Case Study – HMS Illustrious: Design Review, Modification Design and Installation

Background

HMS Illustrious, the Royal Navy's capital through-deck cruiser, had various problems with onboard incineration of waste which had resulted in unsatisfactory flue emissions. The Ministry of Defence enlisted the assistance of **WIS*environmental*** to investigate and propose remedies to the operational issues after a leading international consultancy for defence technology based services had failed to identify solutions to the problems.

Identifying the problems

Following an extensive on board investigation, **WIS*environmental*** identified three problem areas:

- **Flue Emission**
  Unburned waste was occasionally being discharged through the exhaust ducting which were unsatisfactory for ship operations.
- **Molten Steel Leakage**
  There had been a build up of slag due to the addition and processing of tins/cans (mixed steel and aluminium) during the use of the advanced incineration system which was not initially experienced on the land based pilot plant.
- **Marpol compliance**
  The incineration units did not comply with the provisions of the Marpol with respect to CO, soot emissions and O_2 in the combustion chamber

Delivering the Solution

Measure	Marpol Compliance solution	Slagging solution	Unburnt waste discharge	Other Benefits/Comment
Optimisation of feed screw	✓			
Optimisation of combustion air injection and re-commissioning	✓	✓	✓	
Install rotary valve	✓ (more regular feed)			Eliminates risk from aerosol can explosions
Remove metal cans from waste		✓		
Define precise performance envelope for Marpol test	✓			
Investigate draught problem in 4J	✓ (temperature setting)			Eliminate smoke emissions