RECOGNIZING THE VALUE OF STORAGE TANK BOTTOM MFL INSPECTION DATA

Victor J. Escobar
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ROSEN
empowered by technology

CONTENT EXAMPLE

1. ROSEN Group
2. Tank Inspection
3. Tank Bottom Inspection Software (ROSOFT)
4. Case Studies
5. Conclusion

ROSEN GROUP

✓ **Privately-held company for more than 35 years**

✓ **Continued reinvestment ensures stability and long-term growth opportunities**

✓ **Regional focus ensures commitment to needs of local customers and markets**
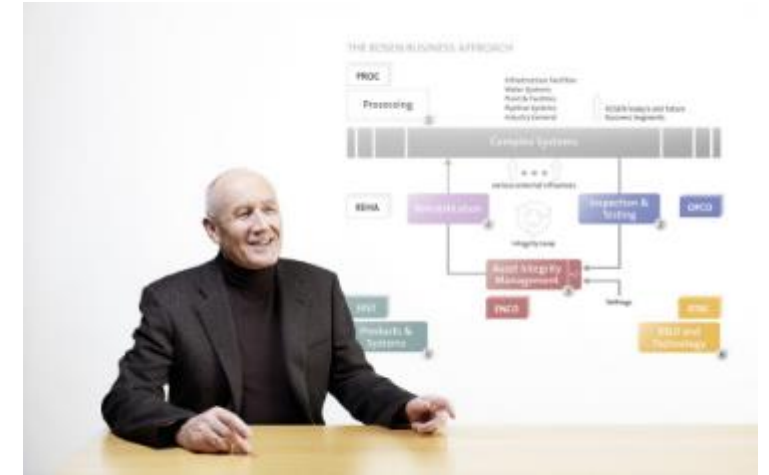
ROSEN GROUP
STORAGE TANK INTEGRITY SERVICES

ROSEN has extensive experience in inspecting tanks and other structures in refineries, processing plants, power plants and terminals.

- Tank inspection services (over 15 years)

- North American group has inspected over 2,500 tanks

- Established processes and procedures for customers integrity programs

- Involved with two customers in creating / implementing a routine mechanical integrity piping plan

  o Probability / Consequence Assessment

  o Documentation / Records

  o Classification

  o Understanding of damage mechanisms (based on location, product, etc..)

  o Selection of applicable technologies, techniques and/or tools

TANK INSPECTION

API 653 Inspection

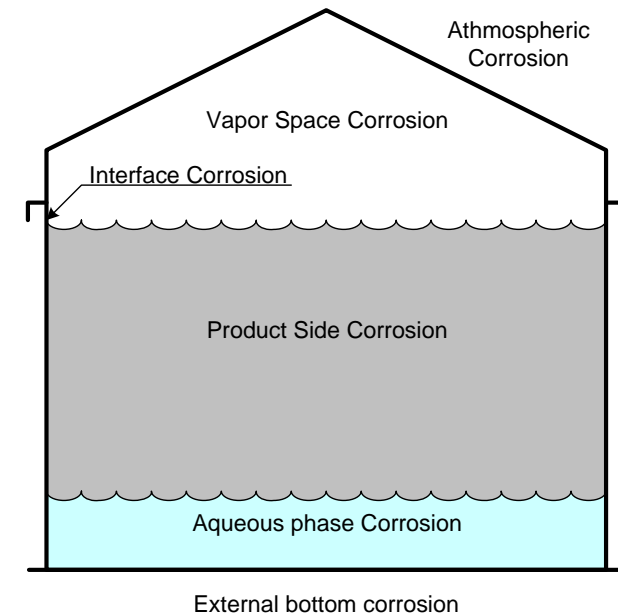**Inspection of ALL applicable structures/appurtenances:**

- Settlement (with Laser Profile),
- Internal (MFL Floor Scan, etc.),
- External (UT, Visual, etc.),
- Shell (UT Crawler Inspection),
- Roof (UT, MFL Scan, etc.),

General Assessments:

- Corrosion rates,
- Remaining life,
- Liquid load conditions,
- Next inspection interval

