



UNIFORM COLOR

An **AUDIA** Company



General overview



 **WASHINGTON PENN**

 **AUDIA ELASTOMERS**

 **UNIFORM COLOR**

 **SOUTHERN POLYMER**

COMPOUNDING

COLOR

DISTRIBUTION

Proprietary & Confidential Property of Audia International, Inc.

Wherever you are, we're there.



Compounding		WP
		AE
Distribution		SP
Color		UC
Audia HQ		
Audia Ranch		

HQ = Headquarters
M = Manufacturing
D = Distribution
S = Sales Office

Industries

A solution for every industry.



Automotive



Building & Construction



Furniture



Consumer



Lawn & Garden



Packaging

Laboratory & Development



A2LA Laboratory
Rheology, FTIR,
DSC & TGA
Xenon Weathering



**Color Science &
Design Experts**
Training Seminars
OEM Mastering



Fast Development
Calibrated Light
Rooms
Formulation &
Measurement
Systems

Quality & Environmental Systems

- ISO 9001 (U.S., Mexico & Slovakia)
- ISO 14001 (Mexico & Slovakia)*
- IATF 16949 (U.S., Mexico & Slovakia)



Masterbatch: A Sustainability Driven Product

Concentrated blend of pigments, process stabilizers, light stabilizers, modifiers and plastic resin in higher concentrations than in a normal mix

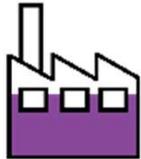
Resin Producer



Plastic Processor



Uniform Color



 **UNIFORM COLOR**

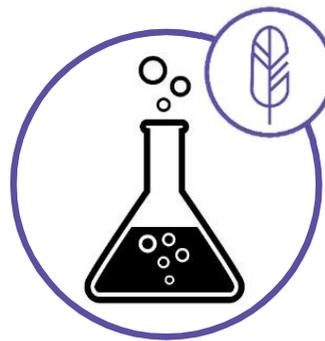
Innovations to achieve our sustainability goals



SUSTAINABLE COLORING

Coloring Recycled Plastic

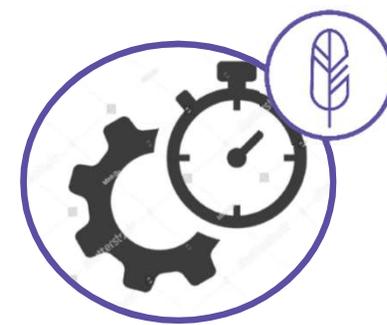
- Color masterbatch solutions to reduce color variations of Post-Consumer Recycle (PCR) resin



LIGHTWEIGHTING

Chemical Foaming Agents

- Reduce density by replacing polymer with air
- Optimize cooling and throughput efficiency



CYCLE TIME REDUCTION

Organic & Inorganic Technology

- Lower part cycle time with latest additive technologies
- Replace PP with PE in some applications
- Possibility to thin-wall parts to use less plastic

Innovations to achieve our sustainability goals



SORTING TECHNOLOGIES

Near Infrared (NIR) Sortable Black

- Sorting accuracy
- Polymer detectability
- Landfill avoidance



REDUCE ENERGY SPENT

Metallic paint replacement

- Eliminating paint
- Weight reduction
- Reduces waste (six- sigma lean manufacturing model)



SUSTAINABLE ADDITIVES

Ultraviolet and Antioxidants

- UV for long term durability
- AO for increased longevity of recycled materials
- Scratch resistance for longer cosmetic life

Innovations to achieve our sustainability goals



EFFICIENT PURGING

UCClean: Purging Compounds

- Purging solutions from the color change experts
- Recyclable – landfill avoidance
- Highly effective chemical & mechanical scrubbing
- Food contact safe options



ELIMINATE LABELS

Laser Marking Chemistry

- Eliminate ink and paper
- Reduce waste generated through loss of printed labels



PLASTIC PROTECTION

Antimicrobial Technologies

- Protection for a longer term cleaner and fresher article
- Resists stain and odor causing bacteria
- Provides a bacteria-resistant surface

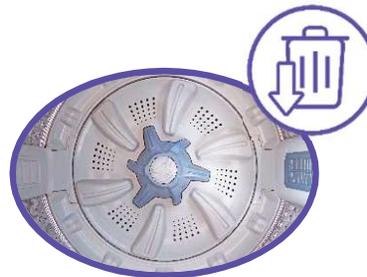
Innovations to achieve our sustainability goals



HEAT REFLECTIVE COLORS

Total Solar Reflectance Solutions

- IR reflective pigments to reflect solar radiation
- Energy reduction
- Cooler touch in outdoor applications



