

Color Matching Problems in the Paint Industry



Presented by Jim Roberts
Duron, Inc.

Simple but Basic



- Consumers now demand perfection
 - Age of computers when anything's possible
 - Little consumer loyalty
 - Many options that are now price competitive to paint
- Brand recognition is less important
 - Many small companies going away
 - Big Boxes sell private labelled offset to brand names - cost less for the same quality
- Paint has become a commodity item - performance has become secondary to price and **COLOR**

Forget About Simplicity

- Generic color formula shot in various paint types
- Differences in Sheen and formula ingredients cause huge shifts, even at same tint strength



Alternates to Paint Readily Available



- Accessories often more important than wall color
 - Color has moved into everything from toasters to coffee tables
 - Natural, restful palettes decrease the need for “color” in a room
- More leisure time allows homeowners to add color with wallcoverings, faux finishes, and textured finishes in place of walls of a solid color
- More free money lets homeowners experiment more - mistakes can be fixed for a few hundred dollars more

The Problems Start Here



- Paint color systems are designed by designers, not paint companies
- Simplification by the designer makes life Hell for the color formulator
 - Single pigment colors
 - Very light colors
 - Alternate paint systems to the standard “flat, high hiding bases” used by the designer

The Problem Continues



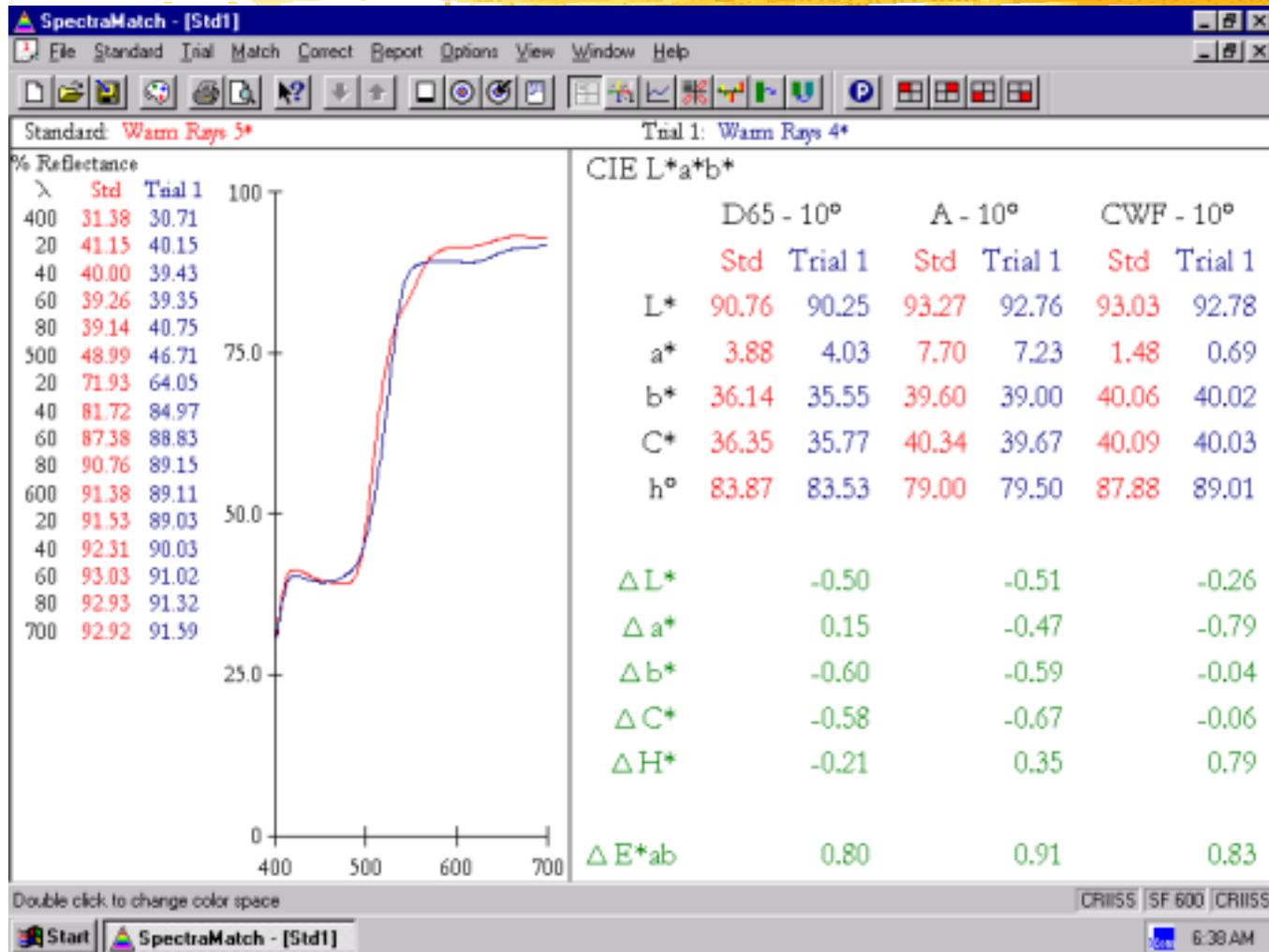
- Lacquers used to produce fan decks and color cards are difficult to duplicate with paint
- Lacquers need to be applied in thin films to achieve quick dry - film thickness changes color
- Same color lacquer will produce different colors on different paper stocks
- These color aids are considered “standards” by the consumer
- Approved lacquers may look completely different when printed
- Metamerism a big problem, especially as new light sources are introduced

