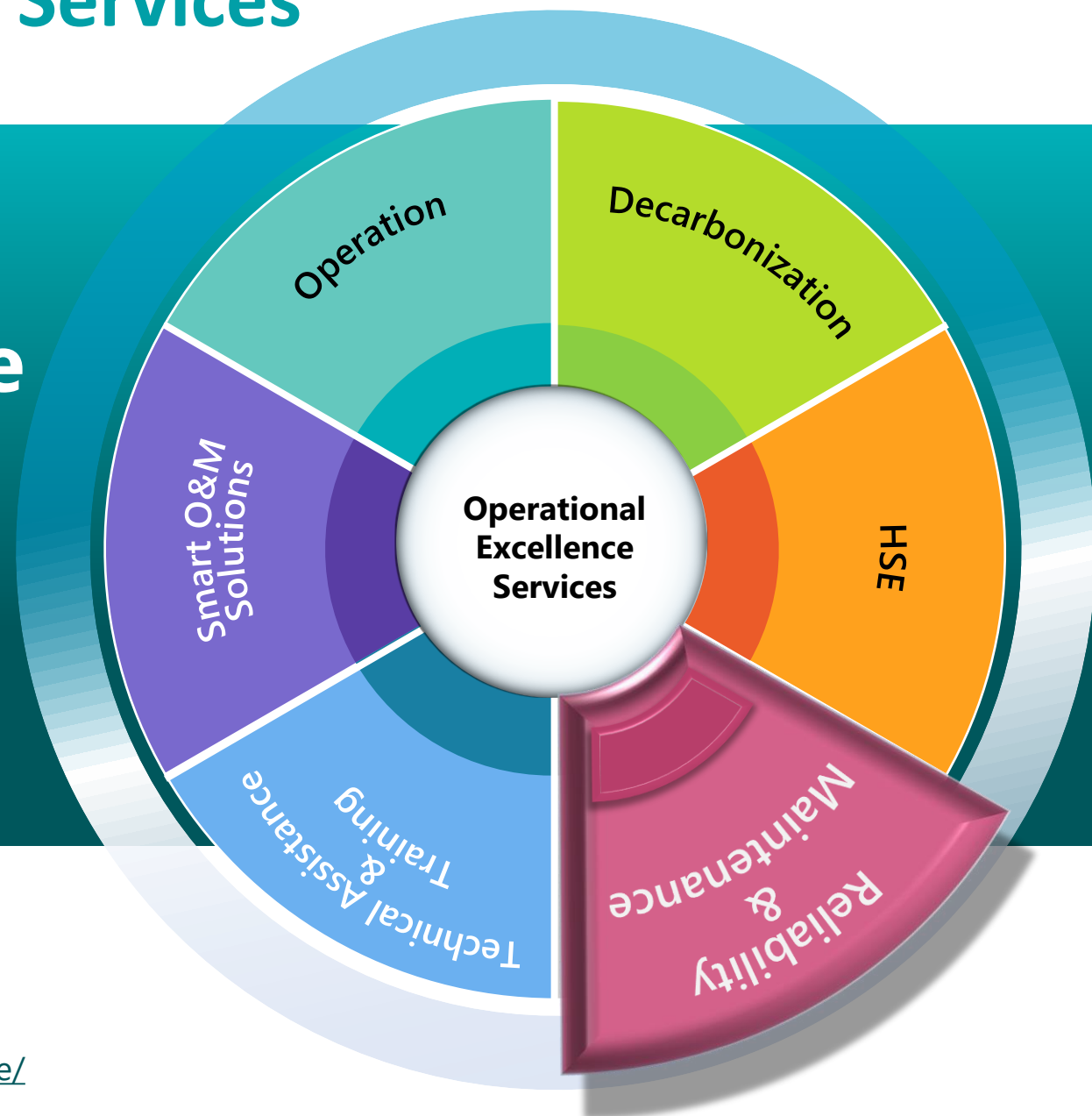




Operational Excellence Services

Reliability & Maintenance Plant Life Extension Program (PLEP)



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 <https://www.jgc.com/en/business/epc/operation-maintenance/service/>

Plant Life Extension Program (PLEP)

Do you have any issues about plant materials ?

