BYKmac - effect space of real automotive coatings

Dr. Carlos Vignolo
Colormanagement Automotive Coatings
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- Graphical approach for sparkle (S) and the diffuse coarseness (G)
- Color analysis with and without Xirallics®
- General analysis of feasible OEM basecoat colors
- Summary and concluding remarks
Basics
## Color measurement with Bykmac

### Table: Color Differences

<table>
<thead>
<tr>
<th>LA</th>
<th>Ge</th>
<th>L*</th>
<th>a*</th>
<th>b*</th>
<th>C*</th>
<th>h</th>
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<tr>
<td>D5</td>
<td>15</td>
<td>140.92</td>
<td>-0.86</td>
<td>0.79</td>
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<td>15</td>
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<td>0.95</td>
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<td>1.82</td>
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<td>-1.73</td>
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<td>110</td>
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<td>-0.76</td>
<td>-2.03</td>
<td>2.23</td>
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</table>

### Diagram: Color Measurement

- [Diagram showing color measurement results with Bykmac]
For each measuring geometry:

- 2D-simulation of Sparkle (intensity $S_i$ and area $S_a$)
- 1D-simulation of diffuse coarseness ($G$)
Graphical approach for sparkle (S) and the diffuse coarseness (G)
Dark grey with and w/o Xirallic®

- Xirallic® concentration ladder 0.3%-2.0%
- Replacement of Xirallic® with mica + silver dollar alu flakes 0.3%-2.0%
Grey, black, blue, red with and w/o Xirallic®

- Xirallic® concentration ladder
- Replacement of Xirallic® with mica (+ silver dollar alu, when needed)
Color analysis with and without Xirallics®
Dark grey with and w/o Xirallic®

<table>
<thead>
<tr>
<th>Sample</th>
<th>CIE L*</th>
<th>CIE a*</th>
<th>CIE b*</th>
<th>CIE Lab</th>
<th>CIE MacAdam 1°</th>
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</thead>
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Audi tolerances

\[ <dS> < 1.4 \]

- **Xirallic®** pigment concentration 0,3%
- Replacement of Xirallic® with mica + silver dollar alu flakes 0,3%

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2011/10/15
Dark grey with and w/o Xirallic®

Audi tolerances
\( <dS> < 1,4 \)

Xirallic® pigment concentration **0,75%**

* Replacement of Xirallic® with mica + silver dollar alu flakes **0,75%**

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Red with and w/o Xirallic®

- Xirallic® concentration ladder
- Replacement of Xirallic® with mica
Blue with and w/o Xirallic®

- Xirallic® concentration ladder
- Replacement of Xirallic® with mica
Light grey with and w/o Xirallic®

- Xirallic® concentration ladder
- Replacement of Xirallic® with mica (+ silver dollar alu, when needed)
Black with and w/o red Xirallic®

- Xirallic® concentration ladder
- Replacement of Xirallic® with mica (+ silver dollar alu, when needed)
Black with and w/o red Xirallic®

Center of the graphic is the Xirallic® color

*Replacement of Xirallic® with mica
General analysis of feasible OEM basecoat colors
Overview, + 1,000 colors

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S_i(S15°) * S_a(S15°)  
S_i(S45°) * S_a(S45°)  
```

“normal” perl/met colors
Overview, + 1,000 colors

“solid-like” perl/met colors
Overview, + 1,000 colors
Overview, + 1,000 colors

mainly Xirallic®
Overview, + 1,000 colors

Dark Grey Met HS 1-Hit ESTA
Overview, + 1,000 colors

S15° S45° S75° Gdiff

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Summary and concluding remarks
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- There is always clearly a sparkle dynamic: $S_{a,i}$ decreases with increasing viewing angle.
- $S_a$ saturates at approximately 40 units.
- $S_i$ values larger than 30 units are only achievable with Xirallics® or with glass flakes (80 units are possible!).
- Diffuse coarseness $G$ values larger than 10 units are for feasible basecoat colors (OEM) almost impossible to reach.
- Replacement of Xirallics® pigments through conventional ones is regarding sparkle limited to only some concentrations or color areas.