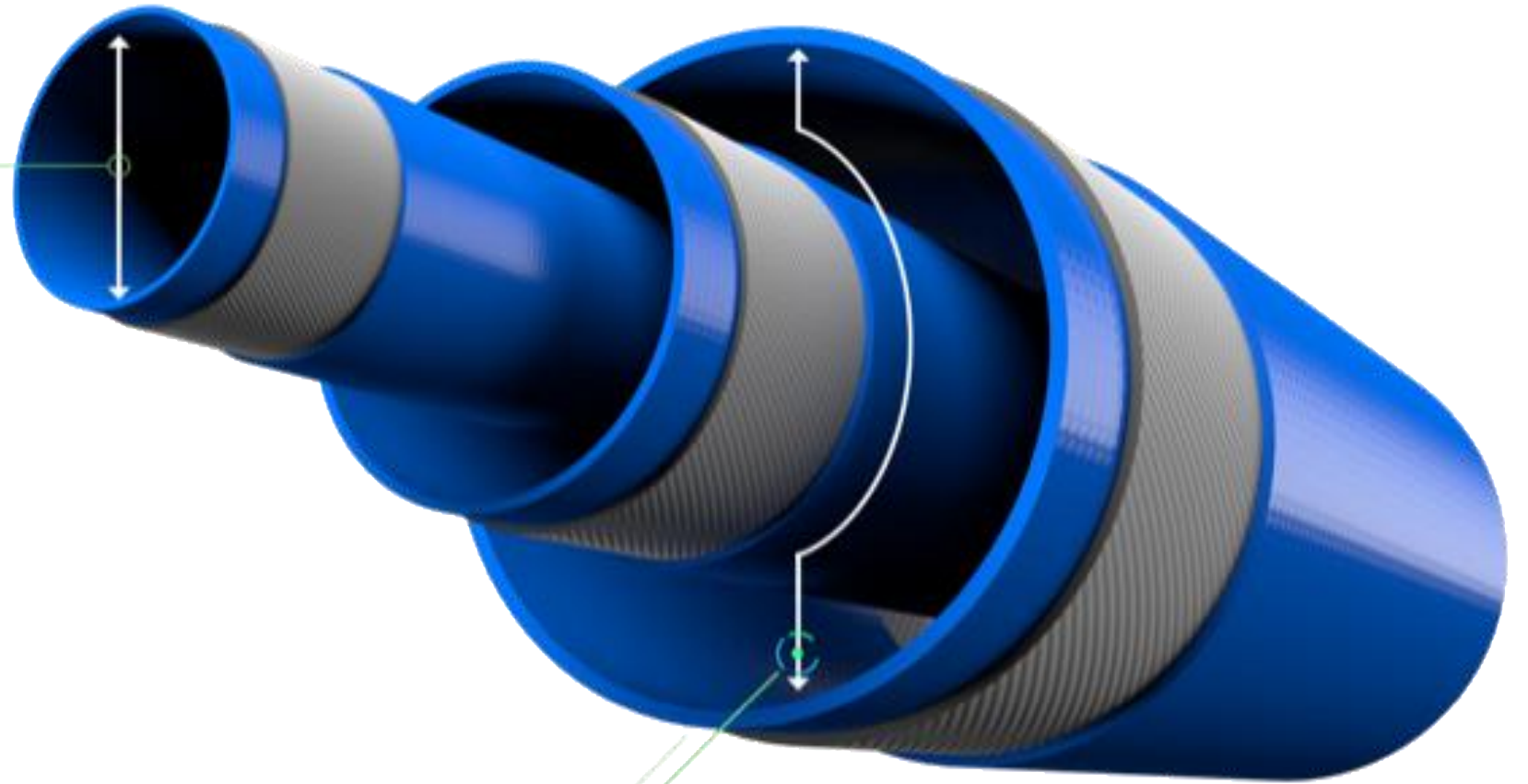


OIL



FOLD & FORM

**50mm**

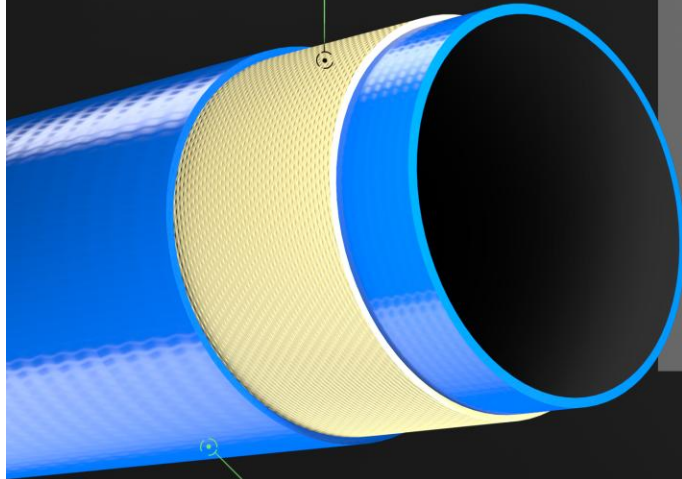


**1600mm**

**The Water Liner Solution is used to rehabilitate the following:**

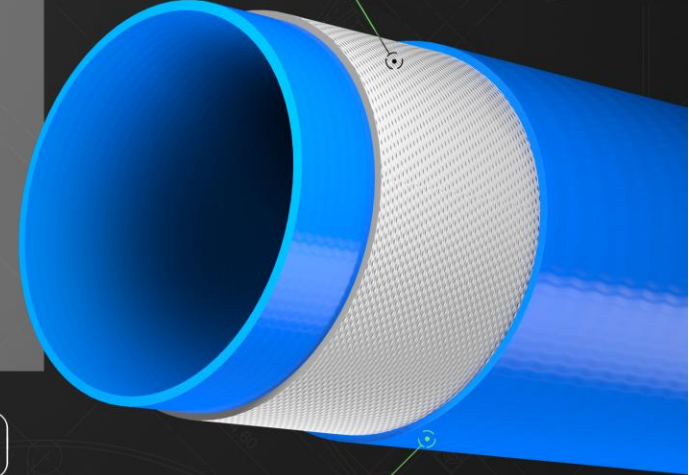
- Pressure & potable water mains
- Salt, ground, mining & dewatering
- Sub sea
- Industrial processed water

KEVLAR / ARAMID

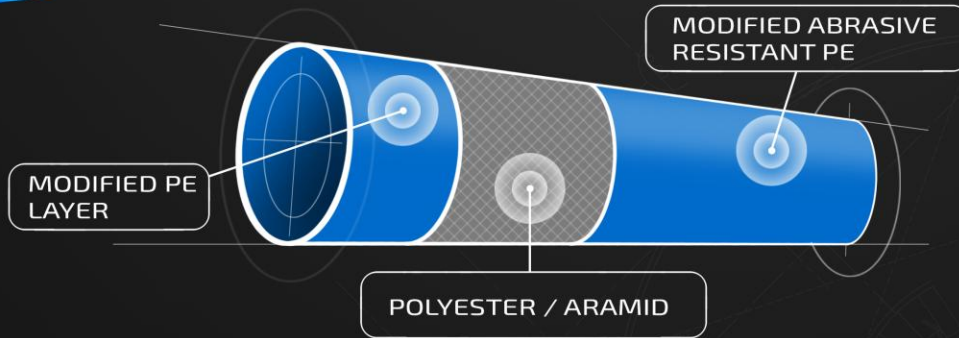


HIGH PRESSURE /  
HIGH TEMPERATURE

POLYESTER



NORMAL PRESSURE /  
NORMAL TEMPERATURE



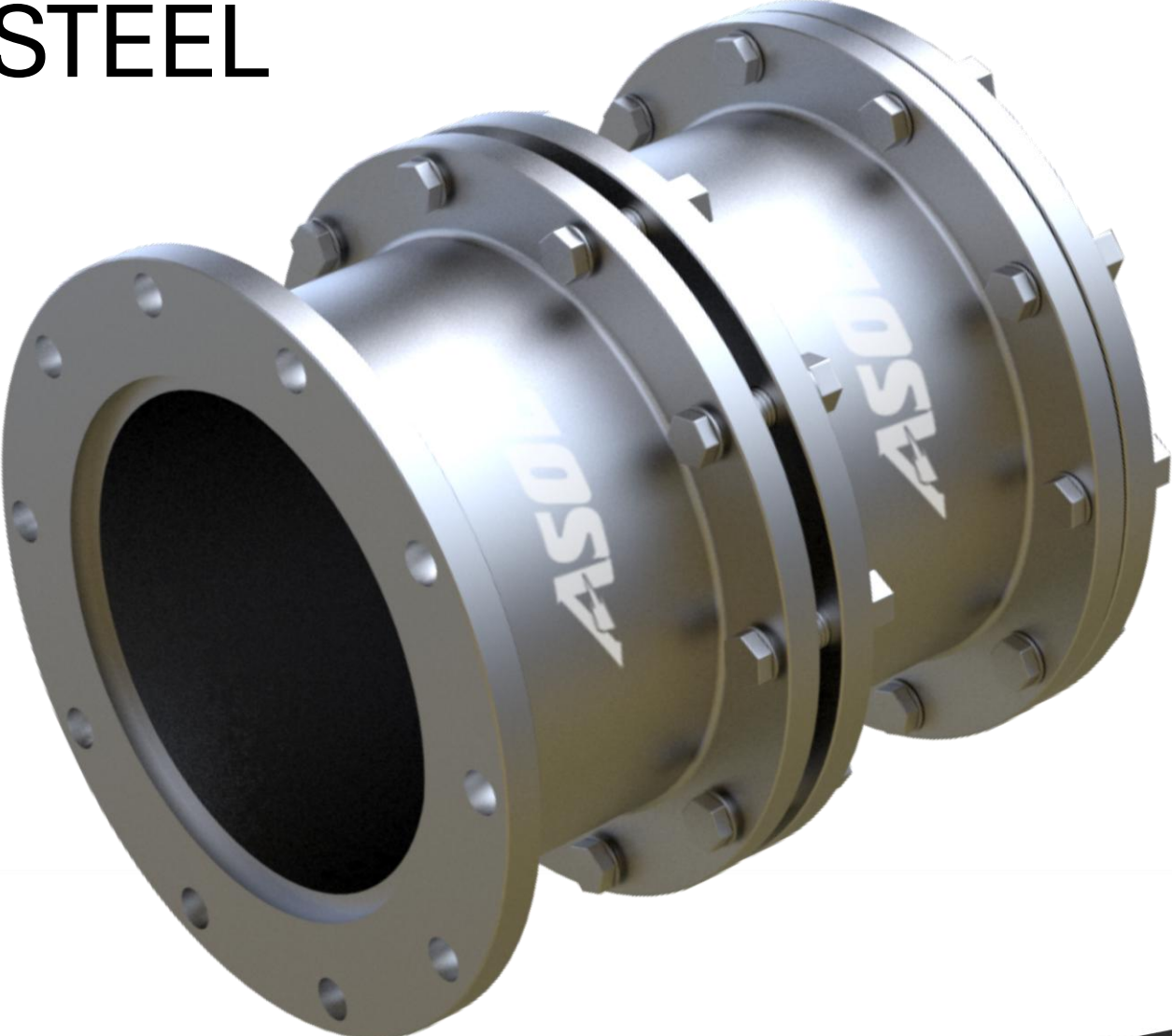
# STANDARD FITTING



**CORROSION  
RESISTANT**



# STAINLESS STEEL



# POLYMER ELECTROFUSION ON OUR BOOTH

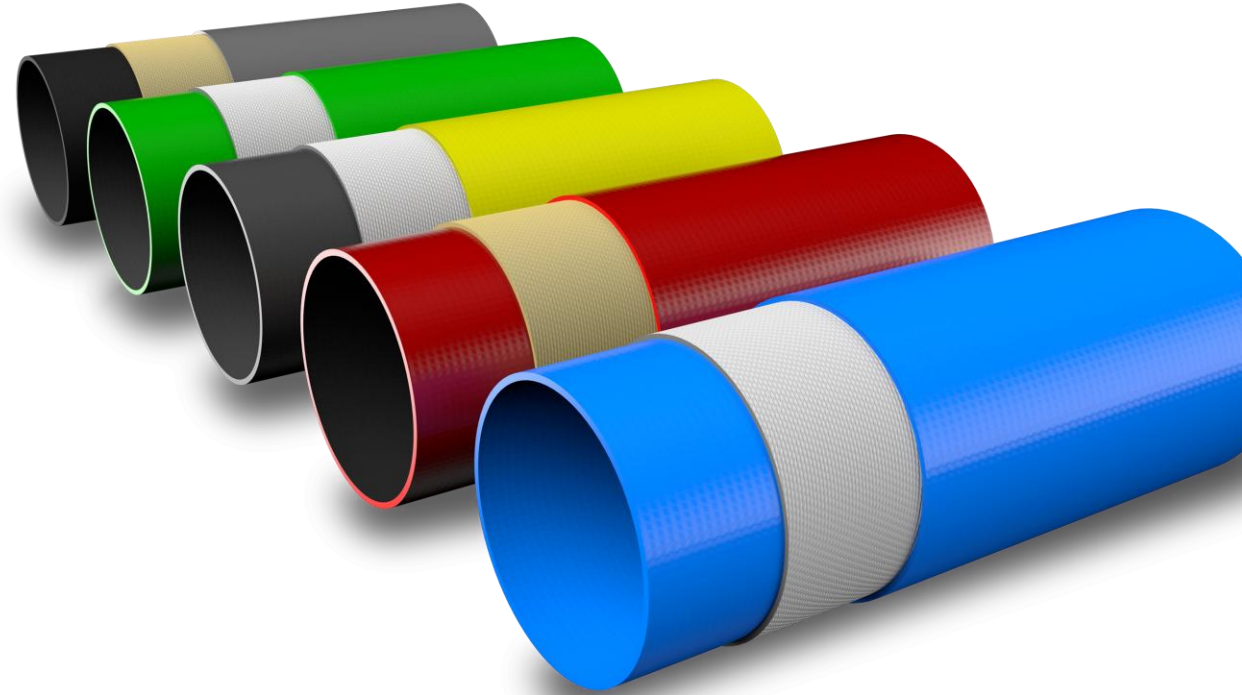
# ABOUT ASOE – A GLOBAL HIGH-TECH LEADER

AT A GLANCE: GLOBAL REACH & INNOVATION

Specialized in advanced  
liner solutions (FFRP).

**Global Footprint: 58 Countries**

**Market Leader: Largest diameter range**



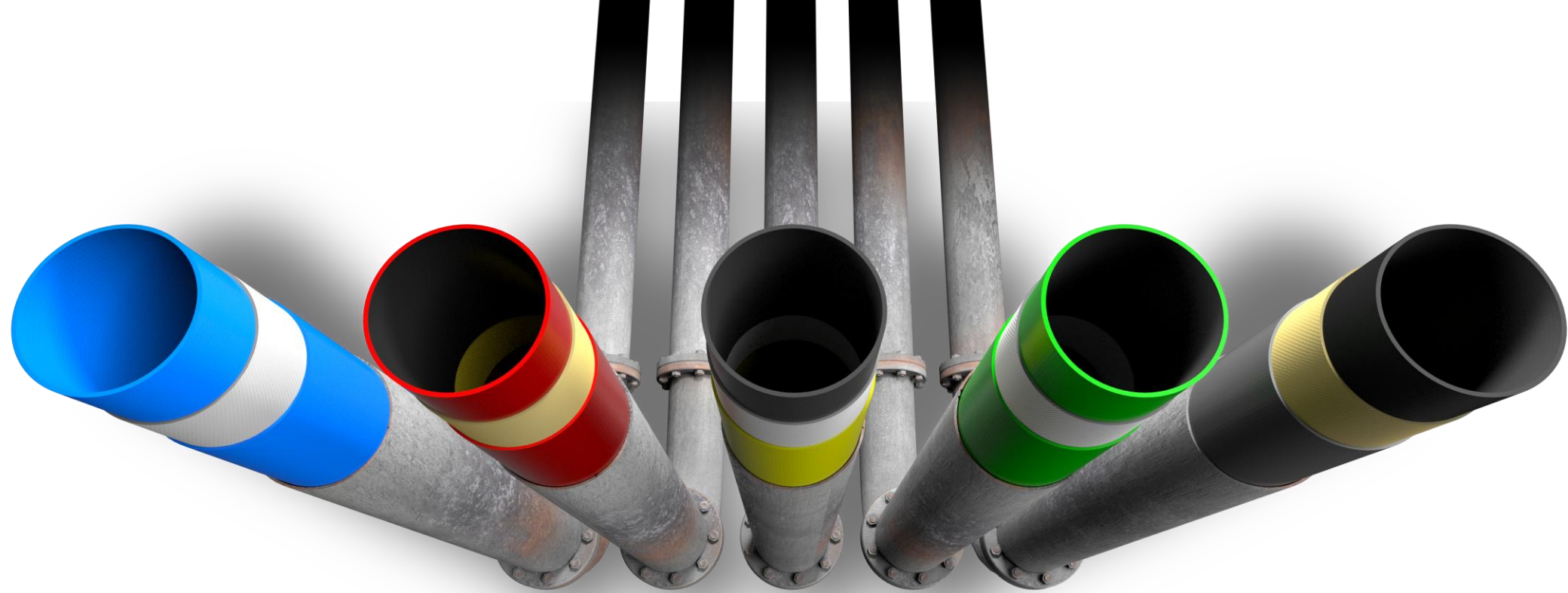
# CORE TECHNOLOGY

## FFRPP LINER SOLUTIONS

### Key Features:

- Integral semi-structural system.
- **Close-Fit Design:** No annulus gap; prevents sediment corrosion/ allows for stronger cost effective solutions
- **Extreme Flexibility:** Navigates 45° and 90° bends (1.5D to 5D radius).
- **Durability:** 50-year service life; high heat & abrasion resistance.





