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Application Leaflet
September 2015

NUOSPERSE® FX 9360

New High-performance Hyperdispersant

Innovation • Compliance • High Performance

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Description

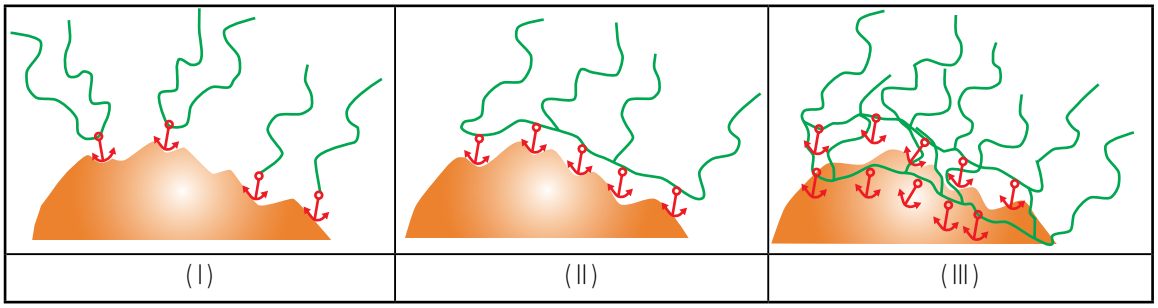
NUOSPERSE® FX 9360 is a new high-performance hyperdispersant based on a high molecular weight polymer containing multiple pigment anchoring groups. It absorbs strongly onto various types of pigments and carbon blacks. Due to its unique structure, this dispersant provides excellent steric hindrance and stability of the resultant pigment dispersions. By virtue of its good pigment wetting and dispersing efficiency, NUOSPERSE® FX 9360 results in improved productivity, good color and gloss development. NUOSPERSE® FX 9360 is recommended for industrial, automotive and other coating systems.

Features

Composition	highly branched copolymer containing multiple anchoring groups
Appearance	yellow to brown liquid
Non-volatile content	38 - 42 %
Solvent	n-butyl acetate
Specific gravity	ca.0.98 g/cm^3

Advantages over conventional dispersants

Traditional dispersing agents (I) are typically composed of one anchoring group and a resin-compatible segment. They often give rise to inadequate dispersion stability and low pigment loading. Polymeric dispersants (II) contain multiple anchoring groups and side chains which provide stronger adsorption and pigment stabilization. NUOSPERSE® FX 9360 is based on a highly branched copolymer containing multiple anchoring groups and resin-compatible side chains (III). This unique structure forms a mesh-like protective layer around the pigment surface thereby enabling superior dispersion stability.



Performance data

(1) Dispersion of carbon black FW 200 in acrylic polyol resins Hypomer FX-4365 and Hypomer FS-2460A :

(A) Hypomer FX-4365

Competitor : Commercial hyperdispersant A

Dosage of dispersant on pigment (D / P): 100% and 150%

Excellent wetting and viscosity reduction

As shown in figure 1, the competitive dispersant yielded high viscosity and thixotropy in the carbon black dispersion at 100% D/P. In contrast, NUOSPERSE® FX 9360 exhibited excellent wetting and viscosity reduction at the same D/P level.

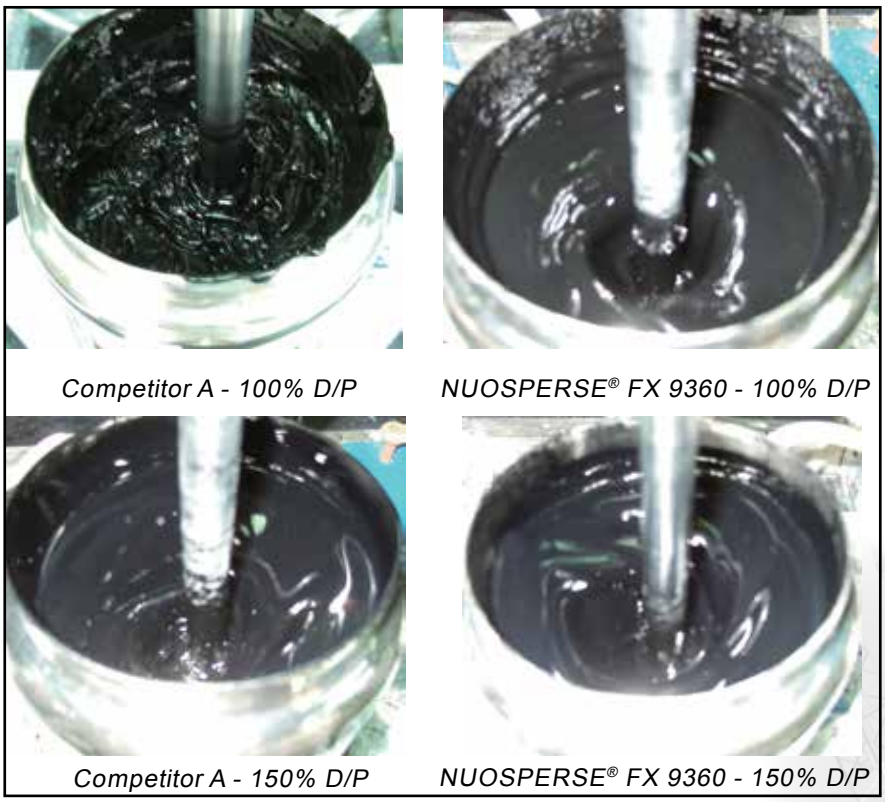


Fig. 1 Appearance of carbon black FW 200 pastes (12% pigment loading) in Hypomer FX-4365.

