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To:	All Surveyors/Auditors
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	Engineering Ships for better Performance
Reference:	**CONARINA Procedures- Hull painting**

Engineering Ships for Better Coating Performance

When examining why marine coatings fail, the industry commonly assumes the causes lie in substandard surface preparation or paint application mistakes. However, the structural design of ships can play a significant role in coating failures, but the industry lacks meaningful guides and standards.

Perhaps then, it is not the process but the skill of the worker that has declined. Perhaps the fact that there are fewer people who are willing to take on these dirty, poorly paid jobs and make a lifelong career out of them. Better to use them as a stepping-stone to other skilled jobs.

The coating failure problem lies elsewhere, in two key issues:

1. Structure design
2. Access afforded to carry out the painting work

Designers very rarely think about the impact of the complex geometry on the coating process. For example, in tanks it would be useful to have fewer but larger access holes to enable workers easier access for themselves and their equipment, such as hoses, ventilation, etc.

We know that coatings are far more likely to fail on edges than on flat plate, but very little consideration is given at the design stage to minimize edges, or at least use radius-edge stiffening wherever possible.

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Design also involves material selection. Some materials are used in such a way as to create a galvanic cell.

The key to achieving coatings performance is to have coating-friendly design. The research has shown that better design can considerably improve the quality of surface preparation and coating performance, while at the same time reducing the overall costs of the project.

Cases in Point: Ship Hull & Ballast Tank

The first case has to do with access to a relatively simple structure: the outside hull of a ship. This was a large flat area, one where it should have been relatively easy to control application quality. Special coating applied gave the following results:

- Specified DFT: 610 μm
- Average DFT: 990 μm
- Standard Deviation: 170 μm
- Process capability to 3 s: 480–1500 μm

Thus, even on a relatively simple structure, the ability to apply paint to a narrow range is limited. In this case, the applicator was faced with poor access and poor prevailing wind conditions. Given those criteria, the applicator probably performed to his best capability.

As surface design becomes more complex, the ability to meet the specification drops off. Consider the equivalent data for a ballast tank:

- Specified DFT: 320 μm
- Average DFT: 602 μm
- Standard Deviation: 162 μm
- Process capability to 3 s: 116–1088 μm

This results in increased time to apply the paint, increased paint consumption, and hence longer drying/curing times and over coating intervals. All this can add considerable cost to a project. Of course, as the coating gets thicker, the ability to repair it is reduced and the performance of the coating may be compromised in one way or another (if not in the short term, then in the longer term).

In Summary

The industry lacks meaningful guides and standards for designers to follow. Those that do exist, such as ISO12944 part 3, are rarely specified or used. Some simple guidelines could be produced to help designers engineer more coating-friendly ship designs.

REFERENCES:

- CONARINA Procedures-Hull

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