Repair & Change of service options

FAILURE MODE: CORROSION

Athmospheric Corrosion

Vapor Space Corrosion

Interface Corrosion

Product Side Corrosion

Aqueous phase Corrosion

External bottom corrosion

TANK BOTTOM INSPECTION

IMPORTANT PARAMETERS

- *Isolated versus clustered pitting versus general*

- *Pit-on a-pit is very unlikely*

- *Pitting is in most cases govern*

- *Corrosion process differs between internal and external*

- *Internal Corrosion: more or less predictable, f(product)*

- *External Corrosion: unpredictable, case-to-case assessment*

- *CP installed, however external corrosion present*

- *Linearity of CR – no models available*
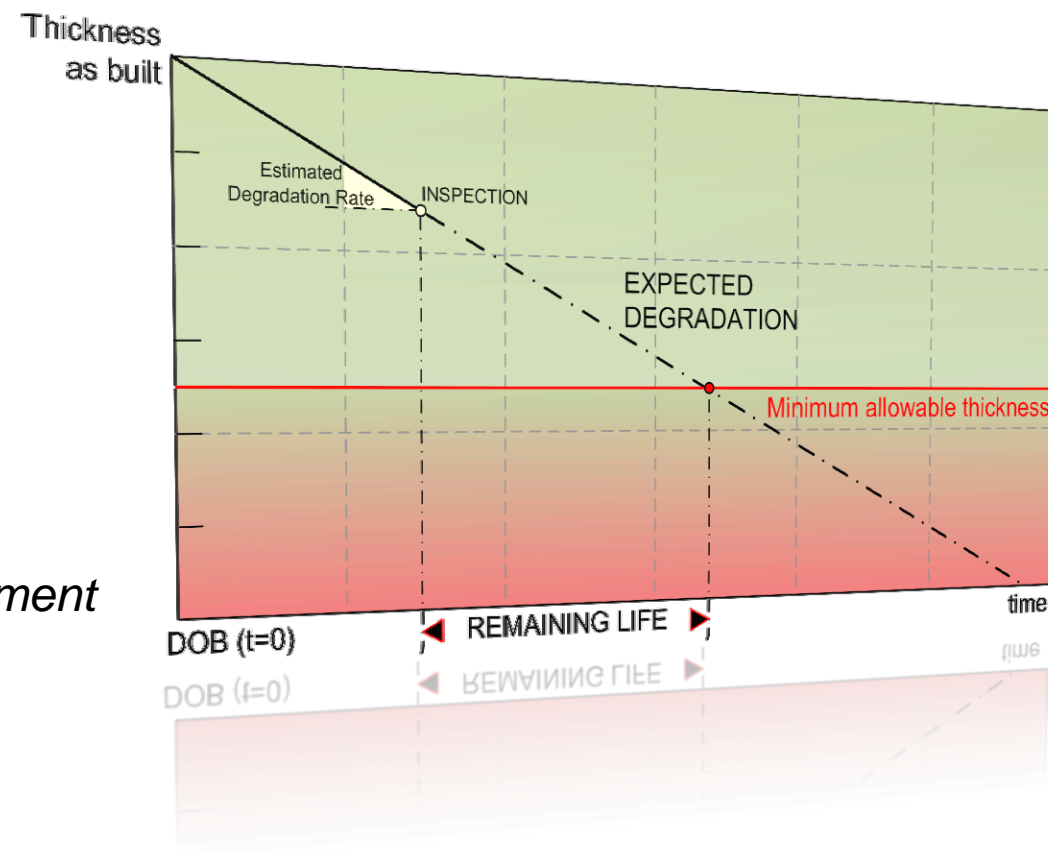
TYPICAL BOTTOM SCAN RESULT
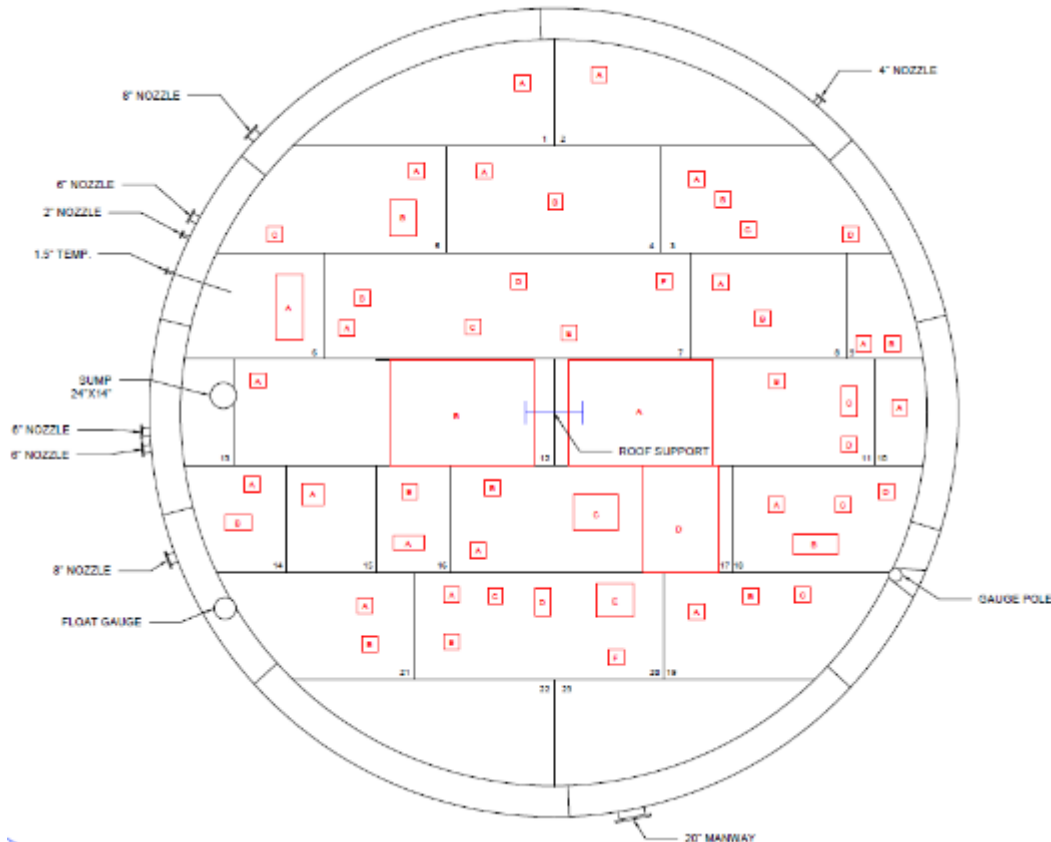
- Plate number
- Indication code
- Location (datum, length, width)
- Remaining thickness & Depth
- Etc..