Figures 2 and 3 depict the viscosity before and after grinding of the FW 200 pastes. NUOSPERSE® FX 9360 showed better wetting, dispersing and viscosity reduction at 100% D/P compared to the competitive dispersant. A higher D/P ratio was required for the competitive dispersant to provide the same effect.

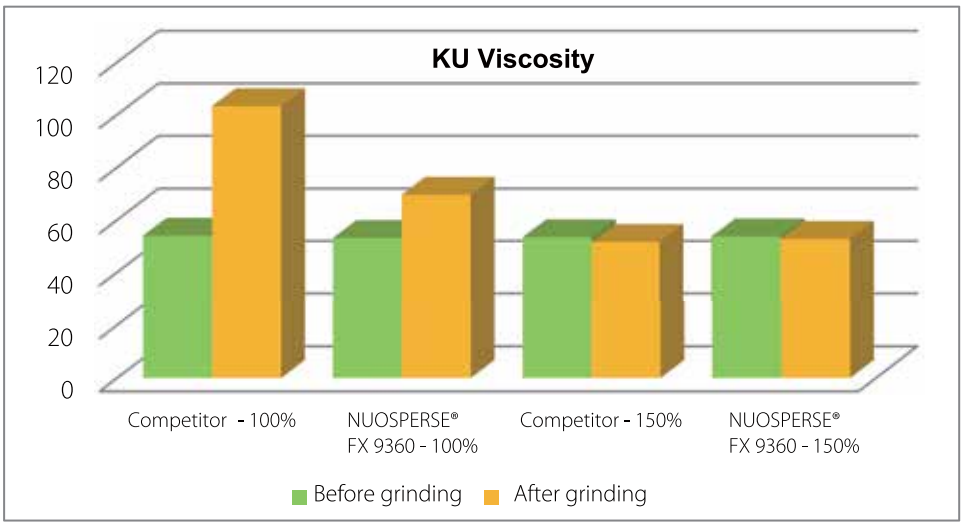


Fig. 2 Dispersing efficiency and KU viscosity at 100% and 150% D/P .

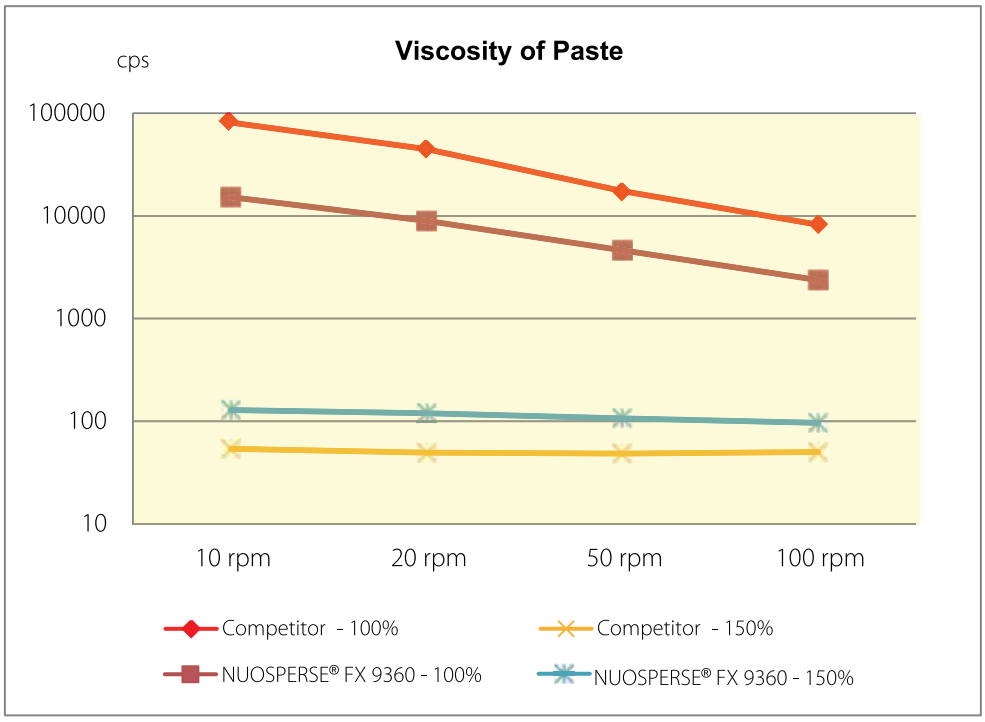


Fig. 3 Brookfield viscosity of FW 200 pastes at 100% and 150% D/P .

Excellent color development and gloss potential

Figure 4 shows the color development and jetness of FW 200 pastes using NUOSPERSE® FX 9360 and the competitive hyperdispersant respectively at 100% D/P. NUOSPERSE® FX 9360 outperformed the competitive dispersant in color development, jetness and gloss. Similar results were obtained for NUOSPERSE® FX 9360 at lower pigment loading levels.

