



# Advantages using 3D Scanner to evaluate corrosion or damages

Rev. B

SEIKOWAVE INC.

# Spec of 3D Scanner

## Outlook



3DT-LCG-01/02

## Specification

- WD (Working distance )
  - 3DT-LCG-01B : 350mm ~ 600mm
  - 3DT-LCG-02B : 160mm ~ 240mm
- Measurement volume (nominal)
  - 3DT-LCG-01 : 300mm x 150mm x 250mm
  - 3DT-LCG-02 : 130mm x 80mm x 80mm
- Resolution of point cloud (distance between points)
  - 3DT-LCG-01 : 0.4mm typical
  - 3DT-LCG-02 : 0.2mm typical
- Effective camera pixels  
300K pixels
- Camera frame rate & capturing time  
90 frames per second (120fps max)  
0.3 second
- Camera exposure time  
Variable by sliding bar (1ms~8ms)
- Standard deviation of point cloud in depth (Z)  
+/-50um or less
- PC interface  
Gigabit Ethernet
- Power supply  
DC +12V~+24V
- Dimension & weight  
205mm x 105mm x 65mm, 1.7Kg

# Application

## Evaluation of pipes, vessels

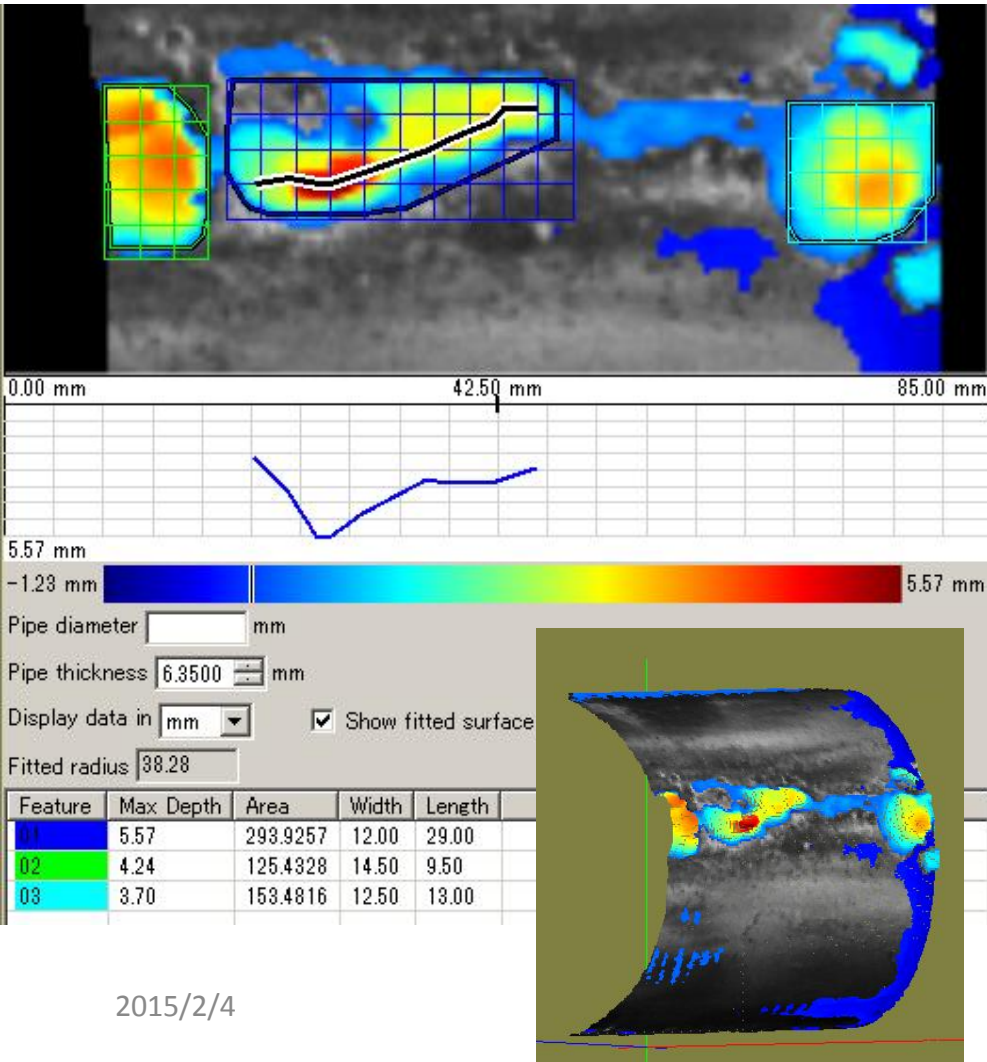
- Corrosion or dents on pipes
  - Measure and analyze
    - The depth and metal loss of corrosion on pipes or vessels
    - The depth of dents of pipes
  - Calculate
    - The remaining strength of pipes or vessels to determine if the pipes or vessels are strong enough to operate
  - Regulations
    - API 579
    - ASME B31G/FFS-2
- As a result
  - Prevent from
    - Explosion
    - Leakage

## Measurement of concrete

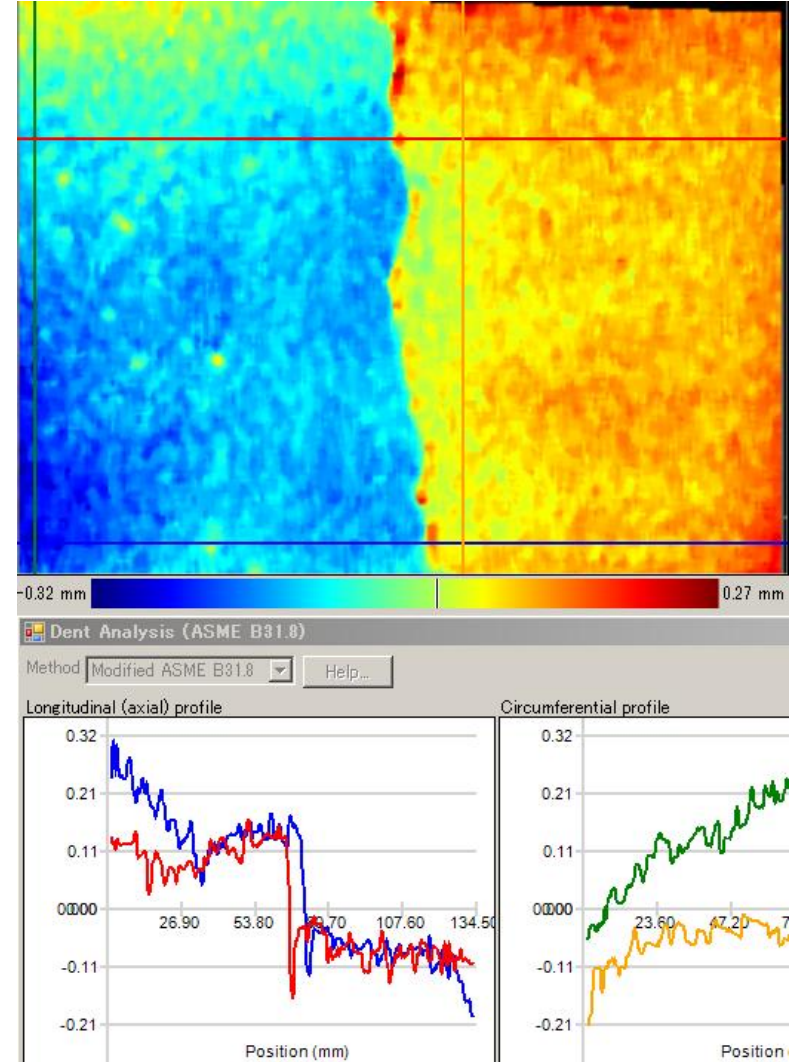
- Damages, cracks, peelings, floats or metal loss of bolts on
  - Bridges
  - Tunnels
  - Ports
  - Roads
  - Runways
- As a result
  - Prevent from
    - Corruption
    - Fall
    - Severe accidents

