



**UNIFORM COLOR**

An **AUDIA**® Company

# General overview





 **WASHINGTON PENN**

 **AUDIA ELASTOMERS**

 **UNIFORM COLOR**

 **SOUTHERN POLYMER**

**COMPOUNDING**

**COLOR**

**DISTRIBUTION**

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# 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:

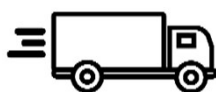
## A Sustainability Driven Product

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

### Resin Producer



### Uniform Color



### Plastic Processor



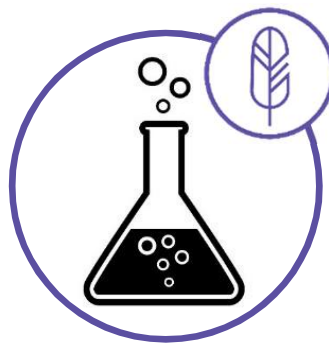
**UNIFORM COLOR**

# 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

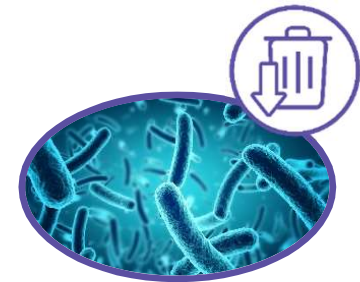
- Purging solutions from the color change experts
- Recyclable – landfill avoidance
- Highly effective chemical & mechanical scrubbing
- Food contact safe options