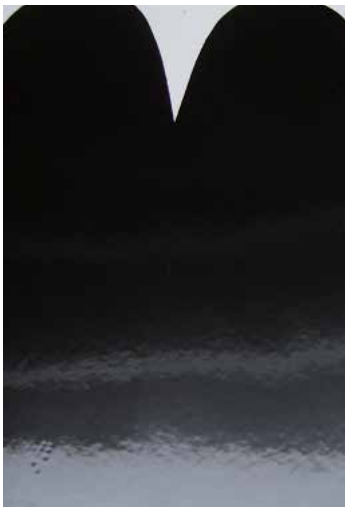
Appearance of 12% FW 200 paste		Appearance of 9% FW 200 paste D/P =100%	
NUOSPERSE® FX 9360	Competitor	NUOSPERSE® FX 9360	Competitor
			
Appearance of 6% FW 200 paste D/P =100%		Appearance of 3% FW 200 paste D/P =100%	
NUOSPERSE® FX 9360	Competitor	NUOSPERSE® FX 9360	Competitor
			

Fig. 4 Color development and jetness of FW 200 pastes at various pigment loading levels at 100% D/P .

At higher D/P level of 150%, NUOSPERSE® FX 9360 again yielded better jetness and paste stability. (Fig. 5)

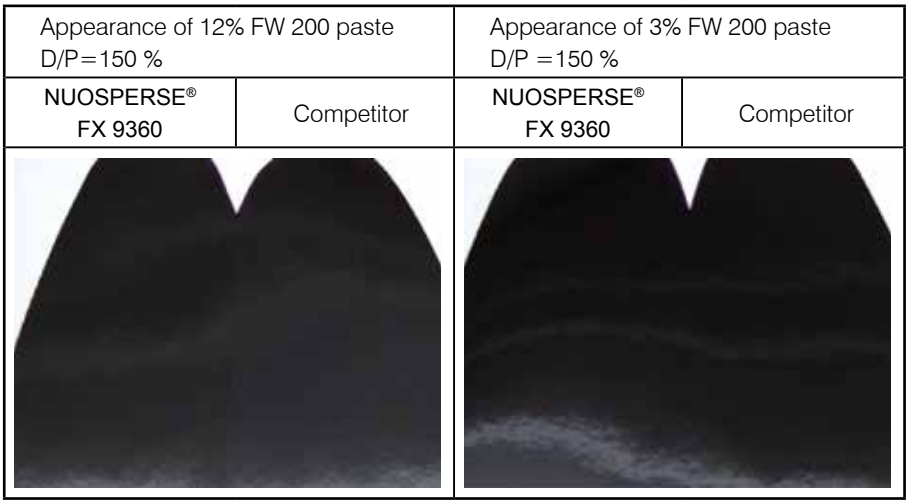


Fig. 5 Color development and jetness of FW 200 pastes at pigment loading levels of 12% and 3% respectively (D/P=150%).

In summary, NUOSPERSE® FX 9360 gives excellent wetting and viscosity reduction when it is used for grinding high jetness carbon blacks such as FW 200 in Hypomer FX-4365 which has high hydroxyl content. The benefits are reduced grinding time and lower paste viscosity.

（B） Hypomer FS-2460A

Competitor : Commercial hyperdispersant A

Figure 6 depicts the fineness of grind versus time for carbon black FW 200 pastes using NUOSPERSE® FX 9360 and the competitive ispersant. After 90 minutes of grinding, both NUOSPERSE® FX 9360 and the competitive product yielded excellent performance with <10 μm fineness.

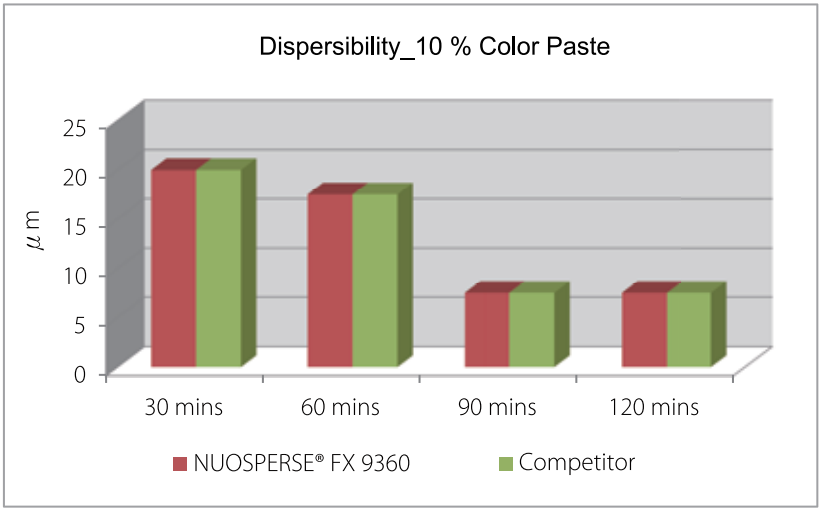


Fig. 6 Dispersing efficiency of dispersants in 10% carbon black pastes.

Figures 7 and 8 show the viscosity data (initial and after 1 week storage at 50°C) of 10% carbon black pastes based on NUOSPERSE® FX 9360 and the competitive dispersant. The difference in viscosities was only marginal. As shown in figure 9, finished paints containing 3% carbon black (based on NUOSPERSE® FX 9360 and the competitive dispersant respectively) have almost the same viscosities.

