



## Planning for Automation of Container Terminals

### Terms of Reference

#### 1. Historical Background (definition of the problem)

As worldwide container traffic continues to grow, operators face challenges in boosting productivity at their terminals, either at existing facilities or at new sites. Environmental issues are also increasingly important, and not only should container handling equipment achieve high levels of performance but in doing so should be environmentally friendly.

The increasing demand for innovative handling solutions has led to the use of automated stacking cranes (ASCs) at an increasing number of terminals. Although these have a higher capital cost than RTGs and require dedicated crane rail systems, ASCs provide high stacking densities, high working speeds, high handling rates and an optimum use of space. As they are driverless, further benefits include improved productivity, lower labour and operating costs, a greater degree of safety than other container handling systems and dependable operation in virtually all weathers.

Continuous technology development is reducing the capital cost of automation and providing increased productivity, as well as increasing the opportunities for semi-automated or fully automated small and medium terminals.

#### 2. Objectives of the Working Group

Today's container terminals can be divided into small, medium and large terminals. Among the large terminals, very few have automated terminals today and few of them have started the automation process. Most terminals are operating the "old" way with conventional equipment. Most large new terminals, which are under construction, are planning for a semi- or fully-automated operation. Even some medium and small terminals are being automated because of the cost of technology and the productivity potential. This means that in a few years it will be normal that all new container terminals and many existing will have semi-automatic or fully automatic solutions.

Increased focus on safety demands fewer people working in the terminal. The human environment today should be a first priority, and most of container terminals are owned or operated by professional international operators who have a very strong focus on that point.

The increased focus on the environment also points towards automation by using more cranes in the terminal and using equipment with electric power and battery technology to reduce emissions.

The WG report should provide guidance to owners, operators and designers of container terminals worldwide, in order to provide safer, environmentally and cost-effective operation of the terminals. The report will be considered as an addition to existing standards, but on this topic few any standards exist and this report will be very useful for design and operations.

### **3. Existing Reports**

There is at least two reports, "Criteria for the (Un)loading of Container Vessels " (WG115) and "Design Principles for Small and Medium Marine Container Terminals" (WG135), which has some input which can be interesting for this new TOR. However, there must be a survey if there are reports, which contain important information related to the topic of automation of container terminals in a broad perspective. A contact with IAPH may be useful on this topic.

### **4. Matters to be Investigated**

The matters to be investigated when planning an automated terminal are all aspects around a container terminal including: STS cranes, terminal equipment such as RTG cranes, RMG cranes, straddle carriers, shuttle carriers, AGV vehicles etc, land installation included automated gate solutions, management system for containers and safety aspects in the terminal. Requirements for new terminals and upgrading of existing terminals should be considered.

### **5. Suggested Final Product of the Working Group**

The final product will be recommendations and guidelines for planning both semi- and fully-automated container terminals, Greenfield terminals and upgrading of existing terminals.

### **6. Desirable Disciplines of the Members of the Working Group**

In addition to the owners and operators of container terminals, the Working Group members should represent all parties involved including consulting engineers, contractors and public authorities. Members with a research background and ship owners will also be welcome.

### **7. Relevance for Countries in Transition**

The recommendations and guidelines will help countries in transition with increased knowledge about modern container terminals and the potential productivity gains that can be achieved during semi or full automation of the container terminals.

### **8. Climate Change**

Climate change needs to be considered in the planning and design of port infrastructure and civil engineering projects.