

## Ship collision against lock gates

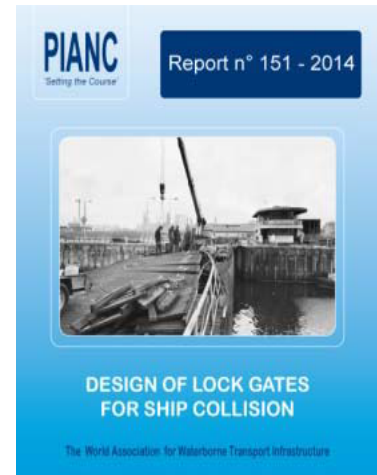
### PIANC SHORT COURSE

SMART RIVERS 2015, Argentina, Buenos Aires, 8<sup>th</sup> September 2015

### Table of content

**1) Introduction: Aims of PIANC WG 151 in terms of ship collision against lock gates (20 min)**

By Prof. Philippe RIGO, University of Liège (BE); INCOM Chairman - [Ph.rigo@ulg.ac.be](mailto:Ph.rigo@ulg.ac.be)



**2) Presentation of the WG 151 report: Design of lock gates for ship collision (45 min)**

By Juan OLLERO, Inros-Lackner AG (Germany) - [Juan.Ollero@inros-lackner.de](mailto:Juan.Ollero@inros-lackner.de)

- Presentation of the data that have to be collected to correctly define the collision scenario
- Brief review of the existing types of lock gates
- Presentation of some impact protection systems
- Description of the current practice and philosophy in different countries to protect lock gates against ship collisions
- Review of the potential consequences in case of impact
- Presentation of four different methodologies to evaluate the crashworthiness:
  - The CETMEF approach
  - The analytical approach
  - The numerical methods
  - The use of physical models
- Conclusion: recommended assessment procedure

**3) Presentation of the experience of Panama (ACP) “How was considered ship collision in the design of the new lock gates” (15 min)**

By Johnny WONG, and Rogelio GORDON; ACP, Panama  
[JWong@pancanal.com](mailto:JWong@pancanal.com) , [RGordon@pancanal.com](mailto:RGordon@pancanal.com)

**4) Presentation of new advanced analytical methods to assess crashworthiness of lock gates (2 x 45 min)**

By Dr. L. Buldgen: University of Liège (BE), [L.Buldgen@ulg.ac.be](mailto:L.Buldgen@ulg.ac.be)

- Presentation of advanced analytical methods to evaluate the collision resistance for plane lock gates
  - Local deforming mode
  - Global deforming mode
- Extension of the simplified method to mitre lock gates
- Validation of the analytical results with numerical solutions
  - Description of the finite element models (LS-DYNA)
  - Comparison of the resistance and energy curves
- Current development:
  - Extension to double hull gates (as wheelbarrow rolling gates)
  - Extension to impact on offshore wind structure (jacket and monopoles of wind turbines)