## 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



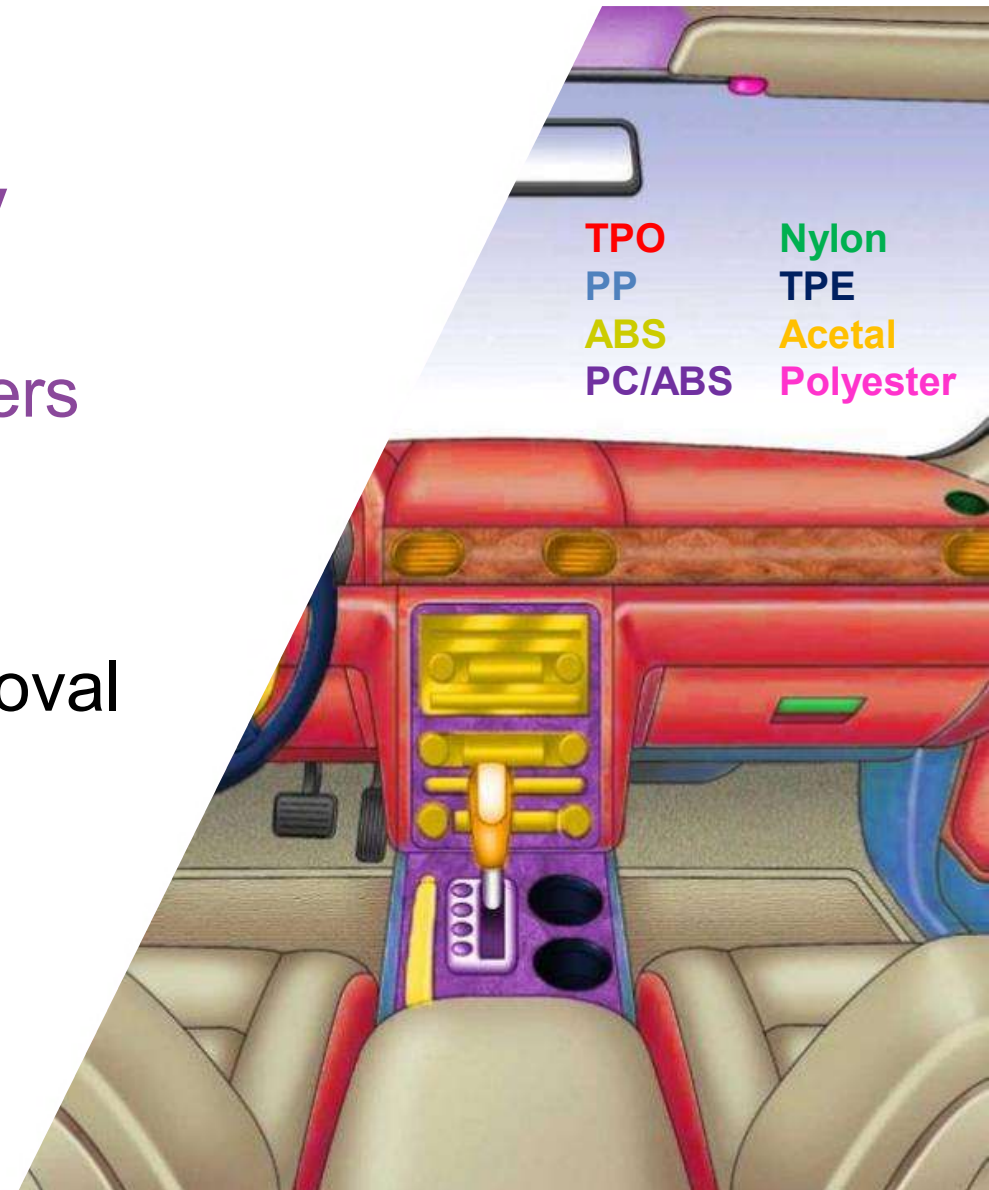
## FABRIC APPEARANCE

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
- Submit support for OEM approval
- 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





