PIANC
The World Association for Waterborne Transport Infrastructure

InCom WG 190

Corrosion Protection of Lock Equipment

Terms of Reference

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1. Background – Problem definition

In today's competitive environment, maintenance costs are a crucial and very significant part of a structure's life cycle cost and its ability to deliver value to its owner. Corrosion, whether stress induced and/or caused by the environmental conditions, can be a major degradation factor responsible for significant maintenance costs. One of the most effective strategies to prolong the life of steel structures and equipment is thus a high performance corrosion protection system. There is currently very little research and documentation available for corrosion protection systems as they pertain to lock equipment such as gates and valves which operate in an aggressive aquatic environment and are subjected to hydro-mechanical forces. If such knowledge was easily available, it would allow facility owners and operators to make durable and sustainable decisions, from original construction of lock equipment to long term maintenance strategies that prolong the life of the assets.

Whereas

- operating equipment such as gates and valves are critical to lock performance
- these assets are expected to perform throughout the life of the project which is typically greater than 100 years
- corrosion is the main cause of surface area loss and structural deterioration of lock equipment
- assets such as gates and valves are very expensive to replace and such works typically cause significant downtime
- corrosion protection systems must comply to increasingly stringent environmental regulations
- most aquatic environments are very aggressive for corrosion
- presence of foul and marine life on the surfaces compounds the issues

Therefore, it is recommended to set up a PIANC InCom Working Group on the state of current best practices in corrosion protection of lock equipment.

The goal is to create a reference guide for corrosion protection strategies for facility owners and operators, in order to inform decisions at the design stage and/or to extend useful life of lock equipment subjected to corrosion.

2. Objective of the Working Group

Although there is extensive literature on the topic of steel corrosion protection, specific applications to the aquatic environment are not well documented and difficult to obtain. There is a need for gathering and assessing the available body of knowledge specific to lock equipment, identifying advantages and limitations of each technique, and documenting relevant case studies.

The information provided will help facility owners and operators make informed decisions at the design stage and during the life of the asset by setting up long term maintenance strategies.

3. Earlier Report to be reviewed

The Working Group shall keep in mind that while there has never been a PIANC document covering the topic of Corrosion Protection of Lock equipment, other PIANC earlier reports (WG25, WG119) relate to the need and best practices of navigation infrastructure maintenance plans and long term asset management strategies which touch on corrosion protection aspects and should be reviewed.

4. Intended Product

The working group will publish a document on the corrosion protection best practices for lock equipment depending on particular use of the equipment and the field operations constraints, and on how to assess their impact on life extension and life cycle costing of the equipment. Various techniques from coating systems to sacrificial systems to material selection and others will be discussed. Case studies will include traditional techniques and innovative solutions. The document will refer to technologies in general terms only, without mention of specific manufacturers or brand names.

5. Scope

The Working Group shall collect case studies from different countries and different exposure environments to compile lessons learned. The existing standards, guidelines and best practices in this field shall be reviewed critically and recommended if and when appropriate as part of the final report. The matters that shall be investigated include:

- Worldwide inventory of currently used corrosion protection systems for lock equipment in aquatic environments
- History of performance from case studies, trending with respect to operating and exposure conditions
- Materials aspects, surface preparation and application criteria: pros and cons of the use of performance specifications.
- Performance assessment, thresholds, maintenance strategies and repair of corrosion protection systems : guidelines and industry standards, such as permissible damage guides, key elements to effectiveness of local repairs, compatibility of systems
- Possibilities of galvanic corrosion and prevention techniques

- Sacrificial systems such as metallizing and cathodic protection
- General conclusions and recommendations

6. Working group memberships

The desirable expertise of Working Group members includes the following profiles:

- Corrosion protection consultants and suppliers
- Infrastructure Management professionals
- Facility owners and operators
- Field operators or managers
- Subject matter experts (engineers and scientists)
- Research institutions (such as US Bureau of Reclamation)
- Young professionals willing to specialize in the field of the Working Group

7. Relevance to countries in transition

The investigation of the Working Group – *Corrosion protection of lock equipment* is relevant for any country that maintains waterborne infrastructure, including Countries in transition. Given the significant cost of lock equipment recoating efforts and the difficulties of justifying financing of such projects in a limited maintenance budget , the selection of high performance corrosion protection systems at the time of design and original construction is essential for facility owners to ensure economical and durable investments.

8. Climate Change

NA