## **Series Applications:**

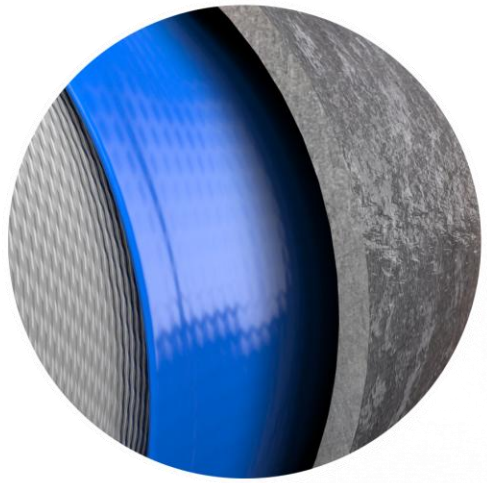
**Water and Sewer Series:** Potable Water

**Oil and G Series:** Oil & Gas (Onshore/Offshore)

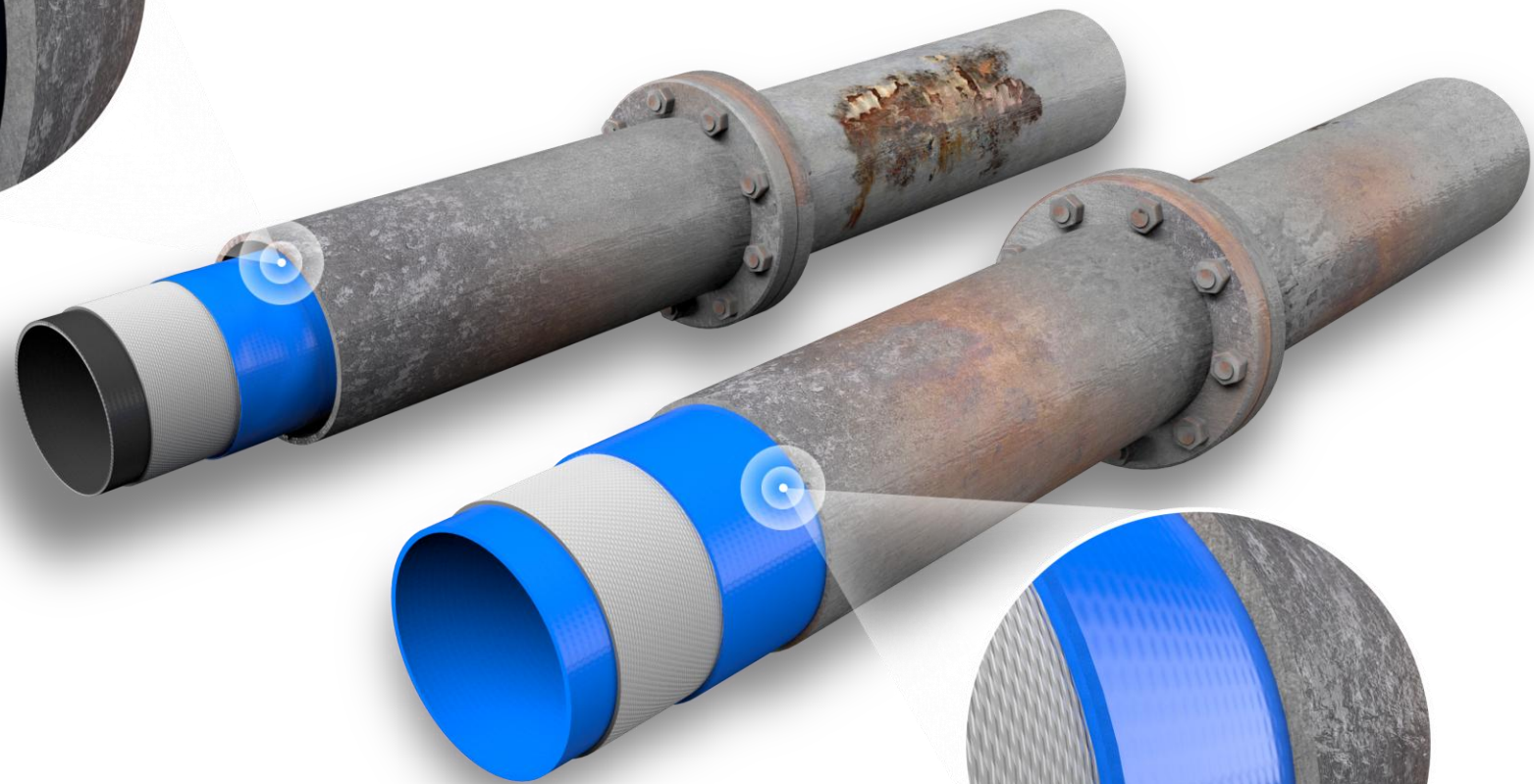
**Hot Water Series:** High-Temp Municipal Heat (up to 120°C)

# ASOE MUD FLAP

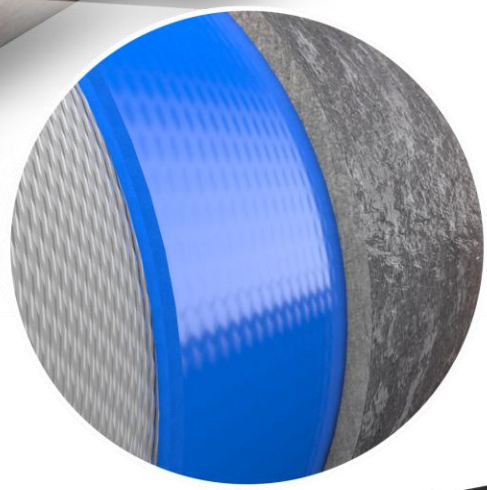




ANNULUS GAP  
OTHER LINERS



CLOSE FIT LINER









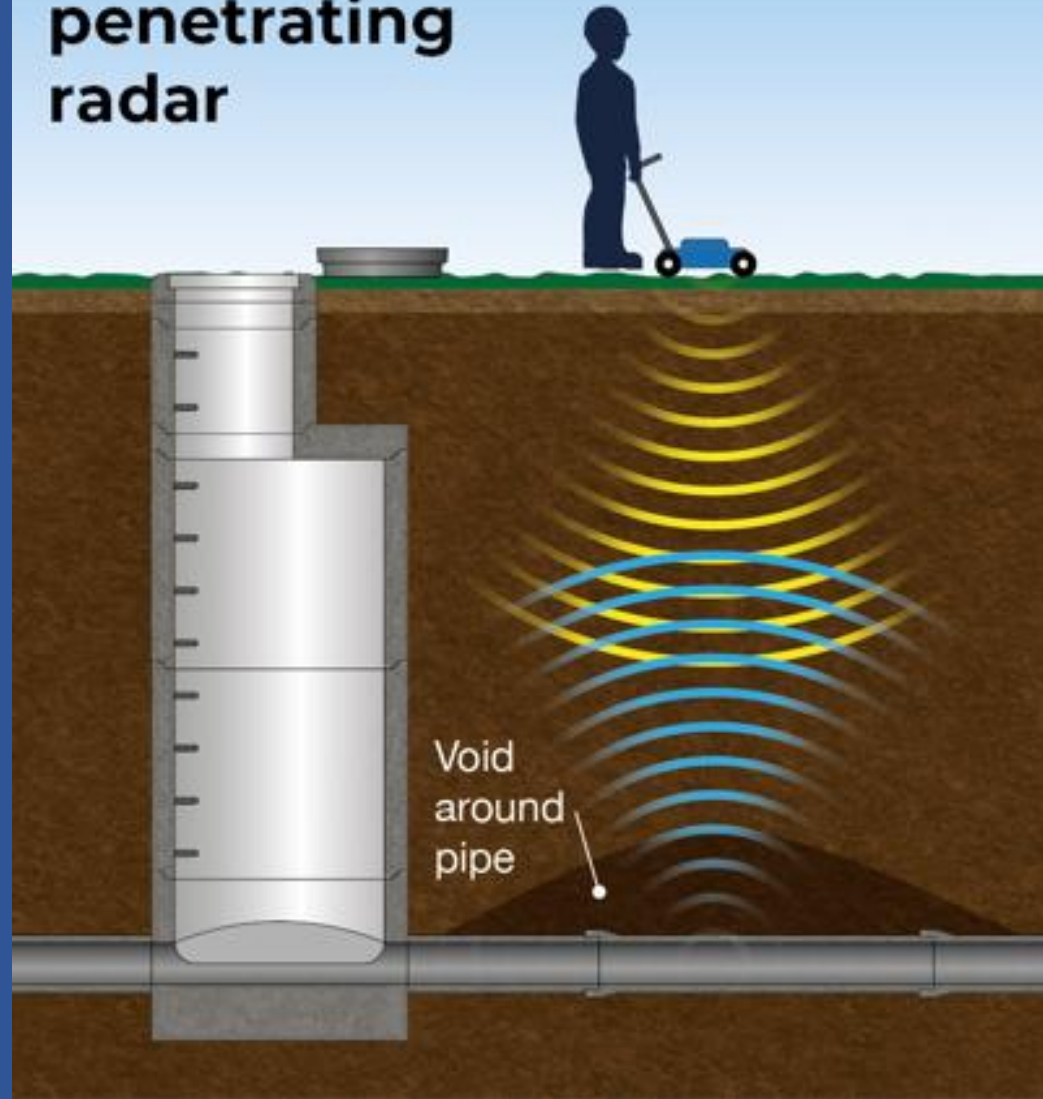


## 1988/9 my love for condition assessment was born

### Ground penetrating radar (GPR)

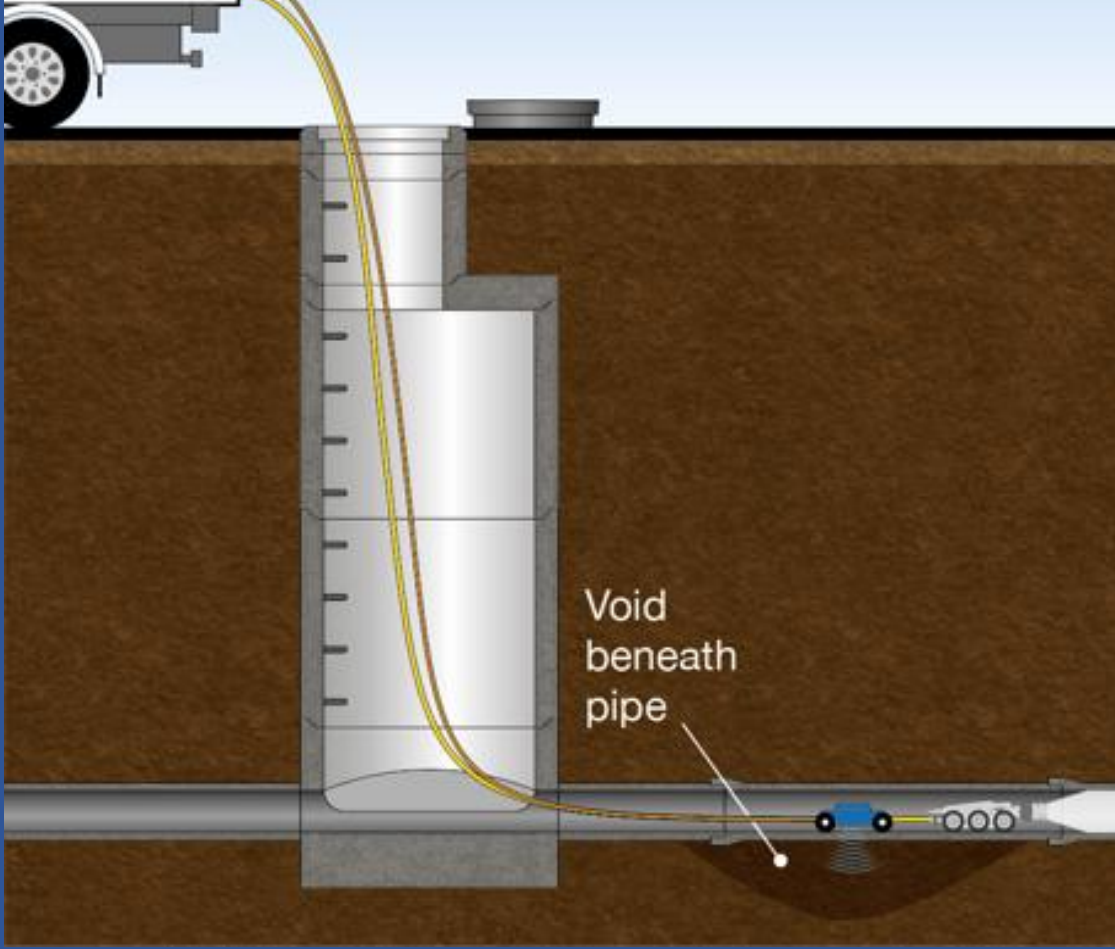
- GPR systems use radar to create an image of objects underground.
- In addition to a survey of the pipeline itself, GPR is also used to perform a geotechnical survey of the environment.