# Application

## Evaluation of pipes, vessels



## Measurement of concrete





# Major advantages

## High efficiency and accuracy

- When trying to measure corrosion
  - Ready to use and ease of use
    - No calibration needed at all, any time
    - No need to draw grids on surface
    - 300K coordinates in 3 seconds
    - Analysis software built-in
    - Easy to transfer data to FEM analysis
  - High accuracy and repeatability
    - $\pm 30\mu\text{m}$  ( $1\sigma$ )
  - Comply to world standard
    - API-579 Fitness-for-service

## Make impossible possible

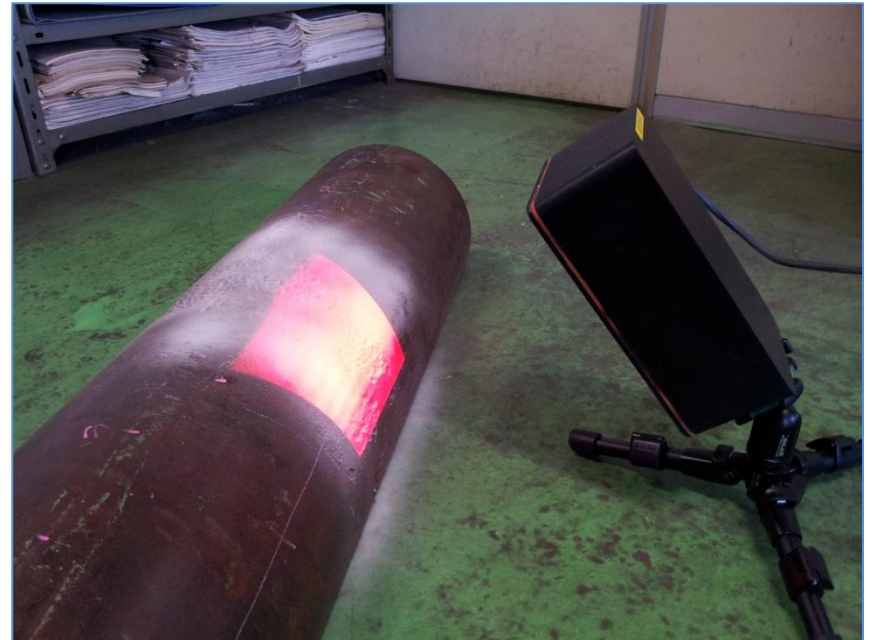
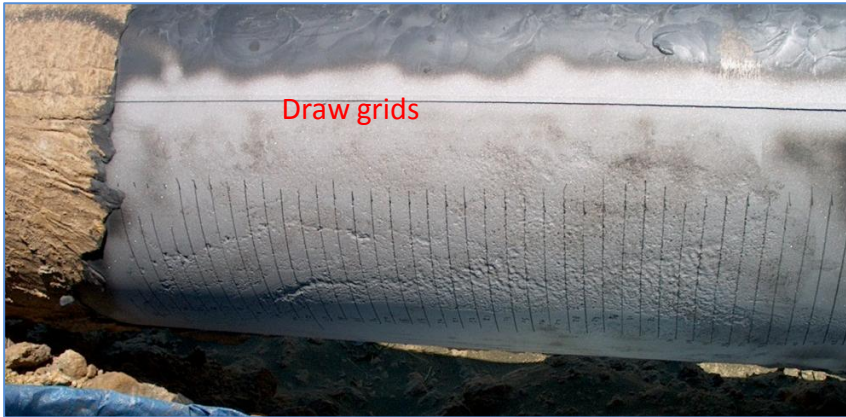
- When trying to record damages on bridges, roads or tunnels
  - Make impossible possible
    - Past – rely on DSC
      - No coordinate data
    - Now – 3D coordinates
      - Absolute dimension
      - Easy to calculate lost volume or depth or height
      - Embed texture information

# How to measure

Past (manual)