The Eye of the Beholder

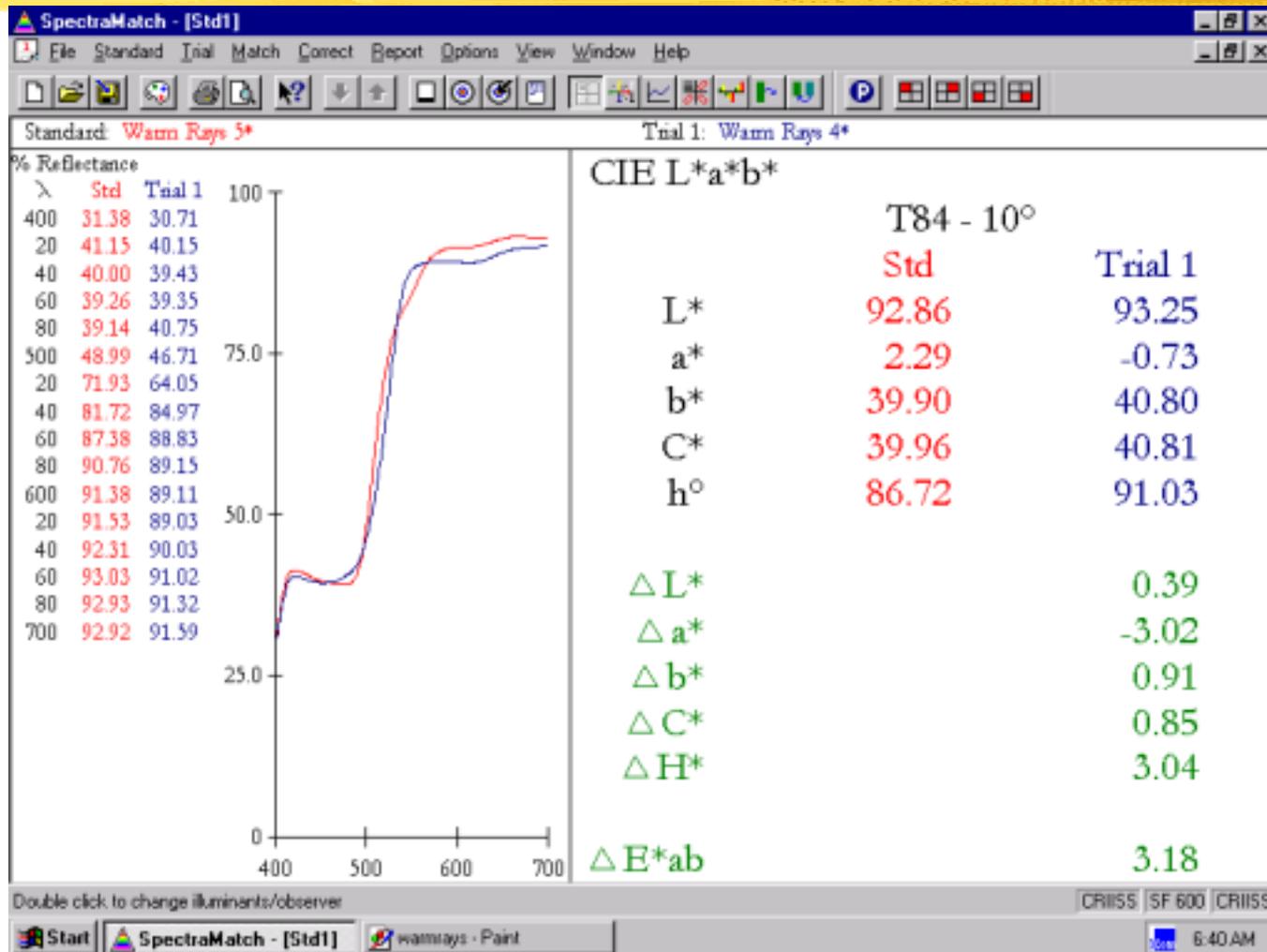


- Gloss compensation in most software does not do a very good job
 - Not a linear relationship
 - lightness/ darkness issues are very subjective
- Matching non-paint materials can lead to metamerism or just be impossible to get agreement with the customer
 - fabric dyes difficult to match with pigments
 - inks
 - metallics and pearls
 - textures

