

# Defects: the whitening defect in glossy polyester paint

Daniele Bergamasco

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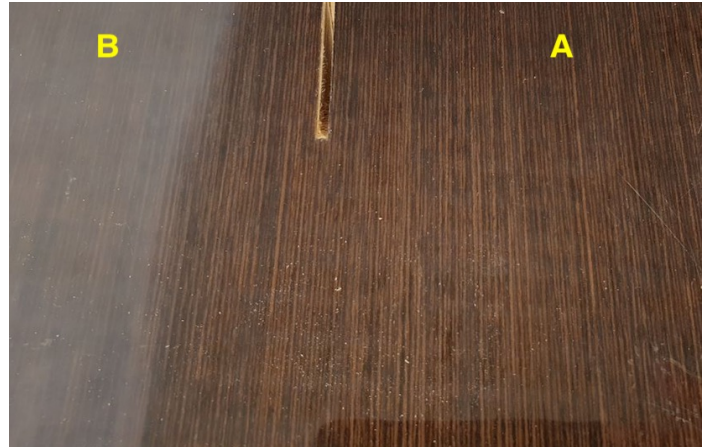
This type of defect, also called **white haziness discoloration**, has a certain recurrence in the naval or luxury furniture sector and at the current time it doesn't have a clear identification of its possible causes yet.

This is a very sneaky defect because does not appear during the normal phases of production but only after several months when the furnishings have already been installed. When it starts to appear the final owner wants to be compensated by the manufacturer, who refers the problem immediately to the paint supplier, who ultimately blames the user for possible improper maintenance or cleaning.

Since both naval and domestic furnishings are very expensive normally the problem turns into million lawsuits. The last case we looked at was a piece of furniture supplied to a penthouse worth about \$10 million in New York.

After all our studies and with the acquired information we can say with certainty that the **four parameters** that could be **most incriminated** for the possible development of this defect are:

1. application in a single time of high thicknesses of coating;
  2. interaction of added solvent with the resin;
  3. presence of water during the painting phases;
  4. not correctly proportioned dilution of paint with an excess of styrene.
1. By applying high thicknesses of paint in a single time, the trapped solvent over time creates escape routes (micro cracks). Then when the incident light finds these voids, it is reflected in preferential directions making the paint film lose transparency.
  2. The interaction of added solvents with the resin and catalyst system needs to be considered when a solvent is added, particularly the relative evaporation rates. If the relative evaporation rates are not balanced, precipitation or separation of the resin can occur, resulting in the formation of haze as well as other phenomena.
  3. Hydrolysis of ester groups (present in the polyester resin) can occur with exposure to water and it could lead to the discoloration observed.



**Zone A:** no defect - **Zone B:** whitening defect

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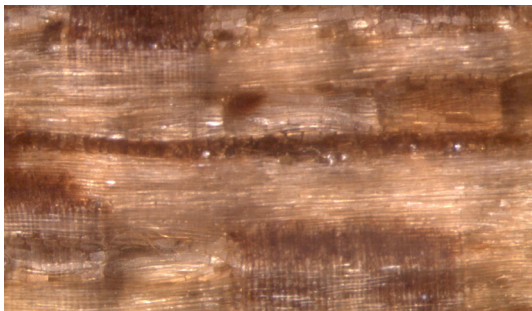
4. In addition, with an unsuitable dilution there is also the risk of trapping too much styrene inside the paint film. This molecule is chemically very reactive and can react with itself creating small polymeric chains capable of refracting light, causing the optical effect of discoloration in the form of haziness.

By acting on these parameters out, **CATAS was able to reproduce the defect.**

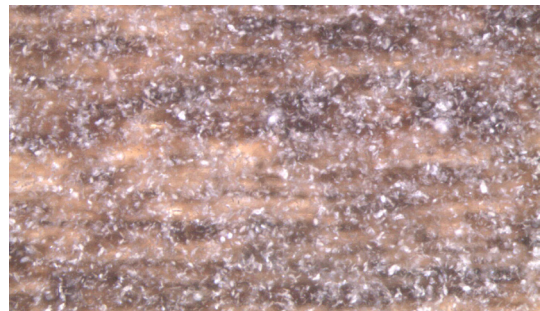
In relation to the emerged evidence, **we suggest the following measures** in order to limit the onset of the possible whitening defect:

1. use dry and unaged styrene
2. properly proportion the dilution to avoid trapping too much solvent in the individual layers;
3. favor the application of several thin coats rather than a single coat but with high thicknesses
4. do not paint at too low temperatures
5. respect the drying times between one coat and the other in order to allow the correct elimination of the solvent.

To conclude we can say that **this type of defect cannot be eliminated, but only kept under control.**



non-whitened polyester paint



whitened polyester paint  
(microscope image)

Find out more about our defects section. **Go on reading!**

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## The CATAS DEFECTS SECTION

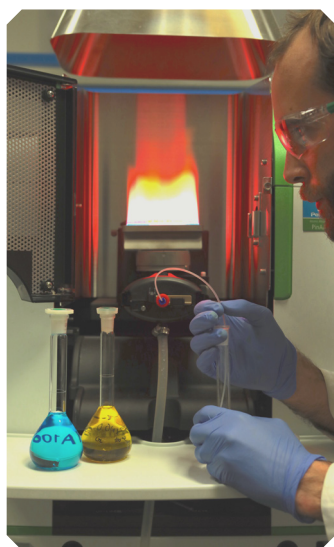
It is a **multidisciplinary working group**: our experts coming from the Chemical, Surface and Mechanical Departments get together to jointly study the customer's technical problem.

Competence, experience and scientific equipment represent the **"toolbox"** of this section.

**Competence**: experts in chemistry who investigate the content and composition of raw materials, components and products, together with the experts who study their behavior and physical-mechanical characteristics. All of them are highly specialized in the wood and furniture sector.

**Experience**: our experts observe and test in the lab hundreds of samples every year. If the defect is ordinary, the solution is already available: we know which testing program to put in field and how to look at the results. If the defect is new, we gear up to study it at the best: we observe it from different points of view, set up pilot test sessions, draw on our rich historical catalog of defects/solutions, that is a relevant component of our technical background built in over 50 years of activity in the wood and furniture sector.

**Scientific equipment**: the best technologies and equipment, which allow us to capture the problem from the most different perspectives. Cutting-edge analytical techniques in the field of spectroscopy, elemental analysis, chromatography, thermal analysis and equipment that allow us to reproduce defects or simulate the most severe conditions of use and stress in terms of temperature, humidity, solar radiation and other kinds of physical-mechanical stresses (abrasions, heat, impact, chemical aggressions, ...).



In the Defects Section, **our work becomes information and knowledge available to the growth and development of the wood and furniture sector.**



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