



# Update the Final Report of the International Commission for the Study of Locks

## Terms of Reference

### Objective of the International Commission

The main objective of the Commission is to update the 1986 **Final Report of the International Commission for the Study of Locks**.

### Background

It has been over 30 years since this benchmark document was produced and much has evolved and an updated report, second version, is needed for the navigation community. The new lock design textbook (not for academic education but young professional in lock design) will be a valuable instrument to promote PIANC and the Inland Navigation industry. This publication will serve the navigation community for years and will solidly place PIANC as the preeminent inland water transport organization.

### Final Product

The original document was an outstanding document, 445 pages, in its time however much of it is simply outdated and now is of limited value. Many of the designs presented simply are not used as more efficient, reliable, cost effective, and environmentally friendly solutions are favored. There are multiple areas to update.

As a second volume, it is envisioned the basic outline of the book will be retained, updated with new chapters or headings for subjects that were not common at the time for such items such as sustainability. Many countries now have mature water transport infrastructure and it is becoming clear the driving force for design are new efficient rehabilitation strategies when expanding or building a lock and maintain existing traffic in an overcrowded waterway. Other strategies such as in-the-wet construction can allow for much smaller footprint since a full scale cofferdam is not needed.

There have also been new exciting, innovative projects to highlight, such as, the Third Set of Locks for the Panama Canal, Three Gorges Locks, and the Falkirk Wheel. In addition there are many innovative navigation design improvements to discuss, such as, new lock filling and emptying systems, e-navigation, Computational Fluid Dynamics (CFD) and other advanced modeling has led to much better understanding of vessel behavior in the approach and during lockage, also a better grasp on mooring forces and salt water intrusion movements, asset management, life cycle cost, aids to navigation, gates, gate protection equipment, local coffer-boxes, innovative materials such as composites, hands free mooring, seismic effects, and security improvements (safety and anti-terrorism).

Many of these individual techniques and materials have been available for decades, but their broader acceptance has been limited. Their technologies and concepts have already been described in specific PIANC working groups, but it is necessary to refer in the updated textbook to allow for inexperienced engineers to have a global understanding of defining the design parameters for a new project, i.e., capacity, lift, layout, required studies, etc.

### **Matters to be Investigated**

There have been numerous PIANC working groups, treatises, research and development reports and innovations to provide an abundant source of background material for the update. Many working group reports can be used or referenced, however most working group reports deal with specialized concerns while the textbook deals with more basic design concepts. No other organization has the network and organization infrastructure such as PIANC to compile a textbook of this scale and value.

### **Desirable Background or Experience of Working Group Members.**

The background and experience may include the following:

- a. Navigation design engineers and consultants
- b. Academia/educators
- c. Operators and managers of existing waterways
- d. Representatives of regulatory bodies
- e. Promoters of improvement or new navigation schemes
- f. Manufacturers and fabricators

### **Relevance for Countries in Transition**

The results will help designers and promoters of new or existing navigation projects throughout the world and provide guidance to develop and operate safe, sustainable, and economically viable waterways. This effort can be useful for all countries developing hydraulic structure infrastructure by providing a relevant comprehensive design experience for new or to extend the life of existing hydraulic structures.

### **Climate Change: Sustainability**

The sustainability concept was incomplete when the original text was prepared in 1986 and is an opportunity to enhance this value in the navigation design process, including the impact of climate change of the design, operation and maintenance of navigation locks.