



Automotive Refinish
Particle Size and Color
Study: -Raven 5000UII

OUTLINE

Subject of this study:

1. Testing the efficacy of two new DOXA polyether polyamide dispersants on Raven 5000UII
2. Testing the relationship between particle fineness, viscosity and hue.

The grades used in this study are:

- Spredox D-333U: Polyether polyamide
- Spredox D-335U: Polyether polyamide/polyester polyamide



ABSTRACT

As coating technology has developed, pigment particle size requirements have become more stringent. As changes in particle size can result in a variety of optical effects, the purpose of the present report is to explore the effect of changes in particle size during the grinding process on the color of the finished product.

The purpose of this report is to determine:

1. The effect of different sized pigment particles on color
2. The effect of different sized pigment particles on grinding time
3. The effect of different formulations on grinding efficiency.
4. The effect of different formulations on viscosity



TEST FORMULATION

Materials	Weight (g)
FX-2060A, Elementis	1000
BAC	120
PMA	400
Dispersant	280
Raven 5000, Columbian	200
Total	2000

Methodology:

1. Disperse using a stirrer for five minutes (speed: 2000rpm)
2. Use a basket mill and a nano-grinder.
3. Regularly test particle size, viscosity, color and gloss.



D-333U

Grinding Time (min)	D50	D90	L*	a*	b	Gloss	Viscosity (cps)
0	341	531	2.98	0.23	0.10	103.00	202.4
20	235	363	1.69	0.07	-0.03	102.90	754.4
40	232	417	1.61	-0.14	-0.32	103.60	1125.9
60	253	455	1.85	-0.07	-0.36	103.20	1062.4
80	230	445	1.67	0.09	-0.38	103.60	1172.3
100	201	353	1.44	-0.12	-0.40	103.50	1575.8
120	192	337	1.41	0.12	-0.41	103.40	1366.5
140	208	330	1.36	-0.12	-0.40	103.50	1489.5
160	222	394	1.41	-0.17	-0.35	104.00	1401.9
180	232	415	1.38	-0.10	-0.41	103.80	1300.9

Explanation:

1. Each row contains data from a single pass.
2. Tests of color strength and gloss were conducted on a 1k color coat covered with a 2k clear coat.
3. Viscosity speed was 2rpm



D-335U

Grinding Time (min)	D50	D90	L*	a*	b	Gloss	Viscosity (cps)
0	282	546	4.21	-0.07	-0.17	91.50	385.5
20	242	467	2.68	-0.16	-0.26	100.40	1305.2
40	177	274	1.07	-0.20	-0.23	103.80	621.6
60	195	341	1.17	-0.25	-0.16	102.70	985.3
80	184	337	1.13	-0.09	-0.33	102.50	780.9

Explanation:

1. Each row contains data from a single pass.
2. Tests of color strength and gloss were conducted on a 1k color coat covered with a 2k clear coat.
3. Viscosity speed was 2rpm



OBSERVATIONS

- After 120 minutes of grinding, Spredox D-333U provided the best fineness and hue. After 40 minutes of grinding, D-335U achieved the same fineness. D-335U also achieved the same particle size and fineness.
 - ➔ D-335U resulted in better dispersion than D-333U.
- D-335U was able to achieve a higher degree of jetness, and D-333U provided a more bluish hue.
 - ➔ Lower viscosity seems difficult to maintain, but the jetness and bluish hue were higher.
- Particle size climbed back up after reaching lowest fineness.
 - ➔ The (repulsive) energy barrier created by the dispersing agent has a threshold. Once the surface area generated creates (attractive) potential energy in excess of that threshold, the particles start to flocculate. This is in line with the repulsion/attraction theory.