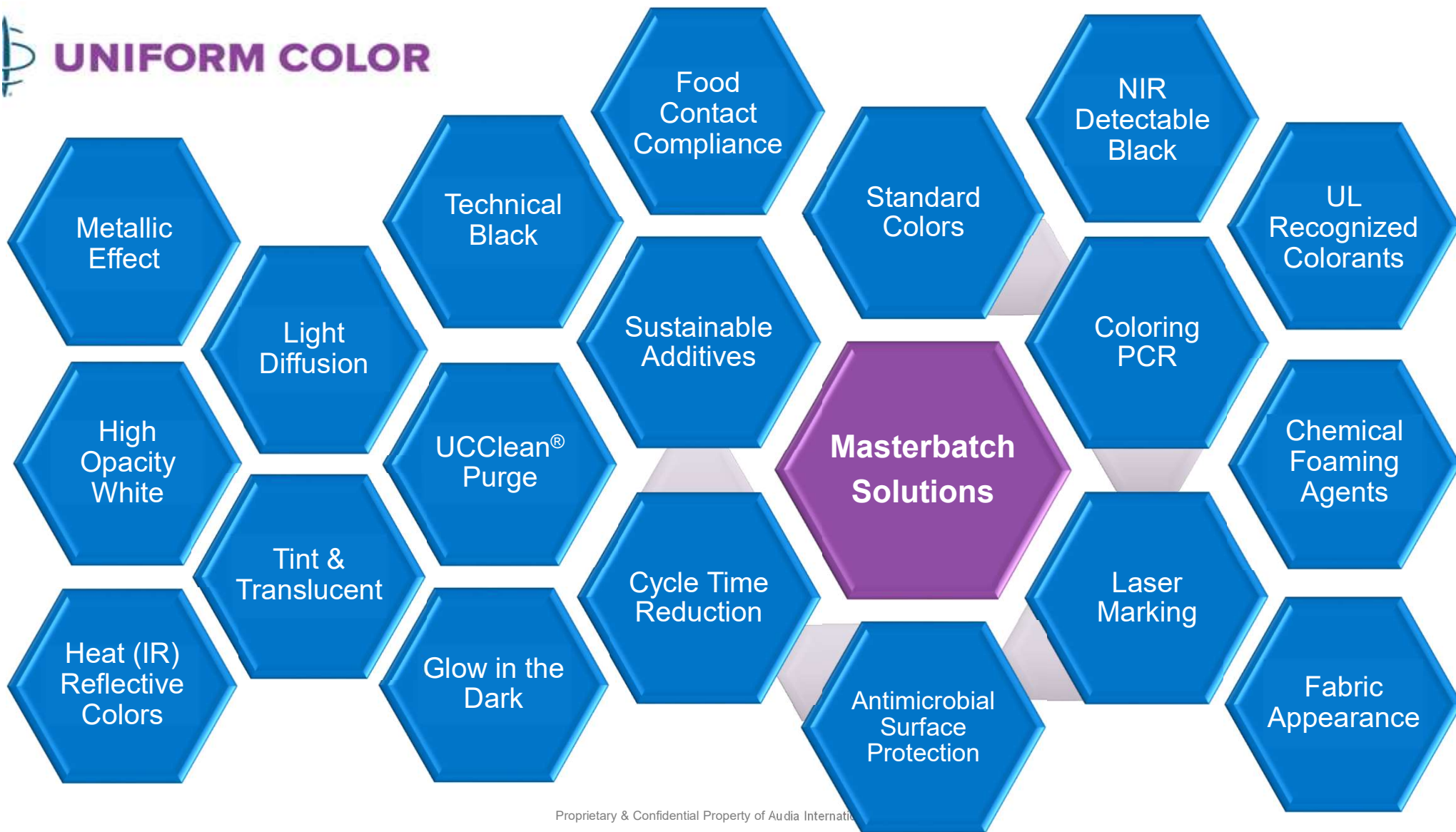
# Technical Service

- 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





## UNIFORM COLOR



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# UNIFORM COLOR

## High Opacity White Case Study

### Problem

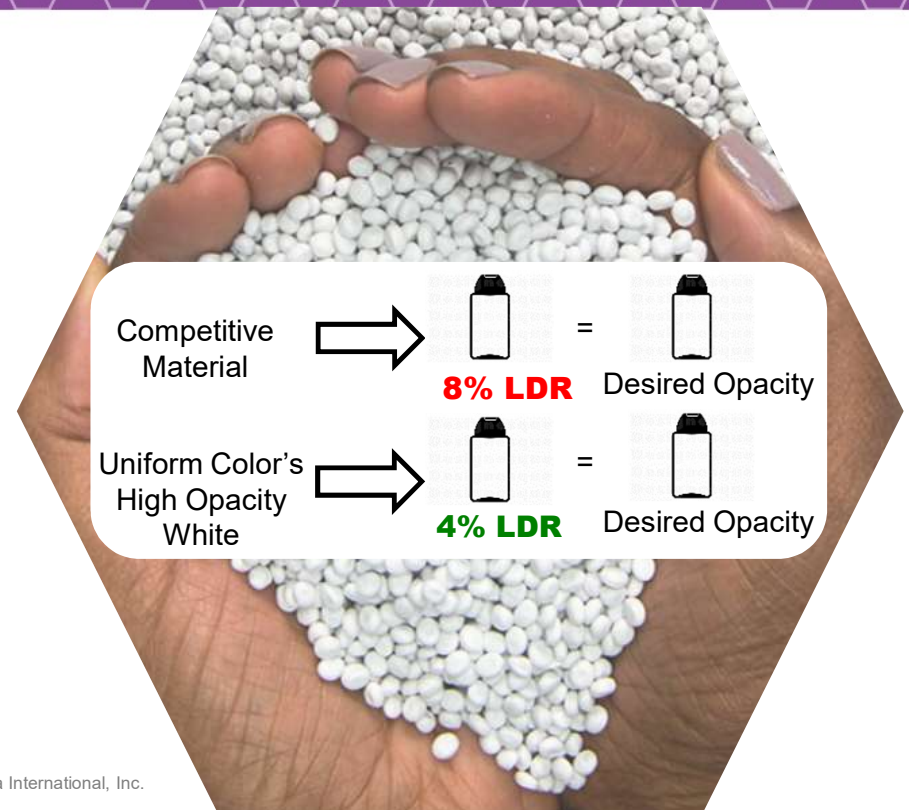