# Ground penetrating radar



## Pipe penetrating radar

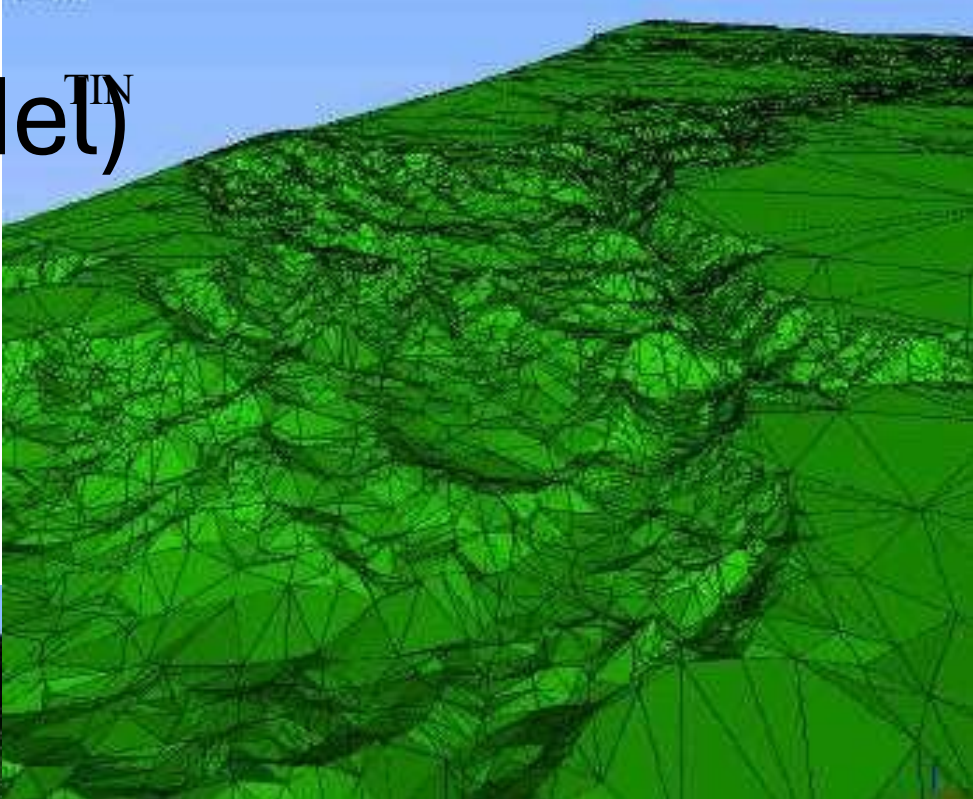
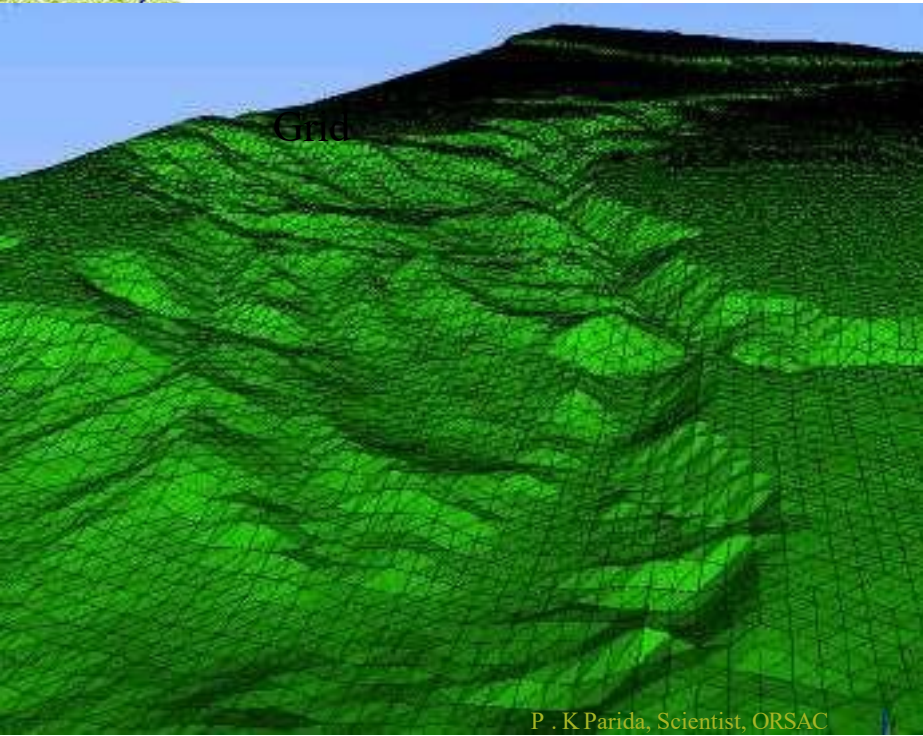
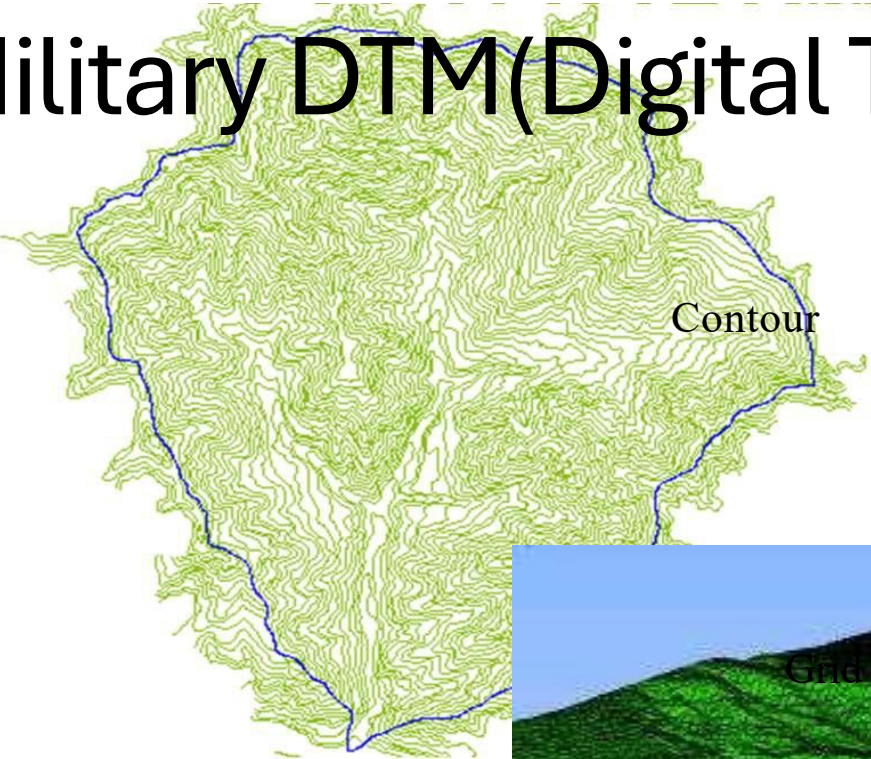
PPR is pulled through the pipe by a crawler camera



### 4.3 Pipe Penetrating Radar (PPR)

- PPR systems use the same technology as GPR, but the units have been re-designed specifically for use inside pipes.
- In concrete pipes, for example, it can locate the rebar in the pipe structure.

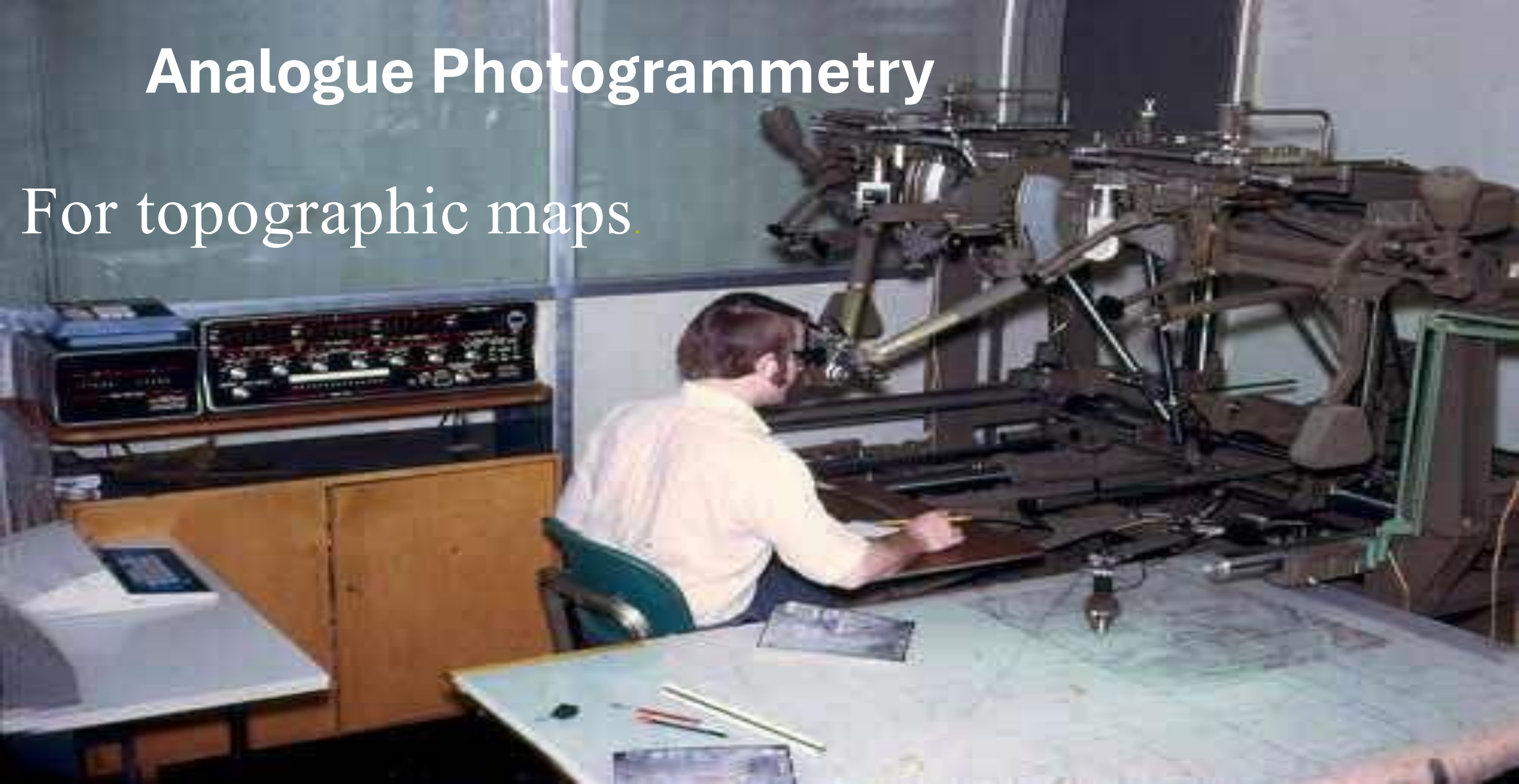
# Military DTM(Digital Terrain) Model



P . K Parida, Scientist, ORSAC

# Analogue Photogrammetry

For topographic maps.