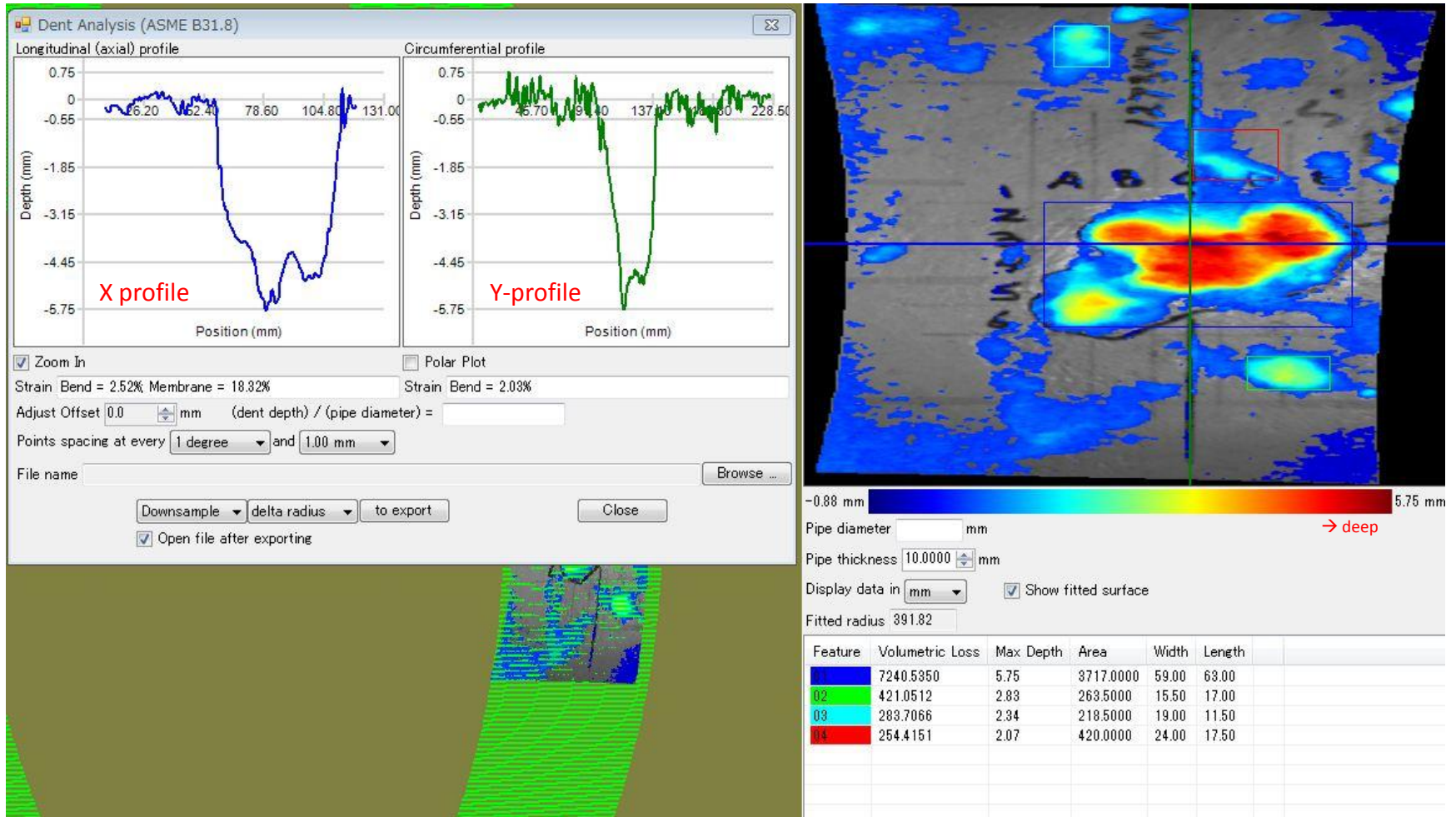


Now (3D measurement)