HIGH OPACITY WHITE

Achieve Opacity at Lower Use Rate

- Use less and hide more
- Highly loaded super-concentrate



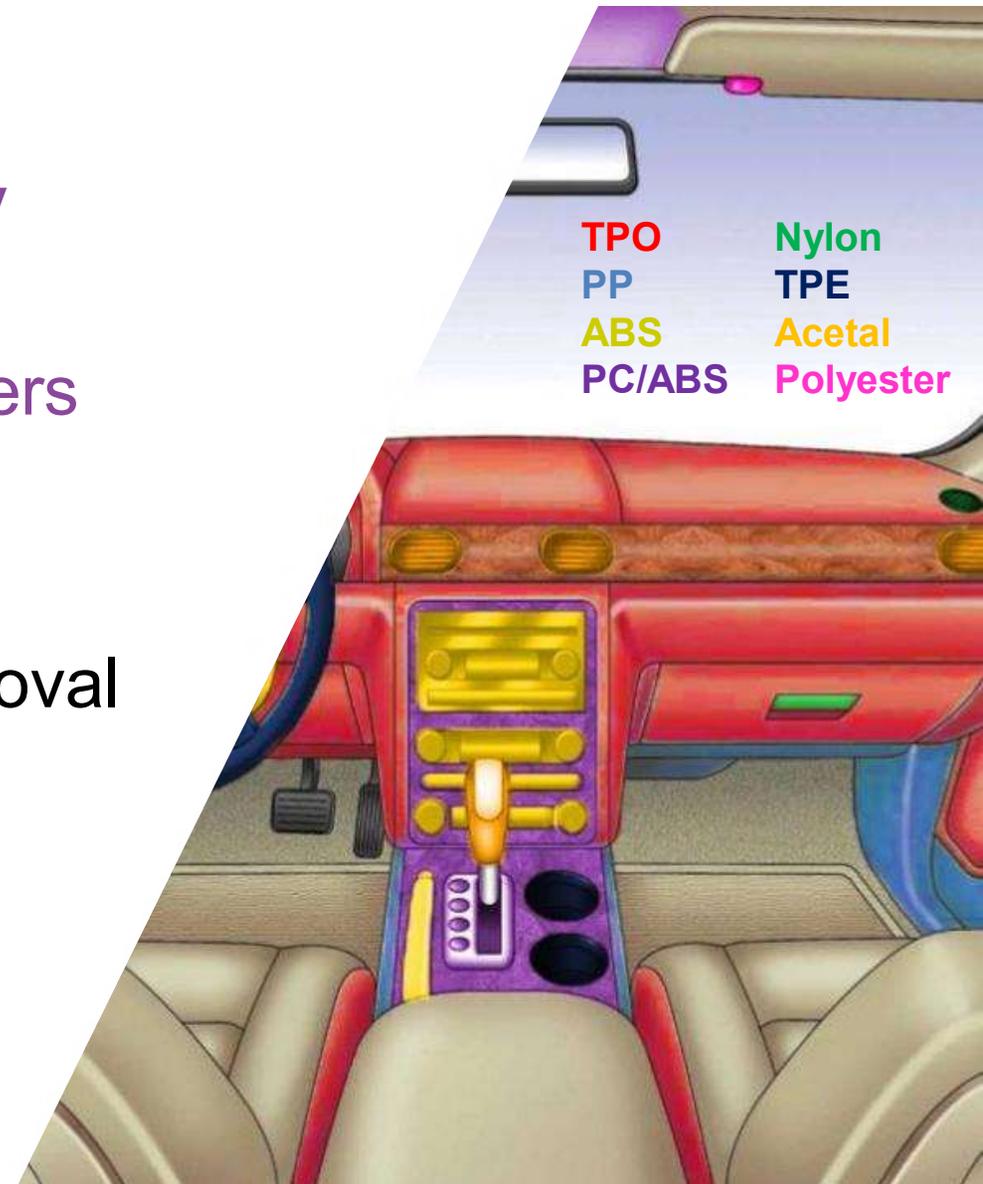
FABRIC APPEARANCE

Eliminate Fabric Wrapping

- A manufactured regenerated cellulose / rayon fiber
- Reduce the need for cloth wrapping
- Example: automotive a-pillars

Color Harmony

- Expertise coloring 45+ polymers
- Accelerated color approval
- In-house color mastering
- Submit support for OEM approval
- Continued technical support throughout product lifetime



Color Harmony

PP, PE, TPO, TPE, ABS, PS,
PA, POM, PMMA, & Others

- Expertise coloring 45+ polymers
- Accelerated color approval
- In-house color mastering
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- Continued technical support throughout product lifetime



Special Effects

- Metallic Paint Replacement
- Laser Marking
- Fiber Technology
- Granite, Marble, & Pearl
- Light Diffusion
- Glow in the Dark



Special Effects

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Processing Additives

- Mold release
- Cycle time reduction
- Anti-static
- Reprocessing
- Assembly slip agent
- Chemical Foaming Agents



Product Performance Additives

- Weather durability
- UV Light fastness
- Content protection
- Impact modifier
- Scratch & mar
- Laser marking
- Dimensional stability



Sustainability Solutions

- NIR sortable black
- Cycle time energy savings
- Chromatic PCR color options
- Thin-walling & light weighting
- Decreased degradation of recycled material