| PLATE NO/ID	PIT DEPTH	REMAINING THICKNESS	X LOCATION	Y LOCATION	INT US (# IND)	✓ NE	✓ CZ	COMMENTS
1A		0.195-0.205	29 - 35	13 - 26	3	☐	☐	14 x 20
2A		0.255	39	30	1	☐	☐	12 x 12
3A		0.220	31	49	1	☐	☐	12 x 12
3B		0.170-0.220	41 - 52	28 - 29	2	☐	☐	18 x 12
3C		0.180	54	7	1	☐	☐	12 x 12
3D		0.120	132	13	1	☐	☐	12 x 12
4A		0.190	24	73	1	☐	☐	12 x 12
4B		0.170	76	47	1	☐	☐	12 x 12

TANK BOTTOM INSPECTION RESULTS
TRUE VALUE OF MFL INSPECTION DATA

In order to take an integrity approach to tank inspection, operators need excellent inspection data in order to assess the root cause and manage data…

- Visualization of corrosion (or pattern)
- Integration into a database
- Corrosion Histogram
- Utilization of data for RBI assessments
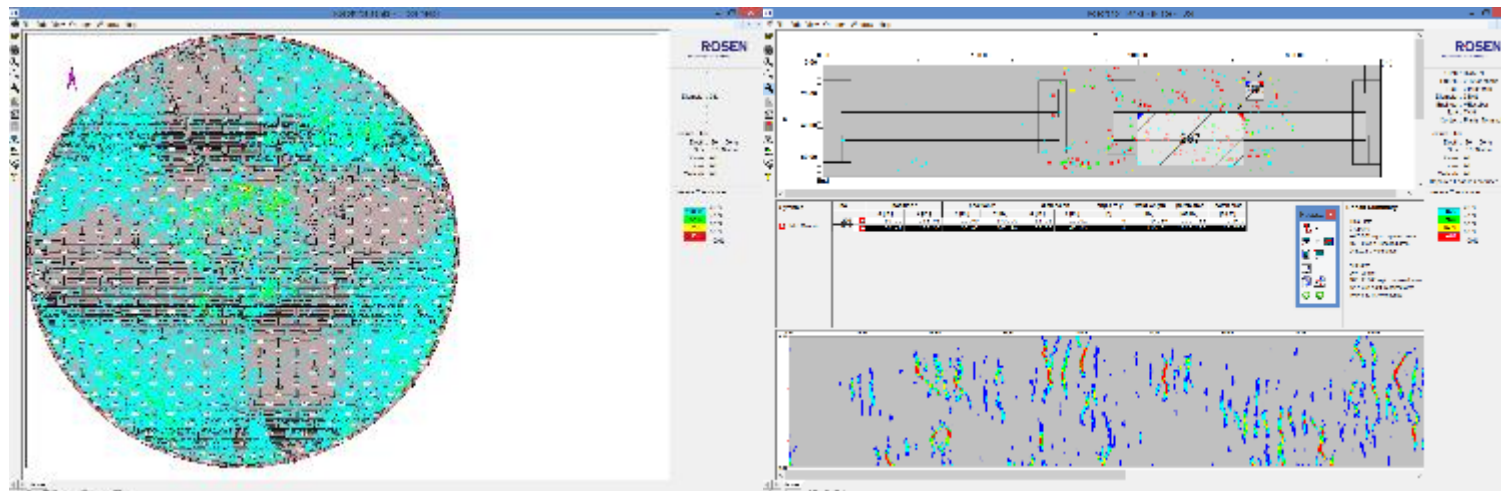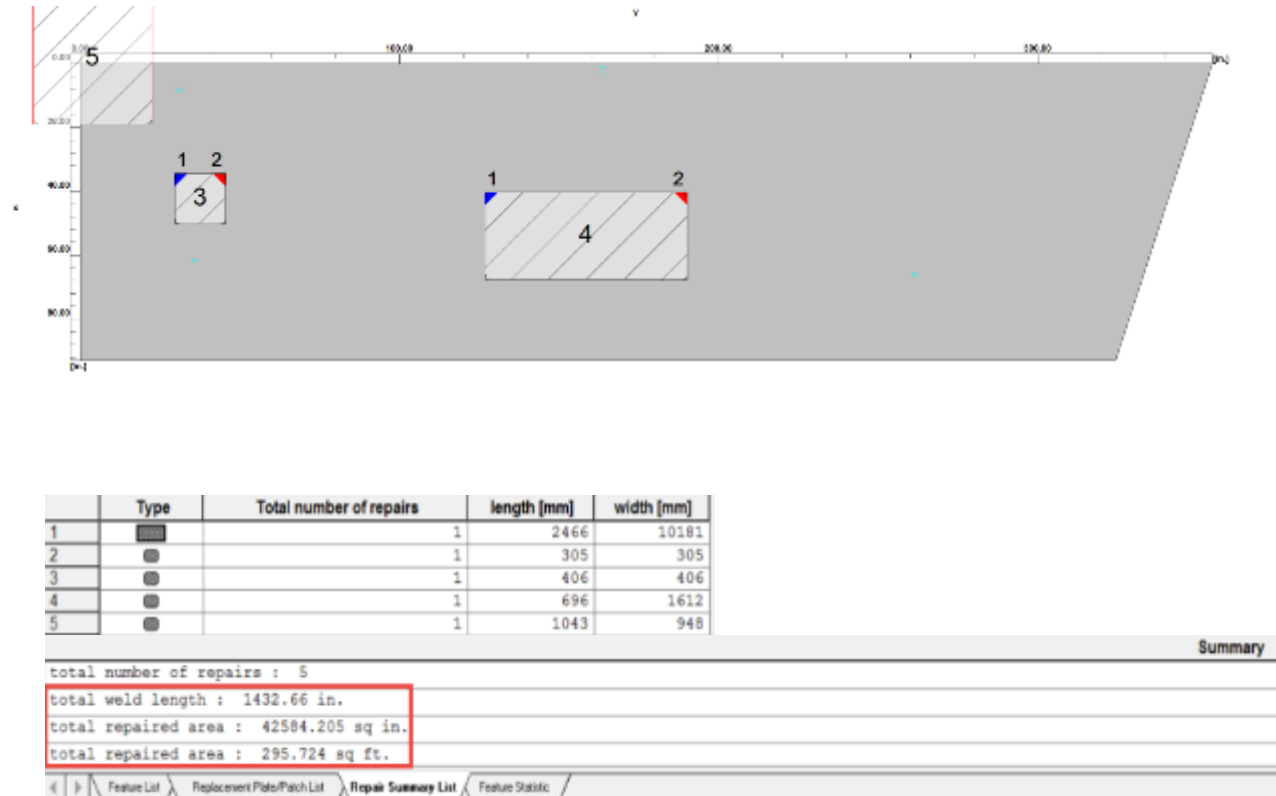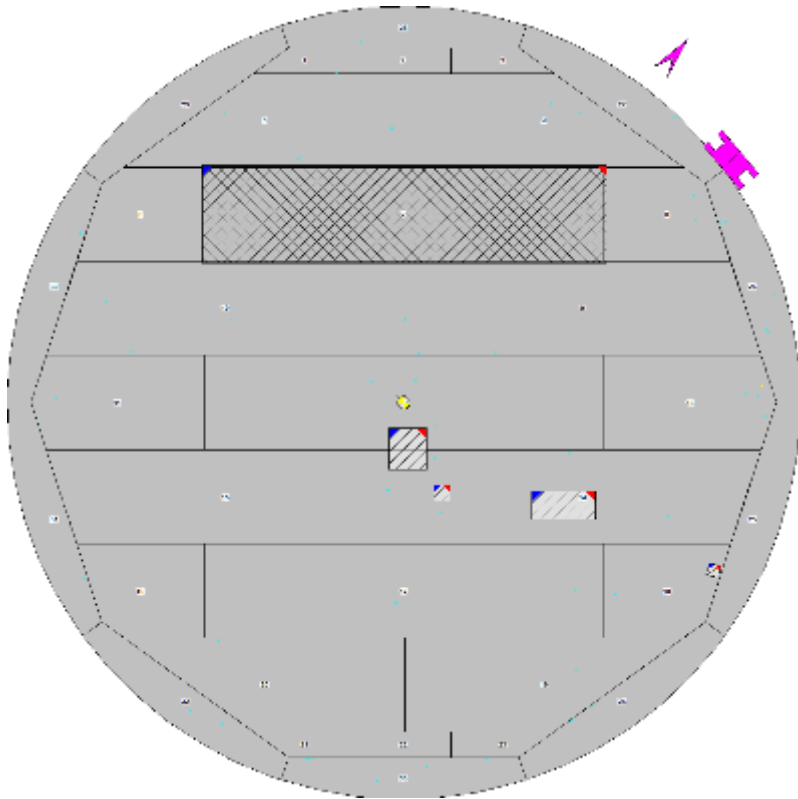- Repair strategies (i.e. 10 vs 20 year or coating)
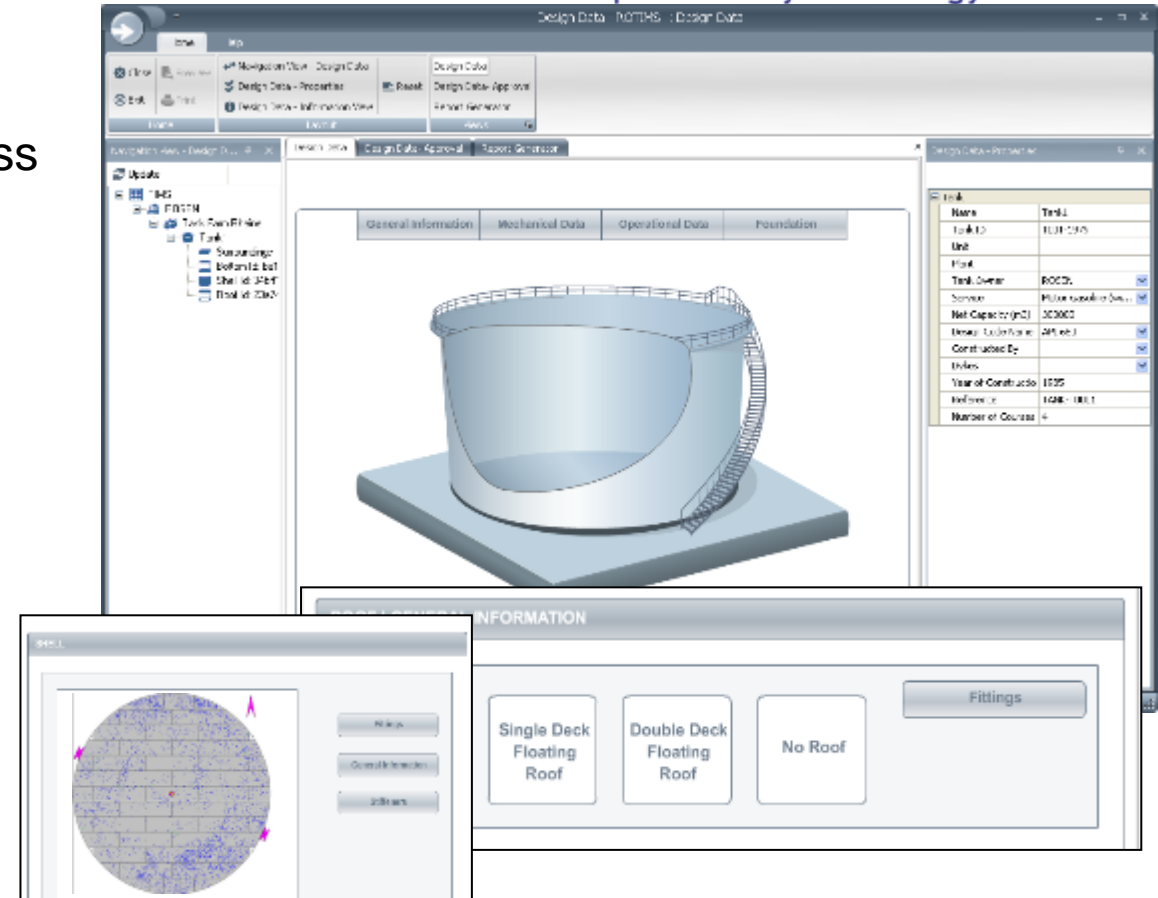
ROSOFT FOR TANKS