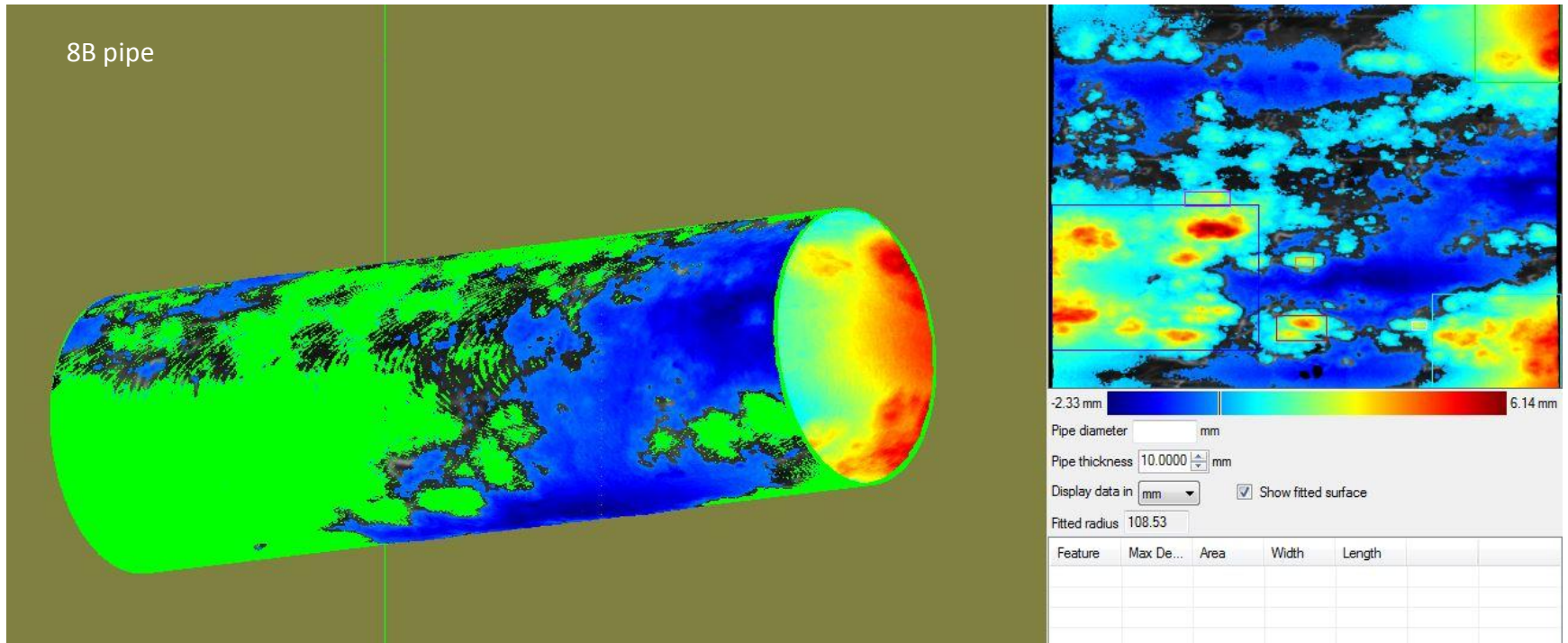


# 1) Local corrosion on pipes

- Metal loss & depth



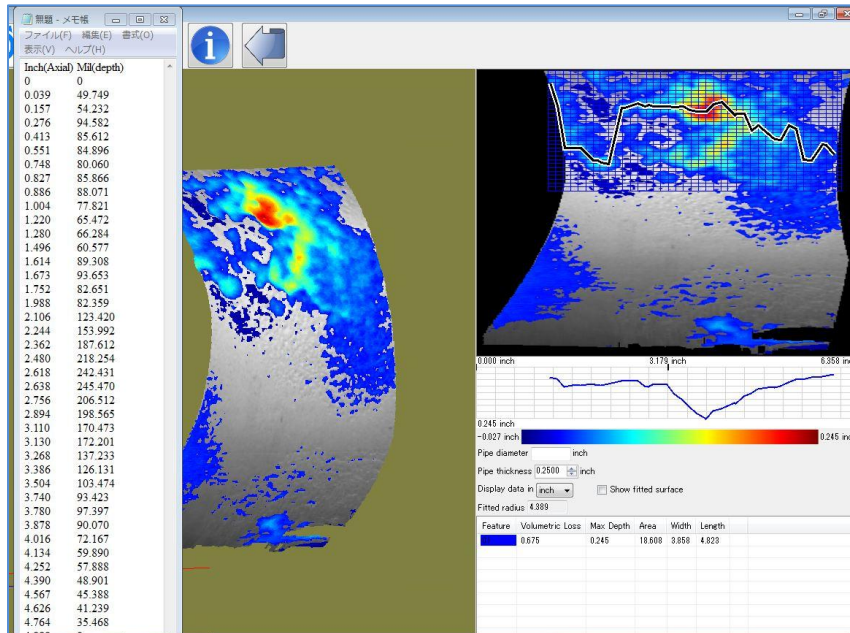
# 2) Corrosion map





# 3) Fitness-for-service evaluation

## Data generation



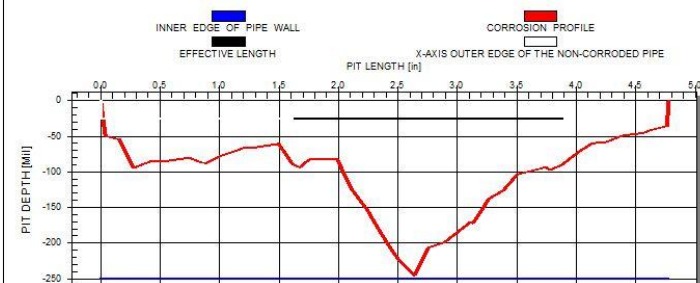
## RSTRENG

P = 2StfT/D [psig] - Calculated Pressure	981.818		
Established MAOP [psig]	500		
Pipe Outside Diameter [in]	8.80	Effective Length [in]	2.26
Pipe Wall Thickness [in]	0.250	Effective Area [in] <sup>2</sup>	0.328