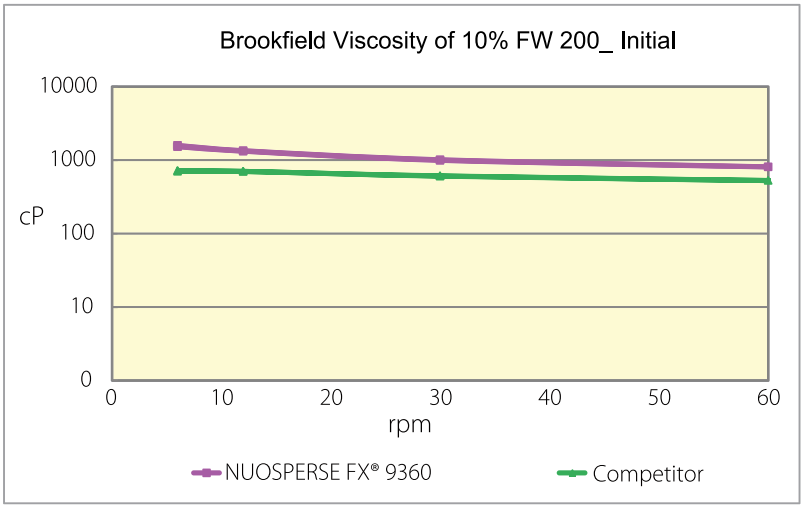


Fig. 7 Initial viscosity of 10% carbon black pastes.

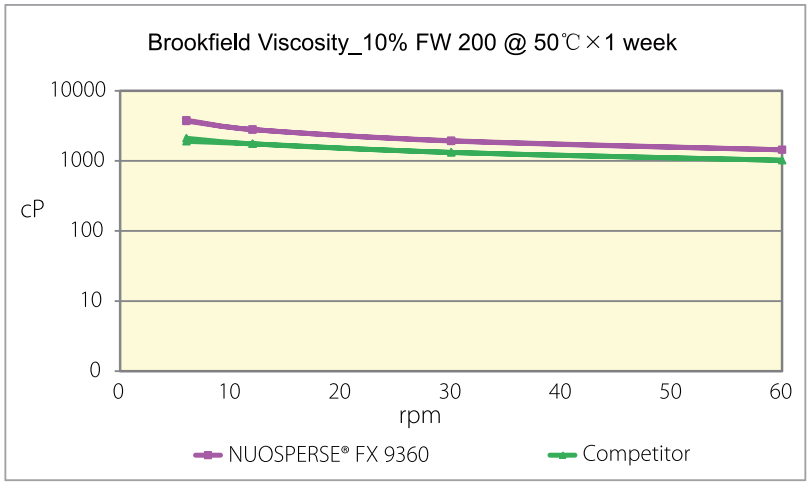


Fig. 8 Viscosity of 10% carbon black pastes after one week storage at 50°C.

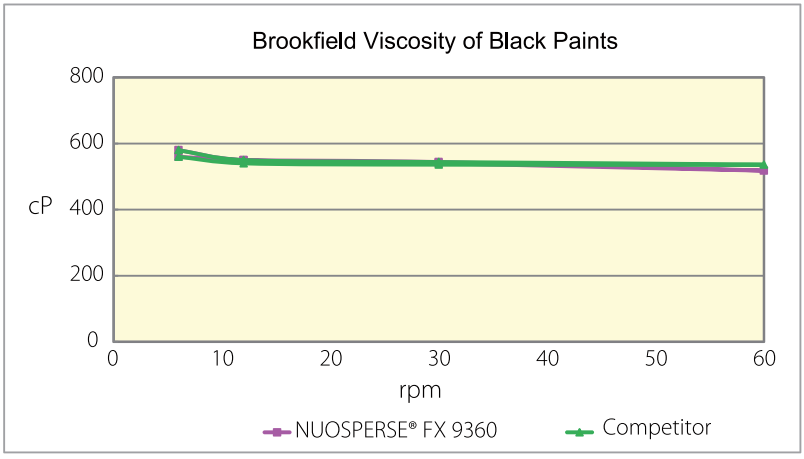


Fig. 9 Viscosity of black paints containing 3% carbon black.

The resultant paints also exhibited comparable gloss and haze levels as shown in figures 10 and 11. When applied via curtain coating onto a film, the paint containing FW 200 paste based on NUOSPERSE® FX 9360 gave slightly better transparency than that containing carbon black paste dispersed with the competitive dispersant. figure 12 shows that both dispersants yielded comparable L and b values in the carbon black dispersions, likewise for color development. (Fig. 13)

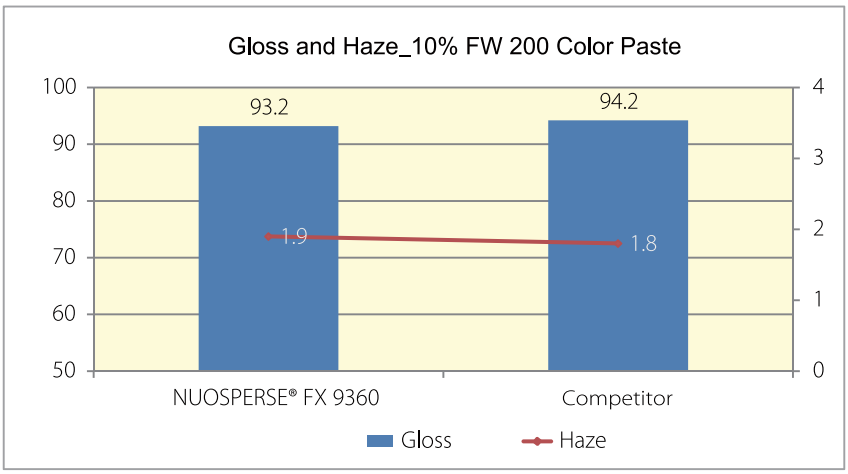


Fig. 10 Gloss and haze of 10% carbon black pastes.

