

## **T&R Session Descriptions**

### **Thursday 25 October 2012**

As in previous years, T&R Sessions promise to be an exciting part of the Annual Meeting technical program. Professor Alan Brown from VPI will again be adding his engaging moderation capabilities to these timely interactive sessions. Sessions range from a panel on when we will see nuclear powered commercial vessels, the state of the art in hydrodynamic load predictions, safe ferry design for poor countries, weight engineering activities, insights into structural failure on passenger ships, air emission reduction technologies, LNG infrastructure for bunkering, how to develop a quality culture, and passenger ship stability rule developments.

#### **TR1 - Is The Time Right For Nuclear Powered Commercial Vessels?**

Jose Femenia, Chair T&R Panel M-48 (Nuclear Propulsion)

As the marine industry is faced with increased environmental restrictions and uncertain fuel costs, the trans-ocean segment has responded by reducing vessel speed and essentially lowering expectations for higher speed future vessels. Nuclear power presents a unique opportunity for the ocean transportation system to continue to enhance the efficiency of the intercontinental marine transportation system and environmental stewardship of the environment. The session will address the potential of adopting for ship propulsion the small modular reactors (SMR's) being developed for commercial electrical generation. The session will commence with an overview based on the pre-read paper available at the accompanying link and will continue with comments and discussion by M48 Panel members and invited guests who are familiar with SMR's. An important element of the session is to foster a lively discussion with interested attendees and solicit ideas on how to proceed with this important effort.

#### **TR2 - The State of the Art in Hydrodynamic Load Predictions and Recommendations for Future Research** – Allan H. Engle, Chair T&R Panel HS-1 (Hull Loadings)

Given continuing problems related to the development, enhancement and application of state-of-the-art load prediction methods, SNAME requested the staffing of a Hydrodynamic Loads Task Group (HL TG). The focus of the HL TG work has been to provide technical review, evaluation, and recommendations concerning the state-of-the-art for a number of hydrodynamic load issues which include:

1. Limits/Capabilities of Existing Criteria, Modeling and Prediction Methods
2. Model Testing/Full Scale Trials
3. Design Loads - Probabilistic and statistical methods
4. Review of USN and commercial standards (Classification Societies) for predicting wave loads (primary and secondary)

The format of the report is such that it will provide the reader with a basic understanding of the

physics related to the seakeeping and loads problem as well as a summary of the current state of the art. Specific recommendations for future research are also discussed.

### **TR3 - Maritime Design for the Developing World: Implementing Innovation**

Roberta Weisbrod, Ph.D., Principal, Sustainable Ports (Chair TRB AP085 Ferry Transportation)

This presentation is about innovating maritime transport for, and with, the developing world in a way that has the potential to open up new markets globally and in the US. Many developing world nations experience dismal records of a large number and high frequency of ferry fatalities. Since 2005 several studies and collaborative analyses that we have participated in have identified the causes and seek to address them.

Of the major causes—sudden hazardous weather, poor training, overloading and poor quality vessels—the latter two causes, which are intertwined, have proved the most intractable. In the developing world, vessels are purchased in the after-market from the developed world. The vessels are old and almost always designed for a different geography. Case in point is the recent ferry sinking in Tanzania in which a former Washington State ferry was designed for transport in the protected waters of Puget Sound but was used on a 45-mile open waters journey.

This presentation formally launches a program to design safe, affordable ferries and announces a competition. The program is modeled on “Design for the other 90% of Us”, and seeks the design of vessels that are site-specific in terms of geography (hydrography, weather, and crossing distance and related factors) and social use (number of passengers, frequency, time of day, and demographics) in such a way that safety, sustainability and affordability are built in and scalability is possible.

The implementation of creating safe affordable ferries has two aspects susceptible to improvement by innovative technology: (1) operations, including training, weather notification, dynamic stability monitoring, rescue, etc.; and (2) the vessels themselves – their design, materials, and construction methods. This presentation will focus on the needs and opportunities for improving the vessels themselves but will also discuss operational improvements. Finally the presentation will discuss the opportunities for commercialization of safe, affordable ferries.

