

Coating thickness measurement – state of the art:
Paint and corrosion protection measurements using innovative technology

Part 10:

New IMO-standards for the inspection of anti-corrosion coatings in shipbuilding

International standards focusing on the inspection of thickness of ship's coatings.

Past maritime disasters caused by enormous corrosion damage [4] bring IMO, classification societies, ship owners as well as shipyards to realize the importance of corrosion protection of ships. Modern coating thickness gauges such as the modular QNix® 8500 measuring system offer a fast and accurate inspection of corrosion protection as well as efficient and convenient documentation of measurements using a PC.

Especially since the implementation of the „Coating Technical File“ which is to be kept during the complete service life of a ship, this system allows the required coating thickness measurements to be analyzed and documented individually by the various organizations involved.

The high quality of the coating thickness gauges from AUTOMATION Dr. Nix, which are being manufactured in Germany exclusively, the fast customer oriented service as well as easy and individual data processing guarantee users a high degree of productivity, flexibility and increase in their value creation.

Report on the use of modern coating thickness gauges for ship inspections and the latest related IMO-standards

The quality of coatings in the ship building industry is increasingly subject to international regulations, because protective coatings reduce corrosion and thus increase a ship's stability [1], [2], [3].

Especially the ballast water tanks of a ship are of particular importance here, because these tanks are prone to corrode easily and any danger to the ship's structure due to corrosion damages is difficult to assess while the ship is being used. In this regard, the first international conventions for preventing corrosion have been implemented: the "Safety of Life at Sea" (SOLAS) Reg. II-1/3-2 regarding ballast water tanks and double hulls, resulting in the extensive IMO-resolution MSC215(82) including the "Performance Standard for Protective Coating PSPC.

The standard aims to provide a constant quality of coatings lasting 15 years of service life. It applies to all ships with more than 500 gross registered tons concerning their ballast water tanks and to double hull ships with a length of at least 150 meters with building contracts dating later than July 1, 2008. In accordance with the latest IMO-regulation, the International Association of Classification Societies IACS issued procedural requirements (IACS PR 34) that demand a complete documentation of work in a so-called "Coating Technical File" (CTF). The CTF has to be kept on board the ship during its complete service life and contains specifications of the coating system, documentation of the shipyard as well as the ship owner concerning inspection, maintenance, and repair work.

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This brings about new challenges for shipyards and ship owners as well as for classification societies, because according to items 6.1.1-3 of the latest IMO-resolution, the measuring results have to be documented into the CTF by an accredited expert.

Essential: Precise and efficient analysis of coating thickness measurements in practical use

In regard to quality control the generally epoxy-based coating, coating thickness has to be evaluated in accordance with the 90/10 rule as required by the IMO-standard MSC215(82). This 90/10 rule specifies that 90% of all measurements have to be larger than or equal to the reference thickness and that the remaining 10% of measurements must not be smaller than 0.9 times the reference thickness [5]. In addition to that, shipyards refer to the DIN EN ISO 12944-5 [6] especially when dealing with rough surfaces. Since January 2008, this standard refers in its controversial Part 5 to ISO 19840 and ISO 2808 [7], [8]. In addition to the qualifications of personnel according to training standards such as the FROSIO or NACE, fast and reliable gauges are necessary to take for instance about 40,000 measurements a day in rough environmental conditions and on difficult spots. With regard to the reliability of several thousand coating thickness measurements taken each day, the specifically treated ruby measuring heads of the interchangeable probes of the QNix® 8500 measuring system offer an excellent wear resistance, because rubies provide a significantly higher durability than any metal overlay.

In shipyards, building a ship is organized in so-called ship sections that are coated and measured separately before assembly. The structured recording of individual sections can be saved to individual named batches.

The fast and structured taking of measurements of each individual layer of the usually used multi-layer systems, depending on location and time is essential, because it provides an efficient working method and thus ensures highly efficient quality management. The extensive analysis and documentation of measuring data for the "Coating Technical File" can conveniently be processed with a PC. To this end, wireless measurement transmission from gauge to PC is available. Thanks to direct transmission of measuring data to Microsoft Excel, the user can analyze the data for statistical purposes according to his requirements and document it individually for the use in the "Coating Technical File". Together with the spreadsheet program, the QNix® 8500 measuring system provides a convenient tool offering a complete solution, including measurement, analysis, and documentation for fast and thus efficient processing of measuring data and its documentation in those institutions that are responsible for building, inspecting and verifying. This will be even more important in the future, when the IMO regulation MSC Res. 244(83) will presumably make the documentation of repair and maintenance work of ships of more than 500 gross registered tones mandatory.

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