Fig. 11 Dried film of FW 200 pastes applied via pour down.

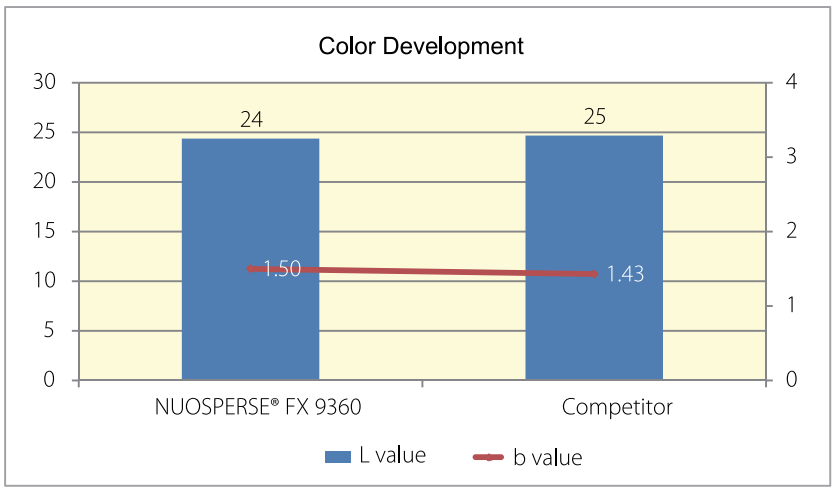


Fig. 12 L and b values of 10% carbon black pastes.

Fig. 13 Color development of 10% carbon black pastes.

(2) Dispersion of phthalocyanine blue (15 : 2 Heliogen Blue L6905F) in Hypomer FX-2060 and Hypomer FS-2460A :

(A) Hypomer FX-2060

Competitor : Commercial hyperdispersant A

Dosage of dispersant to pigment D / P: 30%

Excellent wetting, viscosity reduction and storage stability

As shown in figures 14 and 15, NUOSPERSE® FX 9360 gave comparable performance as the competitive dispersant in terms of pigment wetting and storage stability of the resultant colorants.

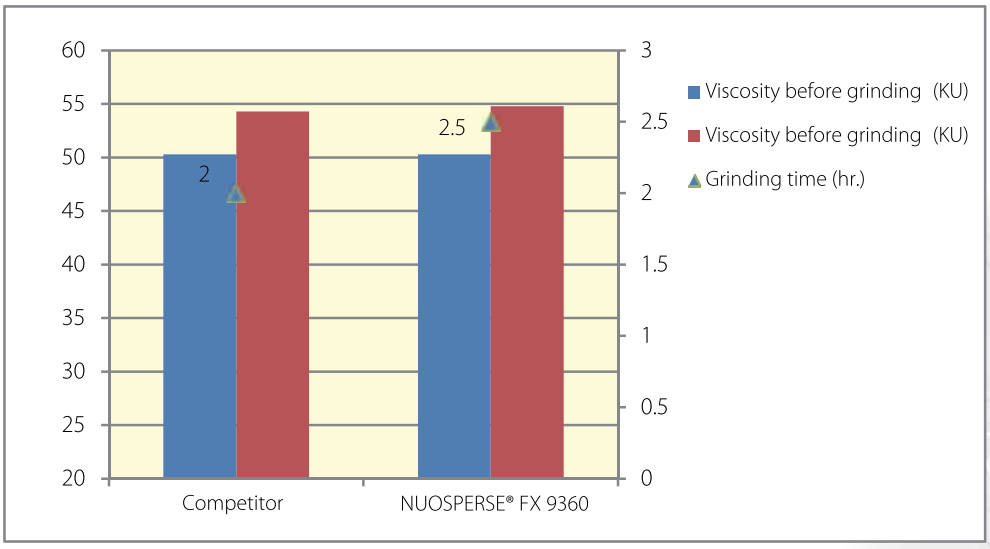


Fig. 14 Viscosity (KU) change (before and after grinding) and grinding time of 10% Heliogen Blue L6905F dispersions in ***Hypomer FX-2060****.*

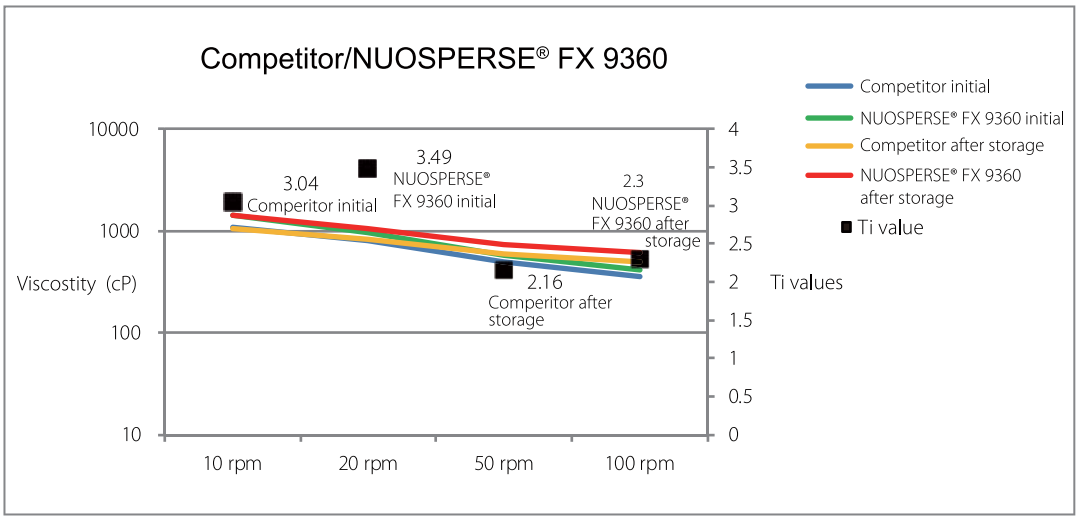


Fig. 15 Thixotropic index (Ti) and viscosity (initial and after one week storage at 50°C) of 10% Heliogen Blue L6905F dispersions in ***Hypomer FX-2060.***