- Inspection results reported on-site

- Classify features dependent on repair thresholds

- Utilize ROSOFT for repairs

- Repair strategy will summarize repairs;

- Repair Patch List (Patch dimension, location, shape)

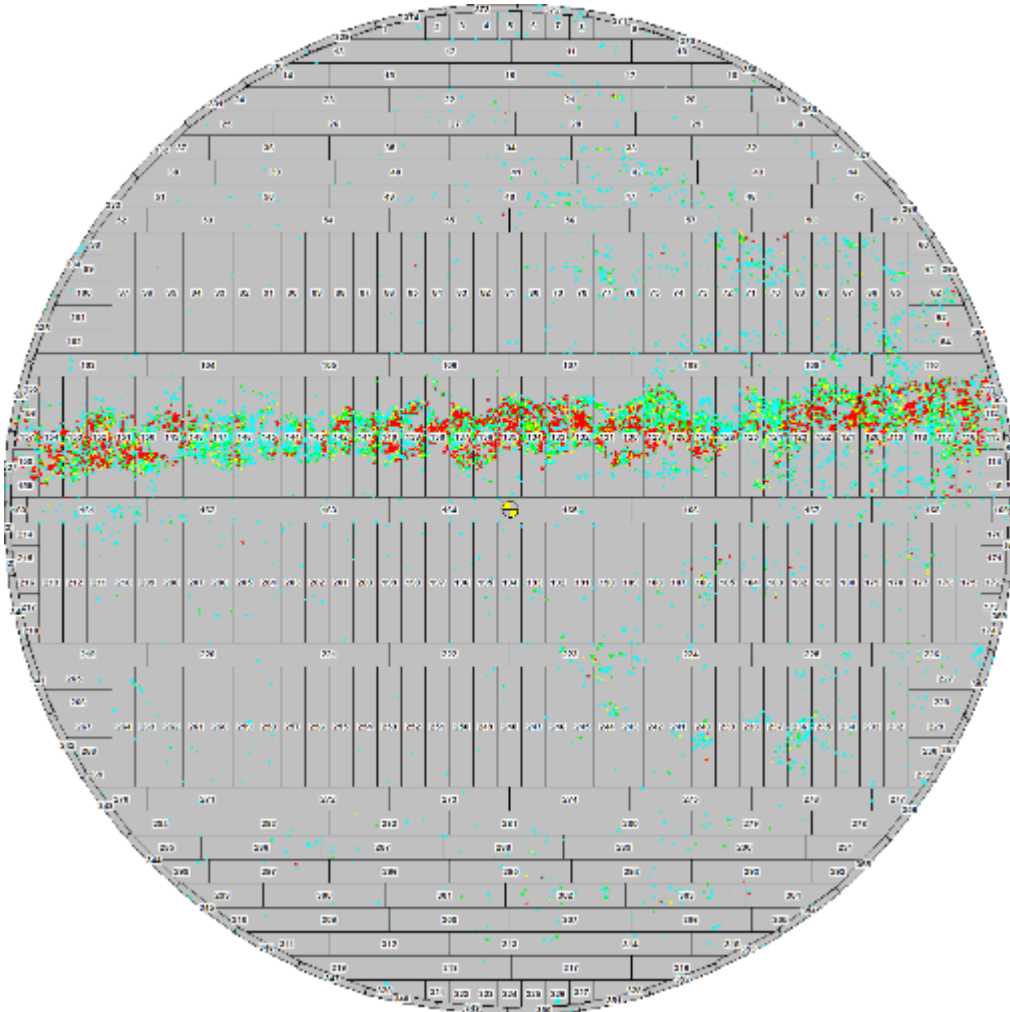- Repair Patch Summary (total no., weld length, patch area/volume)

ROSOFT FOR TANKS

	Type	Total number of repairs	length [mm]	width [mm]
1		1	2466	10181
2		1	305	305
3		1	406	406
4		1	696	1612
5		1	1043	948

Summary

total number of repairs : 5
total weld length : 1432.66 in.
total repaired area : 42584.205 sq in.
total repaired area : 295.724 sq ft.

Feature List | Replacement Plate/Patch List | Repair Summary List | Feature Statistic
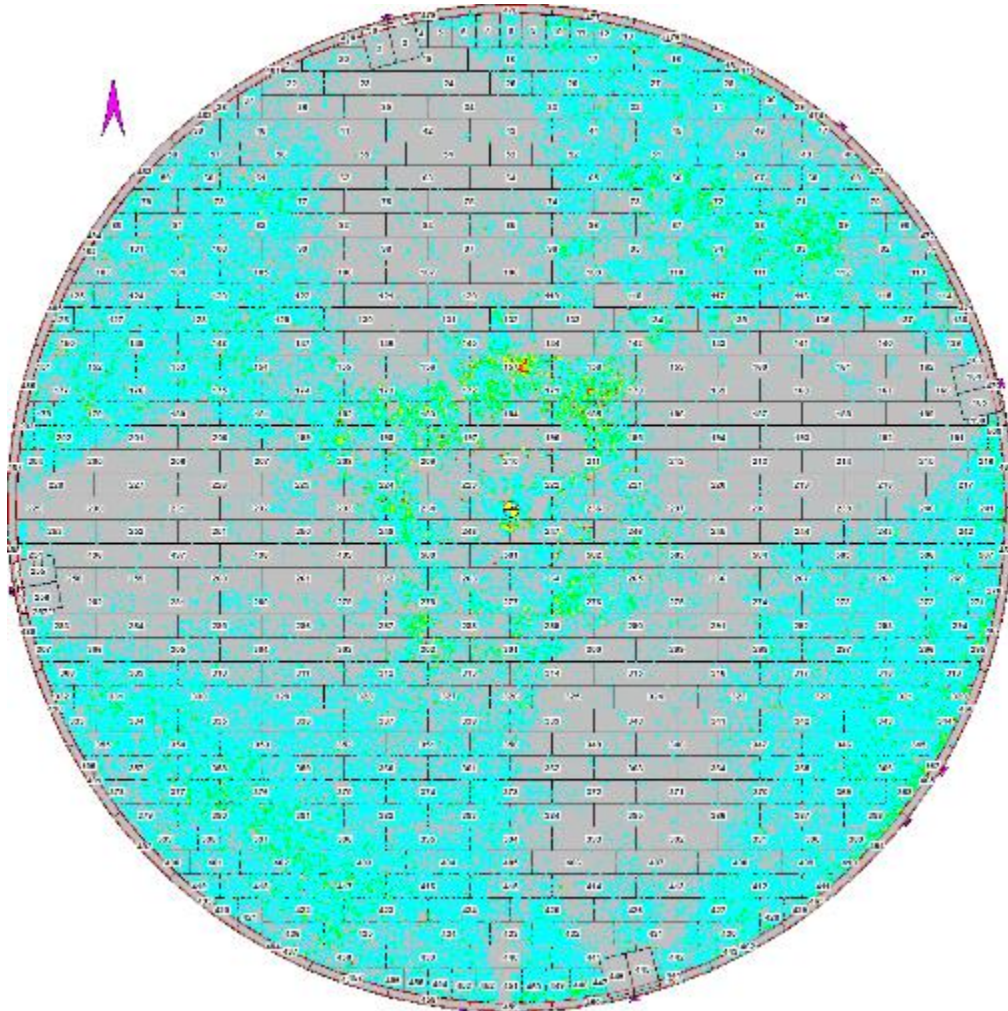
CASE STUDY - 1