☹️ **Plant Aging**

Approaching the lifespan, material degradation is accelerating...

☹️ **Operating Condition Changing**

Conditions becoming more severe, deviating from the design range...

☹️ **Competitiveness Stagnating**

O&M cost increasing, maintenance intervals shortening...

PLEP Solutions

- Identification of facility and locations having materials and inspection concerns
- Suggestion of practical and economical solutions to solve the concerns
- Projection of revamp work, inspection and maintenance work, etc., to extend plant life

Example of issue:

Furnace tube bowing

○ Cause

Bowing on the specific location

→ Main cause: coking

○ Countermeasures

- Periodical IR Monitoring (Hot Spot Monitoring)
- Periodical Pigging
- Visual, DPT, UTM, Creep/PI.Tape, PMI, Hardness, etc.

○ Recommendation for Life Extension

- To measure circumference length on bowed and sound tube periodically in order to assess the creep in every shutdown.
- CFD modeling and consultation may be an option for detailed assessment.

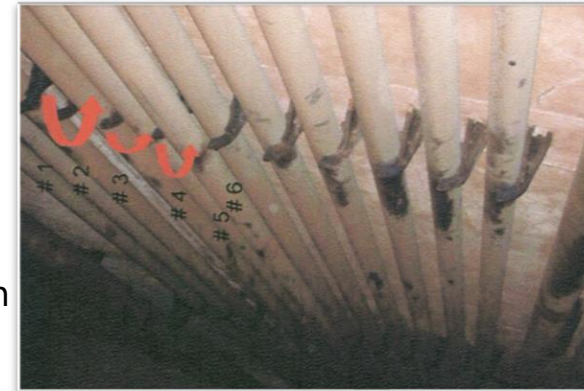
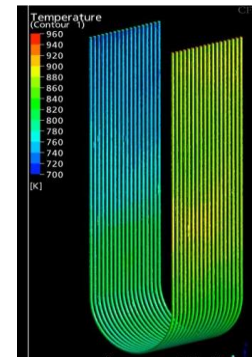


Photo: Bowing



CFD Analysis

Plant Life Extension Program (PLEP)

PLEP for preventing troubles in advance...



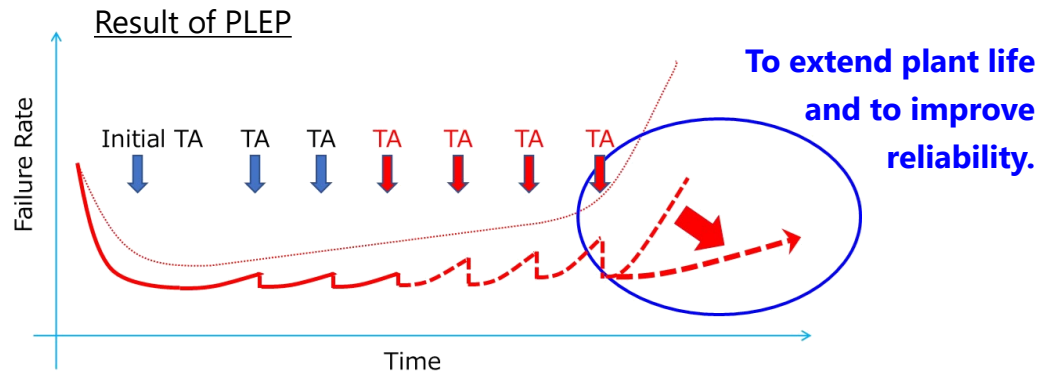
Workflow & Result

1st Step - Plant Integrity Assessment (PIA) : Finding / Screening

- ✓ Assessment of materials selection, inspection program, etc.
- ✓ Site visit and discussion with client.