JAPANESE AERIAL CAMERAS



GOWLAND DELUXE 4X5 AERIAL CAMERA  
WITH FOCUS TUBE



# What is Photogrammetry?

**Photo**grammetry

**Photo : Light**

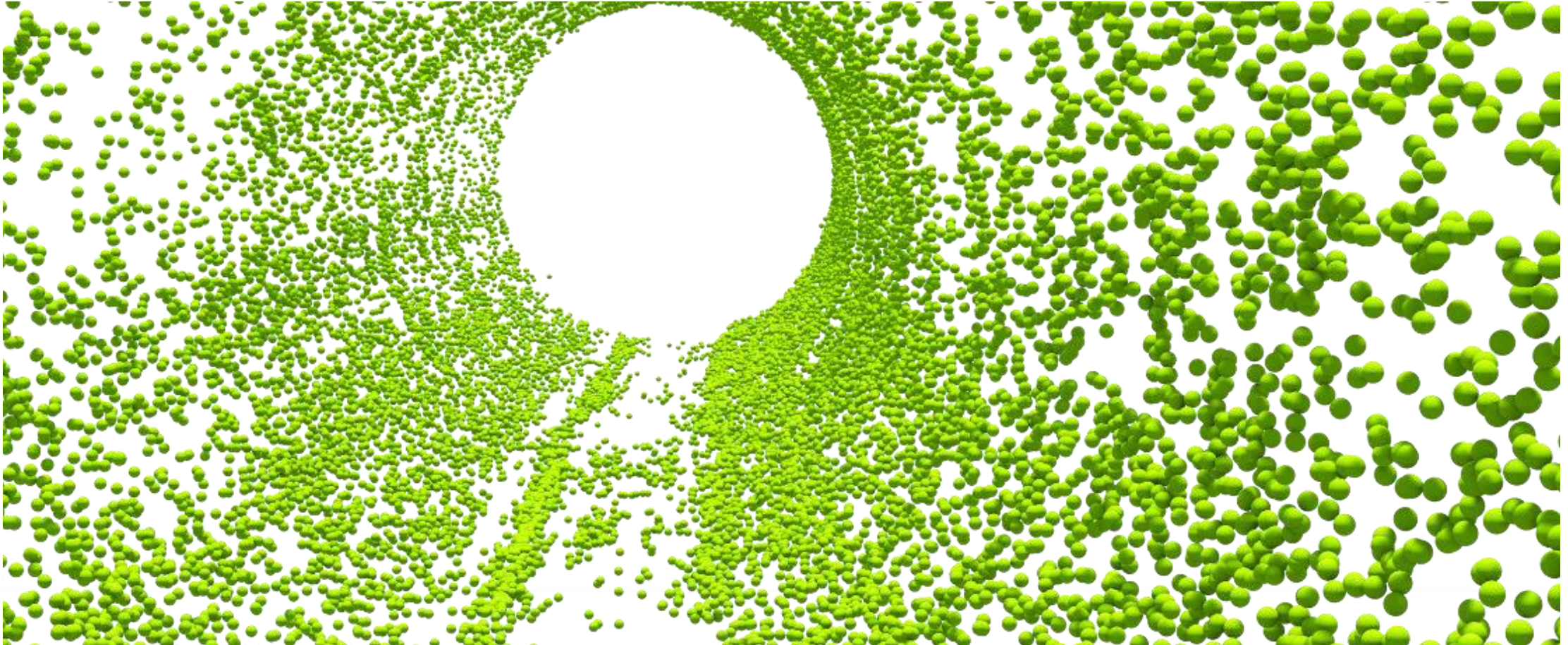
**Gram : To draw**

**Metron : To measure**

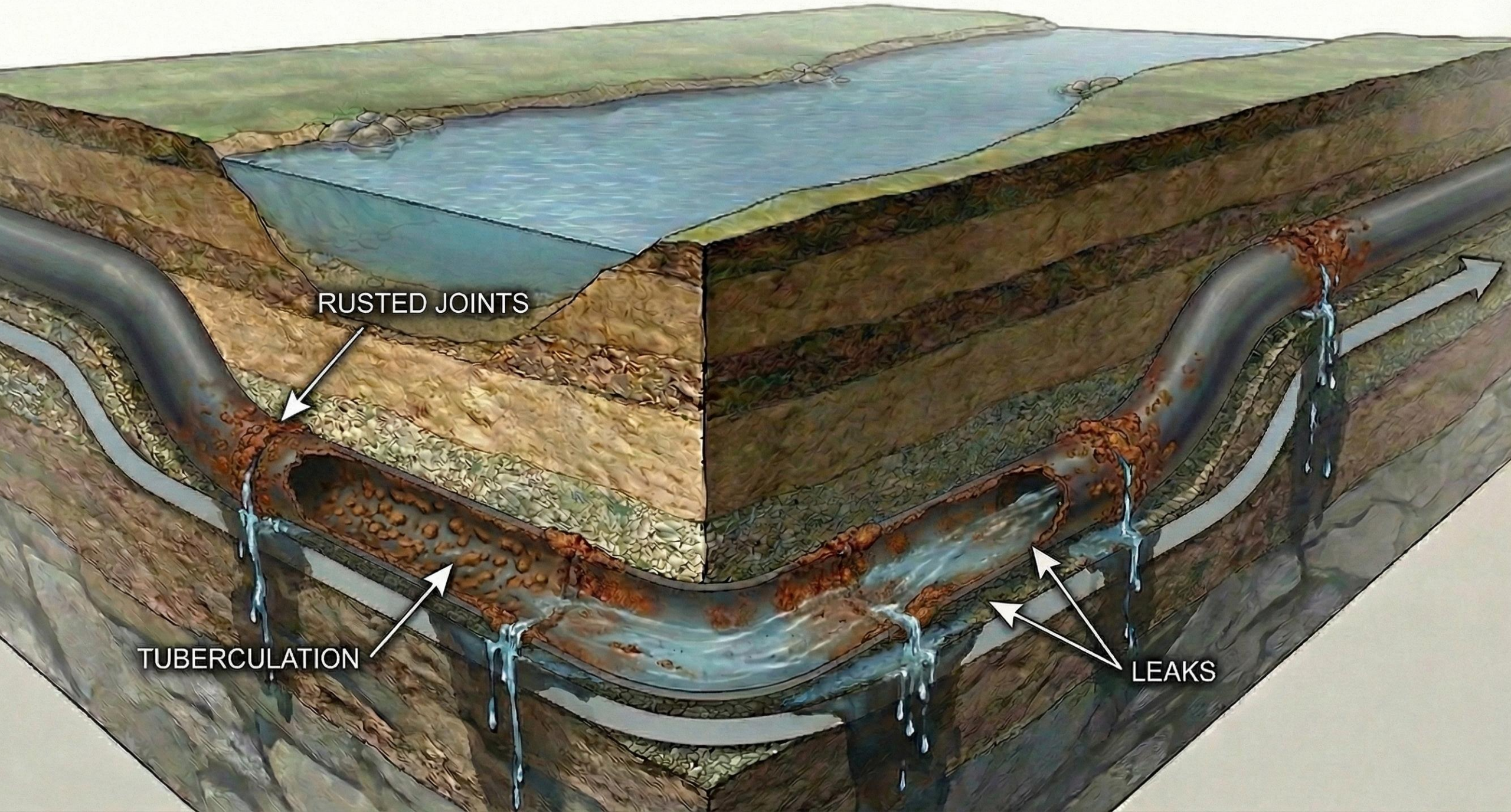




# Each Pixel forms a point in the cloud image of a pipe



Pallon AI



RUSTED JOINTS

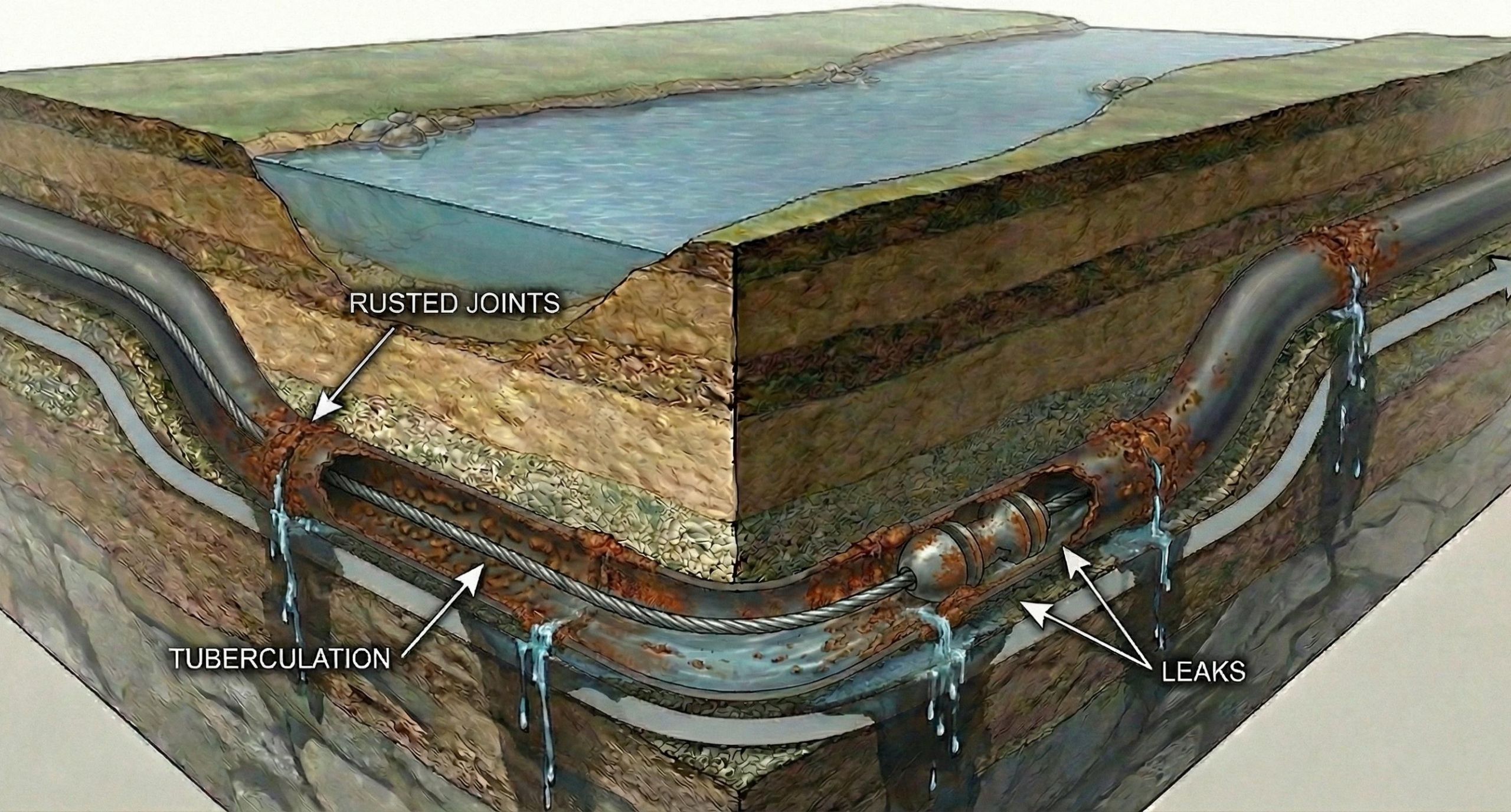
TUBERCULATION

LEAKS



A cross-sectional view of a pipe showing a blue liner installed inside. The pipe's outer wall is heavily corroded and rusted. The blue liner is a smooth, uniform material that fits snugly against the inner surface of the pipe. The text "CLOSE FIT TIGHT LINER ISO11295" is overlaid in white on the blue liner.

