

Current Practice and Future of Ship Painting Products and Related R&D

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1. Introduction

Paints are used for forming layers on steel, concrete, wood, glass, plastic, textiles in order to prevent aging or oxidation and extend lifetime of the finished products and various raw materials, implement the function such as water-resistant, anti-fouling, fireproof, electromagnetic wave shielding, insulation, and for beauty in appearance.

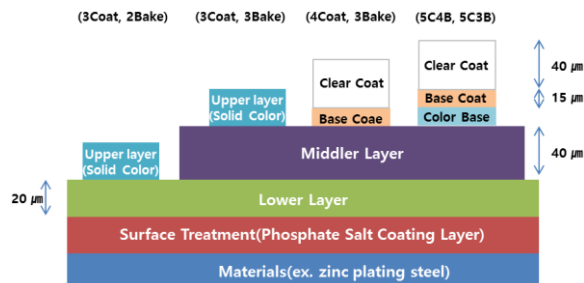


Figure 1. Example of Painting Layer Structure¹

Painting layers usually consist of lower layer (surface treatment on steel or wood for adhesion and rust resistance), middler layer (for interlayer adhesion or chipping), and upper layer (color base to impart color to the appearance, base coat to protect color base layer, and clear coat to grant the role of variety of functionality, such as acid resistance and scratch resistance). The number of coating layers differs on the basis of automobile kinds, such as commercial trucks, general passenger cars, cars for practicing and training. Paint industry is small quantity, multi-variety batch production that has more than 2,000 kinds, and construction, automotive, marine, and various industrial machines are included for its application.



Figure 2. Market Size over Paint Application²

Out of these applicable fields, Korean domestic ship paint industry is very dependent on basic core technologies and raw materials from foreign developed countries despite the top level class in the world of Korean shipbuilding industry.

2. Current Practice

Ship paints are applied to most of ship parts, such as outer skins, water ballast tank, and deck. Epoxy paint has about 80% utilization out of all kind of ship paints.

Akzonobel, PPG, Sherwin-Williams are the representative global ship paint companies. Akzonobel, the top sales company in the world, owns the technical capabilities of special paints for drilling vessels. Ship paints are characterized by long period of time in building ships and multi number of painting jobs. So the maximum or minimum interval for repainting is critical. If sufficient interval time is not secured, additional steps such roughing or removing surfaces with hand or power tools to prevent poor adhesion are required. The extra steps cause trouble in shortening construction time, increasing productivity, reducing labor cost, and even improving working environmental conditions, such musculoskeletal disease. Akzonobel has released products that have 14 maximum interval days for repainting with 60-80 % of solid present. Products of Sigma Coatings from PPG have no limit for

¹ <http://fahrenheit.byus.net>, 2007

² Paint Ink Cooperative Association(Korea), 2012

the maximum period for repainting and been reduced 1.5 to 4 times minimum period for repainting of conventional products.

A number of companies in Japan have developed related products. Toho Chemical has developed an epoxy resin coating composition containing a modified hydrocarbon resin with hydroxyl and carboxyl groups. Jotun has products of 60-80% solid present with 7 day of maximum interval days for repainting, which seems to hold a slightly lower technical capability than PPG or Akzonobel.

Main companies in Korea are KCC (top ship paint provider for merchant ship), IPK (joint company with Akzonobel and Noroopyo, top ship paint provider for merchant ship and marine equipment), Gunseol Chemical, PPG Sigma Samsung, Jogwang Industry, Dongjoo Industry, CSP, Byuksan Chemical. KCC has products with 80% solid content and 12 days of maximum interval for repainting and with 72% solid content and 15 days of maximum interval. KCC keep trying to develop adhesion improved products, as well. IPK is utilizing Akzonobel's marketing network and specialize in paint for oil drilling vessels, which are not so affected as merchant ship in terms of market conditions.



Figure 3. Ship Painting and its Multicoating System³

3. Future Direction of Korea Ship Paint Industry and Related Technology

Paint industry in Korea seems to have entered a mature stage after a rapid development from 2003 to 2006. While the paint market growth of ship, automobile, building construction has stagnated with their industrial economic downturn, the growth of the 3C industry, computer, communication, and consumer electronics, and related paints is remarkable. With the background of the economic trend change, the main target of paint industry is moving toward overseas from domestic market of the country, despite paint characteristics of short storage period capability.

As China has emerged as an inexpensive raw material producing country and front and rear industry of paint has been moved to China and Vietnam, China in paint industry occupies a threatening position in the world. But since needs for Korean value-added products in Chinese and Korean markets have increased more and more and Korea is expected to keep playing an important role in ship building, ship paint industry in Korea will show a sustained growth. Based on application capability of original technology, production process management capability, and energy saving technical capability that have been secured, Korea needs to ensure original technology in the country, securing paint-related capabilities to reduce cost and increase productivity by reducing period of ship building to maintain the top tier of ship industry.

As international environmental regulatory in painting of cars or buildings is being enhanced, safety and health issues in ship industry are also emerging. VOC reduction is a representative for environmentally friendly technologies. Some examples are technology of increasing solid content to decrease VOC-containing solvent, technology of using water instead of organic solvent, technology of solvent-free paint, and technology of using natural sources. In addition, differentiated technology and products such as epoxy paint with maximum/minimum interval free for repainting, anti-wear paint by cavitation, curing agent-free paint, and friction resistance paint are being developed.

Paint market seems to show polarization phenomenon between main companies and SMEs, in terms of technical capability, business competitiveness, and distribution network, etc. It is expected to show severe polarization more and more and will be harder for SMEs to enter the related business unless SMEs try to ensure the original technology development.

4. References

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³ <http://www.nauticexpo.com>