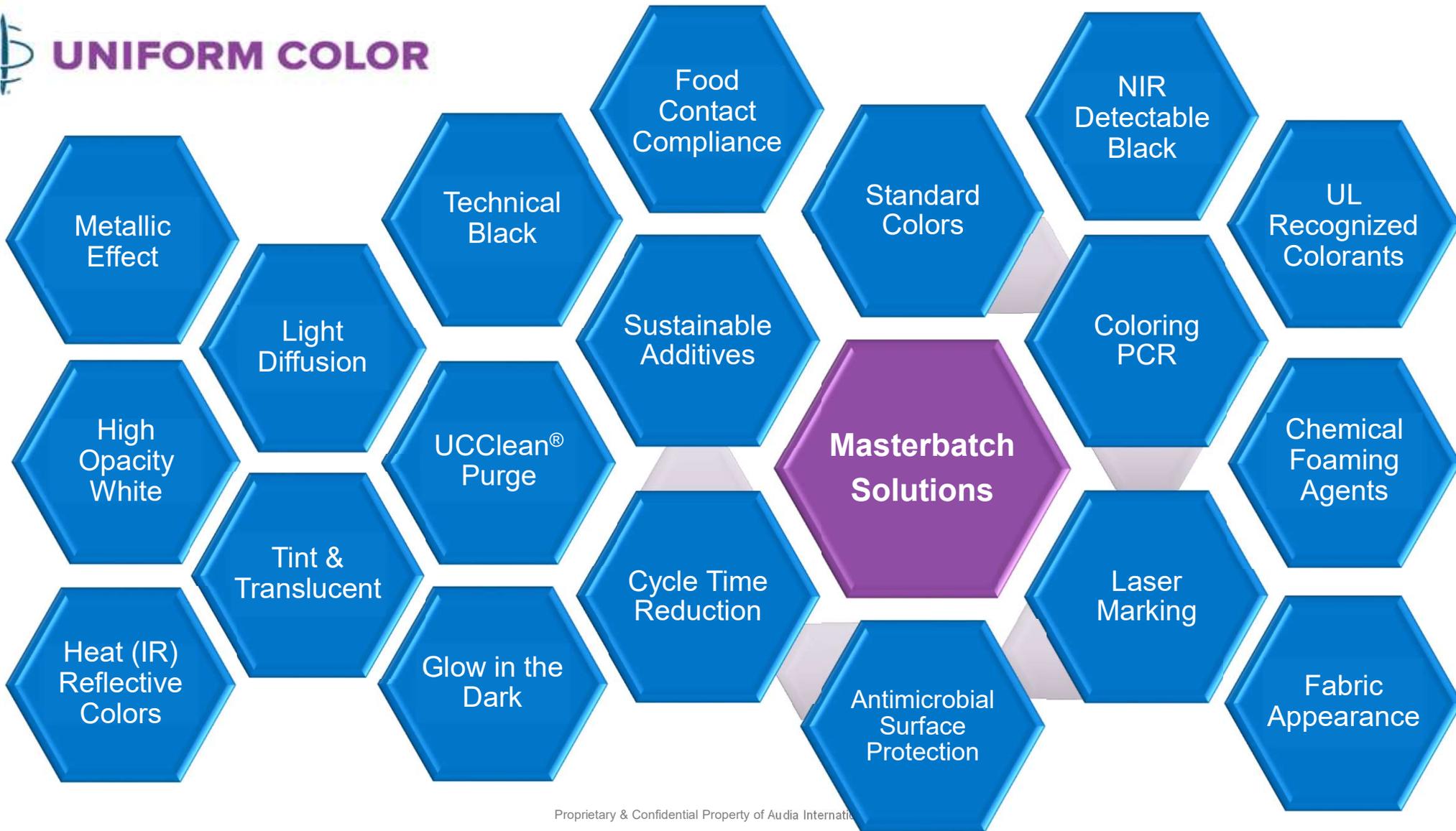
Technical Service

- 24/7 on-site, full technical support for your processes
- Process optimization
- Press-side PPAP color adjustment
- Color harmony reviews
- Color training
- Color quality control best practices implementation
- OEM Submission Assistance and Document Management
- CFA and purge training





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High Opacity White Case Study

Problem

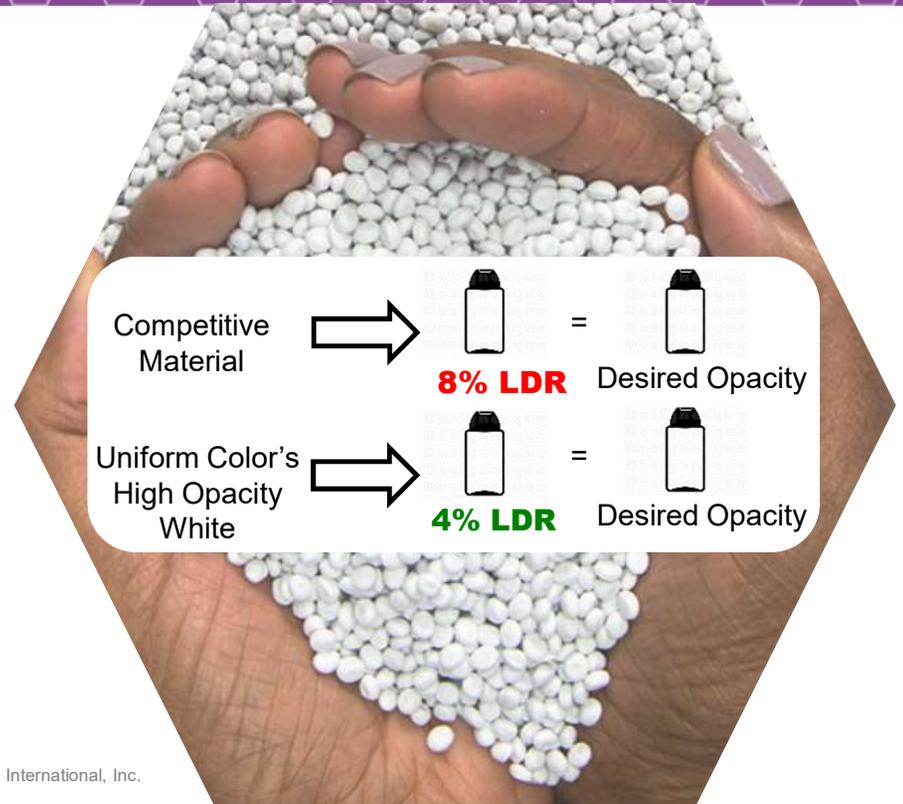
Traditional white TiO₂ masterbatch have a limited hiding power in thin wall applications that require a high level of opacity causing higher than desired let down ratios

Benefit

UC has created our High Opacity White product to match or improve the hiding power of traditional white masterbatch at levels as low of 50% of the current let down ratio.

