Few would give insulation a second thought when talking about the technical aspects of a newbuild but careful selection of pipe lagging and bulkhead/deckhead insulating material could in fact result in significant energy efficiency gains and associated cost savings.

Traditionally, fibrous blanket systems have been used to clad pipework and bulkheads and so on, but whilst these materials are undoubtedly an effective fire-resistant medium for thermal and/or acoustic insulation, the sheer amount a vessel requires can add substantial weight to the lightship condition.

Manufacturers of mineral wool-based insulation materials, however, have developed products that allow for weight savings without detriment to traditional fire, thermal and/or acoustic insulating properties.

Isover's Ultimate range, for instance, 700t of which Germany's Meyer Werft used for fire-protection and thermal insulation aboard the 2008-delivered *Celebrity Solstice*, resulted in a weight-saving of 300t compared with traditional fibre-based materials. The French company's product range is said to be up to 50% lighter than conventional stone wools but can insulate against temperatures up to 650°C.

Could new spray-on insulating coats replace traditional fibrous materials?

Insover's Ultimate insulation range

Replacing the 'old' lag

According to the marketing blurb, weight reductions of 35% can be achieved when Ultimate is used on steel decks and bulkheads, while floating decks could see 50% savings. For aluminium structures, including decks and bulkheads, weight savings of between 21 and 40% are possible but the light-weight material can also be used in composite structures since Ultimate meets the stringent requirements for fire protection (FRD60 and FRD30) with only 7.5kg/m^2 of insulation between the stiffeners. Reduced installation time and enhanced material flexibility are other advantages since the range is a single-layer solution, although double-layers are offered.

Denmark's Rockwool Technical Insulation (RTI), an independent organisation within the Rockwool Group, and a leading supplier of high-quality stone wool products to the marine sector, is another that is marketing low-weight insulation solutions.

The Rockwool marine product, Firebatt 2000, is a single layer slab that can provide A30 and A60 rated fire-resistant thermal and acoustic insulation for significantly less weight. Standard 1000 x 600mm slabs are available in 25, 40 or 75mm thicknesses, depending on the level of protection required.

Rockwell technical support's Tony Richard told *SW&S*: 'Weight saving is fundamental to all marine structures and we have a very effective weight : performance ratio. But insulation is synonymous with performance.'

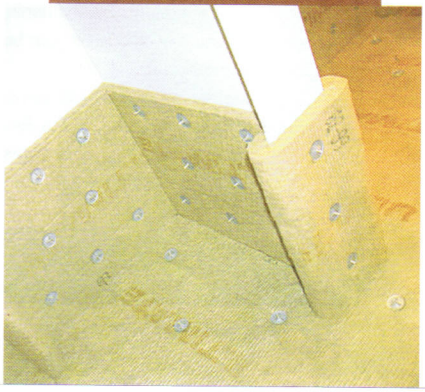
He fails to see how the new breed of liquid latex-type insulation systems can compete with the traditional materials. 'You will never get the same performance with a 30µ spray,' he says.

Companies that offer these spray-on liquid or foam-based thermal insulation and anti-condensation systems would disagree of course, arguing that their products perform just as well, if not better, than the fibrous systems they hope to replace.

Indeed, the Surface Ships division of BAE Systems has concluded a feasibility study into the shipboard application of spray-on liquid insulation systems and found that they can offer significant benefits to shipbuilders and owners.

In a paper highlighting the results of the study, presented last month at the Royal Institute of Naval Architects, its authors, lead engineer Sam Wright and principal design engineer Jim Miller, suggest that use of a ceramic-latex can achieve 'a significant reduction in the weight of the insulating materi-

Ultimate offers significant weight reductions



als and reduced spatial requirements leading to improved through-life fuel savings and a greater spatial envelope for fittings.'

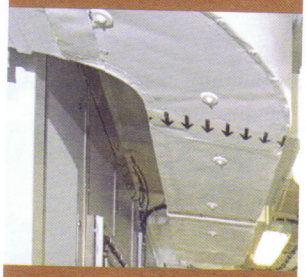
The authors say lightship can be reduced when liquid thermal systems replace fibre insulation in equal volume since the spray-on latex coat is less dense. So if 25mm fibre blankets are replaced with 1.5mm of liquid thermal insulation or 50mm blankets with 5mm of the spray-on latex a 90% reduction on thermal insulation weight across the ship could be achieved, resulting in a physical reduction of about 6.51t. They say replacement can lead to savings of £333 000 over the life of a vessel.