Traditional white TiO<sub>2</sub> masterbatch have a limited hiding power in thin wall applications that require a high level of opacity causing higher than desired let down ratios

### 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

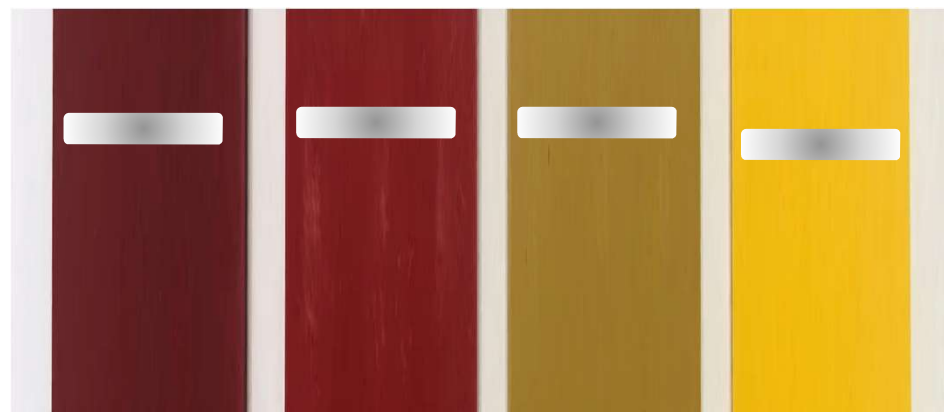
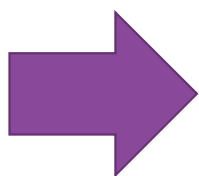
3 layer opaque white bottle used for consumer shampoo bottle.



