

Penn Color UV Enhancer Increases Outdoor Weathering Performance of PVC Compounds and Extruded Profiles



The Situation

Building and construction industry color trends continue towards mid-range and dark colors. While pleasing for the consumers, this pushes the limits of conventional PVC profile formulations.

The PVC polymer is the weakest link in the formula. To protect the PVC and maintain weathering performance of an exterior formulation, it is customary to add more TiO₂ with color masterbatch.

If 10% TiO₂ does not protect the PVC polymer, incorporating Penn Color's UV Enhancer can eliminate having to switch to a higher priced polymers, such as ASA or Acrylic.

Increase in weathering performance of Capstock as a function of changes in TiO₂ and UV Enhancer

Penn Color's UV Enhancer enables PVC compounder and profile extrusion manufacturers to reduce the amount of TiO₂ in their formulations, while maintaining or improving outdoor weathering performance.

This reduction in TiO₂ leads to a reduction in the Let Down Ratio (LDR) of the color masterbatch.

Experimental Test Parameters:

Exposure time = 4000hrs

Light Source = UVA 340

Irradiance = 0.95w/m²

Cycle Time - Clay and Beige PVC Capstock: 12 hours UV, 50°C, 12 hours condensation, 60°C

Cycle Time - Adobe PVC Capstock: 12 hours UV, 60°C, 12 hours condensation, 55°C

Objective

Increase the outdoor weathering performance of PVC compounds and extruded profiles.

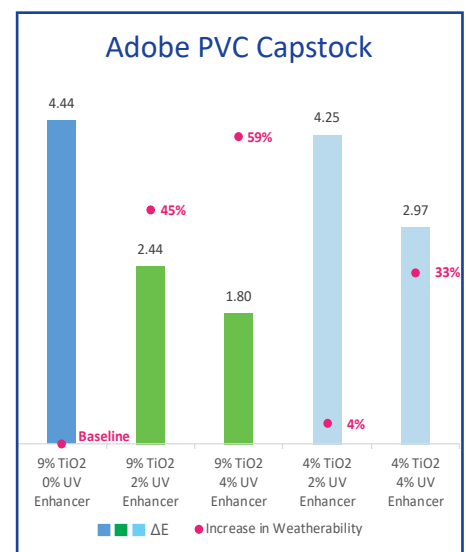
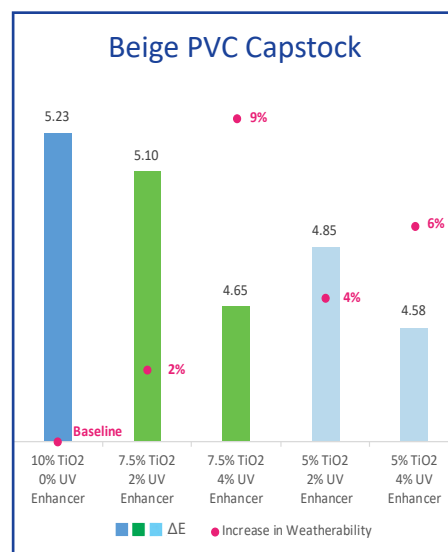
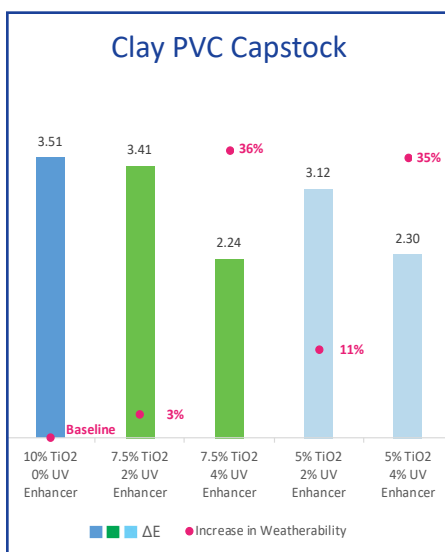
Solution

Develop a UV Enhancer that aids in decreasing TiO₂ while increasing weathering performance.

Result

In the examples shown, adding Penn Color's UV Enhancer enabled a reduction in TiO₂ with increases in weathering performance of up to

60%.



Conclusions

Test results show that the addition of Penn Color's UV Enhancer to a formulation can enable a reduction of TiO_2 with a decrease in ΔE after weathering. This can improve the weathering performance of PVC compound and extruded profiles. To establish the most appropriate level of UV Enhancer with a reduction of TiO_2 for a particular PVC compound, a ladder study should be carried out.

At Penn Color's Global Technical Center in Hatfield, PA, USA, we are equipped with 6 QUV and 3 Xenon weatherometers. These instruments are in operation generating weathering data 365 days per year. In addition, we have outdoor testing facilities for performing outdoor weathering studies. We work with certified weathering facilities and can assist you in obtaining the certification data you need.

Do you need assistance in initial product testing? Our experienced technical team delivers the highest level of engineered products to the market. We can work with you to define and perform small scale testing and weathering with your compound to help you determine the best production formulations for your specific application.

Here's how we can help you perform small scale testing to optimize your formulation and speed your time to market...

- Supply us your compound with 2 to 3 different TiO_2 levels (for example 10pph, 7.5pph and 5pph TiO_2).
- We will perform a ladder study using your compound and adding our UV enhancer. This study will determine the best combinations of your compound, TiO_2 , and UV Enhancer to increase your weathering performance.
- We can also color match to any standard you provide.
- We conduct a minimum of 2000 hours of QUV testing to weather.
- Preliminary test results will be provided.
- Total testing time = 4 months.
- Once you approve the weathering results, the next step will be to run a trial at your site.

Contact your local Penn Color representative to learn more about optimizing your PVC compound for optimal weathering performance.



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