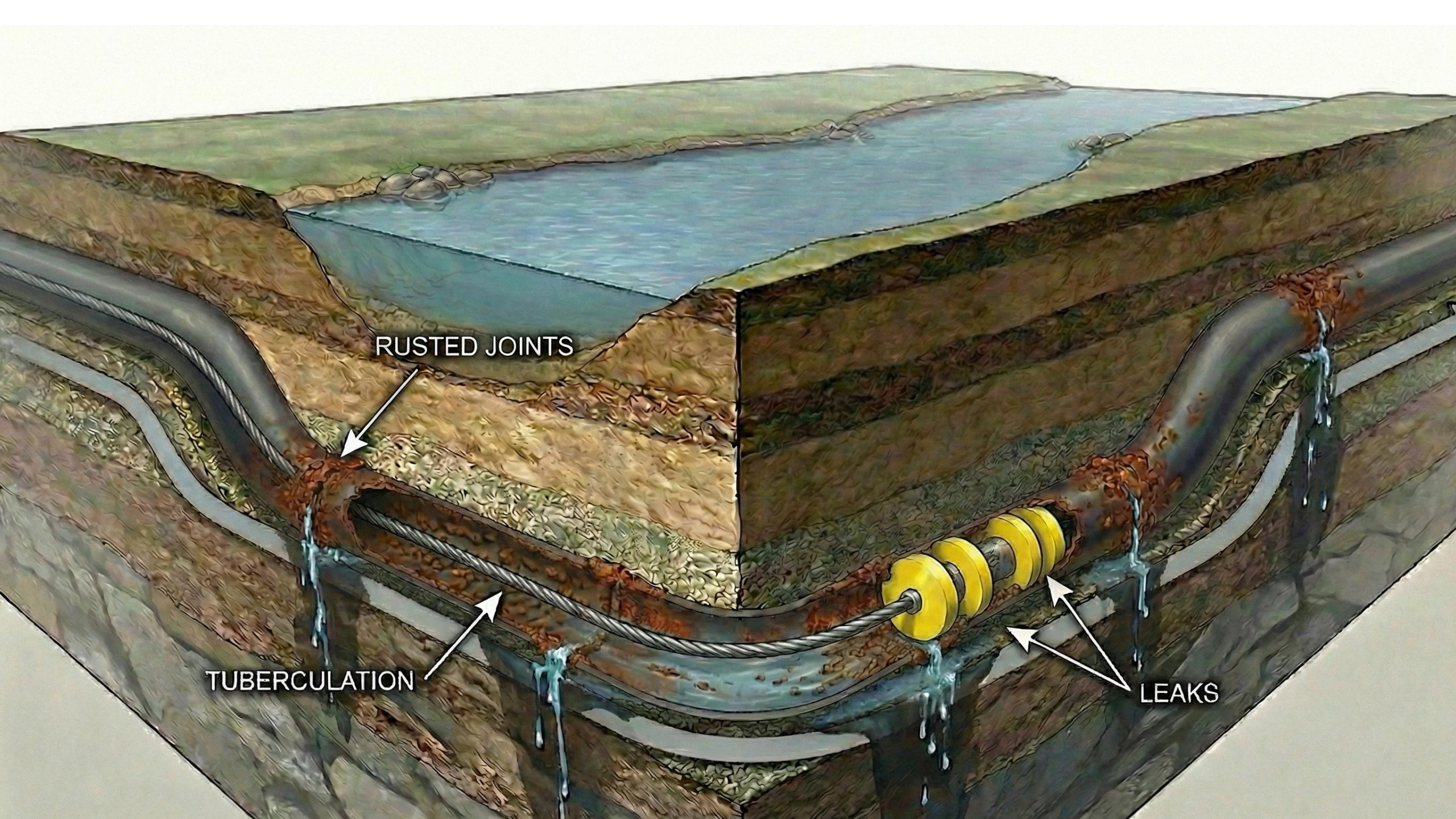
**CLOSE FIT TIGHT LINER ISO11295**



RUSTED JOINTS

TUBERCULATION

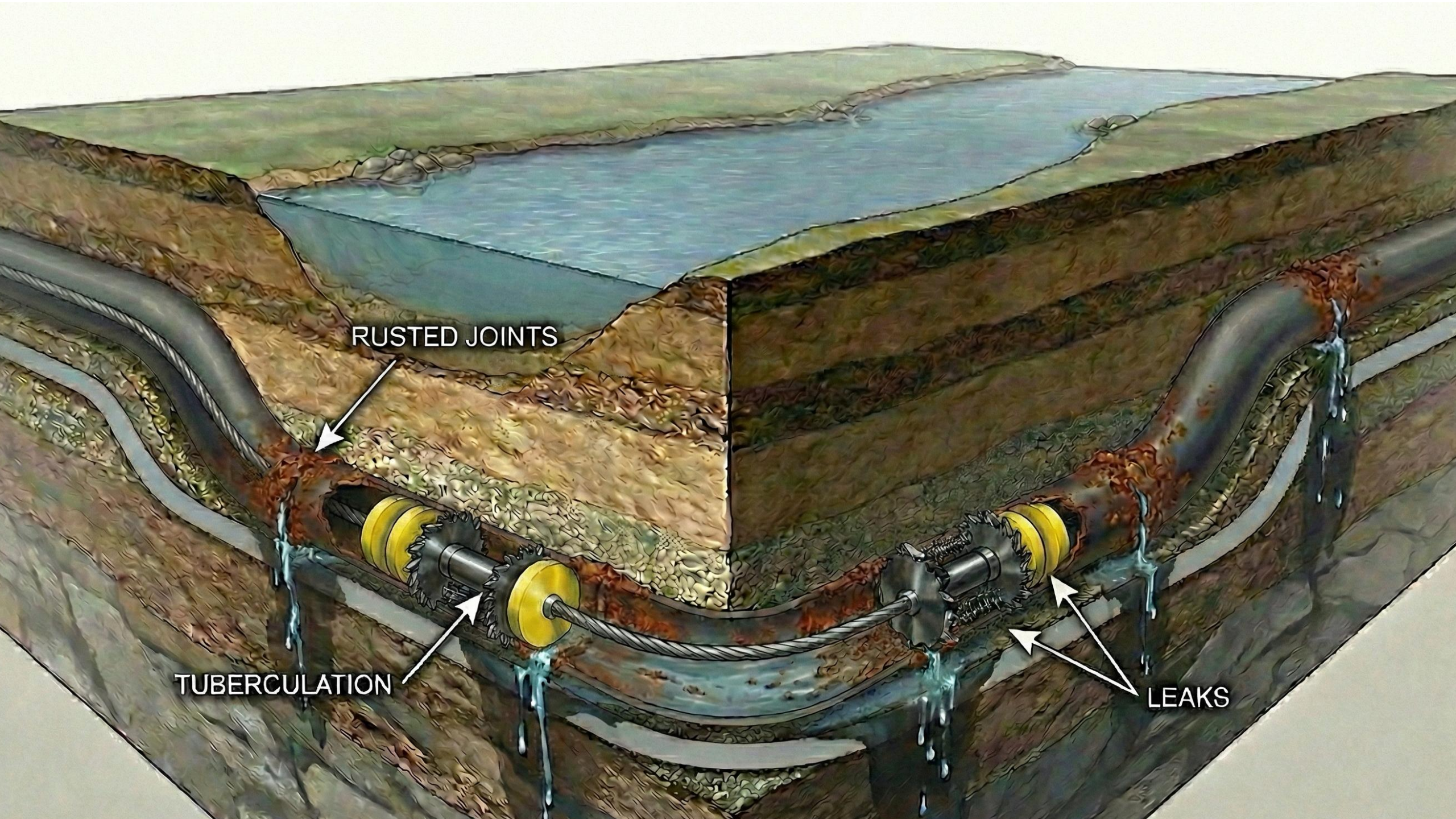
LEAKS



RUSTED JOINTS

TUBERCULATION

LEAKS



RUSTED JOINTS

TUBERCULATION

LEAKS

**Our imagination is our limitation**



# NOTHING LEAVES WITHOUT TESTING







**Radiography**



**Wall Thickness  
Measure**



**Ground Electrical Environment**



**Magnetic Particle Testing**



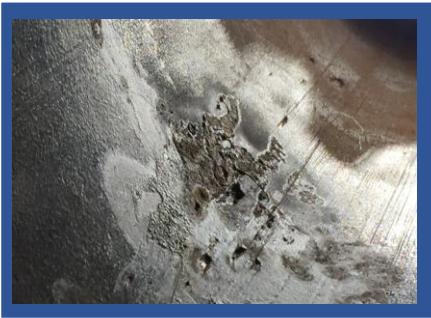
**Current Drainage Test**



**Corrosivity Analysis**



**Coating Defect Survey**



**Visual Inspection**



**Acoustic / Listening**



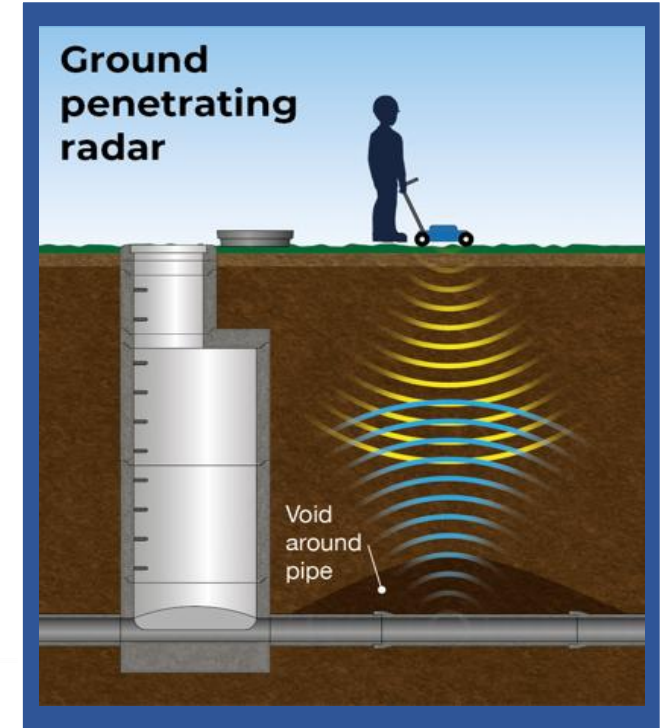
**Voids below pipes & Rebar**



**Desk Top**



**Advanced half-cell Measuring**



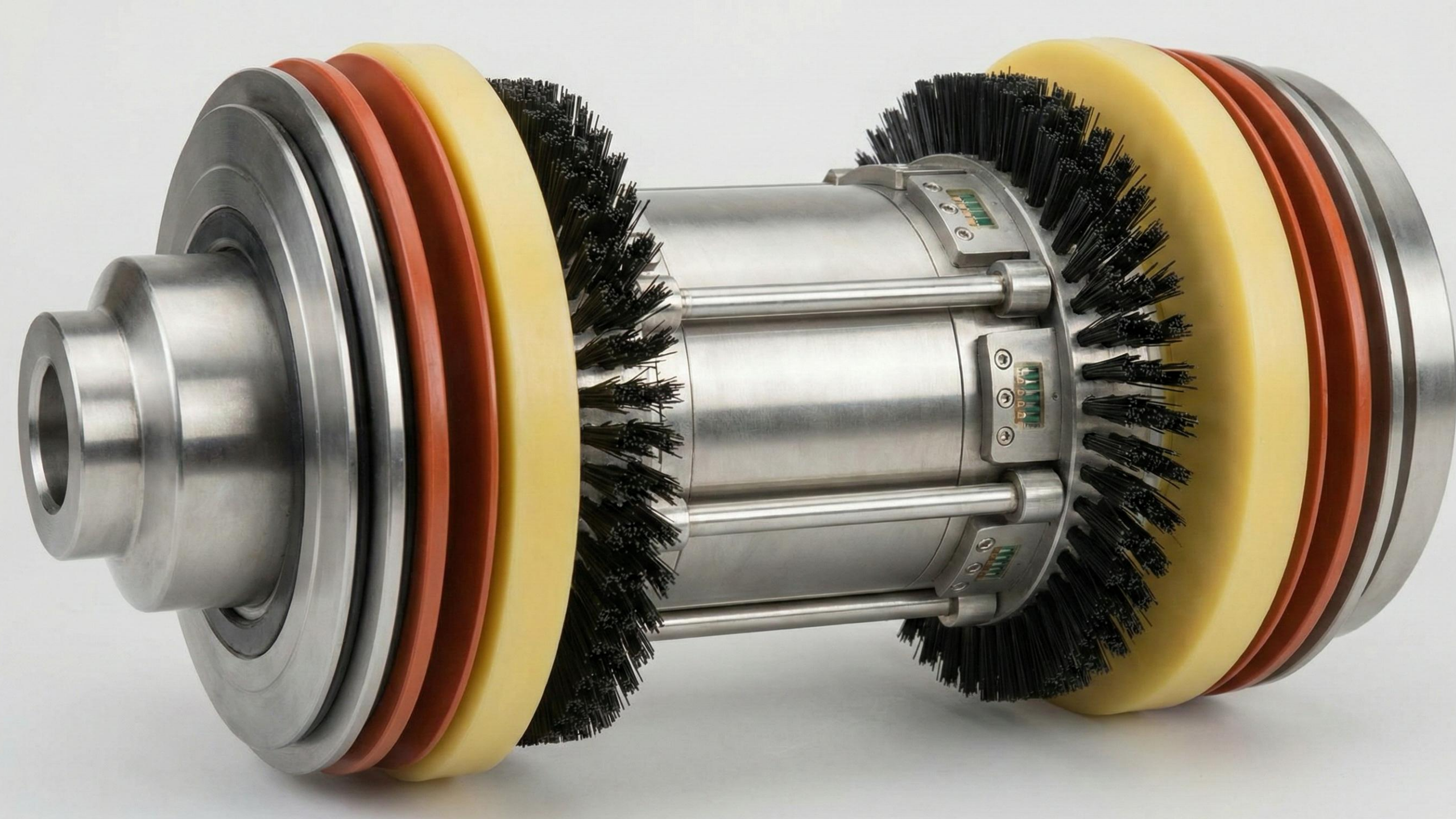
**Ground Penetrating Radar**

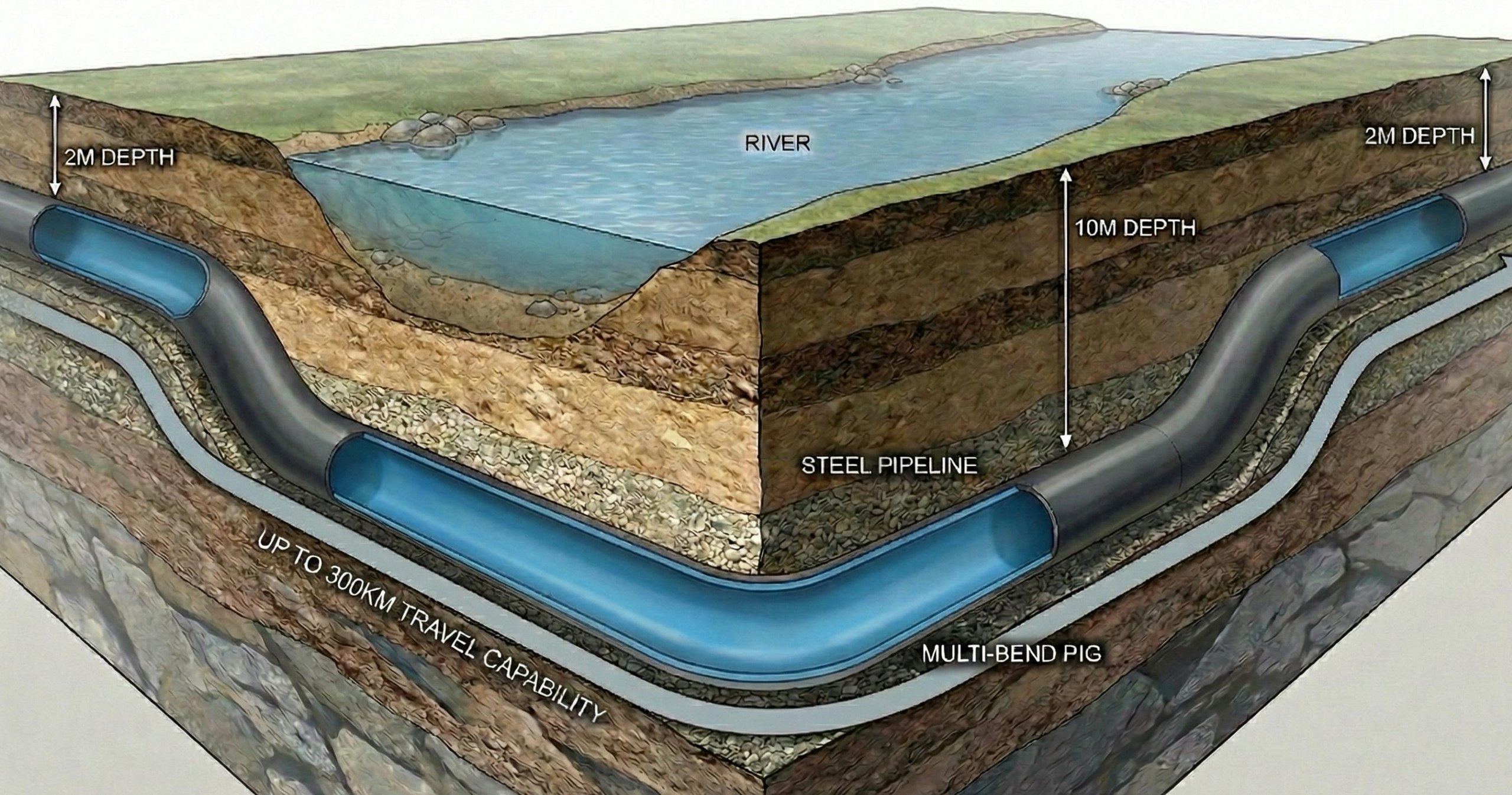


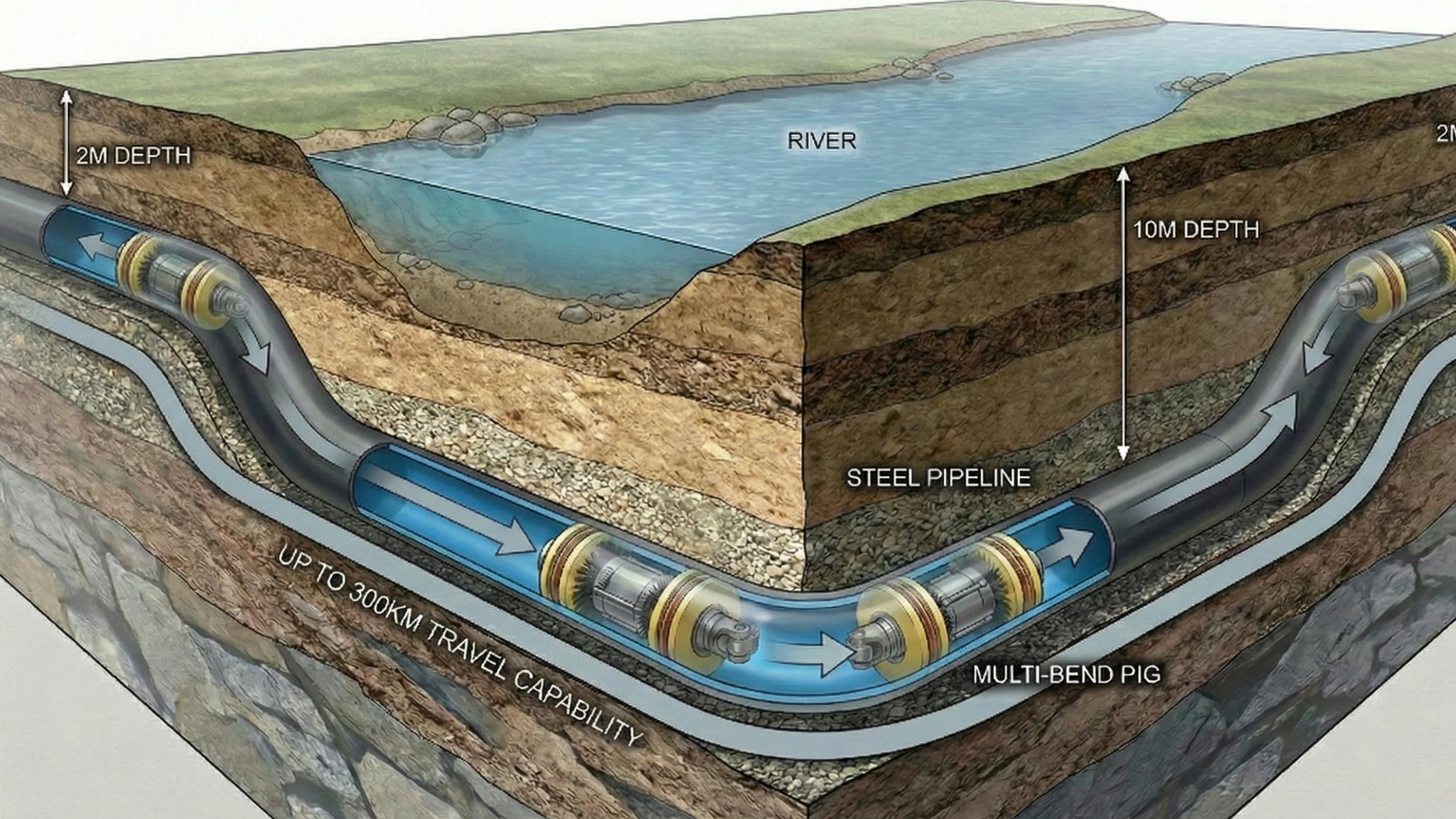
**Noise Loggers**



**Prioritization & Planning**













**Various combinations**

**Be prepared for all scenarios**

# Stage 1: Initial Assessment with a Bi-directional Gauging Pig



# Stage 2:

## Bi-Directional Analysis Gauging Pig Damage

3mm Dent



5mm Gouge



Edge Deformation  