Excellent color development and gloss potential

Figures 16 and 17 show that NUOSPERSE® FX 9360 gave comparable gloss and color development as the competitive dispersant when the Heliogen Blue L6905F dispersions are added in a 2K PU coating.

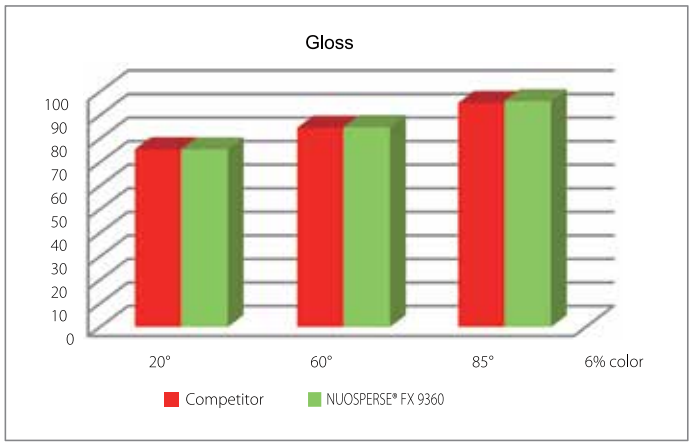


Fig. 16 Gloss of 2K PU paints containing Heliogen Blue L6905F dispersions based on ***NUOSPERSE® FX 9360*** *and the competitive dispersant.*

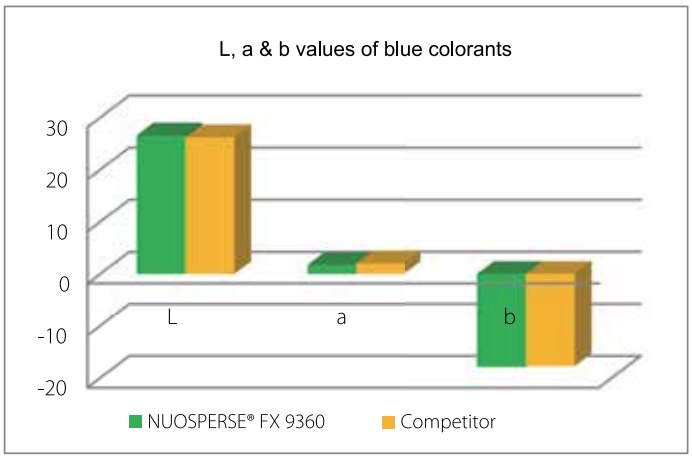


Fig. 17 Color development of 2K PU paints containing Heliogen Blue L6905F dispersions based on ***NUOSPERSE® FX 9360*** *and the competitive dispersant.*

In 2K PU metallic paints containing the Heliogen Blue L6905F dispersions, NUOSPERSE® FX 9360 performed comparably with the competitive dispersant in appearance, gloss and color development (Fig. 18, 19 and 20).

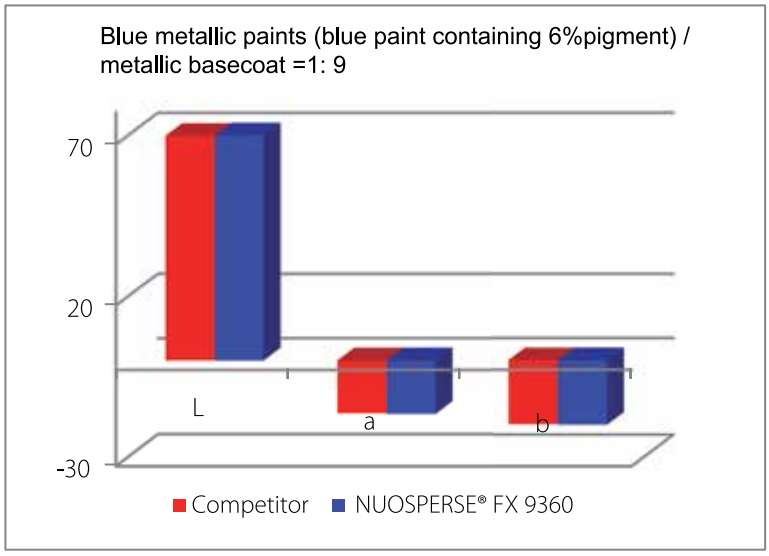


Fig. 18 Color development of 2K PU metallic paint.

