June 2016
Thematic Issue 55

Ship Recycling: Reducing Human and Environmental Impacts

Subscribe to free weekly News Alert

Source: Jain, K.P., Pruyn, J.F.J. & Hopman, J.J. (2014) Influence of ship design on ship recycling. In: *Maritime Technology and Engineering.* CRC Press. pp. 269–276. DOI: 10.13140/2.1.1517.3127

Contact:
k.p.jain@tudelft.nl;
J.F.J.Pruyn@tudelft.nl;
J.J.Hopman@tudelft.nl

Read more about:
Resource efficiency, Sustainable consumption and production, Waste

1.McKenna, SA, Kurt, RE & Turan, O. (2012). A methodology for a 'design for ship recycling. In *The Environmentally Friendly Ship.* 28-29 February 2012, RINA HQ, London. pp. 37-44, International Conference on the Environmentally Friendly Ship, London, UK, 28-29 February.

2.http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32013R1257

European Commission

Science for Environment Policy

Design for recycling: a route to green ship recycling

Ship recycling at the end of a ship's useful life aims to make the shipping industry more environmentally sustainable and is a major source of employment in developing countries. However, there are associated health, safety and environmental concerns. This study argues these concerns are due to inappropriate design and explains how 'design for recycling' can reduce the costs and risks of ship recycling.

The final stage of a ship's life cycle — recycling — is essential for renewal of the shipping fleet. On average, 96% of the ship can be recycled or reused[1]. The re-use of increasingly scarce materials also reduces the burden that shipping places on natural resources, improving the environmental sustainability of the industry.

Ship recycling also supports the developing economies of several countries, such as Bangladesh, China, India, Pakistan and Turkey, which together represent 97% of the world's ship recycling capacity. However, current recycling practices can have negative social and environmental impacts. Ships contain toxic materials, such as asbestos and heavy metals, which many ship recycling hubs do not have the infrastructure to treat, generating health and safety concerns for workers and contaminating the natural environment.

Awareness of the risks of ship recycling was first raised in the early 1990s, leading the International Maritime Organization (IMO) to adopt the *Hong Kong Convention for the Safe and Environmentally Sound Recycling of Ships* in 2009. More recently, the EU has published a Ship Recycling Regulation[2], which aims to reduce the negative impacts caused by recycling EU Member State-flagged ships.

The researchers of this paper argue that, to address the negative impacts of ship recycling properly, hazards must be considered during the design process. 'Design for recycling', a concept which involves identifying the recycling challenges during the design stage, has already been successfully applied in the automobile industry. In the context of ships, it could involve identifying hazards, such as toxic paints, or inefficiencies, such as oil tanks that must be manually cleaned before they can be recycled.

Their basic principle is for ship designers to ensure that recycling is as safe, efficient and environmentally friendly as possible. Not only would this prevent or reduce the use of materials, such as asbestos, PCBs (polychlorinated biphenyls), heavy metals and oils (e.g. residual fuels), that could be a threat to workers and the local environment during dismantling, it would also reduce risk throughout the ship's life-cycle, decreasing risks to builders and crew members.

The concept has three key objectives: providing an accurate inventory of hazardous materials, reducing or replacing hazardous materials, and making the ship easy to dismantle. The latter could be achieved by using techniques such as standardisation of all parts and equipment on every ship to make it easier to identify the components of end of life ships for potential re-use, remanufacturing or recycling. Other techniques for ease of dismantling would be to include properly designed lifting supports for handling dismantled structural parts to minimise accidents due to falling components. The key objectives could be incorporated into design rules through IMO codes, for example.

However, there are concerns about the impact that implementing these changes would have on the costs of building and operating ships. To deal with these additional costs, the researchers suggest that the expense of creating inventories of hazardous materials should be borne by the ship owner (as in the 'polluter pays' principle). They also say costs should be calculated for different replacement materials and design changes in order to identify the most affordable options. The authors say the negative impacts of ship recycling presently undermine the industry's contribution to sustainable development. With this paper, they describe a method, with techniques for efficient ship dismantling, to reduce these negative impacts by improving ship design and, ultimately, to achieve cost-effective green ship recycling.