>10mm



**Interchangeable cleaning tips with varying materials**

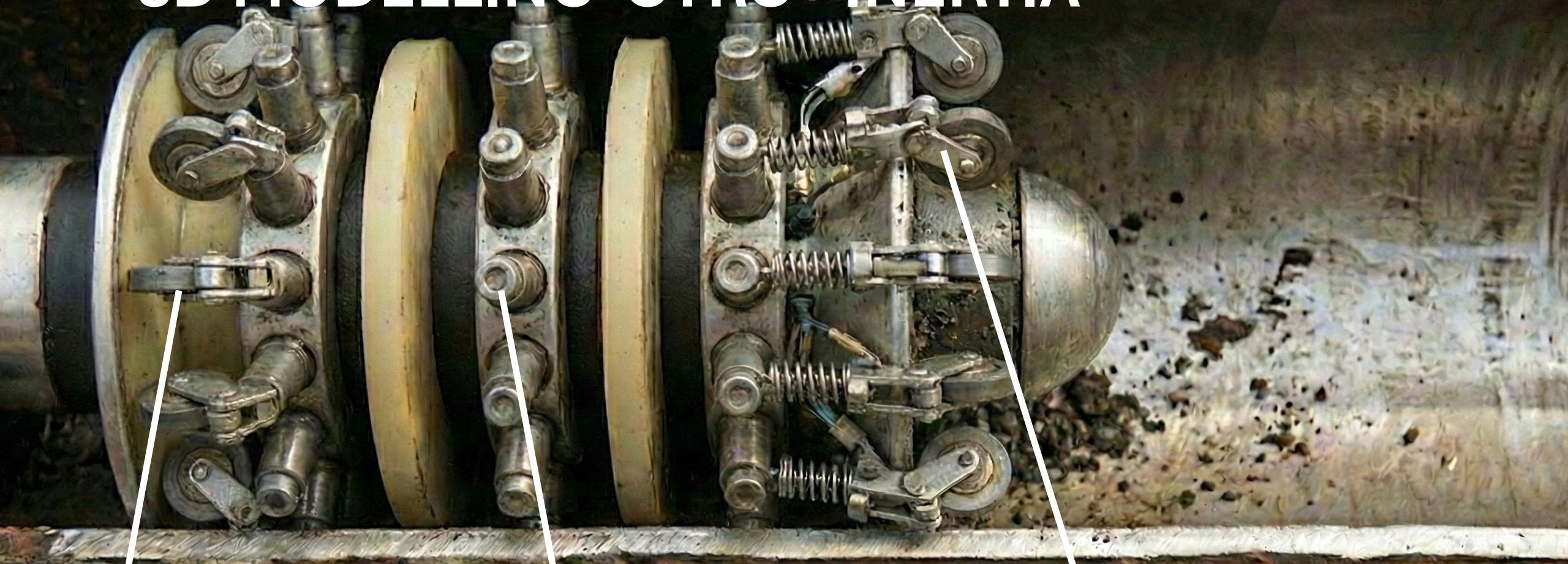


# Stage 4: Cleaning with a Wire Brush Pig



Interchangeable discs with PU / Steel / Brushes

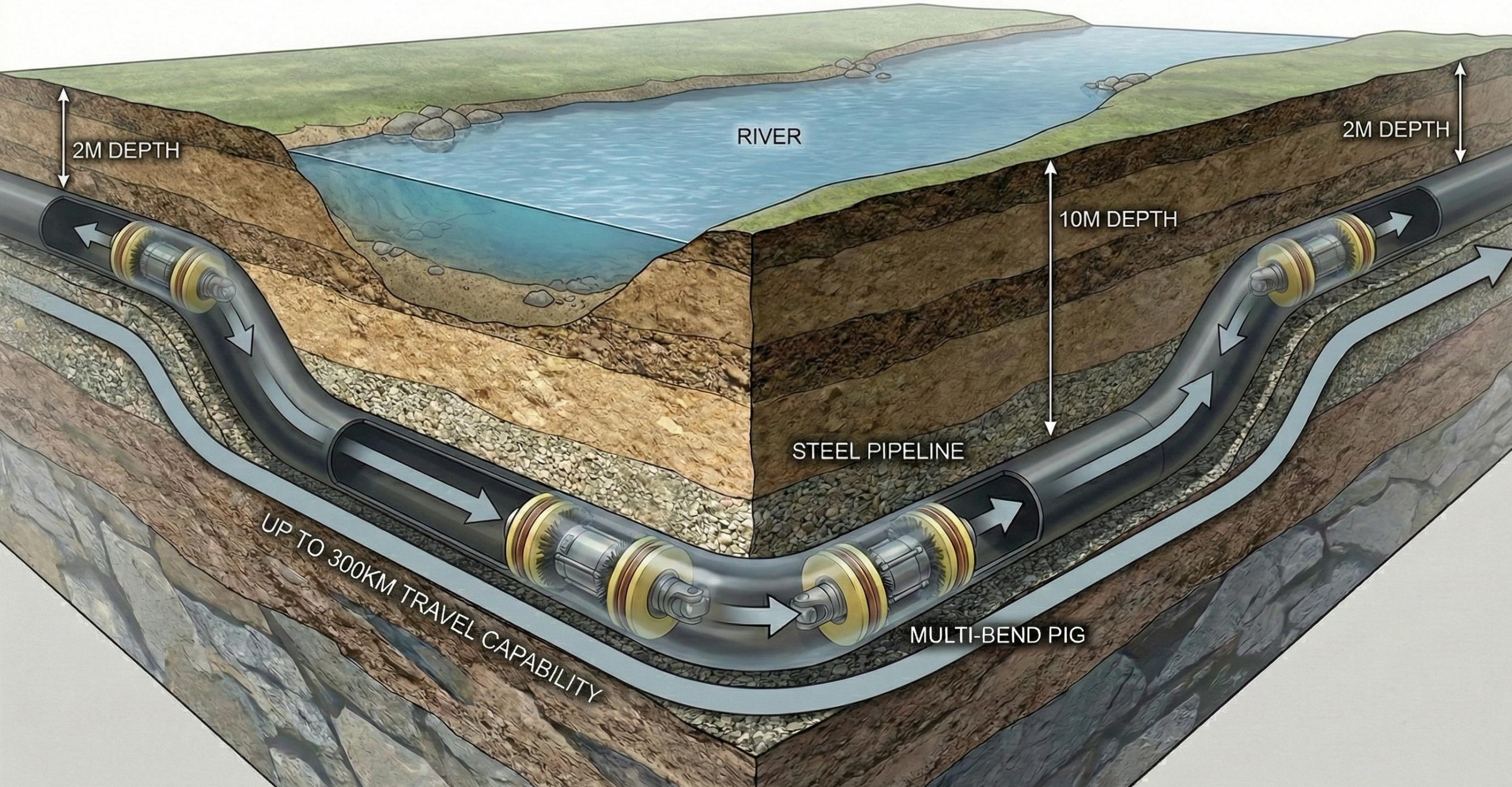
# 3D MODELLING GYRO+INERTIA



Pneumatic loaded measuring wheels

MFL  
SENSORS

Spring loaded measuring wheels



RIVER

2M DEPTH

2M DEPTH

10M DEPTH

STEEL PIPELINE

MULTI-BEND PIG

UP TO 300KM TRAVEL CAPABILITY



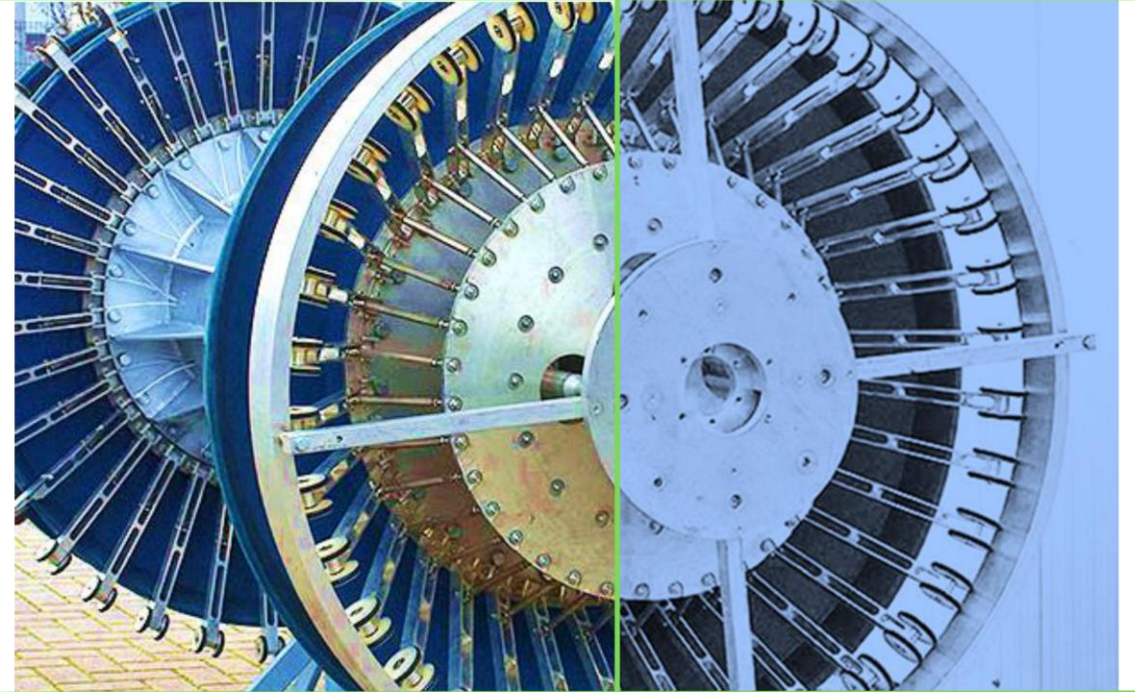
DN200mm 12 kms  
one access point

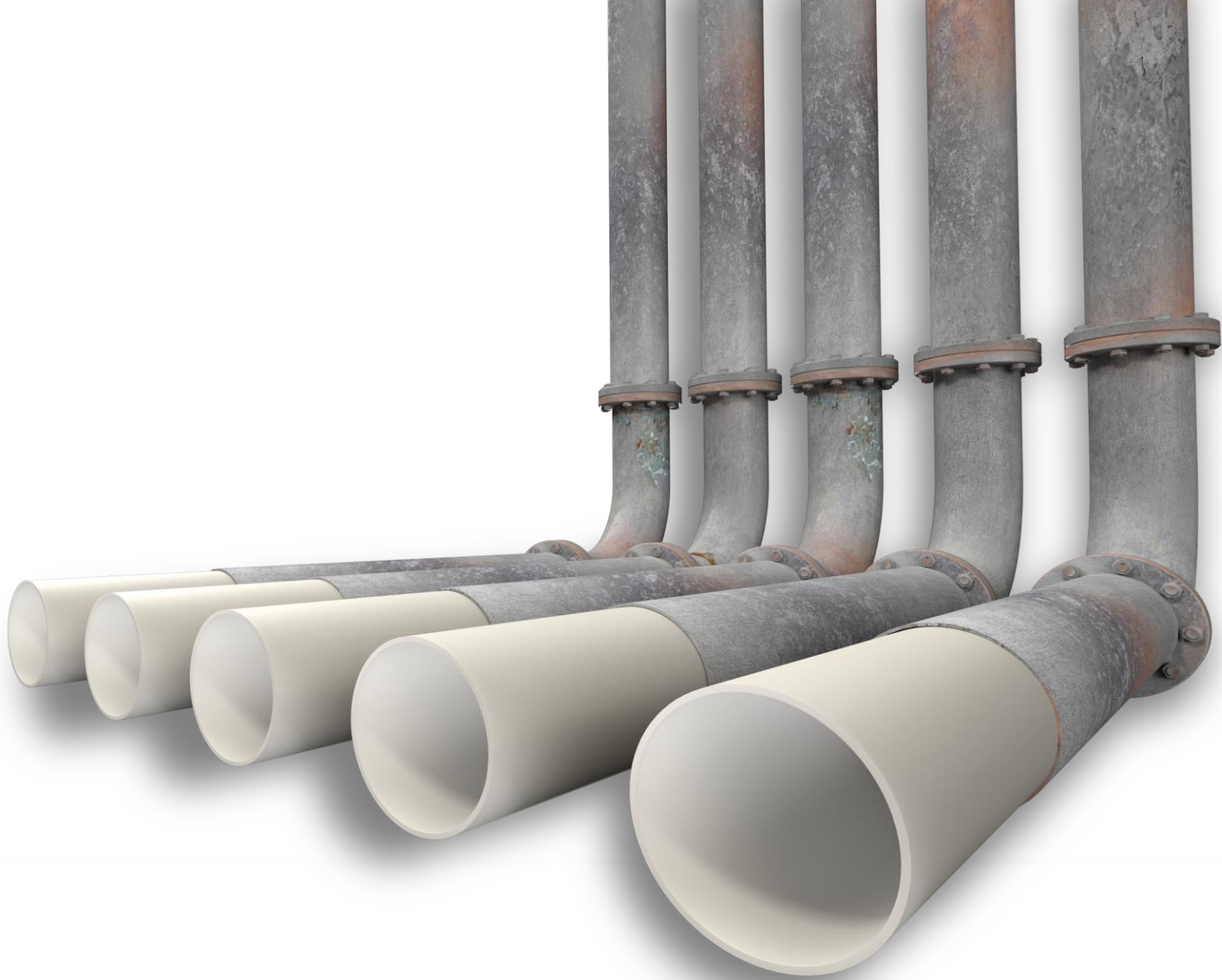
200 Tons removed

# GEOMETRIC INSPECTION SERVICES

## PRECISION INSPECTION & XYZ-MAPPING

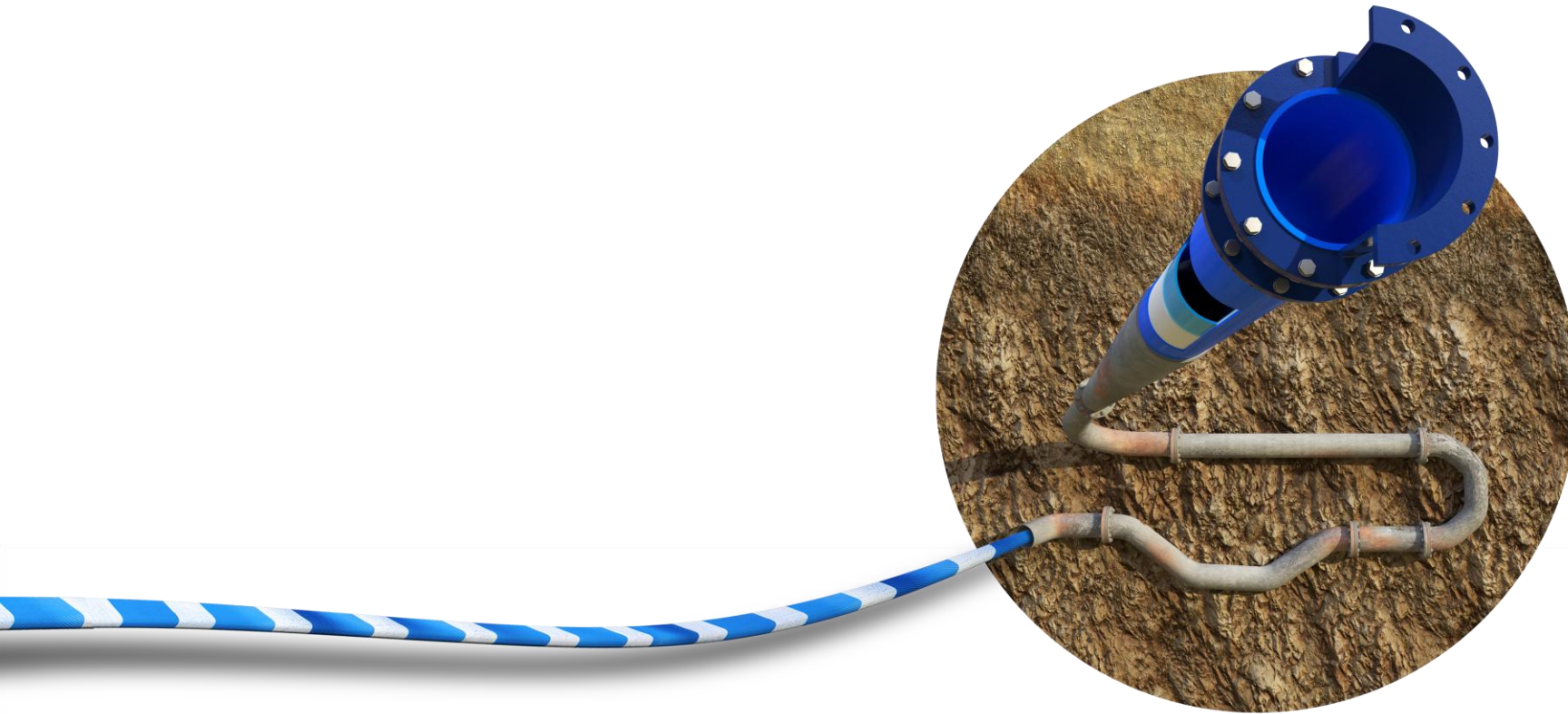
XYZ-Mapping of pipelines,  
Pipe-books – Digital twins  
cleaning of pipelines, provision  
of specialized staff to perform  
service work.

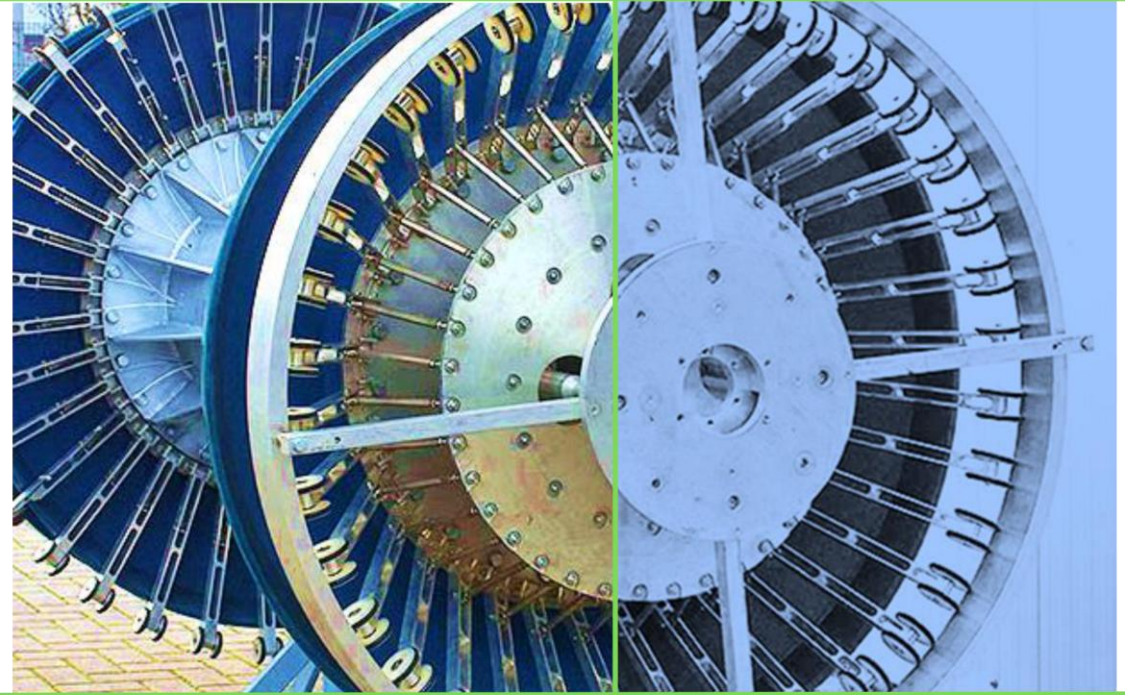




# GEOMETRIC INSPECTION SERVICES

## PRECISION INSPECTION & XYZ-MAPPING





- from 4" to 56".
- **3D Presentation:**
- **Global Success:** Proven performance in both Onshore and Offshore environments.
- **Service Scope:** Position detection, pipebook preparation, and specialized technical consultation.