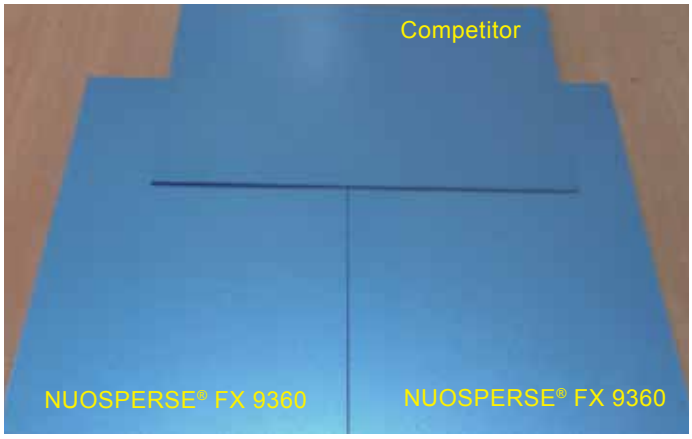


Fig. 19 Pigment orientation in 2K PU metallic paint.

Fig. 20 Pigment orientation in 2K PU metallic paint.

(B) Hypomer FS-2460A

After 90 minutes of grinding, fineness of grind readings of the blue colorants based on NUOSPERSE® FX 9360 and the competitive dispersant were lower than 10 um indicating good performance for both dispersants in this resin system.

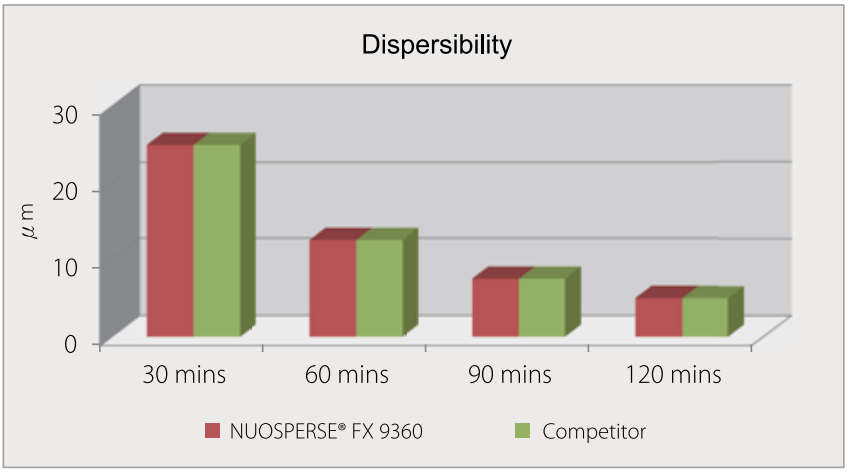


Fig. 21 Dispersing efficiency of dispersants in Heliogen Blue L6905F dispersions.

The viscosity data in figures 22 and 23 shows that NUOSPERSE® FX 9360 and the competitive dispersant have similar performance in terms of wetting and viscosity stability upon storage.

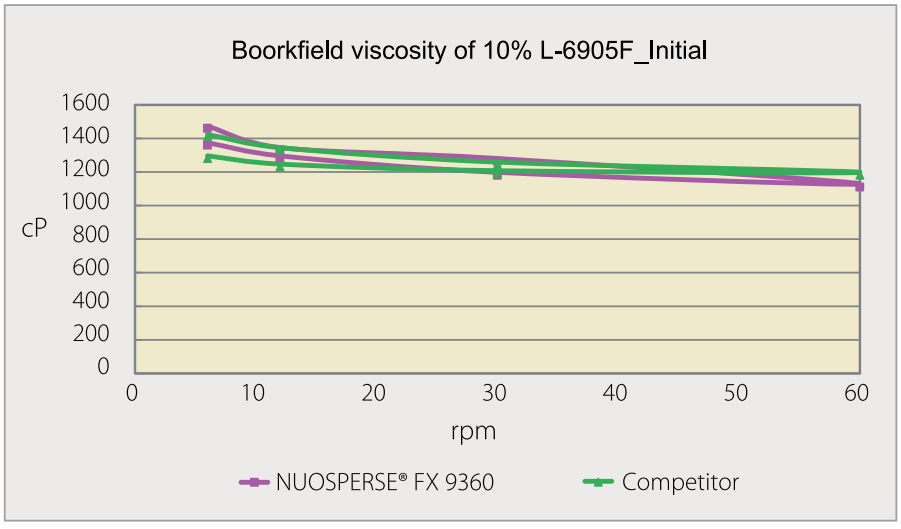


Fig. 22 Initial viscosity of 10% Heliogen Blue L6905F dispersions.

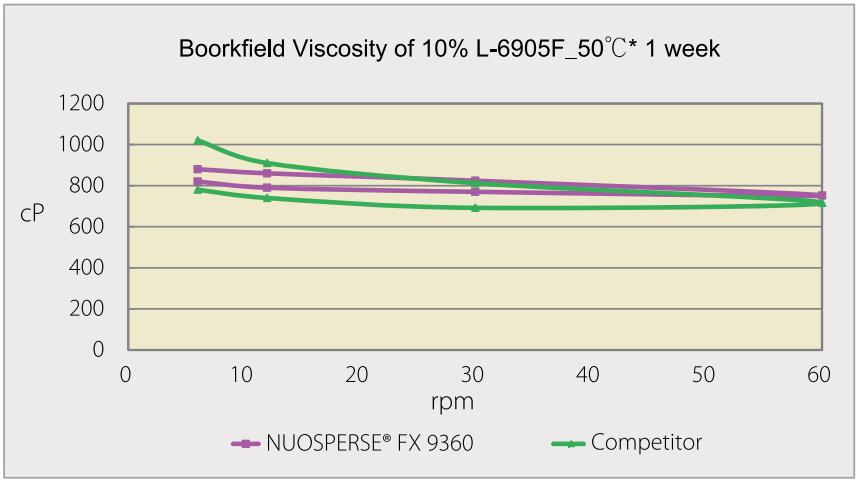


Fig. 23 Viscosity of 10% Heliogen Blue L6905F dispersions after 1 week storage at 50°C.