Fan Deck Comparison - Normal Light Sources



Fandeck Comparison - Energy Saving Fluorescent

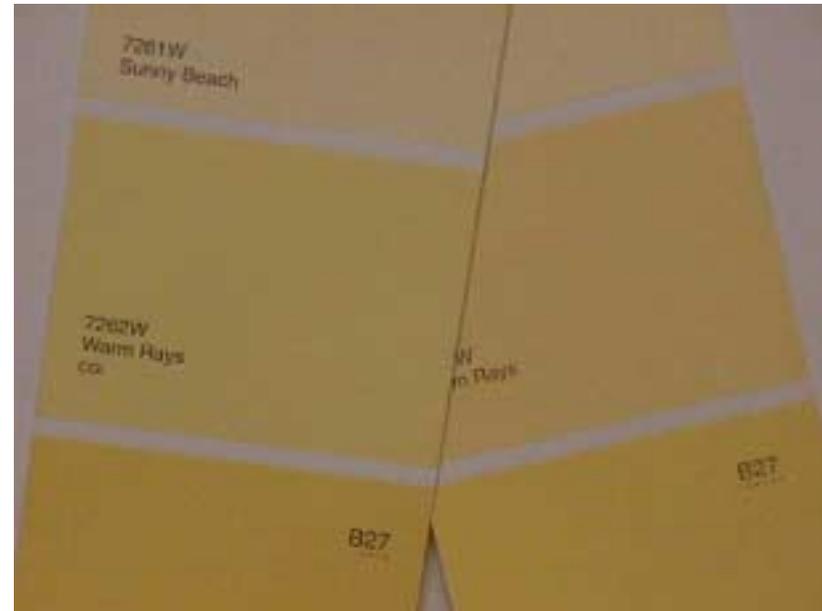


Warm Rays - Light Effects

■ Daylight Bulbs



■ Energy Saving Bulbs



Computer Color Matching



- Consumers have more faith in computers than in the color experts in the stores
- Combinatorial matching is not the best way to get to a good match
- Little change in the basic matching software since it was introduced
- Color matching hardware is not routinely maintained

Color Software and Hardware



- Kubelka-Munk gives good matches but then has to round up or down to limits of dispensers
- Software often uses opposing colorants, on the theory that the greater degree of freedom will get a better match
 - Small errors caused by dispensers cause huge shifts
- “Minimized metamerism” under three light sources can fool you - there’s always that fourth source waiting to get you!
- Most paint companies use the same basic pigment set - why doesn’t software identify pigments first and then use those pigments for the match?
- Using random pigment selection to minimize metamerism gives 60-70% under 0.5 dE CMC (1:1).
- Using known pigments has given as high as 95% under 0.5 dE

Instrument Standardization



- Wide range of readings between two instruments, even from same manufacturer
- Instruments do not hold calibration well
- Daily calibration misleading - it doesn't guarantee accuracy
- No universal standard used - White BCRA tile is whiter than white calibration tile used by many manufacturers
- Internal checks do not find small variations that cause errors
- Calibration back to universal standard is expensive and can not be done on site - expensive downtime required

Tint Equipment



- Tint equipment in the stores has a high error rate at small dispenses
 - Light colors currently in vogue are the most difficult to achieve
 - Contrasting color combinatorial matches can shift dramatically
- Calibration of store tint equipment has very low priority
- Quart formulas impossible to dispense
 - Smallest dispense often too much to get correct color

Colorants



- Most manufactured colorant is controlled to +/- 2% on strength
- Colorants are highly concentrated - small differences make for big errors
- Rheology of colorants can cause dispense differences between different types of equipment

Shakers



- Shake time and energy are critical to getting the correct color
- Timers on store shakers are not very accurate
- One gallon and five gallon shakers do not match each other - shaker suppliers admit they never thought about it!
- Ideal shake time for ALL products does not exist

The Physical Environment



- Strange lighting situations
 - energy efficient fluorescent bulbs
 - mercury and sodium vapor bulbs
 - very low light
- Incident color
 - brightly colored rooms to show off paint
 - brightly colored uniforms or aprons

Training



- Color training a low priority for most companies
- Rapid turnover of trained employees
- Belief in the computer
- Understaffing
- Department store and Big Box cross-departmental responsibilities

Conclusions



- Color matching software works but is beyond abilities of store equipment to dispense
- Consumers want a perfect match and aren't convinced when reality gets in the way of achieving it
- Color formulation today needs to take into consideration that "pretty close" is no longer acceptable

Conclusions (cont.)



- Same color formula used to be acceptable across many different paint products but is no longer possible
- Instruments sold at a price acceptable to store environments have not generally been very reliable in their predictions, and frequently give bad results
- There is no inter-company agreement on spectral readings

Conclusions (cont.)



- Gloss of the paint and incident lighting can make a good match unacceptable to the customer
- Pre-determination of the pigment combination to be used greatly increases the accuracy of predicted matches
- Color is subjective - no matter how good a match is using QC software for analysis, someone will disagree about its acceptability



QUESTIONS?