# Uniform Color Coloring Recycled Plastic

✓ *Chromatic Color*  
✓ *100% PCR*

✓ *FDA Food Contact*  
✓ *Special Effects*

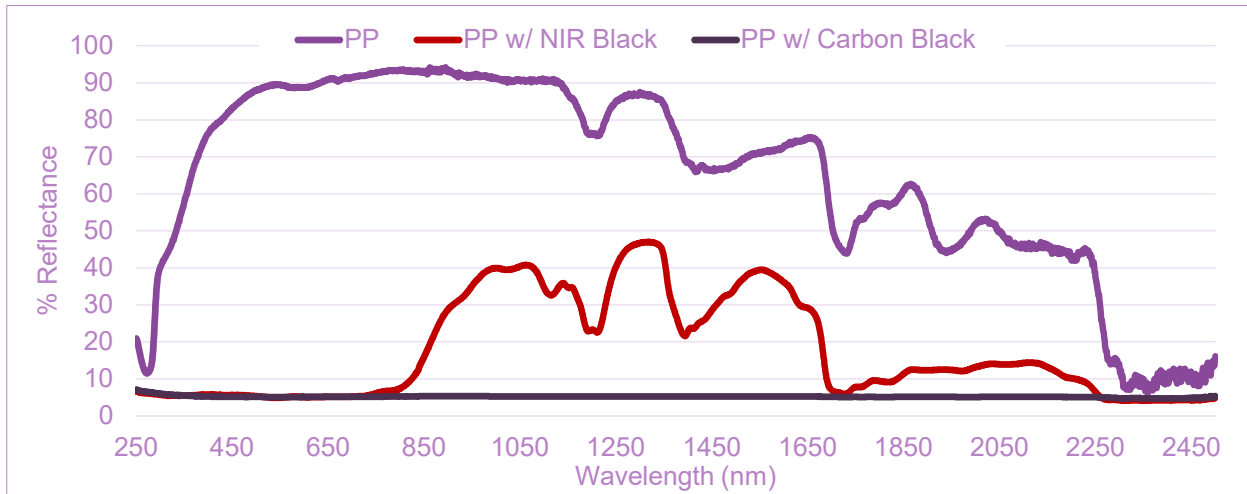




# Uniform Color

## 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

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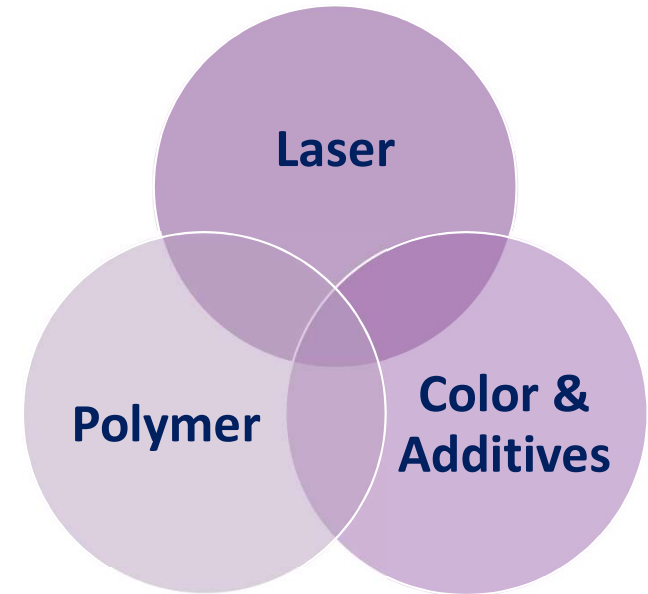
# Uniform Color Laser Marking Technology