Tank Details

- Crude Oil Storage Tank
- Diameter – 245 ft (75 m)
- Region – Gulf Coast
- Age – 8 years
- Coating – Thin film epoxy
- CP system - Yes

Damage Mechanism

- External severe corrosion
- Centralized corrosion pattern

CASE STUDY - 2

Tank Details

- Crude Oil Storage Tank
- Diameter – 279 ft (85 m)
- Region – Central
- Age – 15 years
- Coating – Film epoxy (30 mils)
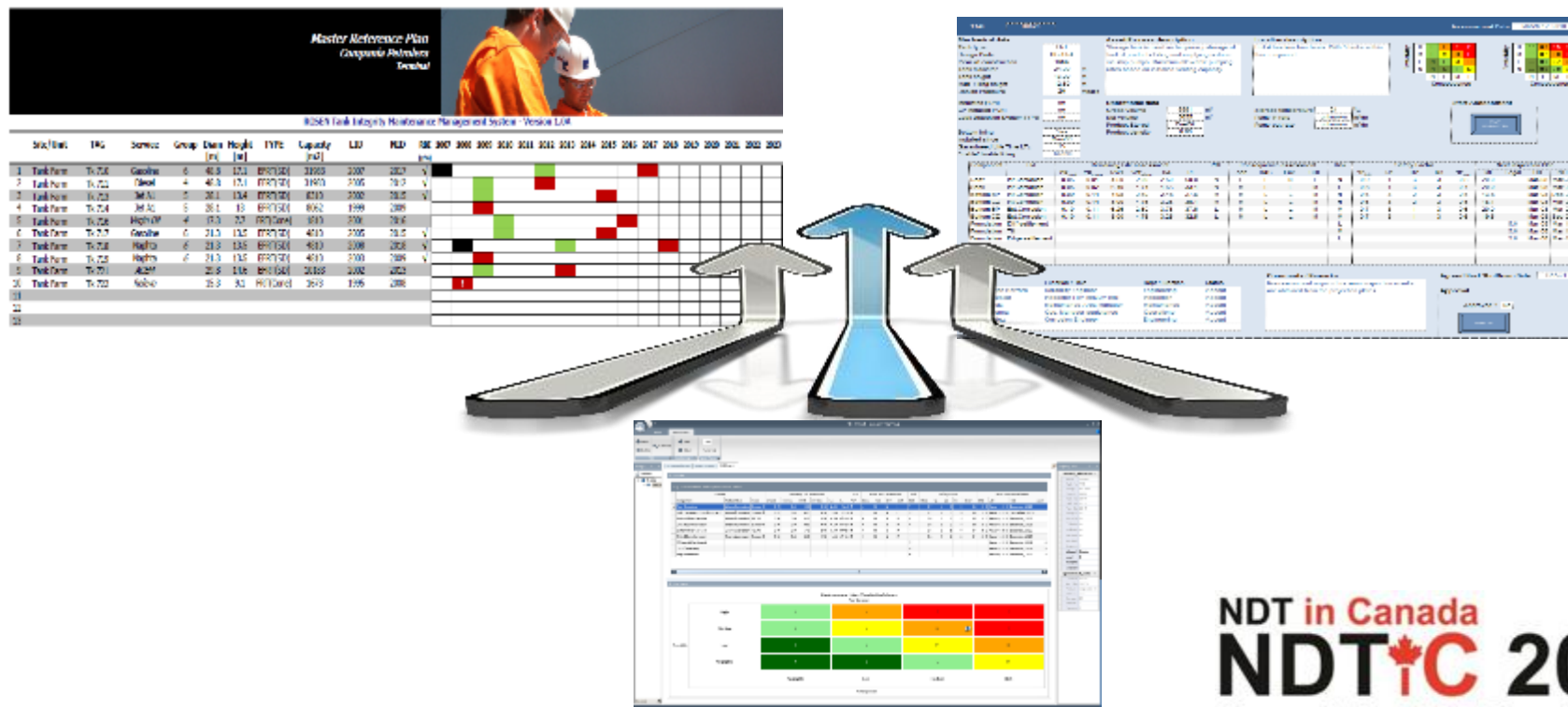- CP system - Yes

Damage Mechanism

- Internal severe corrosion
- Corrosion pattern

CONCLUSION

RBI Utilization Model

Utilizing all of the inspection "data" gathered during an inspection and running an RBI calculation after the Post Repair Inspection allows Operators to extend the service life of a tank.