Case Study Application

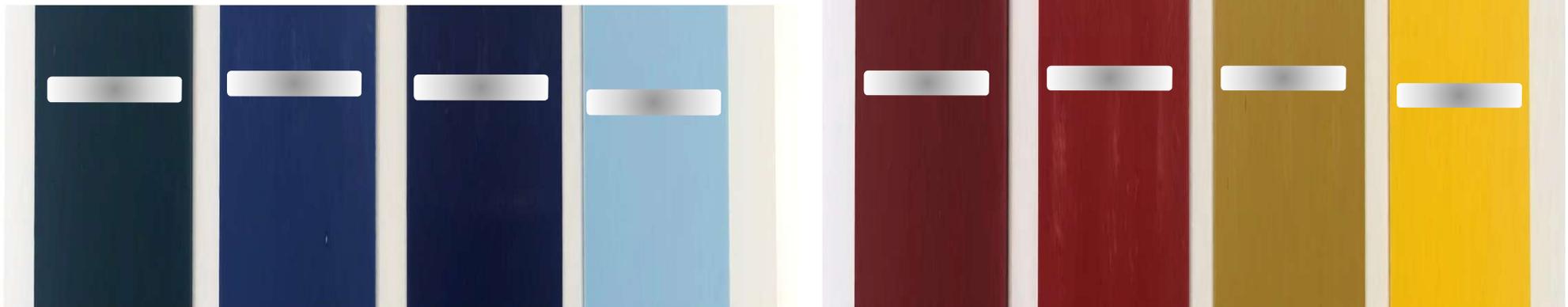
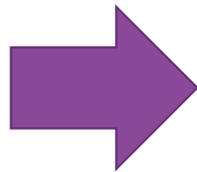
3 layer opaque white bottle used for consumer shampoo bottle.



Uniform Color Coloring Recycled Plastic

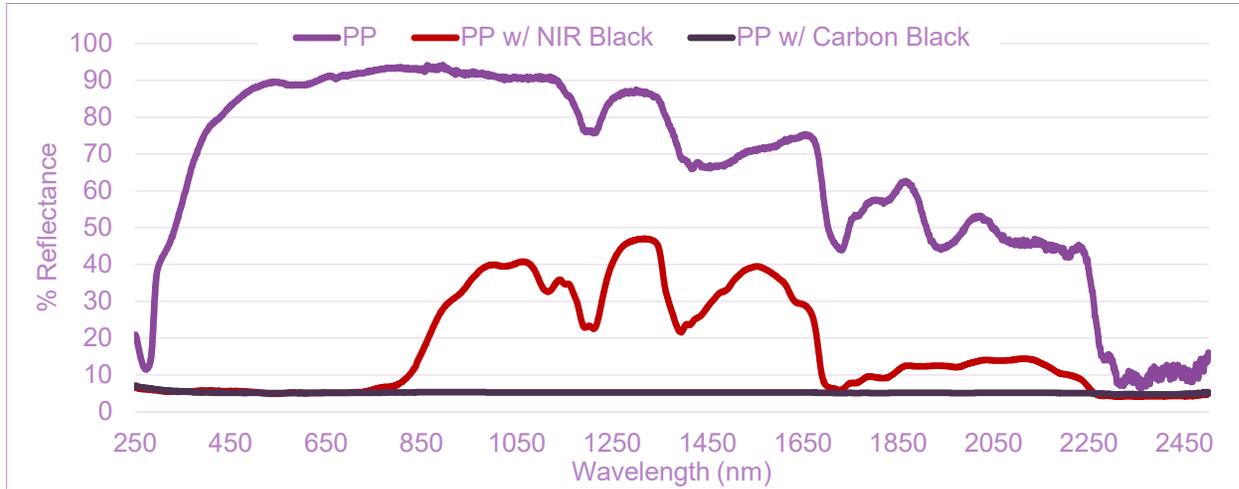
✓ *Chromatic Color*
✓ *100% PCR*

✓ *FDA Food Contact*
✓ *Special Effects*



Uniform Color UCNIR Black

- Traditional Carbon Black Interferes with NIR Waste Sorting
- NIR Black Technology Enables Polymer Detectability / Sorting



Standard Grades	Carrier	LDR	Food Contact Compliance		Polymer Compatibility				
			EU	US*	PP	PE	PS	PC	PET
20-9NIR-A	HIPS	33:1	No	No			X		
30-9NIR-A	LLDPE	50:1	Yes	B-H	X	X			
30-9NIR-B	LLDPE	25:1	Yes	B-H	X	X			
30-9NIR-C	LLDPE	50:1	No	No	X	X			
30-9NIR-D	LLDPE	25:1	Yes	A-H	X	X			
31-9NIR-A	LLDPE	50:1	No	No	X	X			
60-9NIR-A	PC	33:1	No	No				X	
54-9NIR-A	PET	33:1	Yes	C-G					X
54S9NIR-B	PET	33:1	Yes	C-G					X



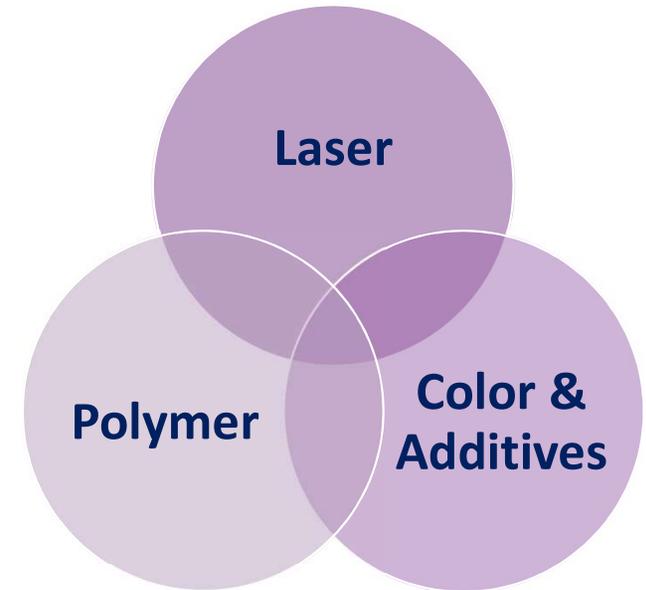
Uniform Color Laser Marking Technology

Components of a Good Laser Mark

1. Polymer
 - Many different resins can be used
2. Additive
 - Different additives depending on mark
3. Laser
 - Many different laser options