SMYS [psi]	24,000	Max. Pit Depth [in]	0.245
Design Factor	0.72	Max.Depth/Wall Thickness	0.98
Total Length [in]	4.774		
Effective Length: Start [in]	1.61	End [in]	3.88

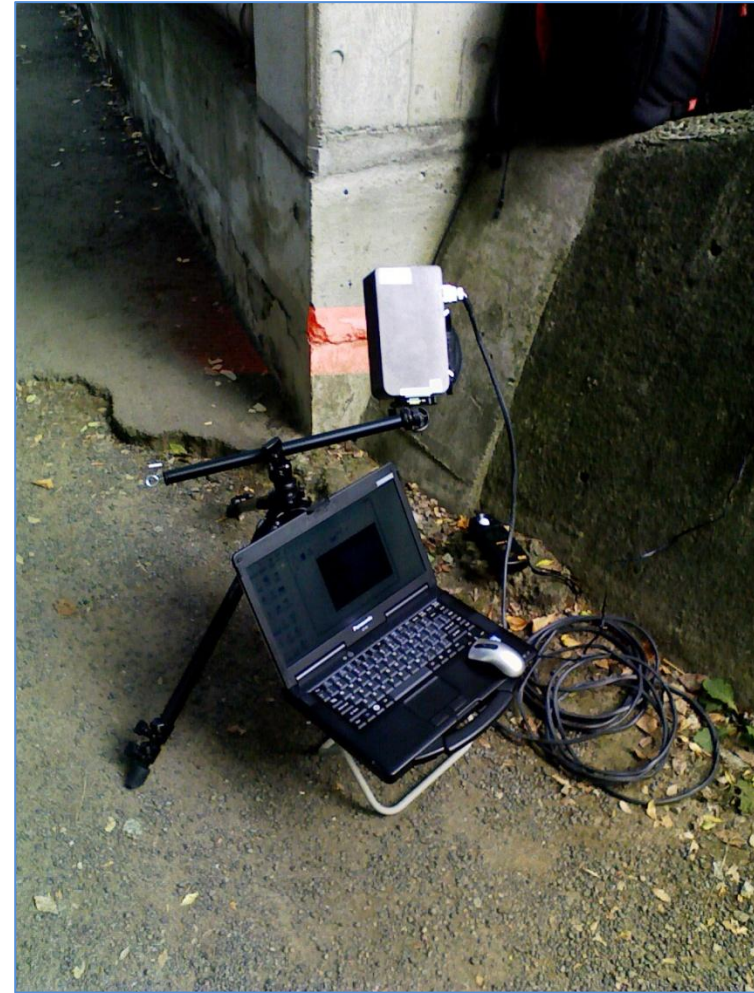
### RESULTS OF ANALYSIS:

METHOD	Max. Safe Pressure [psig]	Burst Pressure [psig]	Safety Factor
RSTRENG - Effective Area	928	1289	2.58
RSTRENG - 0.85dL	335	465	0.93
ASME B31 G	475	660	1.32

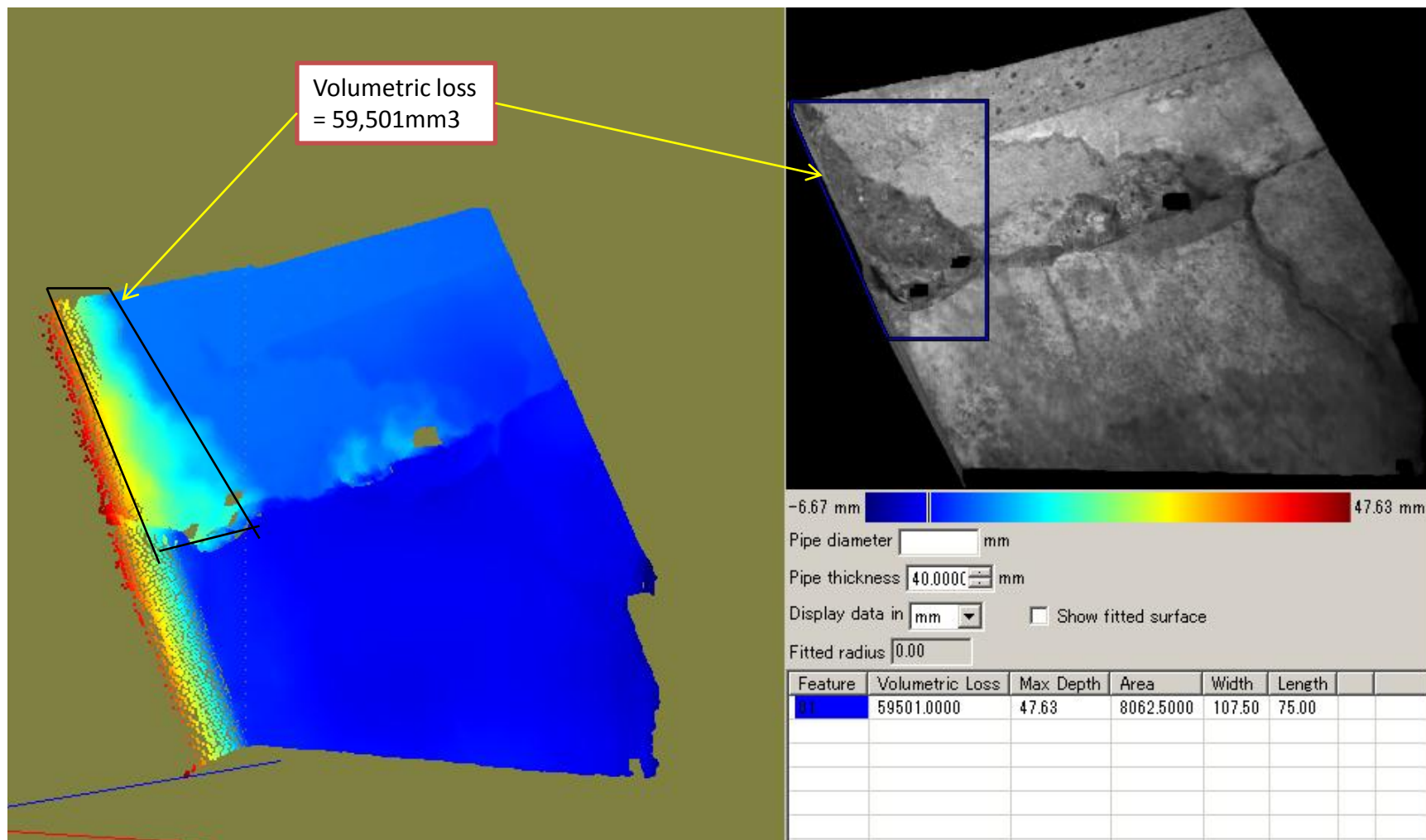
### CORROSION PROFILE:



