The economic benefit of a long-term coating strategy

Remke Willemen
Antwerp Maritime Academy, Belgium

When a ship reaches the end of its service life it is broken down at a demolition site to recover steel and other useful items. The recycling process itself imposes risks to the human health and safety, as well as to our habitat by sending toxic components into the atmosphere and the maritime environment. Not all parts and products can be recycled and thus waste, toxic and non-toxic, is generated. Extending the service life of a ship can contribute to the protection of human life and the environment.

The same is valid when looking at the service life from the ship construction point of view. If the service life of a ship is extended less ships have to be built. To estimate the energy consumption of steel production Javaherdashti (2008) suggests that the energy required to produce one ton of steel is approximately equal to the energy an average family consumes over 3 months and roughly worldwide one ton of steel turns into rust every 90 seconds (Javaherdashti, 2008). The service life of a ship is not determined by the external battering of the ship's hull by wind and waves but mainly by the internal gradual corrosion of the ballast tanks (Thapar, 2013). The latter implicates that a coating with a longer service life will have a direct impact on the life cycle of the ship, the toxic components send into the atmosphere and the energy consumption.

Most ballast tanks are prepared and coated according to the IMO Performance Standard for Protective Coating (PSPC), using a light-coloured epoxy coating that, when on board maintenance is being performed by the crew, should remain in a good condition for 15 years. Ship owners are not only pushed by international legislation (IMO, 2009) but also by commercial needs in preserving a good reputation, to keep the ballast tanks of their vessels in a good condition to avoid extra inspections and costs. Aiming to extend the service life of your vessel to 25 years with ballast tanks in a good condition, a full-recoat must be considered. Recoating is bad for the environment as toxic components are sent into the atmosphere.

Monitoring as a tool to continuously assess the state of health of metallic structures in marine conditions

Yves Van Ingelgem
Vrije Universiteit Brussel, Belgium

Ships tend to spend most of their operational life in challenging marine conditions. Other than for fixed structures the environment they reside in as well as the loads they are subjected to can vary significantly over the full operational life. This means that, in order to track the true 'state of health' of a ship in time one cannot only rely on design assumptions: a thorough follow-up based on continuous sensor readings turns out to be the way to go in optimal structural health management.

When on a trip as well as when in port ships are subjected to various kinds of loads:

- Periodic mechanical loads through waves, currents, wind as well as rotating equipment
- Extreme mechanical loads in case of storms or collisions
- Corrosive loads that vary in time with location, temperature, state of health of the coating