NW ENGLAND & N WALES

Cargo liquefaction

➔ Members and guests met to hear Dr Martin Jonas, a partner at Brookes Bell, speak on the liquefaction of dry bulk cargo. This subject is most topical as there have been many strandings and losses of bulk carriers recently owing to liquefaction. Dr Jonas showed many illustrations, both static and in video form, showing the effects of liquefaction. These are both alarming and quick to develop, transforming a seemingly innocent cargo into a dangerous one.

As a start we watched a video of chrome ore in a hold where the cargo had formed a flat level surface with excess water washing backwards and forwards, rather like on a beach. None of this was apparent on loading when the cargo had been trimmed under the tween deck. However, the solid form had collapsed with cargo particles settling into a more dense packing pattern, reducing the space available for the inherent water and causing loss of shear strength, ie liquefaction.

A bulk cargo may compress after loading in a similar way to packaged cereal in a box which is full when filled in the factory but half empty when bought in the shop. This occurs because the vibration caused during transportation compresses the air and forces it out of the bulk. If the cargo is dry the problem is minimised but if wet, this can leave insufficient space for the inherent water, causing an increase in water pressure inside the cargo, with excess water being pressed to the surface. An example was shown of a wheelbarrow of moist bulk being wheeled over a rough surface. The more the vibration, the more the formerly piled bulk levelled and took on a fluid appearance.

Bulk cargo may tend to liquefy if the bulk is made of small particles and contains inherent moisture. SOLAS has contained rules concerning particle size and moisture content for many years, supported by the BC Code, which was not mandatory. The IMBSC code replaced the BC Code and became mandatory in 2011. The SOLAS requirement is to ensure that the moisture content is less than the Transportable Moisture Limit (TML), ie less than 90% of the Flow Moisture Point (FMP). However, determining this may be difficult.

Commercial pressures, remote loading sites and local and other interests determined to prevent lawful examination of the conditions lead to the occurrence of dangerous situations. Masters need to be aware as situations on board can get quickly out of hand.

The many questions following the presentation showed that Dr Jonas had given a very thought provoking talk.

Dr Steve Bonsall FNI