## 4) Concrete damages



# 4) Concrete damages

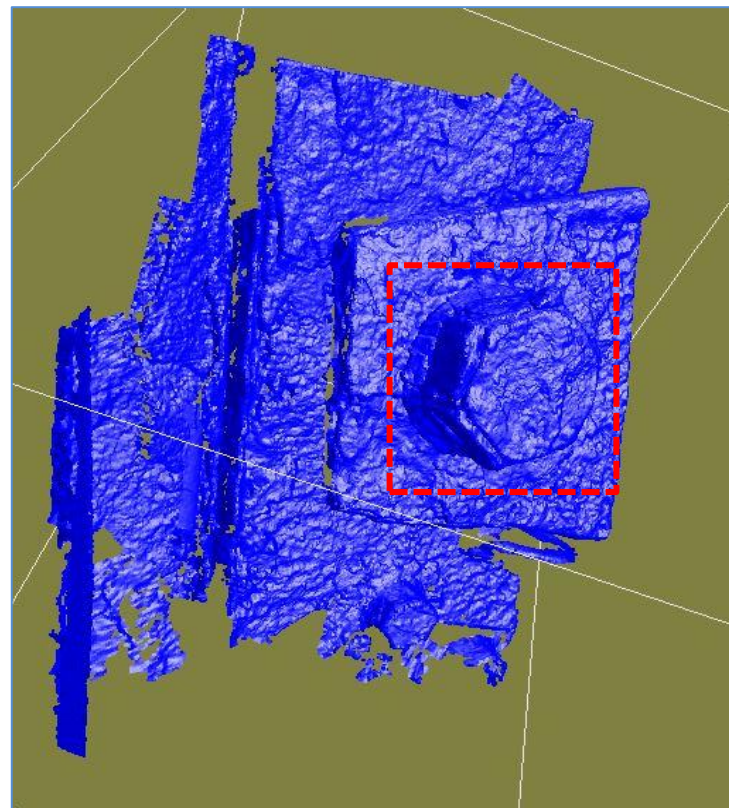


# 5) Remaining volume

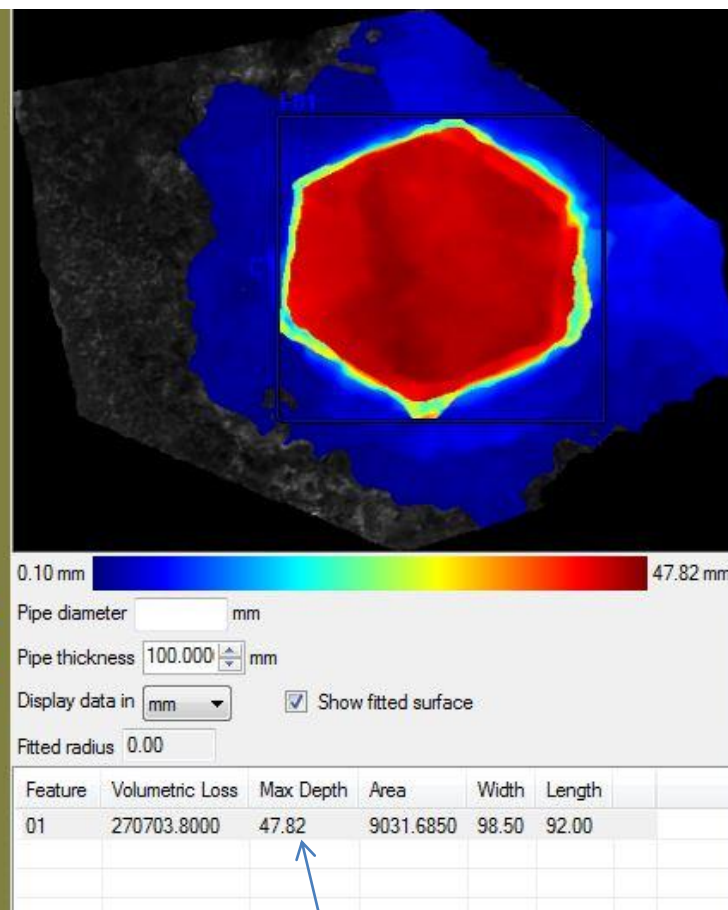
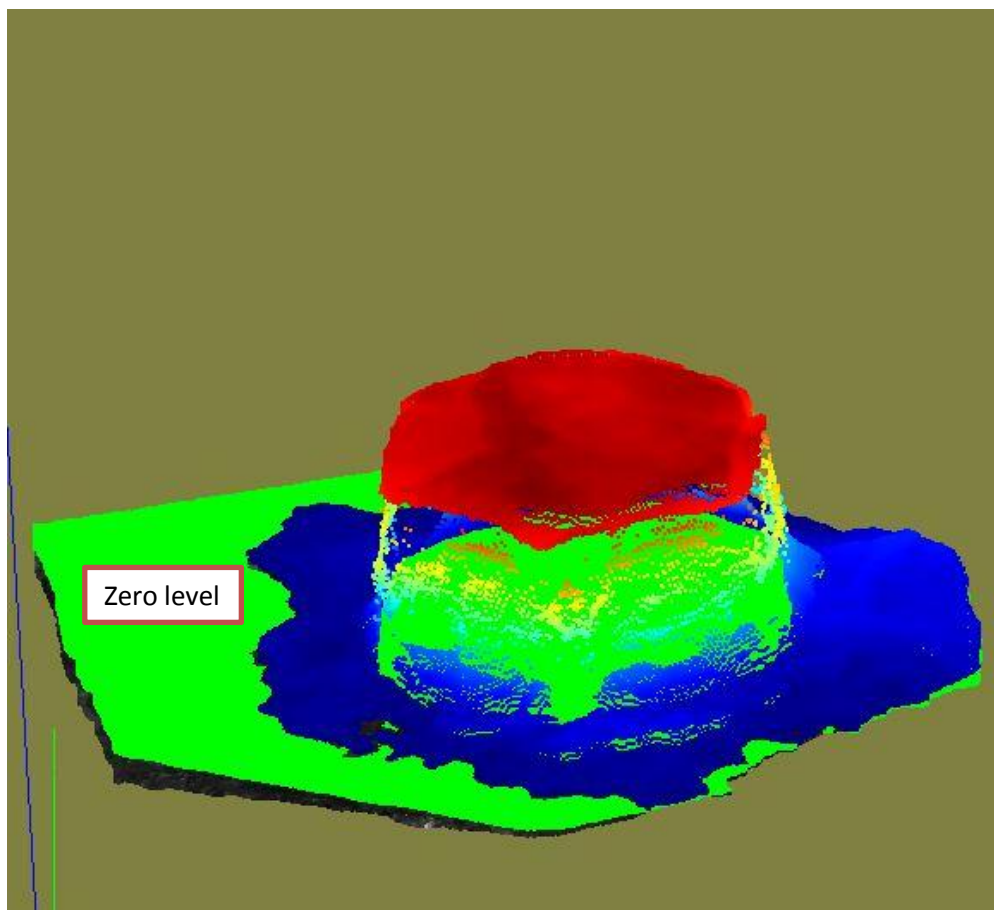
**Object to measure**