No Trees
Harmed



Uniform Color Capability

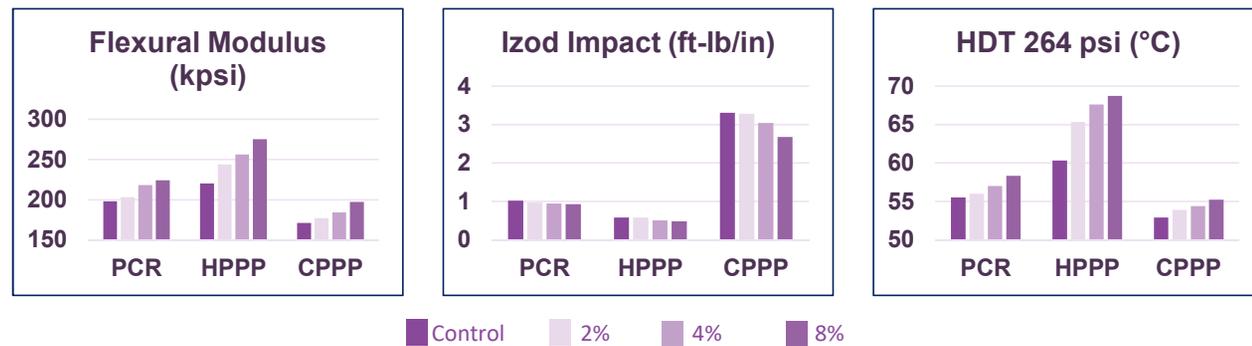
- Laser Marking Technologies
- 20W Ytterbium Fiber
- 1064nm wavelength
- 3-axis travel



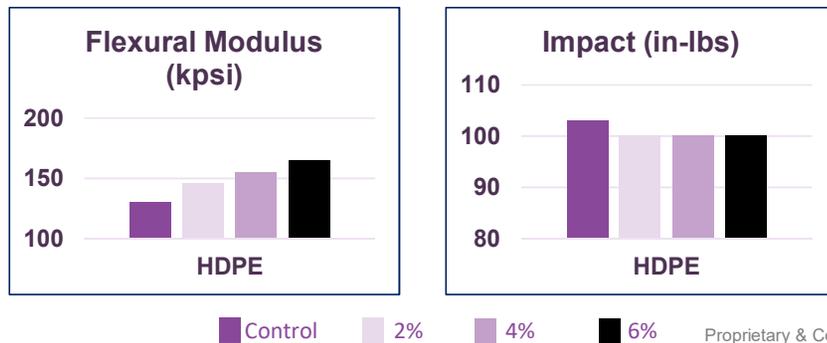
Uniform Color UCCycleTime Technology



Polypropylene Property Enhancements



Polyethylene Property Enhancements



UCCycle Time Attributes

- Heat Transfer Promotor
- Nucleator
- Stiffness Enhancer
- Heat Deflection Temp (HDT) Improver

Applications/Grades

- Injection Molding (UCCycleTime HF) – L360007
- Extrusion Blow Molding (UCCycleTime LF) – L360008

Antimicrobial

- Protect against microbial growth
- Reduce up to 99.9% of microbes in 2 hours
- Wide range of polymer compatibility
- Long lasting efficacy



Uniform Color UC Antimicrobial

Name	LDR	Carrier
10-AG25	25:1	ABS
10-AG50	50:1	ABS
20-AG50	50:1	HIPS
30-AG25	25:1	LLDPE
30-AG50	50:1	LLDPE
30-AG100	100:1	LLDPE
30-AG100CL	100:1	LLDPE
40-AG50	50:1	PMMA
50-AG25	25:1	PA
50-AG50	50:1	PA
54-AG50 [Clear]	50:1	PET
58-AG50-OB	50:1	PET
60-AG50 [Clear]	50:1	PC
80-AG25	25:1	POM
80-AG50	50:1	POM
85-AG50	50:1	EVA
94-AG50	50:1	TPU

- Silver Ion
- Up to 99.9% Efficacy within 2-hours*
 - **Per ISO 22196 Testing Methodology*
- One Pellet Solution
 - Color + Antimicrobial
- FDA / EU Food Contact Compliant
- EU (528/2012) BPR Article 95 Listed
- EPA Registered
- Stain & Odor Fighting
- NSF Listed