## 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

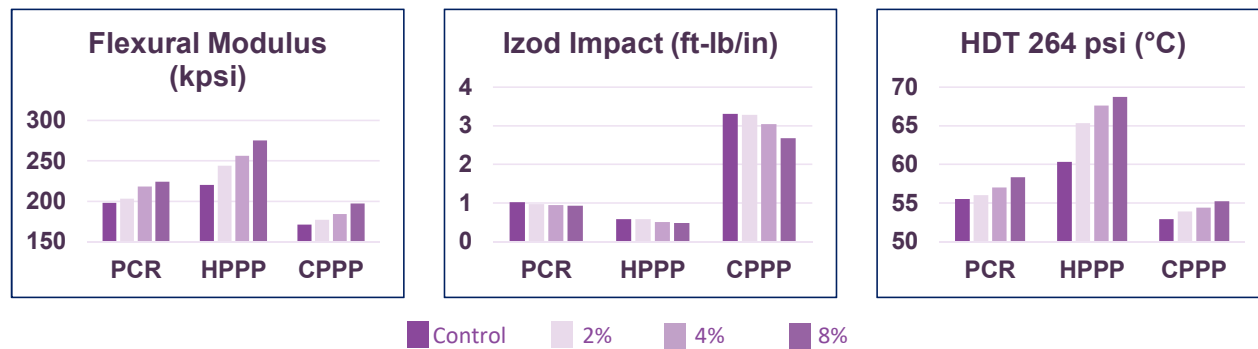
- Laser Marking Technologies
- 20W Ytterbium Fiber
- 1064nm wavelength
- 3-axis travel



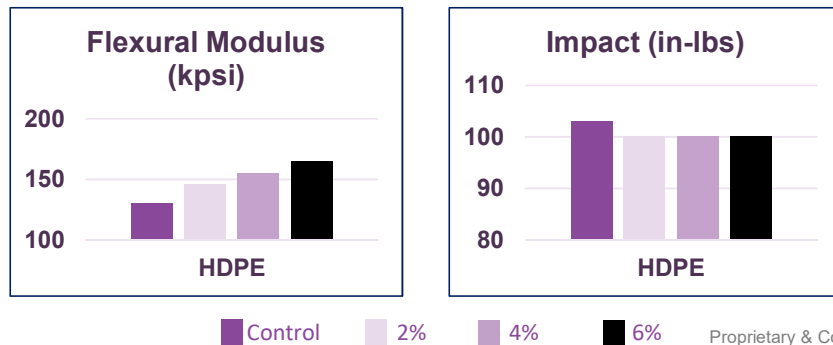
# Uniform Color UCCycleTime Technology



## 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

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# 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

