Adequacy of Selected Lock Size Parameters for Expanded Panama Canal

Revisión de las Dimensiones Seleccionadas de las Esclusas Propuestas para la Expansión del Canal de Panamá

Dr. Hans G. Payer

5 de diciembre de 2005

Contrato No. 161308

Resumen Ejecutivo

Adequacy of Selected Lock Size Parameters for Expanded Panama Canal

Dr. Hans G. Payer
Consulting Naval Architect

Post-Panamax Lock Size Review Study

2005-12-05

Executive Summary

The Panama Canal is seeking an assessment on the *Adequacy of the Selected Post-Panamax Lock Size Parameters for the Expanded Canal*. The aim of the study is to analyse the main dimensions of present and possible future ships in light of the dimensions of the Expanded Canal. All ship types are basically considered, but the emphasis is given to containerships, the shipping sector with the most extensive long term growth. An analysis of the development of containerships up to the largest ships in service, under construction or on order today is followed by a systematic consideration of possible future further developments and extensions of containership design. The geo-political and geo-economic role of the Panama Canal is considered. Limiting factors for the further growth of containerships are discussed regarding the maximum available size of the propulsion plant and ship propulsion, structural strength and stiffness of the ship's hull, beam and depth limitations of world canals and straits, the water depth of port access and in port, and finally port facilities and inland transport infrastructure requirements and availability.

On the basis of these considerations, it is concluded that even larger ships than the 10,000 TEU vessels coming into service today are possible. Ports have generally responded to the developments of the containerships quickly, even if at a high cost. Gantry cranes in most major ports can service ships with a beam of up to 42.8 meters. New cranes in some ports have an outreach of 60 m and 65 m already today. Regarding the water depth it is however concluded that it can be expected to remain limited to about 14.5 to 15 m in the majority of world ports.

The container volume shipped to and from the USA has an exceptionally high growth rate. The further growth of the port capacity to stay ahead of or in line with the development of the container volume is however seen critical, particularly for the US West Coast ports. This also applies to the infrastructure; the trains of the land-link connecting the US West coast to the Mid-West and the most populous East have reached their capacity limits. As an alternative, there is a strong industry-interest in the All-Water-Route to the Us East Coast.

The economies of scale effectively become less significant as the ships go beyond about 12,000 TEU. Considering the economic and operational risks and the reduction in flexibility of very large ships, it is believed by many maritime economists that the most economical containership size is and will be around 6,000TEU.

Container shipping operations will continue to become more diverse as the world container fleet continues to grow. Different types of services, hub and spoke services, one-level transcontinental and feeder services as well as direct services to medium sized and minor ports close to the final destination of the containers exist already today. This development is expected to intensify as the container volume on most routes continues to grow. Based on these particulars it is expected that several

workhorse groups of intercontinental container carriers will evolve. There will be the group around 3,000 to 4,000 TEU, the present Panamax group, a group around 6,000 TEU and finally a large ship group with a carrying capacity of between 7,000 and 10,000 TEU.

It is found that the new lock dimensions are a big step regarding the transit possibility for larger ships. The dimensions are well selected. All containerships presently in operation, including today's largest 9,000 and 10,000 TEU vessels will be able to pass the Canal. Even larger ships such as a 12,000 TEU vessel could be designed to be able to transit the new Canal. It is concluded that the locks are of sufficient size and that they will effectively be able to serve for a long time to come the workhorse ships of the main trade segments and routes.

It can not be excluded that even larger containerships will be put into service; it may, however, be expected that they will operate on special routes only and that they will be the exception rather than the new norm. It would appear uneconomical to prepare the Canal for the largest ships possible.

As in the past, the Canal will have a decisive influence on the design of ships in the future. New Panamax ship types will be developed. For this reason it is recommended that the new Panamax dimensions and limitations should be published as soon as possible. It is possible that some of the design-projects presently considered, with overall dimensions beyond the new Panamax parameters, will be modified to fit the new Canal.

During the assessment of the adequacy of the new locks attention was given to find any significant insufficiencies that may affect the functionality, effectiveness or longevity of the selected Post-Panamax lock size parameters. No such inadequacies were found.

Dr. Hans G. Payer
Adviser and Consultant Naval Architect
Am Karpfenteich 51
D-22339 Hamburg – Germany
Tel.: +49 40 538 89068
Fax.:+49 40 3614976215
e-mail: hans-georg.payer@gl-group.com