

Overcoming Colour Performance Challenges with Novel Post-Addition Colourant Solutions

Sebastian Dziki, Allison Linn, Borchers: A Milliken Brand

Boosting colour strength is on the forefront of coating formulators' and manufacturers' minds. However, for many systems, improving colour performance has been a difficult task. Whether it is a ready-made dispersion or a fully formulated system, large adjustments to a formula can be unfeasible due to manufacturing, volatile organic compounds (VOCs) or consumer restraints.

Borchers' technology allows for the post-addition of an additive to improve colour acceptance, colour strength or quality of a pigmented system. A simple addition of a colour booster or compatibiliser to the base will result in a stronger, cleaner and more chromatic colour, which can be seen in tints with a variety of difficult pigments. Additional benefits include a reduction or elimination of colour rub-out and improved compatibility of universal waterborne systems used in solventborne bases.

Challenges with tinting systems

There are three key factors linked to the rise in challenges with today's tinting systems. The first is the universality of colourants, meaning a formulator is tasked with making a single dispersion line work across a wide range of technologies. A colourant system must perform identically in acrylics, solventborne alkyds, vinyl acrylic esters, alkyd emulsions and many additional base chemistries.

The second factor is an industry-wide move towards globalisation. With an increase in chemists working on formulations across the globe, harmony is something coating companies are targeting. A formulator working in the United States is being asked to use the same tinting systems as a fellow formulator working for the same company in China. This means specialised colourants for each region are being replaced by global tinting systems. The third factor is the reduction or elimination of VOCs in coatings. By eliminating VOCs, universal tinting systems have become primarily waterborne, leading to compatibility restraints, as VOCs are useful in achieving compatibility with solventborne alkyd paints.

Dealing with each of these factors on their own can be very challenging for formulators, but accomplishing all simultaneously creates a great deal of stress on a system. Often, universal colourants will show incompatibility in the form of colour rub-outs, reduced tint strength or visible defects. These are serious symptoms many formulators face. Novel post-addition additives have been developed to overcome these challenges in the form of colour boosters and compatibilisers; these solutions enhance colour strength and colour acceptance respectively.

Table 1. Description and use of the different colour boost additives available

Name	Solids	Description
Borchi® Boost 510W	50% in water	Waterborne: 2K Polyurethanes, Acrylics
Borchi® Boost 540WS	100%	Solventborne: 2K Polyurethanes, Acrylics
Borch® Boost 570WS	100%	Waterborne and Solventborne: 2K Polyurethanes, Alkyds, Epoxies

Dosage: 1-3% active on base paints

Colour boost additives

The colour boost additive line was specifically designed to enhance the performance of universal tinting systems in like-into-like applications. For example, waterborne colourants going into waterborne paints and solventborne colourants going into solventborne paints (Figure 1). This can include both architectural and industrial applications. Depending on the compatibility of the additive in different systems, formulators need to screen for the best performance from the additives provided in Table 1. Benefits of these additives include increased chromaticity and colour strength (Figure 2).

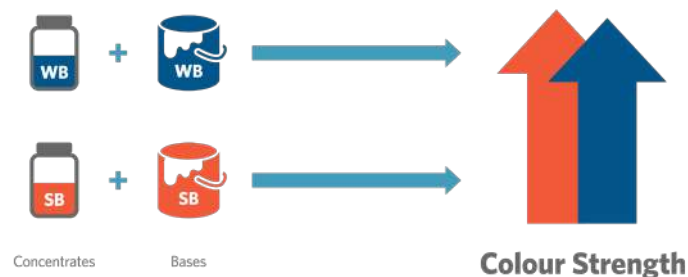


Figure 1: Colour boost additives are designed for like-into-like applications



Figure 2: Borchi® Boost 510W enhances colour strength in decorative vinyl acetate ethylene emulsions tinted with universal waterborne colourants

Compatibiliser additives

Compatibilisers serve a different purpose than colour boost additives. Their main function is to overcome compatibility limitations of VOC-free waterborne colourants used in low-VOC alkyd systems (Figure 3). This is most relevant to the DIY market where alkyd-based paints have been reducing VOC levels, but it can be also found in solventborne industrial systems, such as 2K polyurethanes. The colourants used in these systems are often based on different resin types than a base paint and can lead to incompatibility and brush streaking. Table 2 shows the different compatibilisers available. These additives can eliminate rub-out and resolve incompatibility issues between colourants and base paints of different chemistries (Figure 4).