# UCAntimicrobial

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



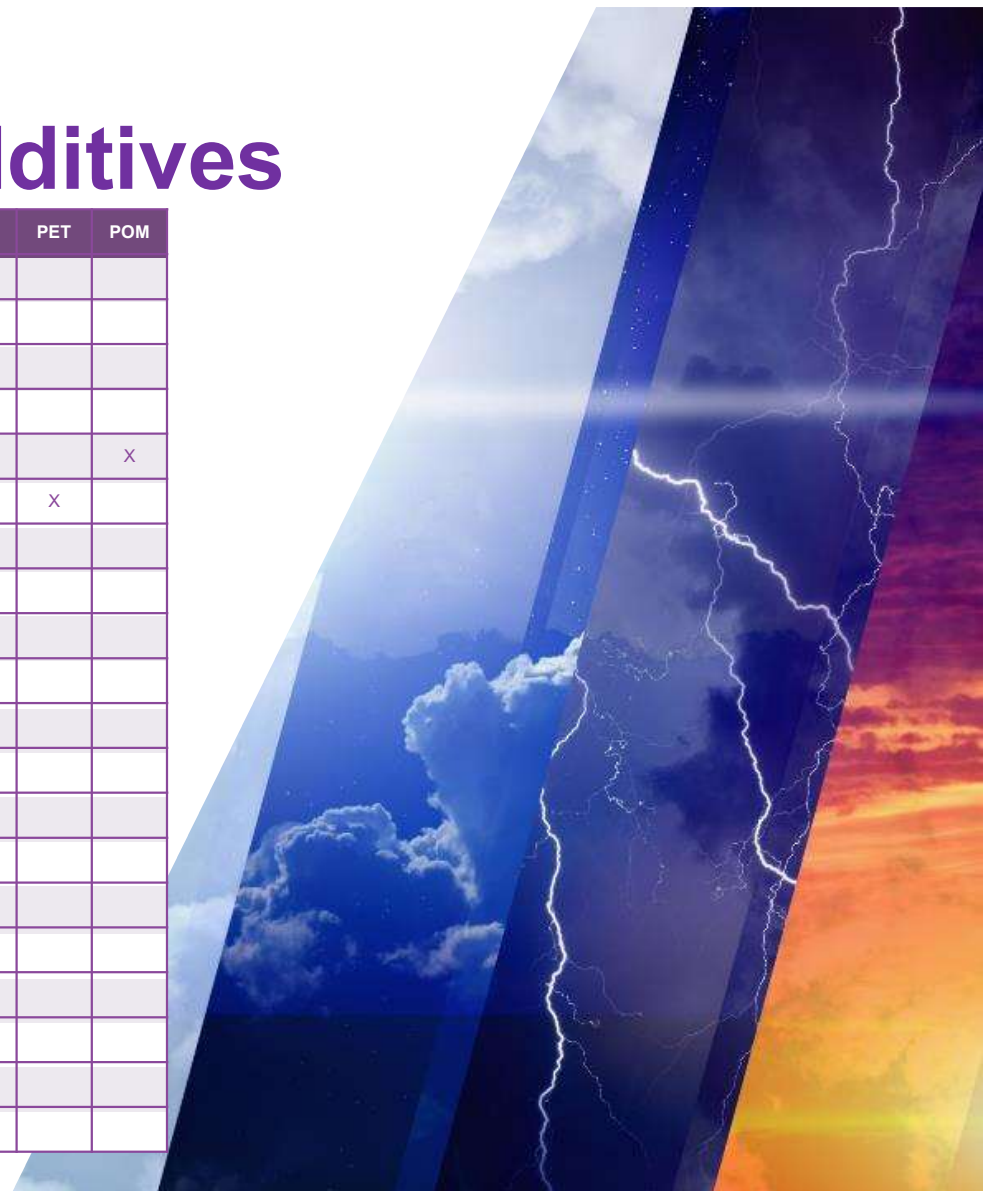


Uniform Color

# 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)

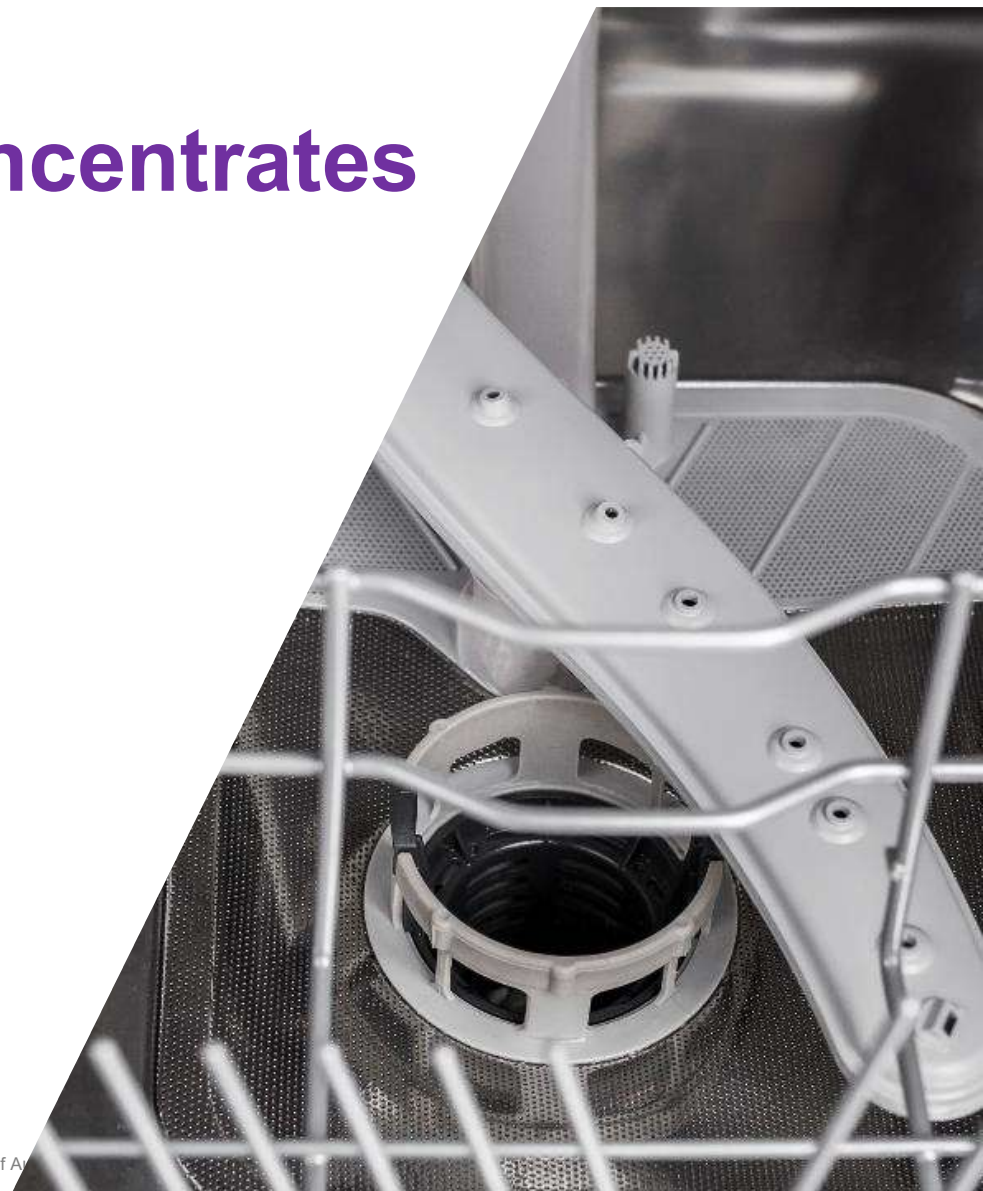
**Component - Color Concentrates**  
File Number: E193229