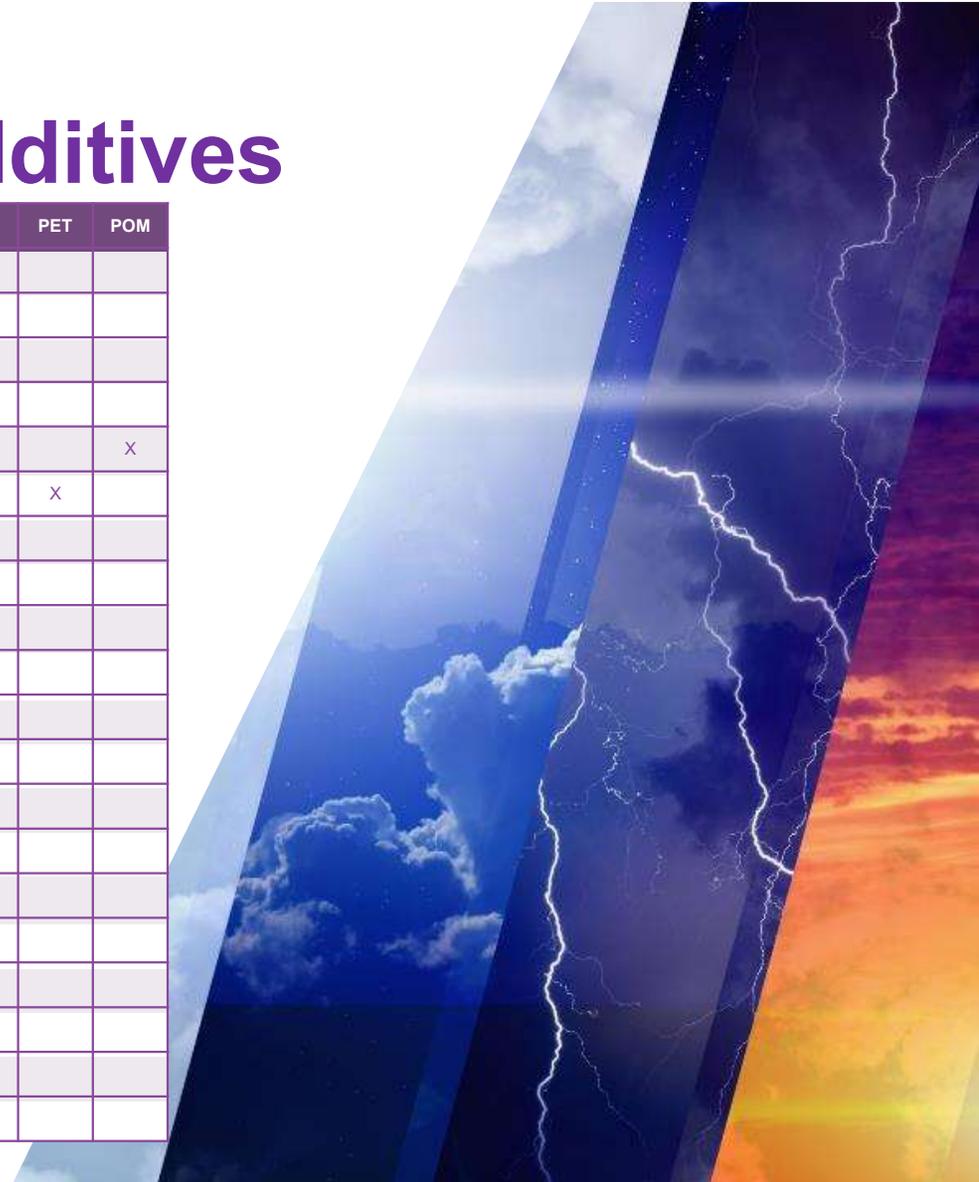


Uniform Color

UCSustainable Plastic Additives

Product	Description	PP	PE	ABS	PA	PC	PS	PET	POM
ACMARPP	Polypropylene Mar Resistance	X							
ACMARPE	Polyethylene Mar Resistance		X						
ACMARPA	Nylon Mar Resistance				X				
ACMARPC	Polycarbonate Mar Resistance					X			
ACMARPOM	Acetal Mar Resistance								X
ACMARTPEP	Polyester Mar Resistance							X	
ACMARABS	ABS Mar Resistance			X					
UCCycleTime HF	Cycle Time Reduction	X	X						
UCCycleTime LF	Cycle Time Reduction	X	X						
ACPAPP	PP Flow Modifier	X							
ACIMPPP	PP Impact Modifier	X							
ACAS	Temporary Anti-Static	X							
ACPPGMS	Temporary Anti-Static	X							
ACMR	Mold Release	X							
ACNUC	Nucleation	X							
ACUVI	UV Protection	X							
ACUVLT	UV Protection	X							
30-715441095	UV Protection		X						
ACSLIP	Slip Concentrate	X							
ACSM	Scratch & Mar Concentrate	X							

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Uniform Color

UL Recognized Color Concentrates

Horizontal Burn (HB)

- ABS – *all colors*
- HDPE – *all colors*
- Polystyrene – *all colors*
- Polypropylene – *all colors*
 - Authorized Manufacturer of WPP Color Concentrates

Vertical Burn (V0, V1, V2, 5VB, & 5VA)

- Resin Grade Specific (inquire)



Component - Color Concentrates
File Number: E193229

UNIFORM COLOR CO
942 Brooks Ave
Holland, MI 49423-5337 United States

23-(a)