# GEOPAT MULTICHANNEL TECHNOLOGY

## ADVANCED DEFECT DETECTION: THE GEOPAT SYSTEM

### Capabilities:

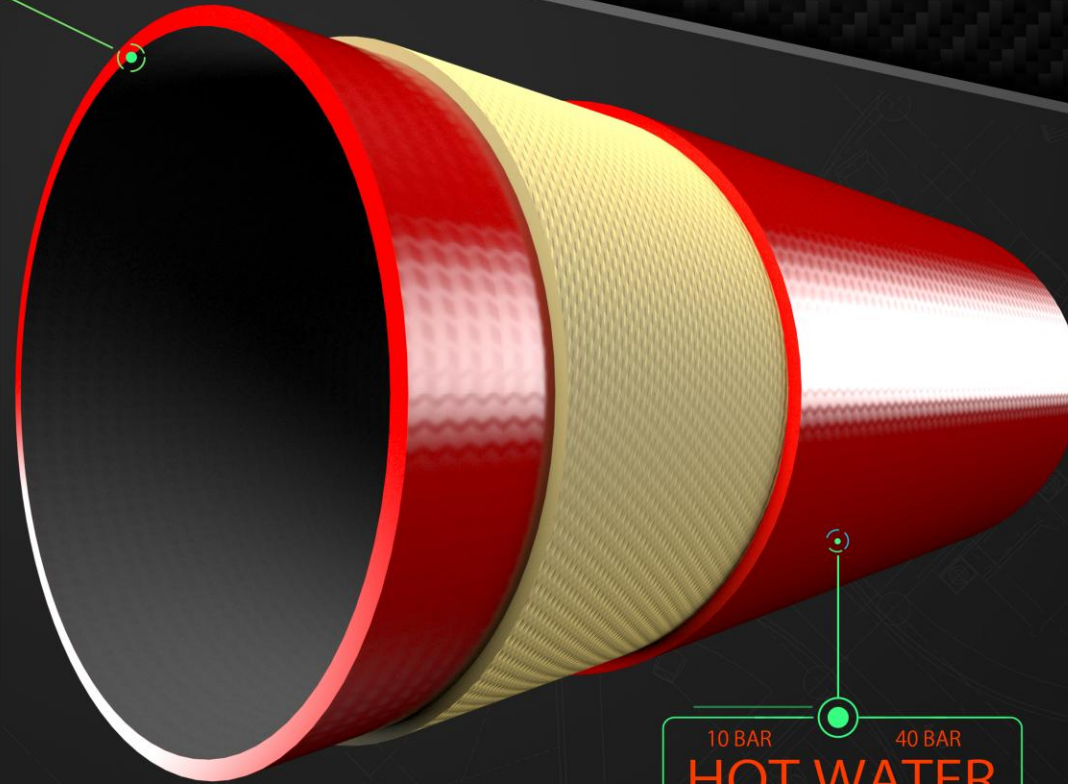
- Detects dents, ovalities, and nominal geometry deviations.
- Highly Adaptable: Individually designed for specific pipeline requirements.
- **Navigation:** Can pass diameter reductions of up to 25%.
- **Mapping:** Precise IMU-based XYZ coordinates for each





## Technical Specification

- Trenchless Solution Type: Semi-structural pipe rehabilitation
- ID of host pipe: DN 50mm – DN 600mm
- Max Length of each installation: Depends on diameter
- Max Operating Pressure: 1 – 4 Mpa (10 – 40 Bar)
- Max Bursting Pressure: 3 – 12 Mpa (30 – 120 Bar)
- Temperature of medium: 40° C - 95° C
- Installation mode: Pull in U-shape Liners
- Raw Materials: High tenacity fabric reinforcement layer (Kevlar/Aramid), heat resistant PUX cover, heat resistant PUX tube
- Abrasion resistance (DIN53516) 10.5mm<sup>3</sup>
- Wall thickness: 6mm – 8mm
- Pulling speed: up to 400m/h
- Service Life: 40 years

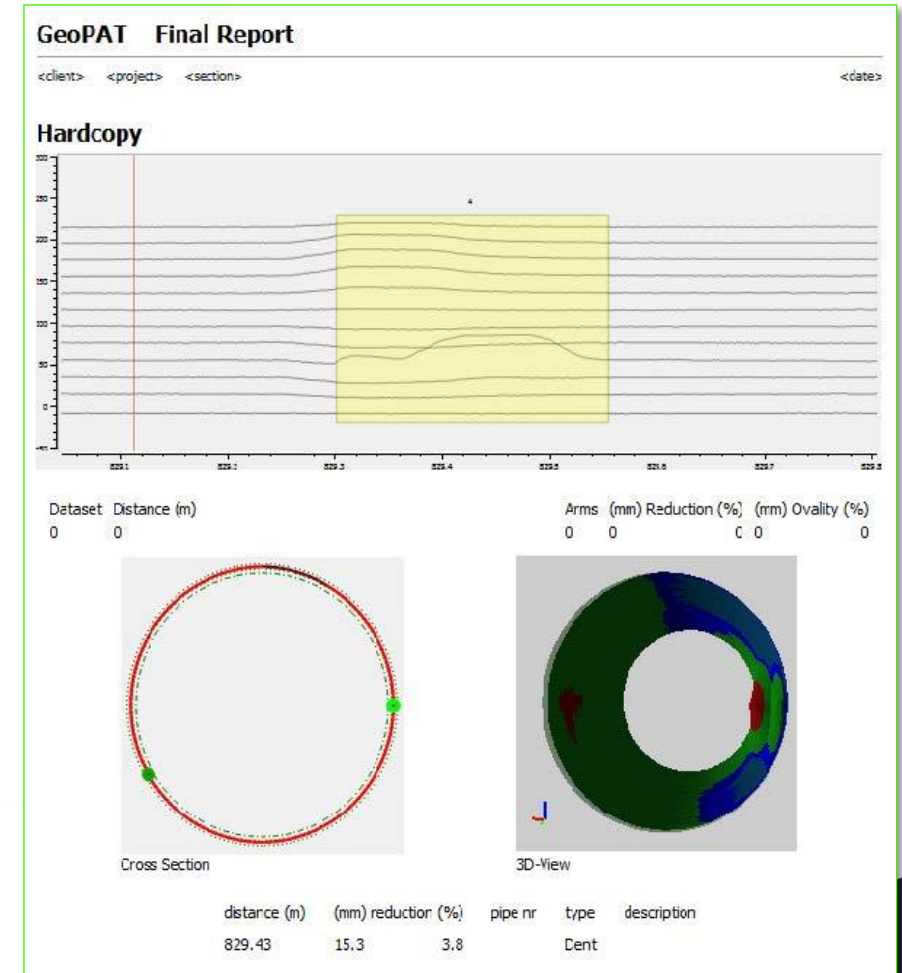
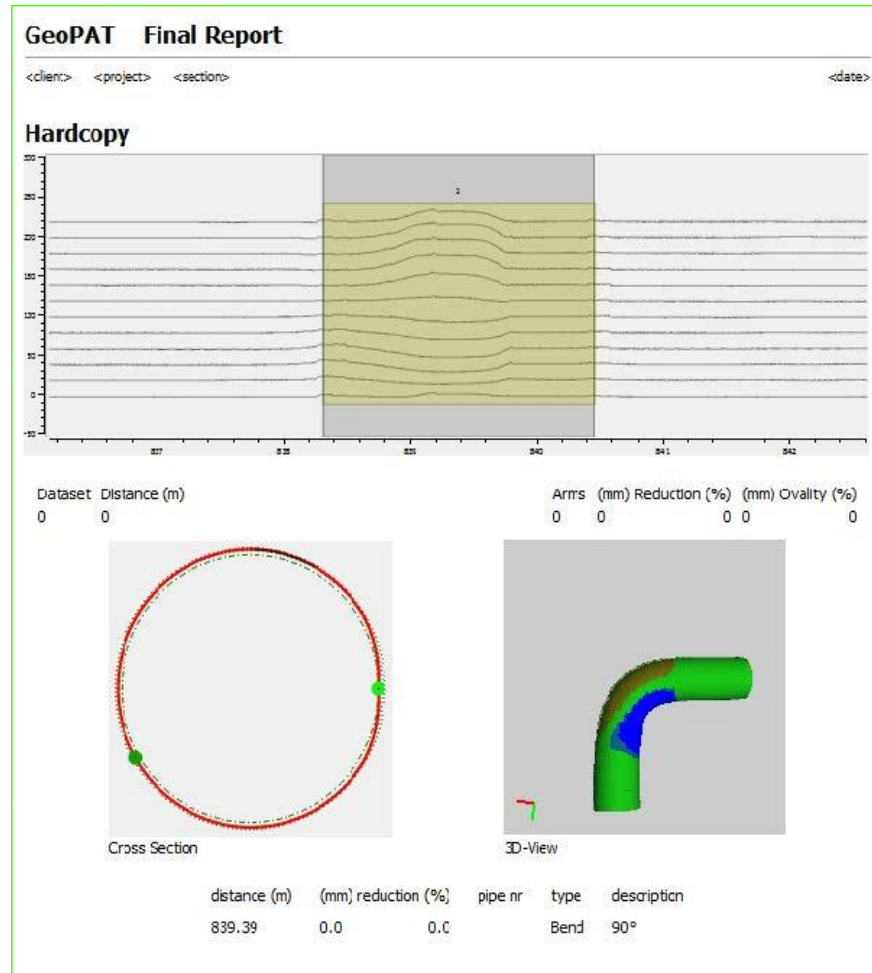


10 BAR 40 BAR  
**HOT WATER**

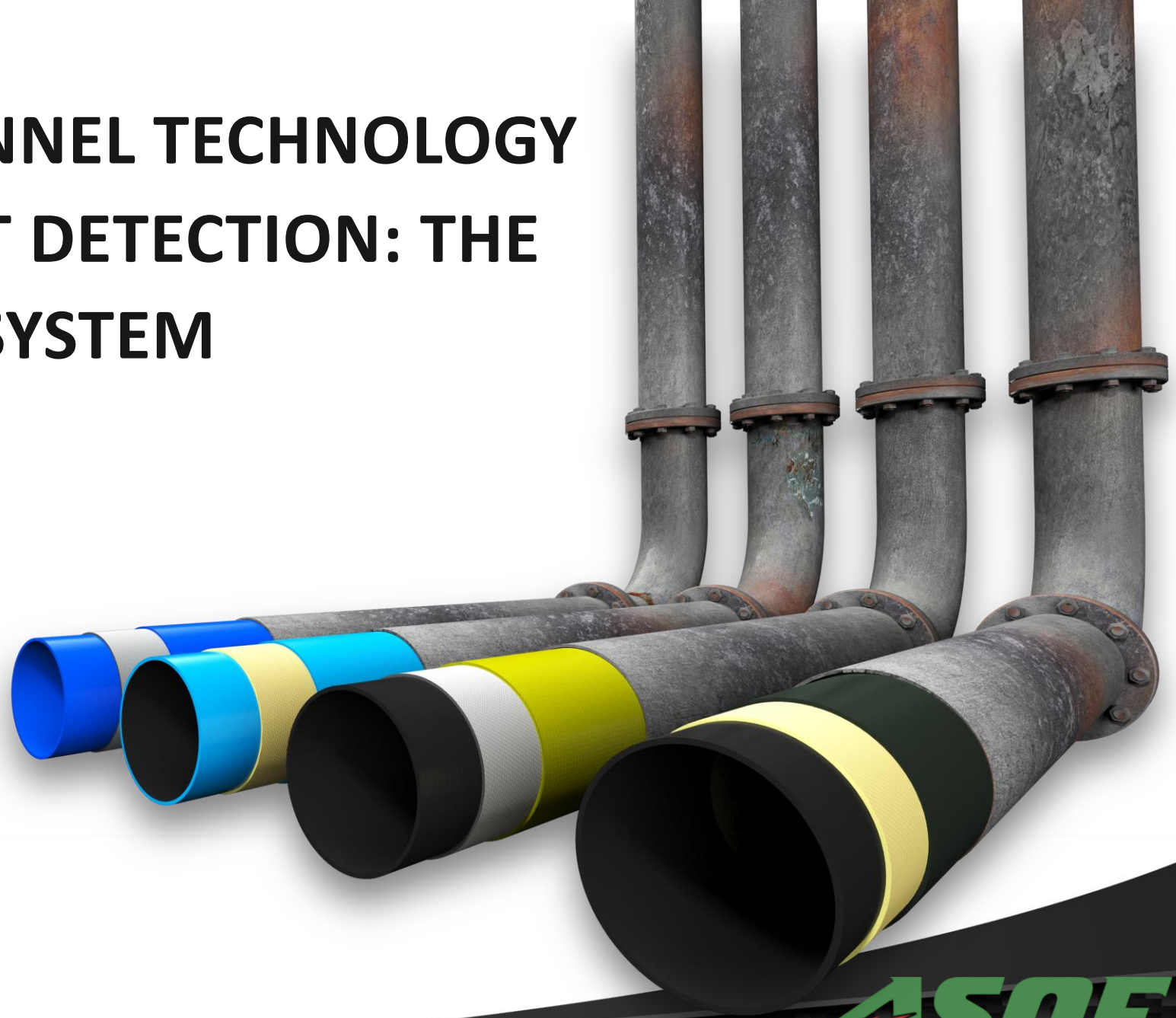
# GEOPAT MULTICHANNEL TECHNOLOGY

## ADVANCED DEFECT DETECTION: THE GEOPAT SYSTEM

Specially developed state-of-the-art software for the evaluation of the measurement data, which enables a comprehensive and high-resolution 3D presentation of the recorded data.



# GEOPAT MULTICHANNEL TECHNOLOGY ADVANCED DEFECT DETECTION: THE GEOPAT SYSTEM





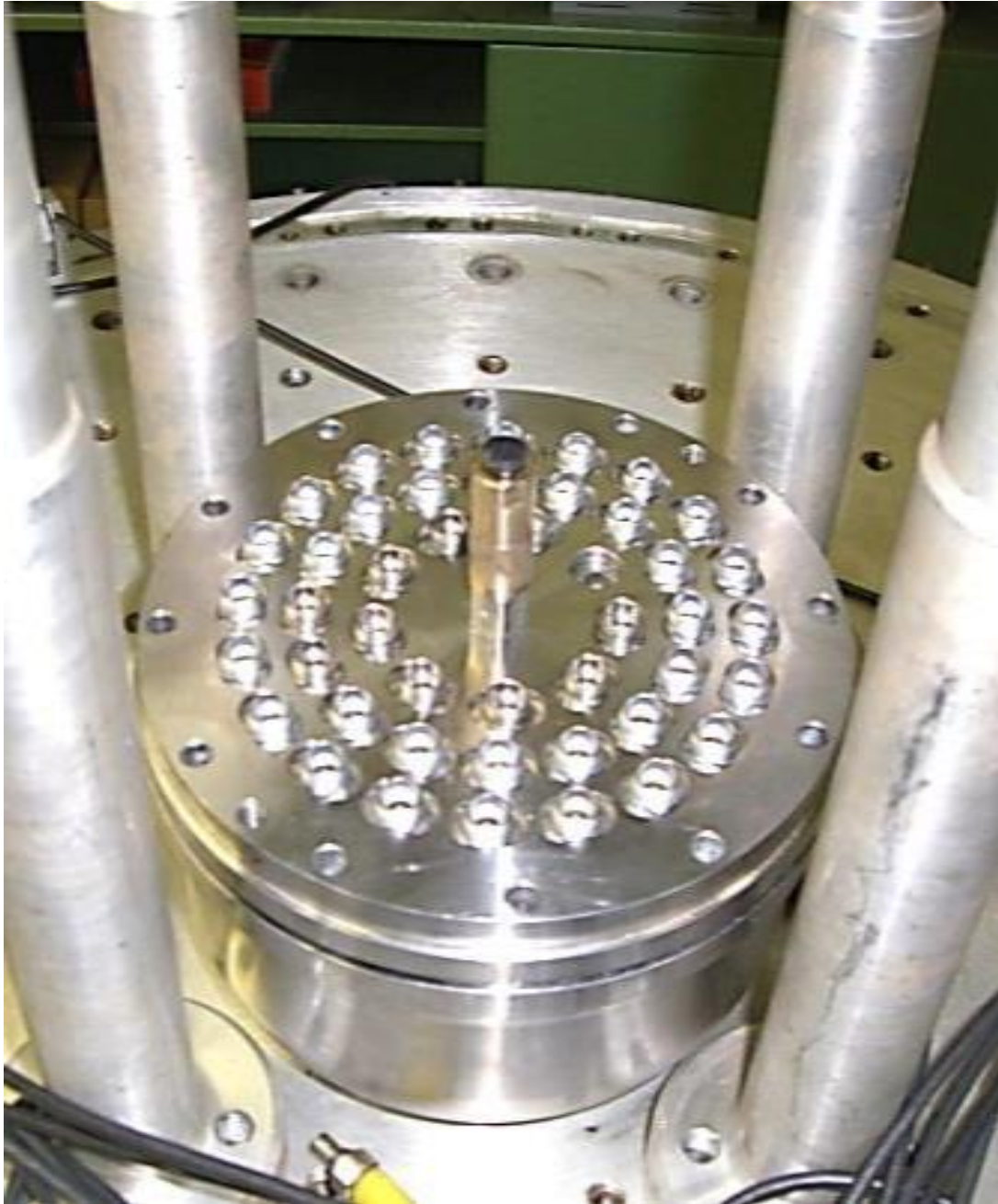
PU-coated  
odometer wheels



Data storage with power supply  
system in a pressure-proof case up to  
100 bar



One or more pig bodies made of high-quality aluminum or stainless steel in adapted design, depending on the project. Optionally as multichannel and/or single channel sensing system.