2nd Step - Integrity Improvement Initiative (III) : Detail Study

3rd Step - Life Extension Project (LEP) : Project Development and Execution



Our Strengths

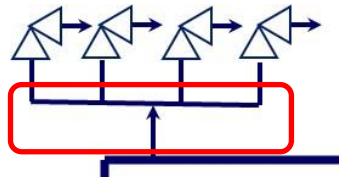
- ✓ **One-stop** service of engineering, construction and maintenance services to make convenient for client
- ✓ **Practical and efficient** approaches including workshops and site observations will provide best solutions
- ✓ **Easy** methods without special software will avoid client burden
- ✓ **Flexible** program will run along with client's demands to the goal.

Our Experience

- **CDU/VDU, Asia**
83 findings / 22 recommendations
- **Gas Processing Unit, Middle East**
116 findings / 34 recommendations
- **GOSP, Middle East**
88 findings / 7 key recommendations

Plant Life Extension Program (PLEP)

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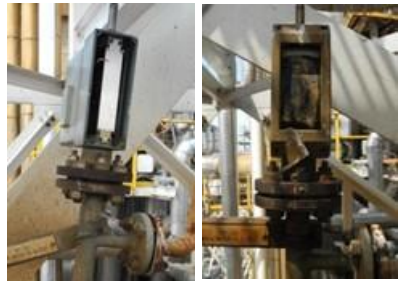
✓ TML setting at RV manifold

<Finding>

Severe condition is expected because of stagnant condition.

<Recommendation>

To set thickness measurement locations (TMLs) around the manifold.



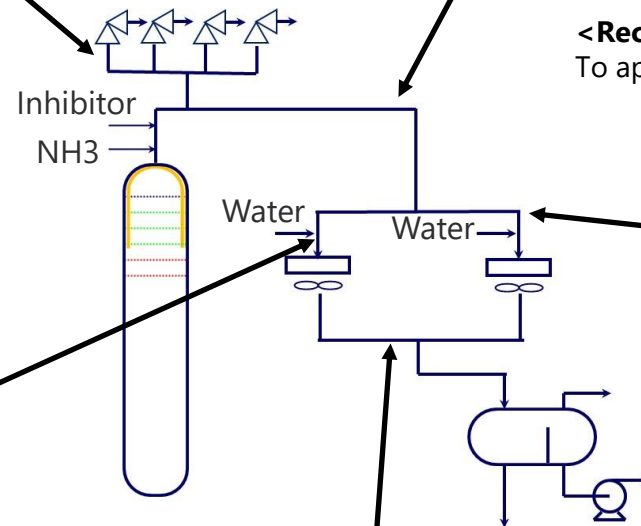
✓ Flow-meter trouble

<Finding>

Flow-meter malfunctioned, and flow rate could not be measured

<Recommendation>

To fix the flow-meter and to adjust proper injection rate.



✓ Hot insulation setting

<Finding>

Due to inadequate length of hot insulation, corrosive water condensed, and it induced severe corrosion.

<Recommendation>

To apply hot insulation.



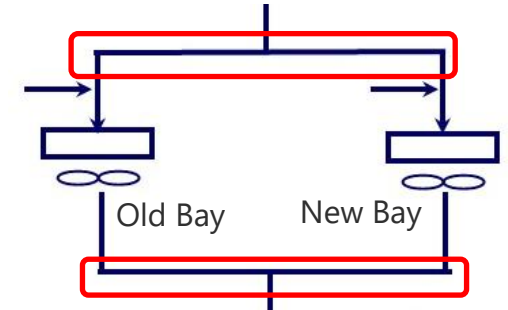
✓ Assessment of flow distribution

<Finding>

The actual corrosion rate is significantly different between old and new bays (condensers), and it suggests uneven flow distribution.

<Recommendation>

To conduct flow distribution analysis.



✓ TML setting at condenser downstream

<Finding>

Corrosion monitoring device is installed, but thickness measurement location was not set.

<Recommendation>

To add thickness measurement locations to monitor actual corrosion rate. This can also check the efficiency of corrosion inhibitor and NH3 injection at upstream.