**3D image (no texture)**

Area to analyze



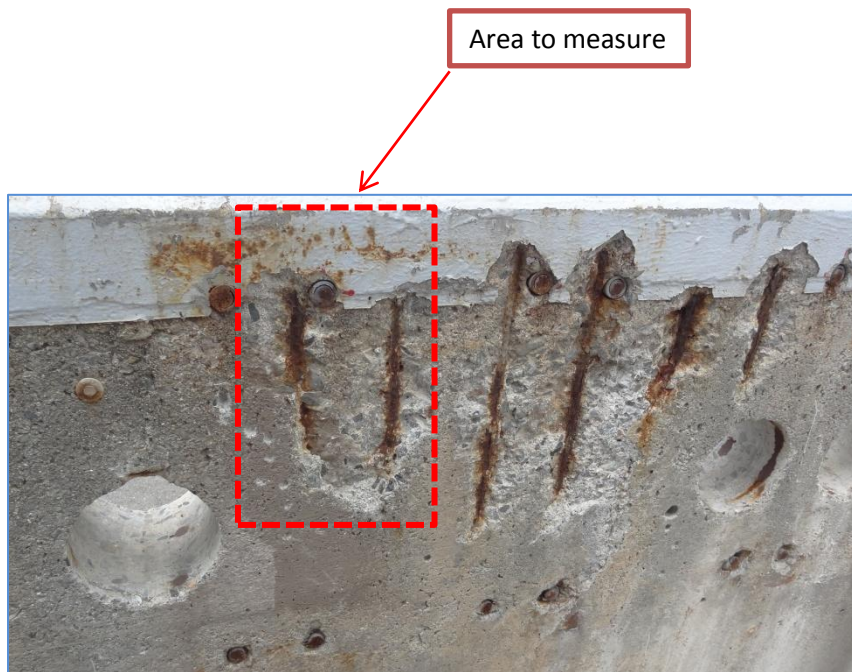
# 5) Remaining volume



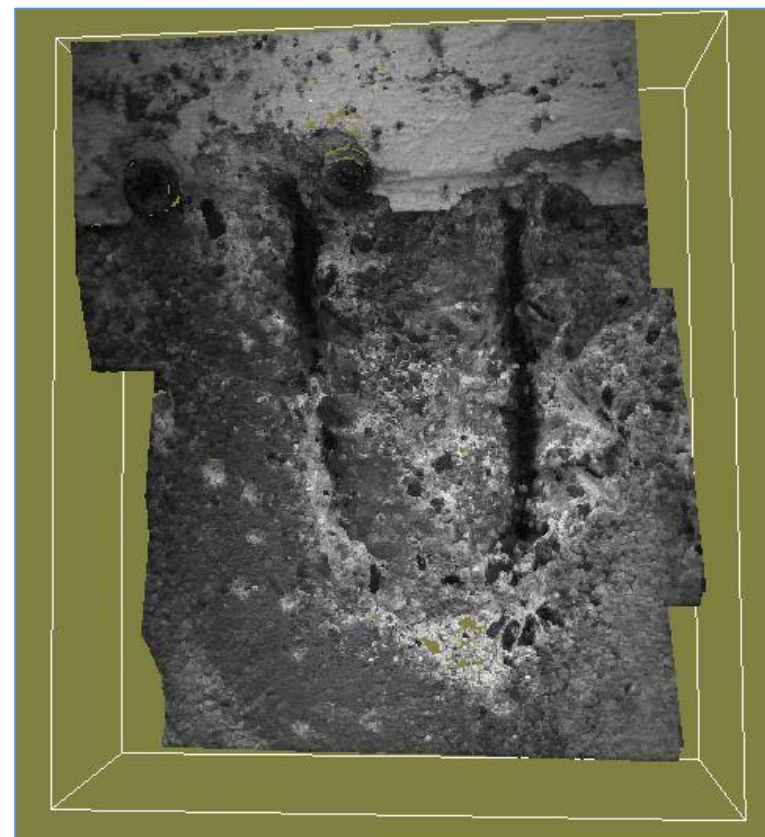
Height

# 6) Damages on concrete

Area to measure

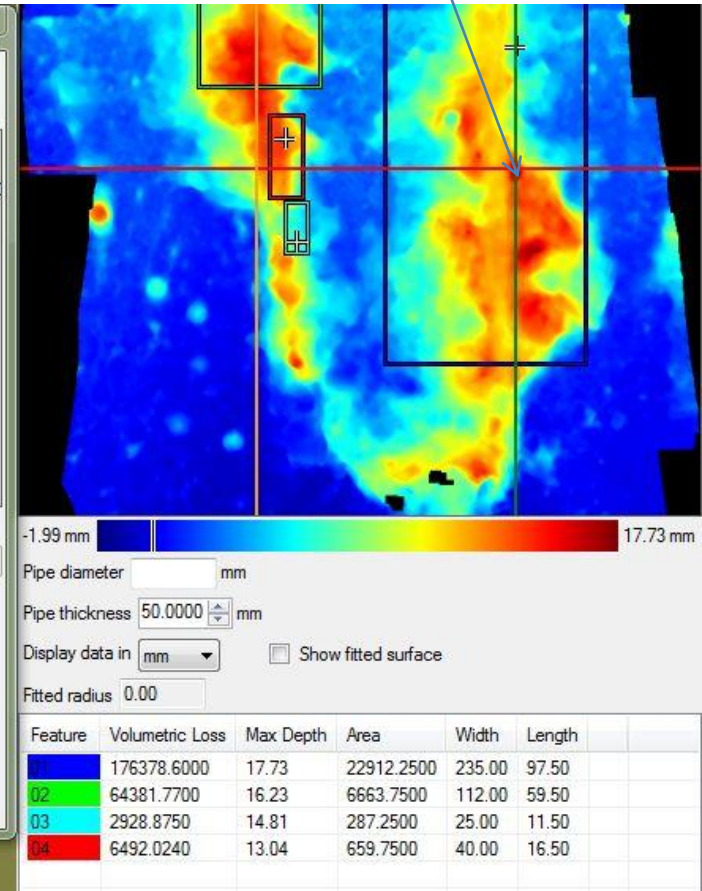


3D image

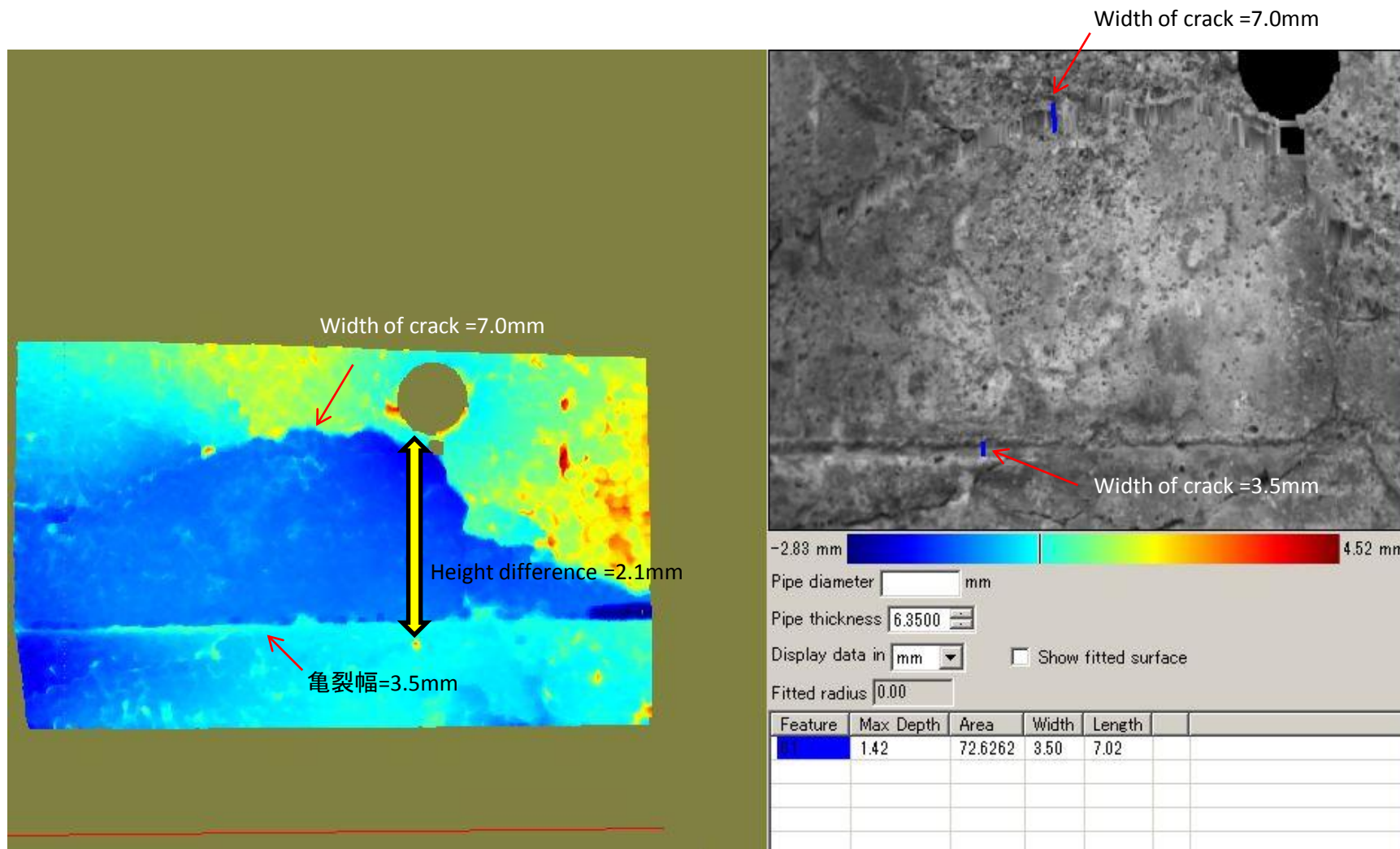


# 6) Damages on concrete

Max depth = 17.73mm