There was virtually little difference in gloss and haze data for both dispersants in the blue colorants. (Fig. 24) The L and b values in figure 25 show that NUOSPERSE® FX 9360 gave comparable color development to the competitive dispersant. They also produced similar color strength and film appearance in the colorants and metallic paints as shown in figures 26 and 27.

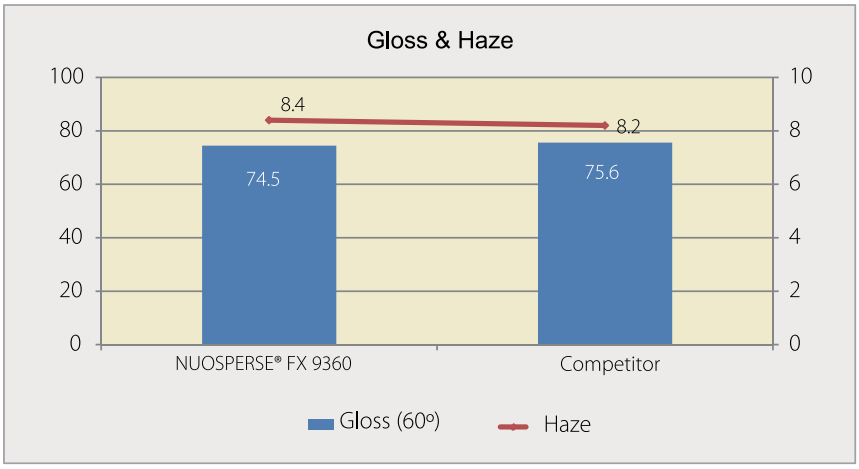


Fig. 24 Gloss and haze of 10% Heliogen Blue L6905F dispersions.

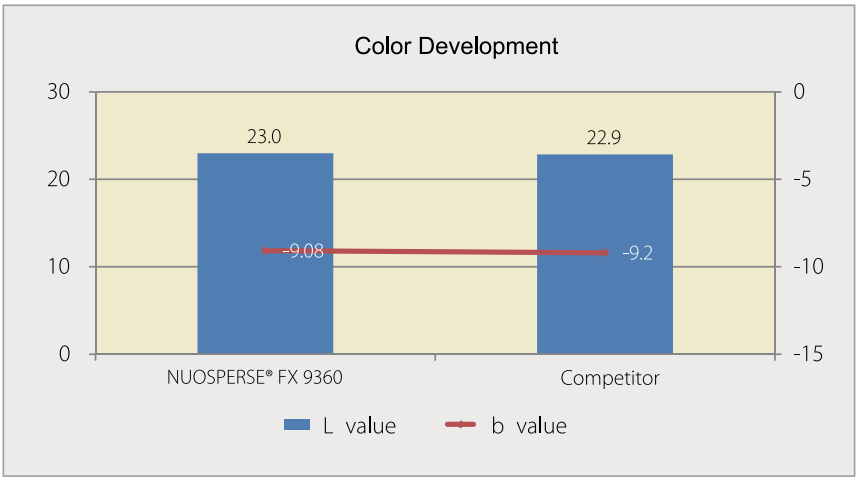


Fig. 25 Color development (L and b values) of 10% Heliogen Blue L6905F dispersions.

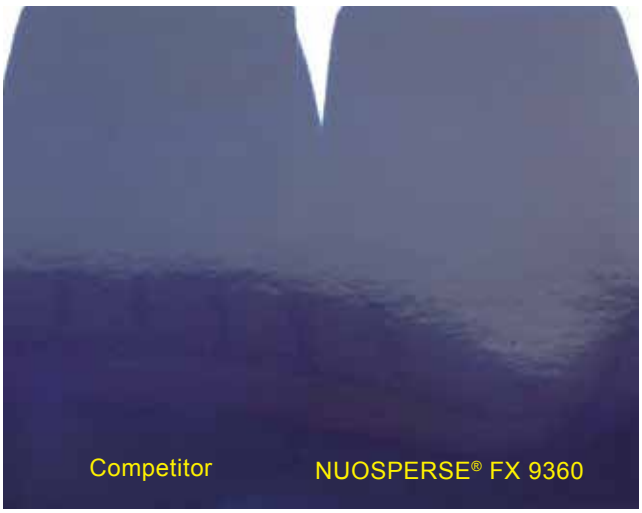


*Fig. 26 Drawdown of Heliogen blue L6905F dispersions (10% pigment loading) in **Hypomer FS-2460A**.*

*Fig. 27 Metallic paints containing blue colorants dispersed with **NUOSPERSE® FX 9360** and the competitive dispersant respectively.*

Conclusion

Elementis' new product NUOSPERSE® FX 9360 is a new generation hyperdispersant that exhibits excellent wetting and dispersing efficiency, good storage stability and flocculation resistance, excellent color development and high gloss potential. It enables high pigment loading with good viscosity reduction and works particularly well with organic pigments and carbon blacks in solvent based systems. Tests conducted on high jetness carbon black and phthalocyanine blue pigment demonstrate that this dispersant performs comparably with, if not better than, the market reference in both pigment dispersions and tinted coatings. NUOSPERSE® FX 9360 is recommended for industrial, automotive and other coating systems.

Note

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