CONCLUSION

- UT grid measurements should not be used for RL assessment;

- No alternative tools or software available to quantify the 'problem';

- The need for high-resolution inspection data collection is warranted and required;

- Defect depth sizing accuracy of ±10% is feasible;

- Relative "cheap" way to justify extending the next inspection period (in comparison with the cost for cleaning/gas-freeing);

- Define your repair scope more efficiently;

- Strategize your repair strategy based on cost or operations;

"Finding the actual origin of tank bottom deterioration enables operators to treat not only the symptom, but also the cause – and thereby to take far more effective mitigation measures"…this is our approach.
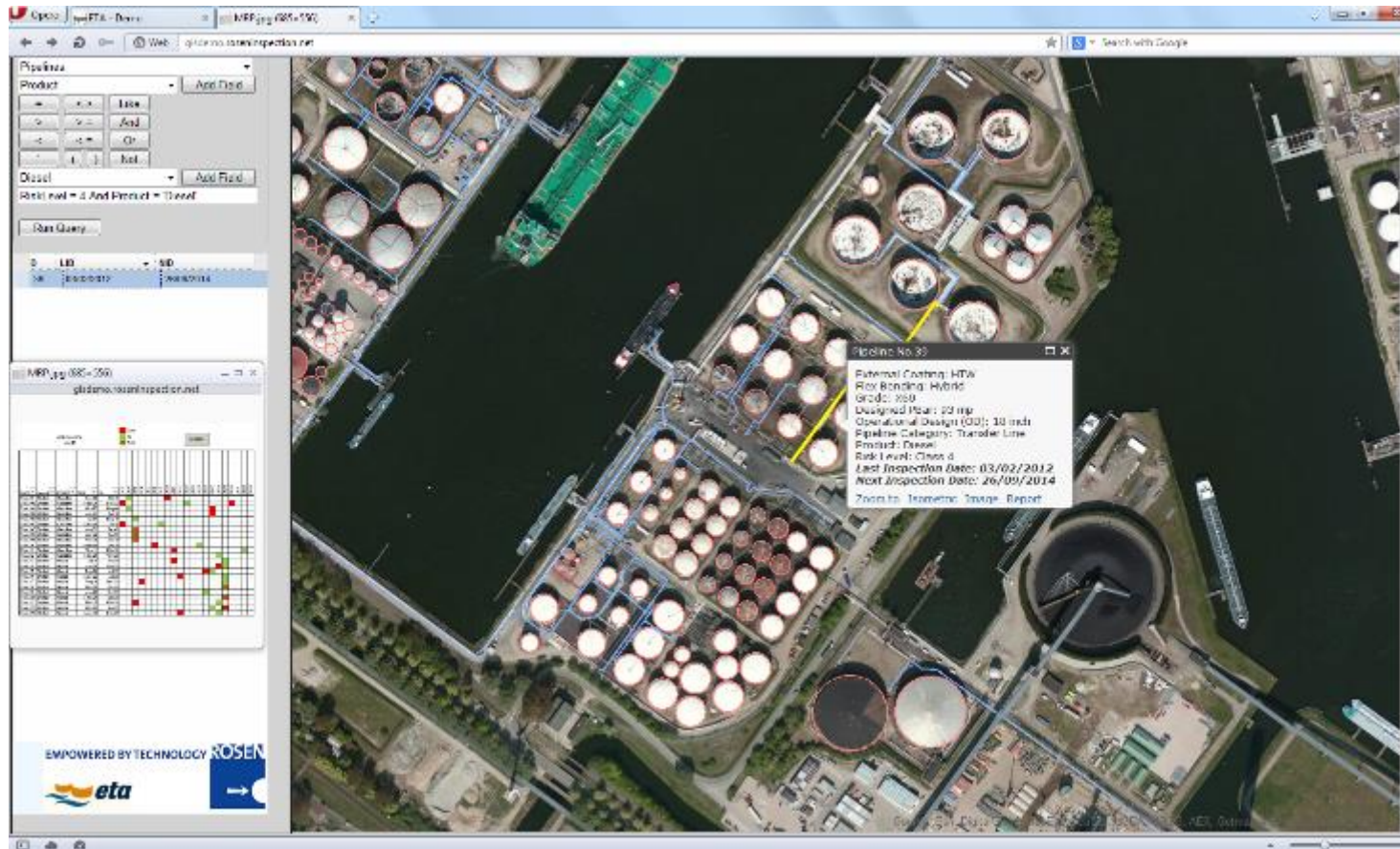
THANK YOU FOR JOINING THIS PRESENTATION.

TANK BOTTOM LAYOUT

TANK INSPECTION