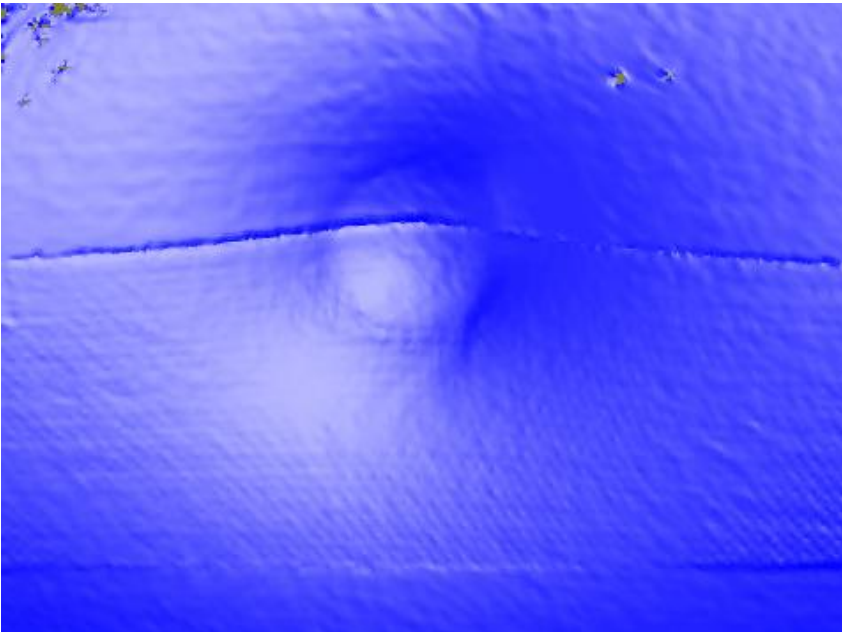
# 7) Cracks on concrete



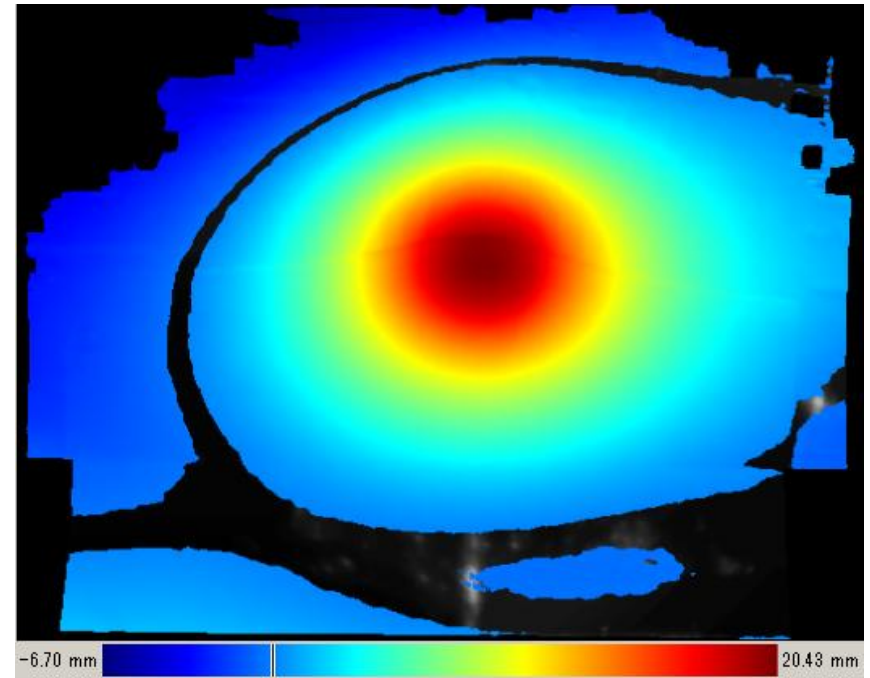


## 8) Mechanical damage on pipe

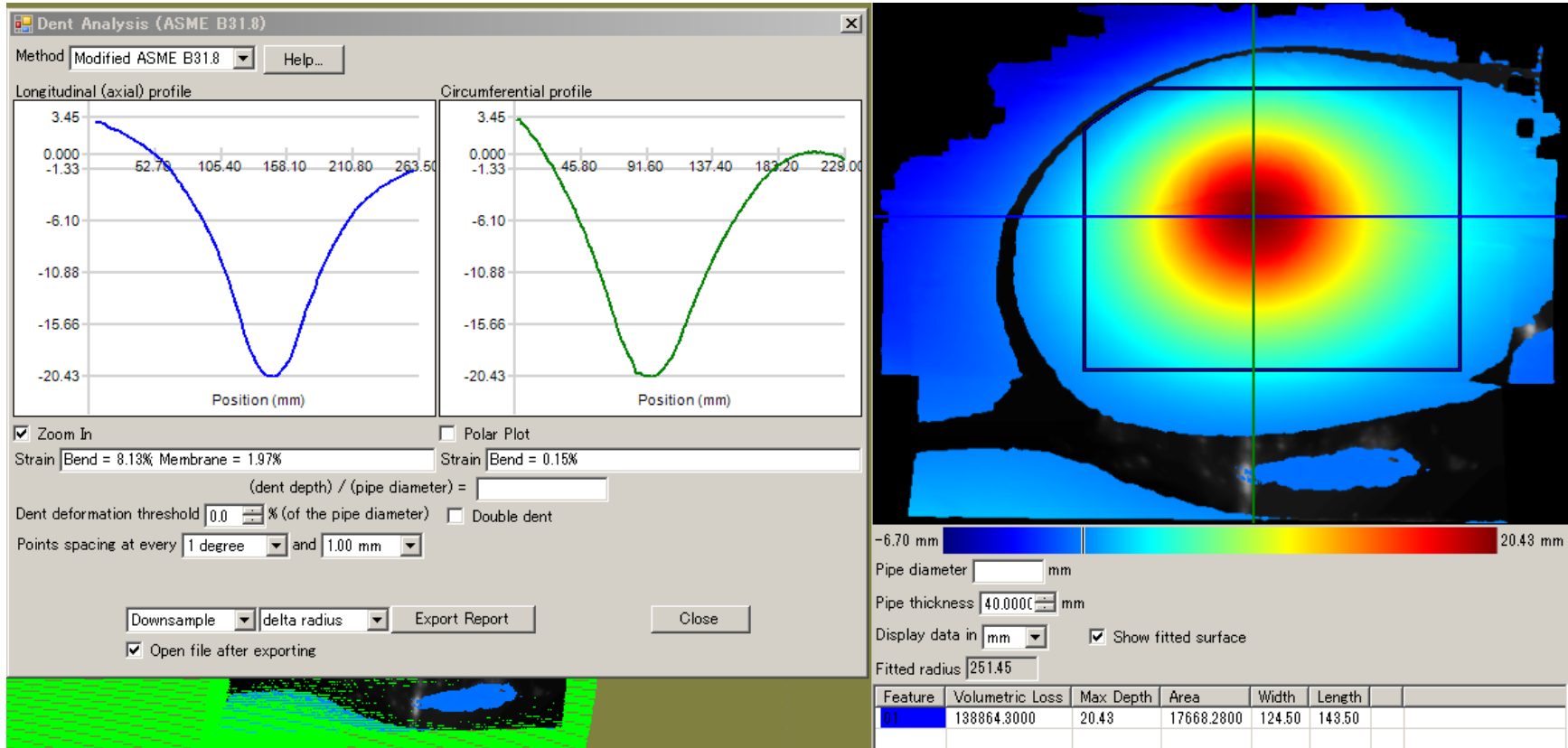
3D image on pipe



Color contour image



# 8) Mechanical damage on pipe





# Contact information



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