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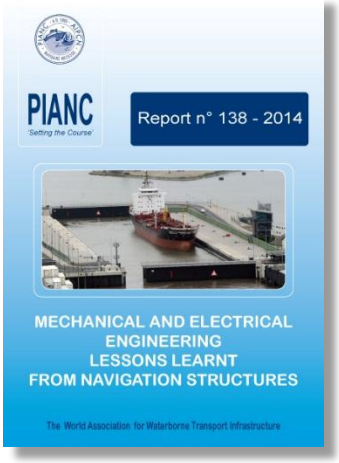

Title: "Mechanical and Electrical Engineering Lessons Learnt from Navigation Structures"

Author's: InCom Working Group 138

Price: € 150,00 (238 pages)

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Introduction:

Navigation locks are located throughout the world. A number of different gate types are utilised for navigation structures with their own unique design features, including lock service gates, fill/empty gates and dam gates. A variety of mechanical/electrical systems are used to operate these gates. Two typical methods are hydraulic cylinders or electrically operated gear-driven machinery.

Some of the design considerations for selecting operating machinery include the type of gate, loading conditions, site conditions, operations, maintenance and operator preference.

A number of mechanical/electrical design manuals and guidance exist for lock operating machinery. However, information on comprehensive 'lessons learnt' from actual installations are limited. Problems with mechanical/electrical systems quickly emerge causing expensive unscheduled closures. A comprehensive 'lessons learnt' on navigation operating machinery will help facilitate the design of new construction or rehabilitation and in troubleshooting existing operational and maintenance issues.

The Objective of the Working Group is to *establish a mechanical and electrical engineering working group to assemble 'lessons learnt' from navigation lock operating systems.*

The intention will be to provide a comprehensive summary of lessons learned and best practices that can be incorporated into future lock operating machinery designs. The report will include a summary of relevant guidance documents from various countries. The Working Group will provide guidance on the choice of systems to use in future designs for navigation structures. The report will use case studies to compile lessons learnt on hydraulic machinery, electro-mechanical machinery and electrical control systems and determine best practice to improve reliability and thus availability. Some of the issues that could be investigated include:

- Troubleshooting – Difficult for lock personnel to troubleshoot, programming of PLC is complicated
- Exterior Mounted Components – Vulnerable to sun, water and flooding
- Custom designed cylinders and other components with long lead times for service and delivery
- Possibility of impact damage on machinery connections to the gate
- PLC versus hardwire systems, use of programmable logic controller replaces many parts and flexible for adopting changes
- Hydraulic components provide for fewer moving parts, centralised HPU, accurate control of speed, shock absorbing, smooth operation and fewer installation/alignment issues and less pivot points for wear.
- Labour-intensive maintenance

The Working Group will review all areas of concern and prioritise them to prepare a shortlist of matters of critical concern to navigation operators and engineers and develop its report accordingly.

NOTE: The objective of this report is to provide information and recommendations on good practice. Conformity is not obligatory and engineering judgement should be used in its application, especially in special circumstances. This report should be seen as an expert guidance and state of the art on this particular subject. PIANC disclaims all responsibility in case this report should be presented as an official standard.

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