Table 2. Description and use of the different compatibiliser additives available

Name	Solids	Description
Borchi® Add 406WS	90% in water	Waterborne and Solventborne: 2K Polyurethanes, Alkyds, Acrylics, Epoxies
Borchi® Add 409WS	100%	Waterborne and Solventborne: 2K Polyurethanes, Alkyds, Acrylics, Epoxies

Dosage: 1-3% active on base paints

Factors that led to severe incompatibility of zero-VOC colourants with low-VOC alkyd paints

Long-oil alkyd manufacturers are being forced to reduce VOC content in their resins, coming primarily from mineral spirits. Traditional formulations contained up to 50% VOCs, and the market has tasked many manufacturers to reduce the amount of VOCs to less than 10%. This has been accomplished in two distinct ways:

- Increased resin solids;
- Partial substitution of mineral spirits with water.

This formulation change has led to a saturation level of water content in the alkyd base where any additional water coming from the waterborne colourants is no longer accepted by the system. Paint producers have had limitations and little influence on the quality and performance of ready-made colourant lines. Adding Borchi® Add compatibilisers into high-solids, low-VOC alkyd bases allows for increased formulation flexibility and enables higher water acceptance levels. These novel post-add additives are easy to test and simple to incorporate into the base paint.

Such solutions have empowered formulators to directly address problems and eliminate incompatibility without modifying the colourant system.

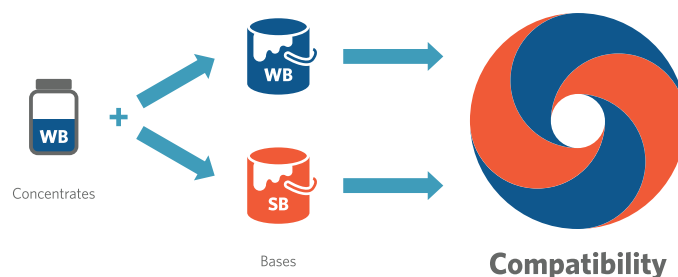


Figure 3: Compatibiliser additives for water-into-solvent applications

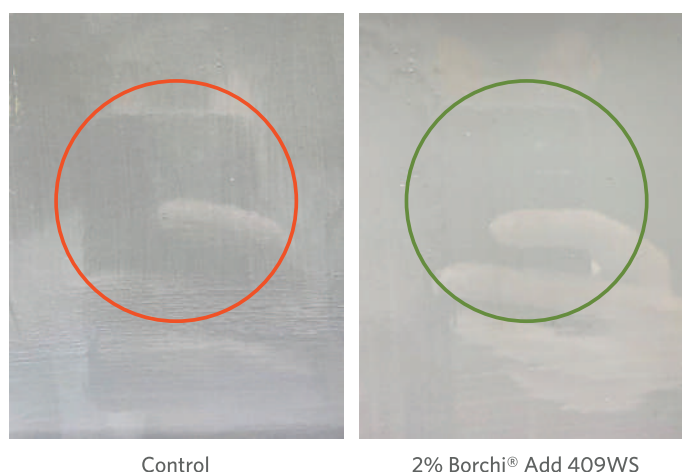


Figure 4: Borchi® Add 409WS removes brush marks (rub-out) in a 2K polyurethane base used in protective coatings that was tinted with a black colourant based on an aldehyde resin

Conclusion

Borchi® Add and Borchi® Boost are post-addition additives designed to improve colour performance and reduce or eliminate incompatibility, allowing paint formulators to overcome most of the challenges associated with VOC-free universal tinting systems or purchased colourants. These additives provide high value to a paint formulation and easy product handling through post addition. All products are VOC-free and improve colour performance or compatibility of colourants into various paint systems.

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Borchers GmbH, Berghausener Strasse 100, 40764 Langenfeld, Germany
Contact: Sebastian Dziki, Technical Service Chemist
Email: sebastian.dziki@milliken.com
borchers.com