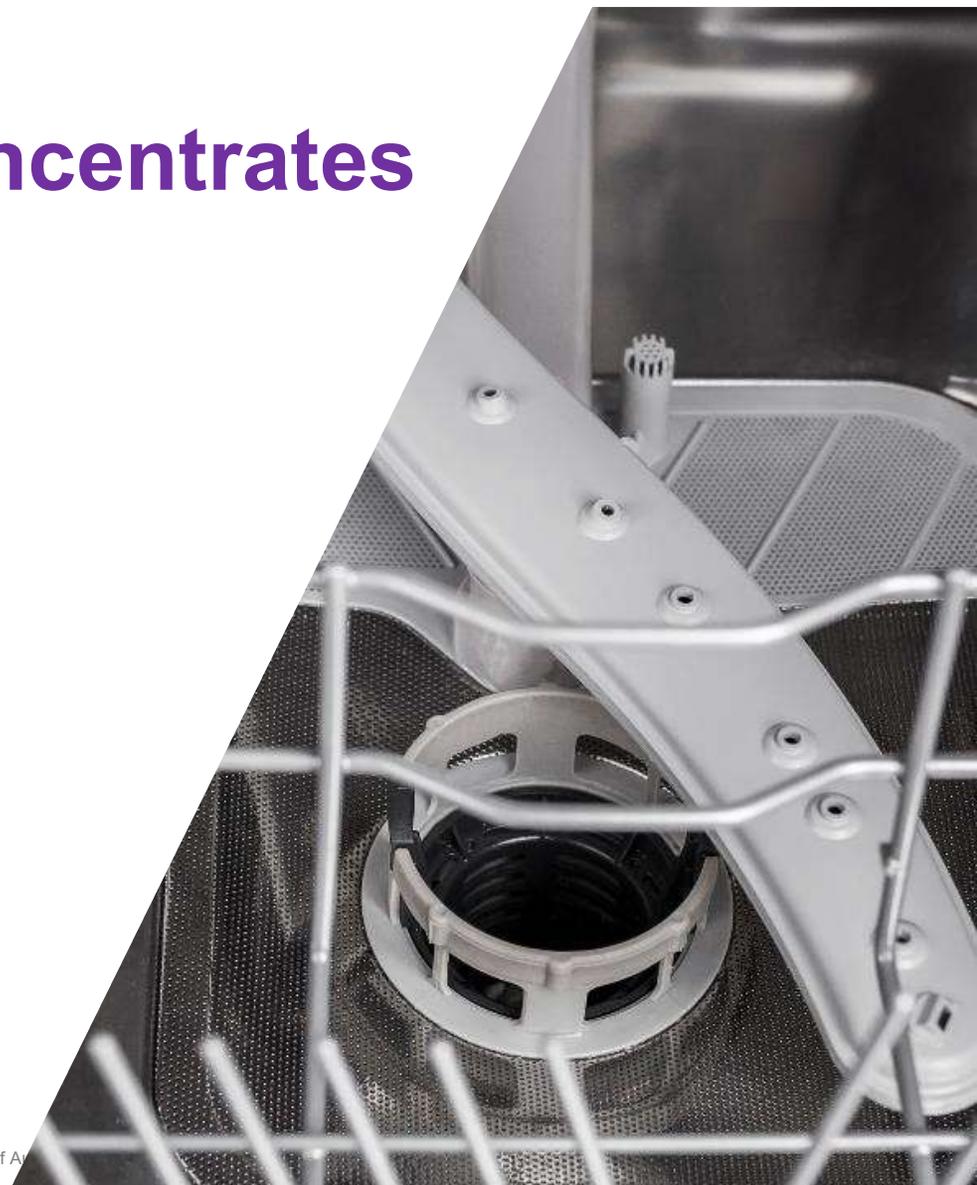
Color Concentrates, pellets

(a) - Designates a four digit color code.



Flame Rating	Thickness	Color	Max LDR	Category	Recognized Manufacturer	Recognized Material	File Number
HB	1.50 mm	ALL	1:25	Polystyrene (PS)	Any QMFZ2	Any Recognized Polystyrene (PS)	

Proprietary & Confidential Property of A



Uniform Color UCDiffusion Technology

- Light without the intensity or glare of direct light
- Light scattered from all directions
- Light wraps around objects
- Light does not cast harsh shadows



33:1



15:1



10:1



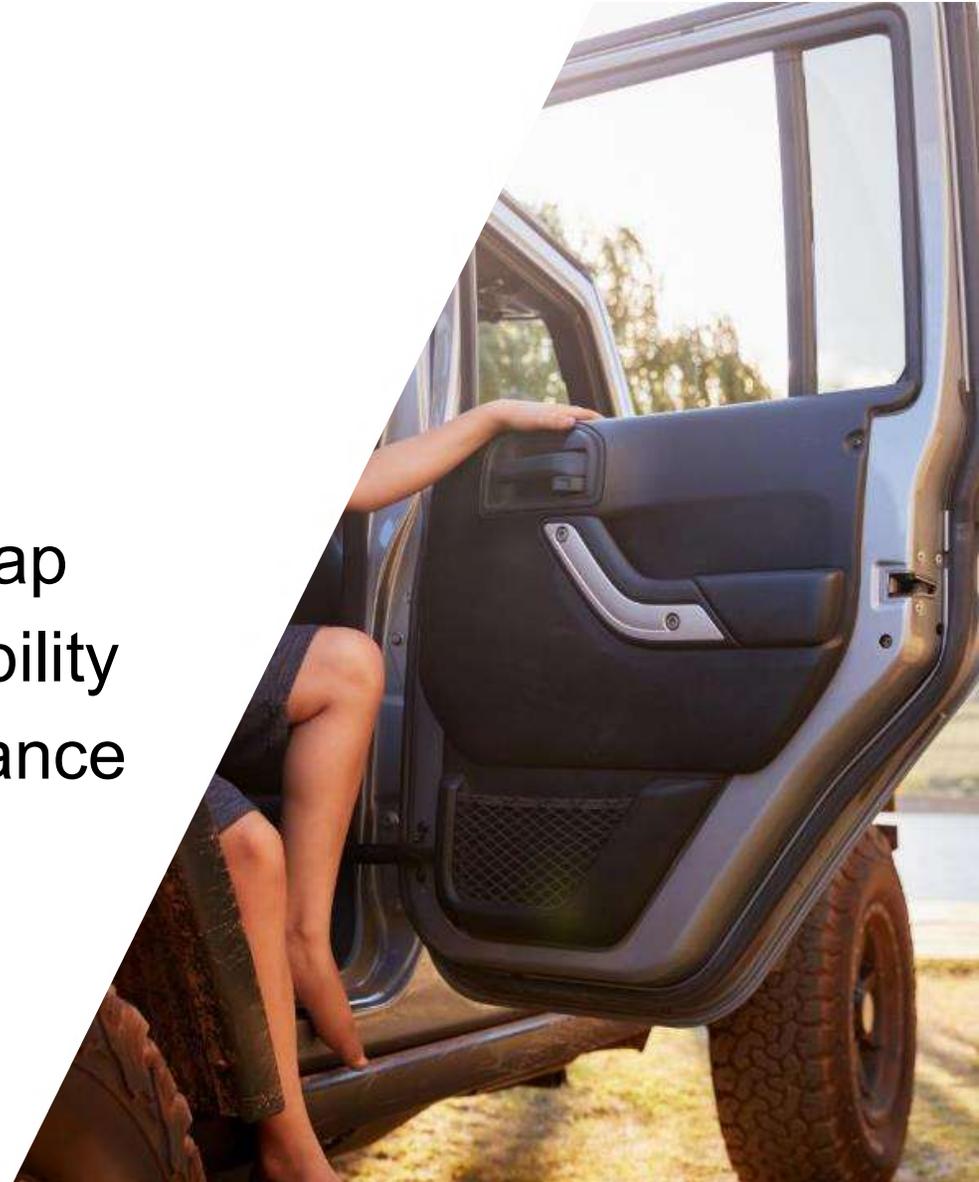
7.5:1



Haze Meter

Scratch & Mar

- Proprietary industry-leading technology
- Reduce WIP damage and scrap
- Improve end application durability
- Tailor to specific part performance