### **TR4 - Panel SD-1 Weight Engineering Recent and Planned Work**

William Boze, Chair T&R Panel SD-1 (Weight Engineering)

The prediction and control of mass properties in vehicle design, construction or modernization is of paramount importance in ensuring a vessel safely operates within its owners desired performance envelope. One purpose of the Panel is to ensure the knowledge and experiences of today’s veteran mass properties engineers are passed onto others. SNAME T&R Panel SD-1 has been working through the Society of Allied Weight Engineers to capture marine, aerospace and ground transportation vehicle industry best practices and document these practices within a set of marine industry reference documents.

This presentation is intended to inform the marine community of the now six marine mass properties industry standards and one 388 page Marine Vehicle Weight Engineering reference book now available. Planned Panel activities to supplement three existing standards, create three new standards, and eventually recreate these standards as American National Standards will also be presented.

#### **TR5 – Structural Failures in Early Large Passenger Ships**

William H. Garzke, Jr., Professor Richard Woytowich, and Roy Mengot (Marine Forensics Committee)

The decade and half after 1900 saw a dramatic increase in passenger ship size. The growth was beyond the edge of the marine structural technology of the time and resulted in problems. Most of those huge ships took their flaws to the scrap yard but, ironically, *Titanic* left hers to be explored. During the period since *Titanic's* discovery in 1985 there have also been significant improvements in naval architecture hydrostatic calculations and structural analysis capabilities through advances in computer technologies that include better specialized software as well as improvements in computer hardware. Combining these advances in computer technologies with recent knowledge gained from the scientific expeditions to the wreck site has provided additional insight into the sinking of the RMS *Titanic* and other famous ship losses.

#### **TR6 - ECA and Air Emission Reduction Technologies. A study into the technologies likely to be adopted by 2020.**

Tony Teo, Chair T&R Panel M-43 (Alternate Fuels)

Based on the trends in the world economy and transport demand, marine regulations and technology, four possible development paths are expected towards 2020. These scenarios give input to a simulation model developed to assess likely technology investment in the world fleet from 2012 to 2020. This study has identified key findings concerning the main regulatory issues, highlighting important considerations for designers, ship owners and operators in the period leading up to 2020. We welcome you to this presentation to learn about and discuss the key findings.

#### **TR7 - LNG Fuel Infrastructure and Bunkering in North America**

Tony Teo, Chair T&R Panel M-43 (Alternate Fuels)

One of the key obstacles limiting the development on the use of LNG fuel is the lack of both infrastructure and regulations relating to LNG bunkering of ships. In recent years there has been a lot of interest and several developments in the usage of LNG as a marine fuel in North America. The main challenge still remains the supply chain and availability of bunker stations in North American ports. This report will address the infrastructure present in North America and procedures involved in bunkering and safety considerations. It will also make recommendations on regulatory and infrastructure developments in North America related to LNG bunkering.

### **TR8 - Maritime Quality Culture**

Michael Klein-Ureña, Leader of Student Affairs, T&R Panel O-50 (Maritime Quality Culture)

Quality management is a vital element in our professional life, including the success of any engineering project. The discipline of quality management consists of two fundamental attributes: the system and the culture. While the system is relatively understood, the culture has been overlooked by the industry due to lack of knowledge in the area of human behavior and psychology. Panel O-50 (Maritime Quality Culture) was created to bring awareness and to enable SNAME's members and other industry professionals to benefit from this important knowledge.

This presentation outlines the basic concepts of quality culture, the challenges of implementing quality initiatives, and its importance to the maritime industry. The presenter reviews the "Thought-Outcome-Behavior" Process as it applies to quality culture and concludes with a summary of the Panel's activities to date.

### **TR9 – IMO Developments on the Stability of Passenger Ships**

Hendrik Bruhns, Herbert-ABS Software Solutions LLC

The new probabilistic and more risk-based subdivision and damage stability rules have brought many changes and more flexibility to subdivision requirements for passenger ship designs. Whilst designers are still adapting to the fundamentally changed SOLAS requirements applicable January 1<sup>st</sup> 2009, many additional items remain on the agenda of the International Maritime Organization (IMO) addressing the stability of passenger ships. Additional damage stability regulations for ro-ro passenger ships as well as requirements towards stability and sea-keeping characteristics of damaged passenger ships in a seaway when returning to port by own power or under tow are among the topics that are currently being addressed. These could have considerable impact on future passenger and ro-ro passenger vessel designs.