Automobile Paint Finishing Systems Contributing to Carbon Neutrality

Against the backdrop of a global shift to a carbon-neutral society, the automobile industry is undergoing a revolution. The Company takes on a challenge of developing and changing the technology of painting process in order to achieve carbon neutrality at paint finishing factories in consideration of CO_2 emission reduction targets of automobile manufactures. As one of these initiatives, we are working on an innovative shift in production technology from wet painting to dry decoration.

Issues to achieve carbon neutrality in the automobile industry

Automobile manufacturers include CO_2 reduction targets in their business strategies in light of the risks of climate change. They have same three major emission sources: upstream emissions from processing plants (Scope 3), direct emissions from processing plants (Scope 1 and 2), and downstream emissions from processing plants (Scope 3). Therefore, addressing these emission sources is a common issue in the automobile industry.

In particular, with regard to direct emissions from processing plants, it is important to change the painting process, in which energy usage is the highest in the automobile manufacturing process. Accordingly, the Company works with automobile manufacturers to develop and provide paint facilities that reduce CO_2 emissions to zero in order to achieve carbon neutrality in the painting process.

An example of the initiatives is an innovative shift in production technology from wet painting to dry decoration. The conventional flow of the painting process includes three layers of paints such as electrodeposition, intermediate coating, and top coating. A drying process is provided after each painting to prevent paint from mixing between coating film layers. This process requires the car body to be rapidly heated and cooled in a short section and moisture to be exhausted out of the equipment with large air volume, resulting in very high energy usage due to direct emissions from the processing plant. The Company is examining the application of film decoration (dry decoration) systems to reduce energy usage in this process.

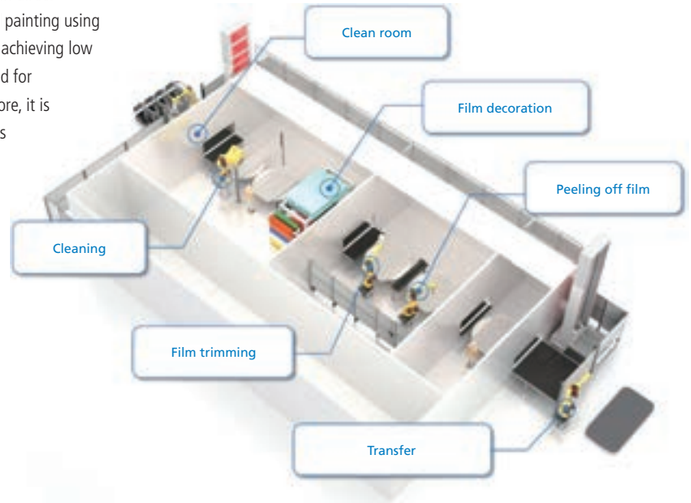
What is film decoration (dry decoration)?

Film decoration technology provides the exteriors of automobiles with film decoration (dry decoration) by applying films through vacuum suction and heating instead of the conventional spray painting (wet painting).

In contrast to wet painting, in which painting and drying are repeated in the process of recoating, high-coverage film decoration (dry decoration) can significantly reduce energy consumption in direct emission at a processing plant compared to conventional painting using paint, achieving a 50% reduction or more. In addition to achieving low carbon emissions, film decoration also eliminates the need for wastewater and exhaust treatment equipment. Furthermore, it is possible to expand the design features of decorating films such as patterns, marks, and lighting, and to add functionality (solar cells, heat shielding, etc.). In the future, we can expect further reductions in CO_2 emissions by realizing innovations in processes, such as recycling the base materials of coated objects and film substrates, in the upstream and downstream sections of processing plants.

By adopting a three-dimensional vacuum pressure thermoforming (TOM) method, the Company enables film to be used for something that has been an issue for conventional dry decoration technologies, decoration (application) on complicated solid shapes with irregularities. This method made it possible to apply films to large, complicated solid shapes with irregularities, such as integral-type bumpers for passenger cars, with low extension (film extension percentage: 100% or less).

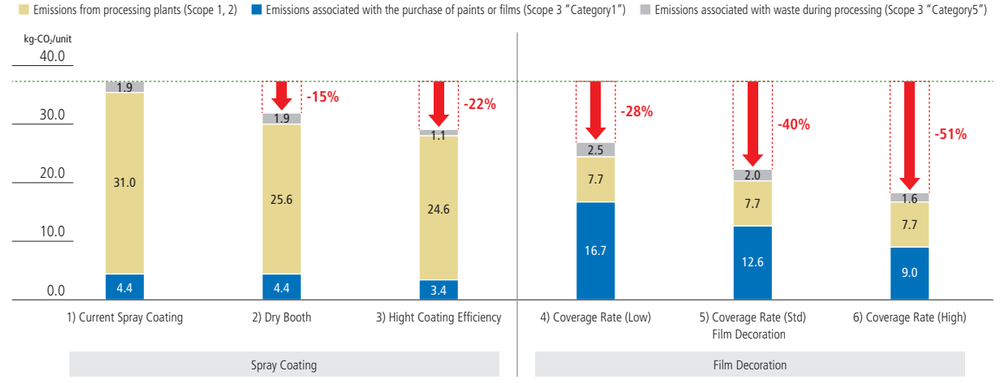
We are currently engaged in detailed discussion on paint finishing lines incorporating this dry decoration system.



A monolithic molded bumper

A split-type molded bumper

● Scope 1, 2, and 3 CO_2 emission per unit
Bumper 240,000 units/year (bumper 480,000 items/year)



Future business development

In order to establish a dry decoration process, we are currently conducting verification from various perspectives, using bumpers as a case example. We are also planning to build a demonstration line in our research facility for a dry decoration system assuming a mass production line. We are determined to promote the development of dry decoration technologies that provide higher value for automotive exteriors to continue contributing to the realization of a decarbonized society.

We have the following specific roadmap. First, in 2024, we will phase in exterior parts using the out-molded laminate (OML) film decoration process into the market. From 2026, we will aim to achieve full-scale linkage with the reduction targets of automakers toward carbon neutrality by 2030, while expanding the number of exterior parts to which film decoration is applied and adapting film decoration to large exterior parts.

A Taikisha Group Company Won the Jury's Award at SURCAR

The International Conference on Automotive Body Finishing: 6th SURCAR 2023 in Detroit, the U.S. is one of the most prestigious international conferences in the painting industry. At the conference held in June 2023, the joint presentation by TKS Industrial Company, a group company of Taikisha Ltd., and Nippon Paint Automotive Coatings Co., Ltd. received the Jury's Award, an award for the presentation with the highest evaluation by the judges.

Dry decoration has faced issues including the limited sizes of the objects to be decorated as well as application of films to objects with complicated shapes with reduced color tone changes and without wrinkles. The technology introduced in the presentation received high praise for realizing dry decoration even on integral-type bumpers with a height of 700 mm or more and a large curvature without wrinkles and with reduced color tone changes by controlling the film extension percentage to 100% or less.