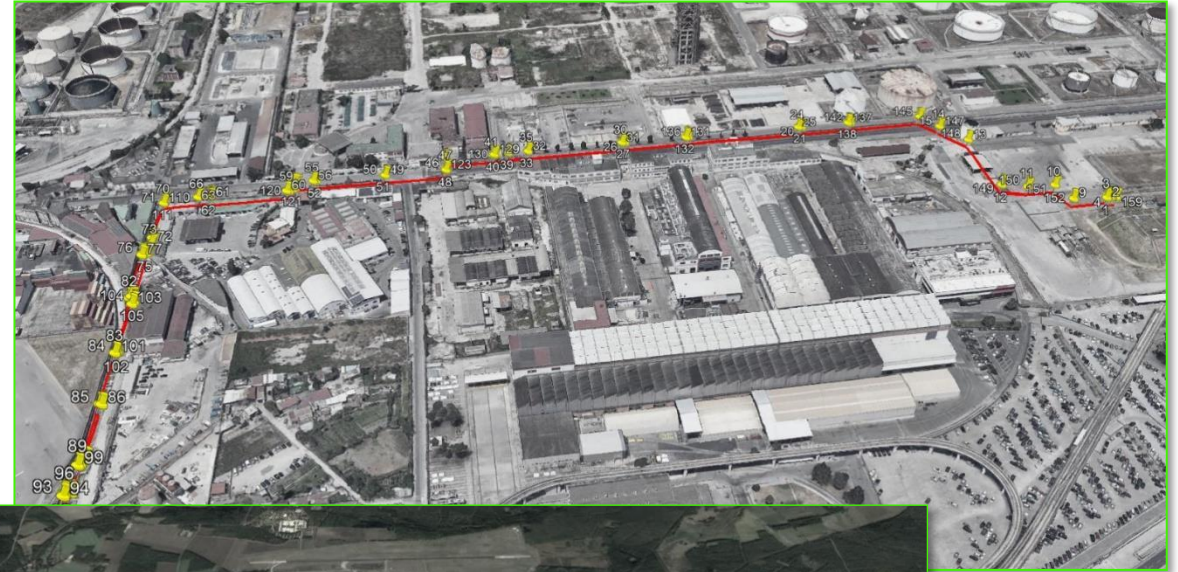
Recorder with  
IMU-system  
(Internal  
Mapping Unit)



# MAPPING & GPS INTEGRATION

## ACCURATE PIPELINE POSITIONAL DATA

- **MEFS GeoPAT Tool:** Equipped with IMU and powerful transmitters.
- **Data Standards:** Outputs in GIS, WGS84, UTM, and Google Earth compatible formats.
- **Outcome:** Accurate "Final Reports" including mapping of every critical pipeline feature.



# PIPELINE RANGE – PIGS & SCRAPERS

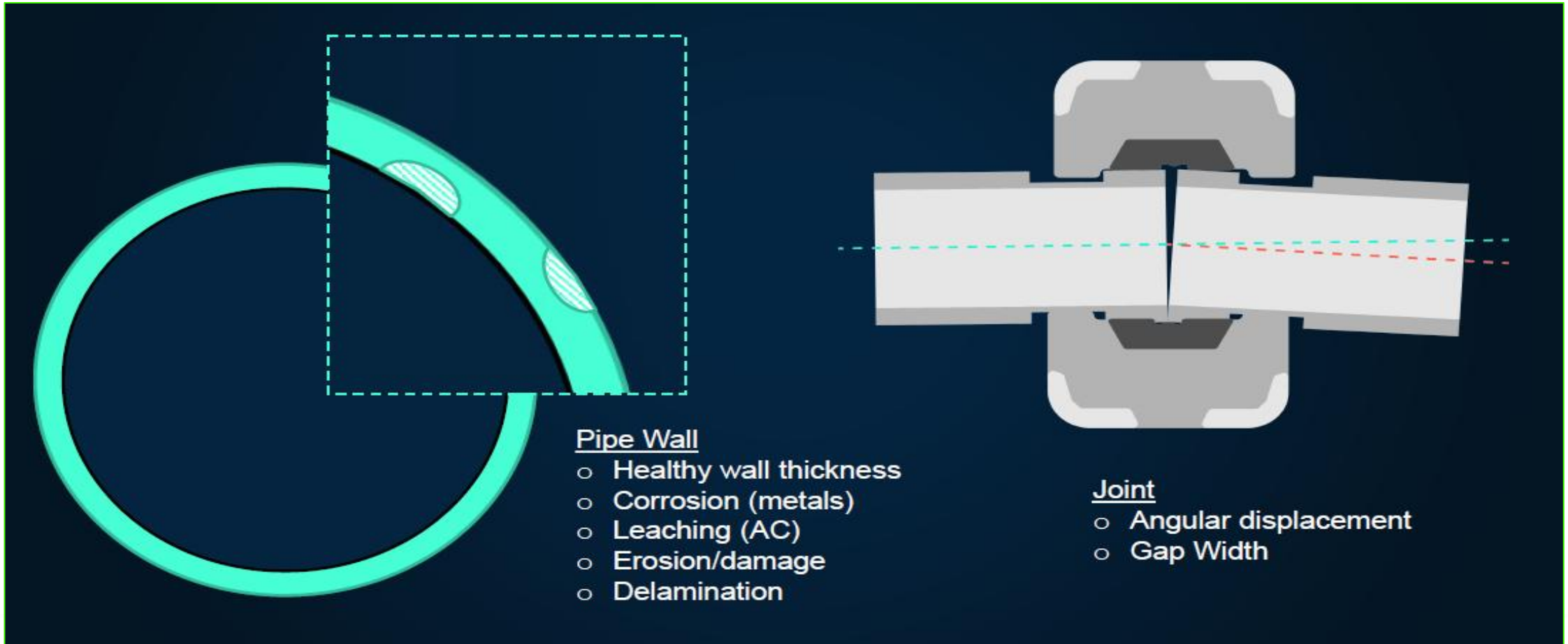
## SPECIALISED TOOLING FOR PIPELINE INTEGRITY

### Products:

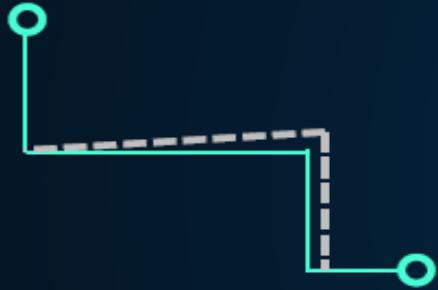
- **Bi-Directional (Bi-Di) Pigs (4" – 56"):**
  - Applications: Cleaning (brushes), Magnetic (debris removal), Gauging, and Filling.
  - Material: Ultra-durable Polyurethane discs/cups.
- **Foam Pigs (2" – 64"):**
  - Available in Low, Medium, and High densities.
  - Options: Polymer strips (criss-cross) or brush-equipped.



# WHAT CAN A PIG MEASURE?



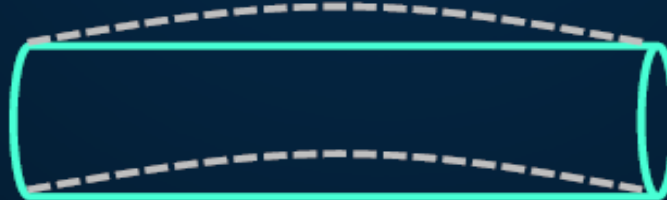
# WHAT DO YOU MEASURE?



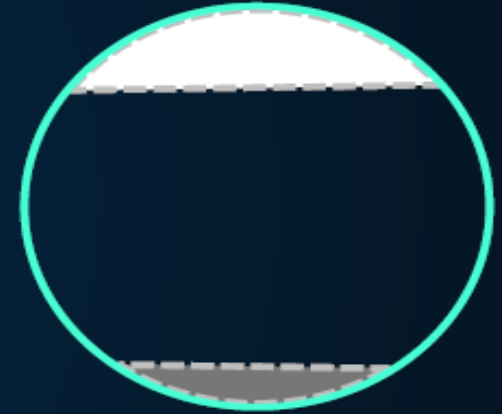
- XYZ-mapping



- Roundness/Ovality

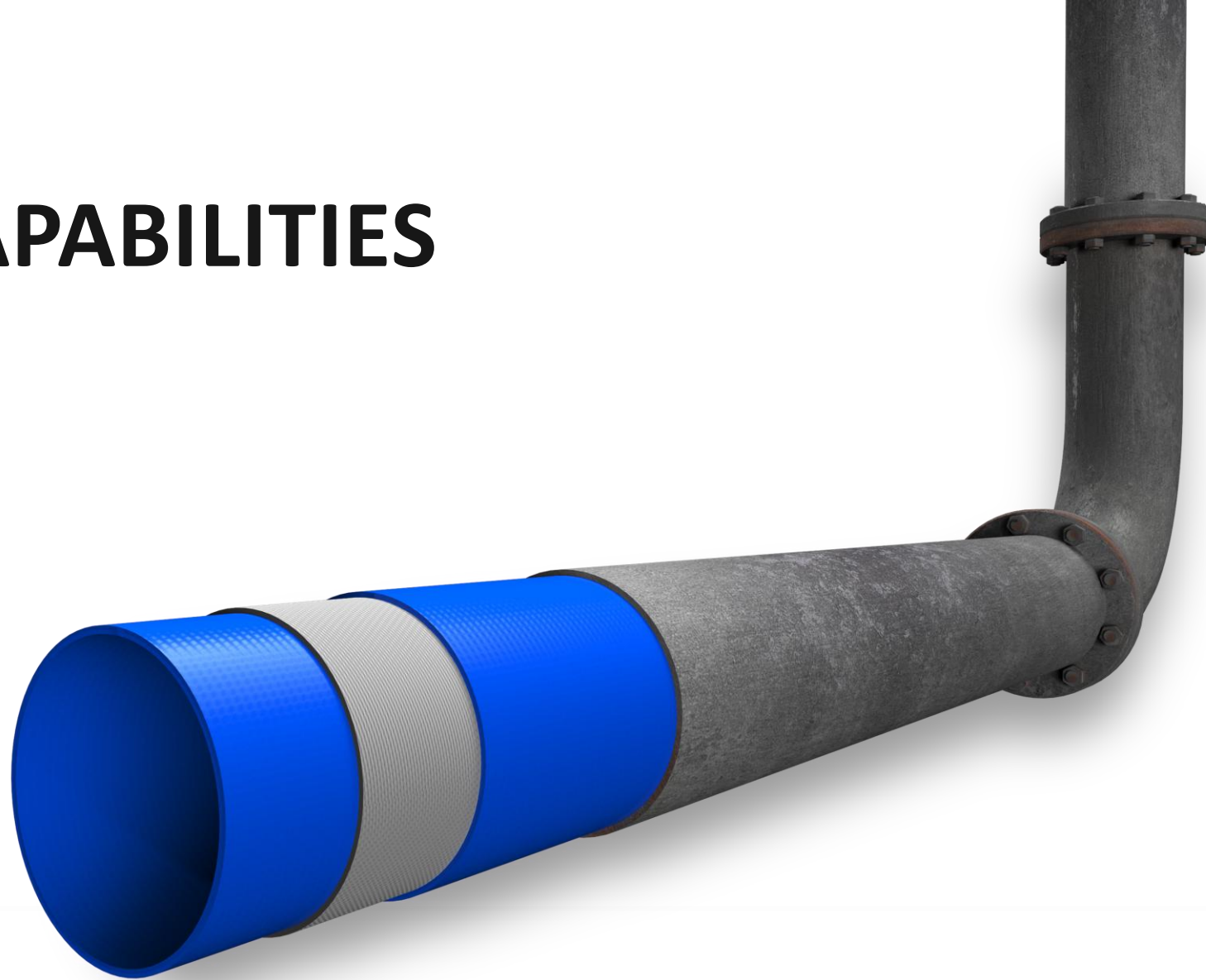


- Axial deformation



- Air pockets
- Debris

# CAPABILITIES



Measurement (accuracy)	Steel/DI/Ci	Prestressed Concrete	Asbestos Cement	PCCP	Plastics (PE/PVC/GRP)
XYZ Mapping (0,5 m)	x	x	x	x	x
Wall Thickness (0,49 mm)	x (corrosion)	x	x (leaching)	x	x (delamination)
Joint Angular displacement (0,25°)	x	x	x	x	x
Joint Gap With (4,0 mm)	x (or condition welds)	x	x	x	x
Ovality (0,5%-point)	x	x	x	x	x
Axial Deformation (0,2 m)	x	x	x	x	x
Leaks (>13.0 dB)	x	x	x	x	x
Air pockets	x	x	x	x	x
Debris	x	x	x	x	x
Wire break		x		<i>Under development</i>	

# COMMITMENT TO QUALITY & SAFETY

## CERTIFIES EXCELLENCE

### Certifications:

**ISO 9001:** Quality Management

**ISO 45001:** Occupational Health and Safety

**SCCP:** Health and Safety Management

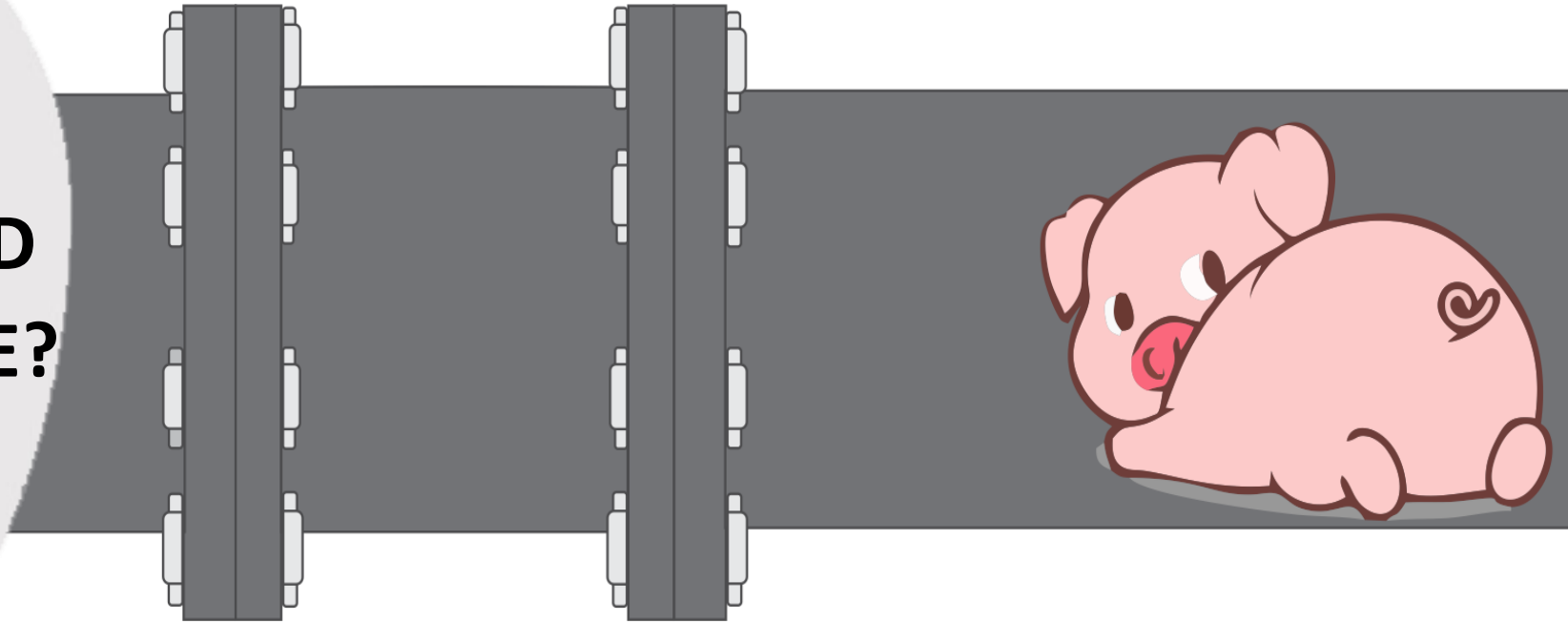
**BSI:** British Standards Institution Validation

Our geometry tests have been successfully performed in onshore as well as in offshore pipelines.



# THE DIFFERENCE BETWEEN PIGGABLE & UN-PIGGABLE PIPELINES

**QUESTION: WHERE DID PIGGING GET ITS NAME?**



**ASOE – YOUR PARTNER IN PIPELINE INTEGRITY**

**THANK YOU**

- DEON POHORILLE
- DEON@ASOEPIPE.CO.UK
- +49 17 632 983 129

