

The neuroscience of safety

Delegates at ITS 2014 in Hamburg may be surprised to come across people wired-up to computers and wearing fancy blinking headwear, surrounded by weatherchart-like diagrams, changing colours, and topographic presentations flickering on the wall. What is it all about?

The use of simulators in the shipping industry is becoming increasingly widespread. Technology is becoming so accurate at modelling hydrodynamic forces and vessel performance that modern simulators are able

to introduce sailors to many of the situations they might meet out on the ocean.

Despite this, the philosophy of training institutes seems to be something of a matter of taste. Is training used as a means of preventing accidents, or as 'repair work' after something has gone wrong? How does training address both the need of the shipowner to make a profit and the need of the sailor to work in safety? We need to understand more about the relationship between technical perfection and so-called 'soft' skills, such as bridge resource management.

To address this issue, K&S Projects decided to study the person to whom all these efforts are directed: the sailor. Stress and high workload cause problems in many ways: they take away control from the decision-making process, and in the long-run affect health. To look at the complex system of our brain in extreme situations, we initiated an ambitious project with academic and industry partners.

In the study, test subjects will be connected to an EEG (electro-encephalogram) during a training session in a ship-handling simulator, where they are asked to execute manoeuvres as the responsible tug master of a harbour tug. Similar tests will be conducted during *ITS 2014* to demonstrate the subject's changing workload. The results will support the design of individual and standardised training, in combination with modern management tools.



▲ *The ANS 6000 Simulator.*

Prof Klaus Gramann, Institute for Neural Computation at the University of California, San Diego, said: "For the first time, EEG/BCI analyses are being used in a close-to-real situation in the maritime context. The idea is to identify cognitive workload and stress deriving from critical or demanding situations."

The ongoing research will aim to answer several questions: Can simulators be used to design an efficient, tailor-made training experience? Is it possible to produce both individual and general training solutions? Can simulations help determine the physical limits of sailors, and can they also be used to develop methods to handle the situation?

ITS 2014 will provide a first look at this innovative study programme, and K&S Projects invites all visiting delegates to come to the exhibition area to observe and discuss the findings.