Uniform Color

Chemical Foaming Agents (CFA)

Light Weighting

- Reduce part weight
- Reduce cycle time
- Sink elimination
- Dimensional stability
- Core-back technology



Ucclean[®]

- Powerful purge
- Fast color changes
- Time & material cost savings
- Multiple resins & temperatures
- Black speck elimination
- Sustainable waste reduction
- FDA approved options





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UCClean® G1 Case Study



Application & Process

HDPE Trash Can Lid

Process

Injection Molding

Color Change

Green to Tan

Benefit

Only 4 shots of UCClean® G1 followed by resin was required, compared to 10 shot of the previous purge



Superior Cleaning
Performance

UCClean® G1 vs. Competitor

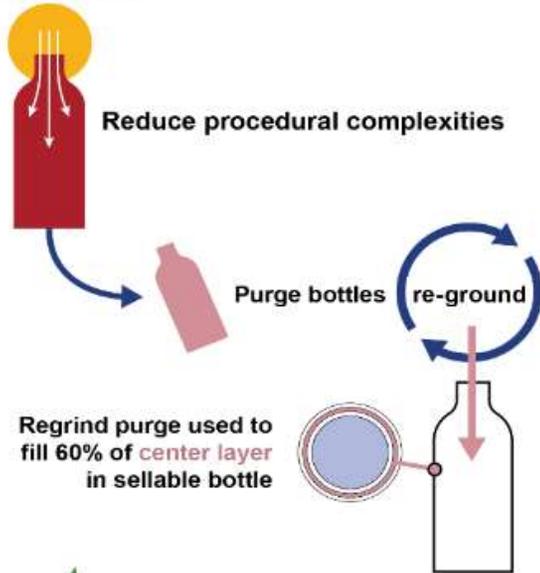
Shots to Clear		
Cycle Time	 90sec	 90sec
Purge Material Used	 32 lb	 80 lb
Purge Material Cost	 \$80	 \$200
Machine Time/ Changeover	 6min	 15min
Machine Run Rate	 \$125/hr	 \$125/hr
Total Cost Per Change Color	\$93	\$231



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UCClean[®] G0 Case Study

UCClean Blown in at production throughput



Zero Waste Change Over

Application

3 Layer Bottle

Process

Extrusion Blow Mold

Color Change

Red to White

Benefit

UCClean[®] G0 produced zero waste material for this application by being re-ground and re-used in the feed stream



Reduce Waste Stream & Energy Usage

UCClean[®] G1 vs. Competitor

Machine Time/Changeover



1.5 hrs



3 hrs

Purge Material Used



590 lbs



3,810 lbs

Purge Material Cost



\$701



\$1,525

Machine Run Rate



\$125/hr



\$125/hr

Total Cost Per Change Color

\$889

\$1,900



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UCClean[®] CL Case Study

Application

PET Preforms

Color Change

Red to Transparent

Process

Injection Molding
16 Cavity Hot Runner

Benefit

UCClean[®] CL produced a **haze free** preform on the 4th injection cycle

UCClean[®] CL vs. Competitor

Purge Material Used



Machine Time/
Changeover



Material Savings:

50 %

Time Savings:

44 %



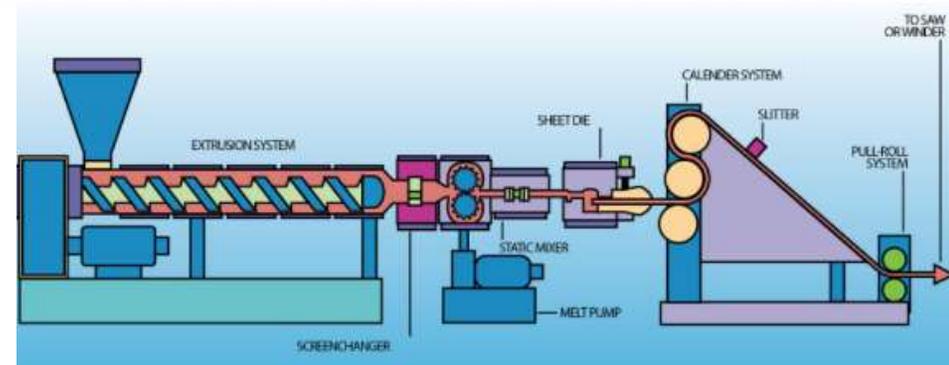


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UCClean[®] HMS Trial Recommendations

UCClean[®] Dosing and Extruder Preparation:

- A. Dosing Guidelines for best overall performance:
- If thin sheet or stable sheet is not required = 100% UCClean[®]
 - If heavy sheet and stable sheet is required = start w. 60% UCClean[®] + 40% base resin
- B. Check screen pack mesh size: remove screen pack if ≥ 30 mesh



If process requires the spend purge sheet to pass through Calender System then:

- C. Reduce gap between die head and roller as much as possible to minimize risk of sagging
- D. Reduce speed of Calender System (Roller System). Work with plant technical staff to determine the right speed reduction.
- E. High likelihood that sheet sags in this location. Monitor this area closely.
- If sheet begins to sag then speed up the top roller to try to tighten the sheet. Collaborate with plant technical.
 - If sheet begins to tear then reduce the speed of the top roller.
- F. Determine if outer edges of sheet are trimmed and how much. The outer edges of the sheet will be the last to come clean so the cleaning time can be reduced if it is not necessary to clean the entire surface area.



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Thank You

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