



PIANC Working Group 135 (MarCom)

Terms of reference

Design principles for container terminals in small and medium ports

1- Definition of the problem

Container terminals in medium and small ports have been designed in the past without enough up-to-date references, whereas large hub ports have been designed according to other considerations .

In fact, a first PIANC group MARCOM 9 was settled in 1984 , which focused its attention on general cargo terminals and delivered in 1987 a report with the title "design of modern terminals". The fact that this report is out of print today shows that it interested a large number of users. But it was referring to a growing industry which evolved in-between from a consolidating industry to a fully developed technique nowadays.

Several considerations indicate necessity to give new approach for design:

- a) adaptability of terminals to service larger vessels for container traffic
- b) difficulty to change technology of operations to face growing traffics or to try to improve performance
- c) environmental issues related to terminal design or terminal operations
- d) land shortage due to environmental or urban considerations
- e) tendency to use automation or new trans-shipment technologies, which require also attention for maintenance concepts
- f) the development of information technology, which yields moreover to systems analysis
- g) new trends in logistics using door-to-door concepts and inter-modal transport units

The composition of the group MARCOM 9 was balanced between state representatives, consultants, port engineers and members from countries in transition. It tried to find internationally agreed upon guidance for conceiving or

developing general cargo terminals. Many of the figures or schemes used at that time have to be updated. So there is a need to produce a new document, considering that other documents have already been published on ferries by PIANC(MARCOM 11) or in several books written by consultants on port engineering as a broader topic. The work itself should be a cooperative work with IAPH , which is dealing with operating topics in ports and should concentrate on general cargo facilities , with the main work dedicated to container terminals.

2- Objective of the working group

The design of new terminals has to take into account the main logistical trends concerning general cargo terminals within port terminals in the past twenty years and several considerations regarding environmental or security matters:

- large use of inter-modal transport units (container, roro-units, etc...)
- growing increase of containerized part of this traffic
- large scale effects which yields to increase the size of the ships(13 000 TEUS instead of 5000 TEUS for container ships) , productivity adaptation on both sides of the terminal (sea and land)
- using different transportation means (road, rail, barge, short sea ships) and favouring modal shift from the road to other transportation means , which may also yield to add some considerations in designing inland port facilities
- environmental considerations regarding terminal design and operation
- special attention paid to specific cargoes(dangerous cargoes with confinement or caution in operation; heavy cargo with consequences on terminal revetments)
- development of information systems , to smooth the cargo moves through the terminal
- frequent use of new technologies , especially automation , which rises specific questions , concerning labour force acceptance, maintenance or costs
- generalized tendency in having discussions between port operators for terminals and port authorities for quays and land transportation facilities
- attention paid to security initiatives (ISPS code)

3- PIANC reports or other works to be reviewed

1978 UNCTAD Port development: a handbook for planning in developing countries

1987 PIANC-MARCOM 9 - Design of modern terminals

2001 IAPH Guidelines for planning and design

2005 Agerschou and al Planning and design for of ports and marine terminals

2005 Thoresen Port design handbook

MARCOM WG 52 criteria for (un)loading of container ships (undergoing)

4-Matters to be investigated

The last WG 9 group was based upon giving general guidance to design or to understand the design of container terminals, ro-ro terminals, barge transporter vessels terminals, general cargo terminals with information on reefer facilities.

This kind of guidance was dedicated first to an overall view of a multi-purpose terminal, allowing the possibility to give the main description of the terminal, the vessels it should service and the corresponding servicing devices (equipment, shed , yard) and then get into more details about the design principles , mainly for the quay , for the yard and for the rail or barge facilities on which or for which it should operate.

Of course, the same matters as WG9 should be investigated: type of vessel to service, improvement and tendencies to consider for the ship-to shore equipment or for the yard equipment.

Other considerations such as those mentioned in point 2 should be added, especially those concerning environmental considerations and security requirements(ISPS code implementation).

Though basic design principles should be kept as something crucial, one has to consider that a large discussion between port authority for infrastructure and terminal operators raises today important questions in understanding capacity and rates of use of facilities, either on the berth side, on the yard side and at the gate. Other matters such as information treatment should also be either reviewed or at least understood

5- Method of approach

Two different tools could improve the method for a new group:

- systems analysis applied to the terminal in its different servicing functions
- functional analysis to derive the different matters that should be investigated

So the new working group could use a method which we describe only with its main elements:

- select a proper typology of medium and small ports , then:
 - a) describe the appliance of both functional and systems analysis of the terminal (vessel, berth, ship to shore equipment, yard, yard equipment, gate, land transportation means, workforce, terminal control, other devices) in order to understand the main functions such a terminal system should implement
 - b) describe the general trends of evolutions in vessels, equipments or terminal services
 - c) give some general and comprehensive views on operations productivity with minimum , maximum and average values for sea-road inter-modality, sea-rail inter-modality, sea-inland navigation inter-modality
 - d) identify the key dimensioning factors and select then the main matters where internationally agreed standards or state of the art exchanges could be produced such as physical lay-out guidance and operational factors lay-out

6-Suggested final product of the working group

The final product will have the format of the normal WG report (50 pages), and should give practical views as well as design schemes .The task shouldn't be too hard if some examples or some more specific information is driven back into annexes.

7- Desirable background or experience of the working group members

The WG 9 group composition remains relevant, with small additions:

- a) technical departments of ports(both stemming from developed countries or countries in transition)
- b) port consultants
- c) national technical institutes
- d) terminal operators (if they agree in sharing there needs)
- e) IAPH members

8- Relevance for countries in transition

The first WG 9 report was written in an attempt to share experience with countries in transition. It seems to be still relevant though some consideration on the terminal size could focus more or less on small container terminals.