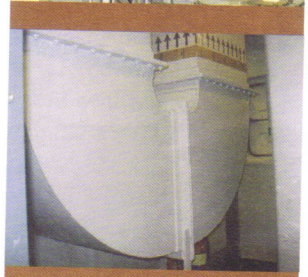
The reduced lightship condition consequent of the thinner insulation material does not constitute a direct increase in space/volume, but gains would be noticeable in areas where space is at a premium, such as technical galleries and evacuation routes. The thinner layers of insulation could also increase the level of safety for individuals working in these areas because working conditions would be less cramped and movement less impaired. Increased space around pipes, ducts and vents would facilitate ease of installation and fitment, particularly where current insulation methods restrict movement and placement of tools during installation, say the authors.

BAE Systems studied the application of insulating products manufactured by a US-based company, Temp-Coat, and found that the technology inherent to its TempoCoat 101 (thermal) and Silent Running 1000 (acoustic) products created a non-porous binder which eliminated convection from air flow, making the product resistant to water and moisture retention, delivering an additional anti-corrosive benefit to the material.

Temp Coat 101, classified by Lloyd's Register as a fire resisting material, having low flame spread characteristics, is a liquid acrylic latex ceramic insulation that can be applied to piping, air and heat duct work, exposed water pipes, tanks, oxygen lines, steam lines, refrigeration equipment, cryogenics, and condensation control. It physically adheres to the surfaces it insulates between -66.2°C and 176.7°C and on surfaces as hot as 260°C.

■ Traditional installations require spot welding of insulations pins





■ A Ceramic-latex insulation offers a more aesthetic finish

Wright and Miller found the liquid insulation also suitable for use in external or 'wet' spaces and parts of ship where traditional materials are not suitable. 'Being non-permeable, liquid insulation will not wick or absorb water in the same fashion as fibre insulation therefore it can be applied to the entire bulkhead without leaving a 150mm gap at the deck/bulkhead interface,' they say in their paper, *Application of Spray-on Liquid Insulation for Thermal and Vibrational Management.*

From the shipbuilder's perspective it is unequivocal that the spray-on insulation would be easier to install and maintain. For instance, there would be no need to spot weld insulation pins to the ship's structure prior to the attachment and fixing of conventional insulation materials. The liquid coat can be applied by the yard's paint team using a low pressure airless spray gun in a process not unlike spray painting. It can also be applied by brush or roller where spraying equipment is unavailable and then coloured or tinted which might, in some cases, remove the need for cosmetic painting. □

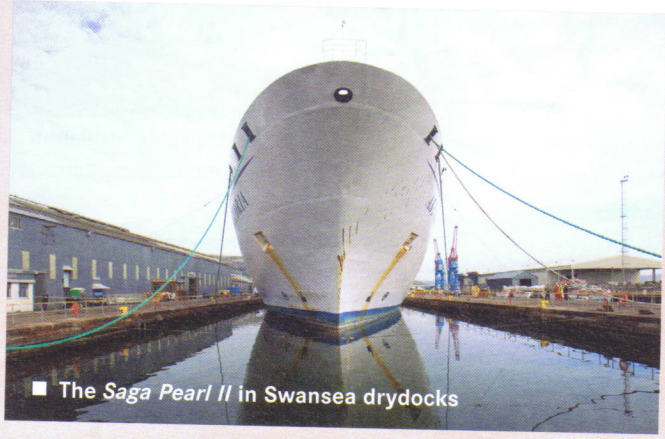
The Microban Saga

Sheets and reels of Armacell's Class O Armaflex insulation material have been supplied and fitted to the recently re-commissioned Swansea drydocks for installation in the *Saga Pearl II*, Saga's newly acquired cruiseship under refurbishment by Harris Pye.

Manufactured in Oldham, in England's northwest, the Armaflex sheets were selected due to the incorporation of a new anti-bacterial protection technology – called Microban – that inhibits mould, mildew and microbial growth, phenomena that often afflicts a ship's chilled water systems.

The product will be used mainly to insulate the vessel's chilled water system, although the material will also be used on some domestic hot water pipeworks.

Inherent to the light-weight and flexible insulator is a closed cell elastomeric nitrile rubber that Armacell says offers a high level of protection against condensation while reducing energy loss by up to 87%. The inclusion of the Microban technology in the Armaflex production process creates an effective water vapour barrier, preventing moisture and therefore reducing the potential for microbial growth.



■ The *Saga Pearl II* in Swansea drydocks

Bacteria and mould often forms within an insulation material underneath the surface covering.

Armacell's application specialist Alan Jakeman says the German headquartered firm is the only manufacture that is providing nitrile rubber based insulation with the Microban solution.

The 18 591gt *Saga Pearl II* was originally built in Germany in 1981 and launched as the *Arkona* and later renamed *Astoria*. Harris Pye completed the £20M refit work late last month. □