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**

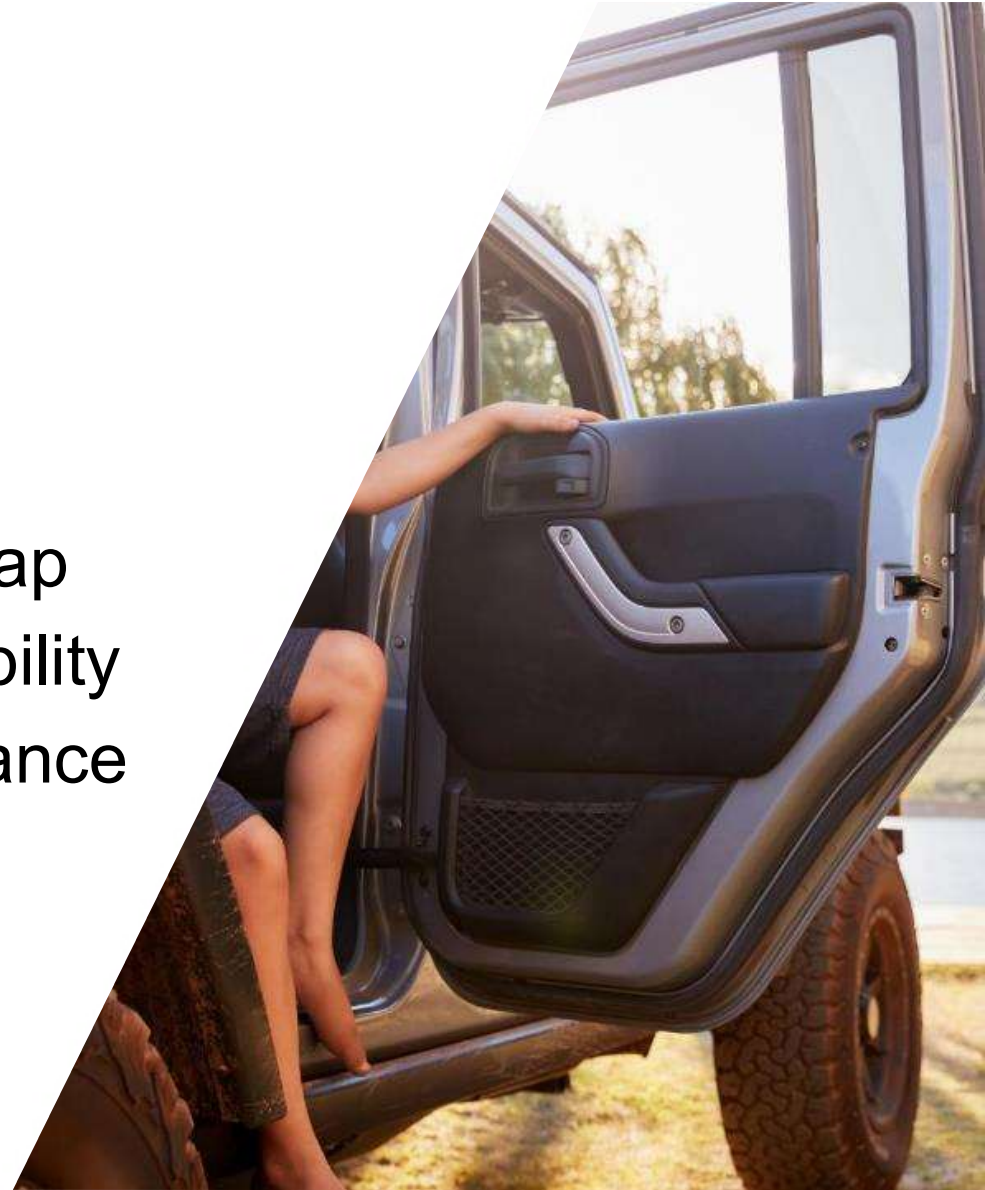


**Haze Meter**

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# 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







- 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	<b>\$93</b>	<b>\$231</b>

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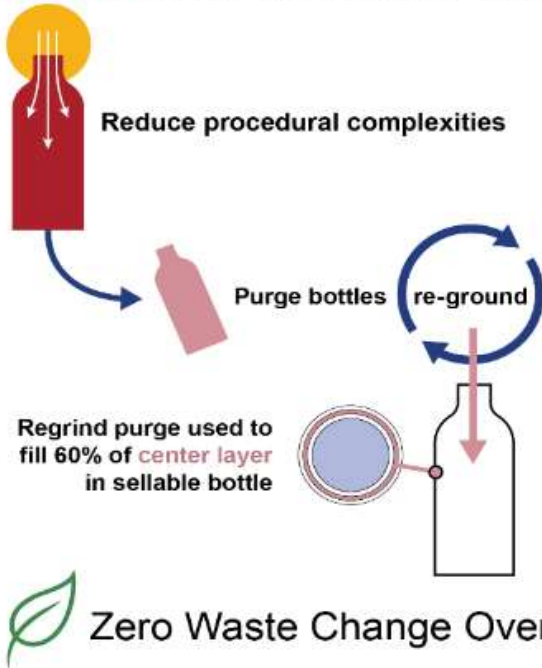


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# UCClean® G0

## Case Study

**UCClean** Blown in at production throughput



**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



### UCClean® G1 vs. Competitor

Machine Time/  
Changeover



Purge Material  
Used



Purge Material  
Cost



Machine Run  
Rate



Total Cost Per  
Change Color

**\$889**

**\$1,900**





## UNIFORM COLOR

# 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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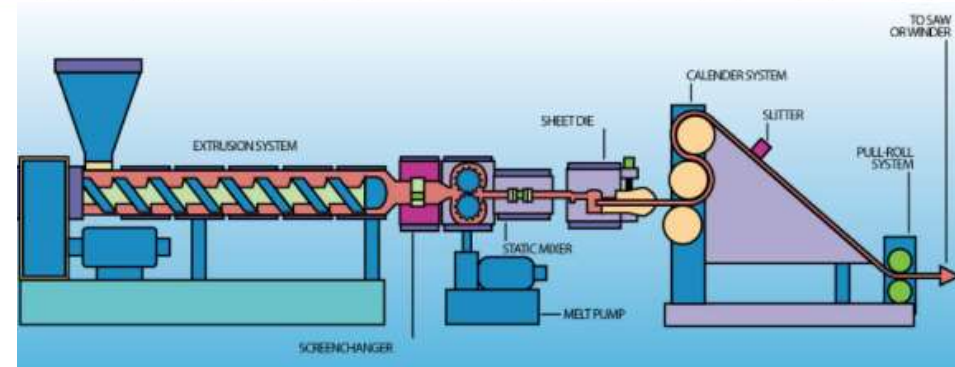


# UNIFORM COLOR

## 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  $\geq 30$  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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