

“Latest Advancements in UV Finishing Technology: LED & Beyond”



**Are You Ready to Go UV? ---
A Guide to Implementing
UV Technology**

Presented by: **Larry Van Iseghem**, President/CEO, Van Technologies, Inc.

Let's Get Right Down To It:

Questions for You:

Why are you here?

How many of you HAVE
adopted UV Technology?

How many of you have NOT
adopted UV Technology?

How many of you simply want to learn more about
UV Technology?

Importantly, what would you like to know about the
potential of implementing UV technology?

What does it cost to implement? And ...

Does it require special equipment to process?

Can we pay it off in a reasonable time?

Will it help our finishing operation?

How difficult is this going to be? gy

Will it work on our parts?

Will we be more competitive?

Will our customers appreciate it?

How does it work?

Is it hazardous and/or is it safe?

Is it hard for our finishers to learn?

? Did you know ?

UV Curable Finishes:



Reduce Labor!


Enable efficient use of floor space!

Increase productivity!

Are considered "Green"!

Are easy to apply!

Offer unparalleled finish quality!



Are highly cost effective!



Can increase profitability!

UV

How does it work?

logy

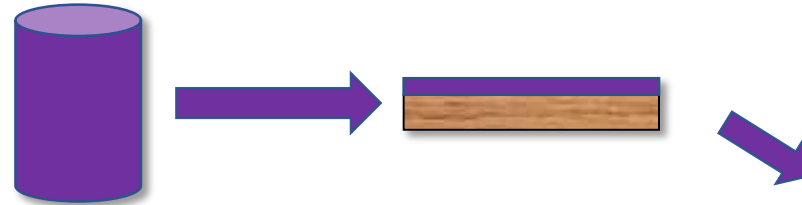
UV Curable Coatings

A Formulated Mixture of:

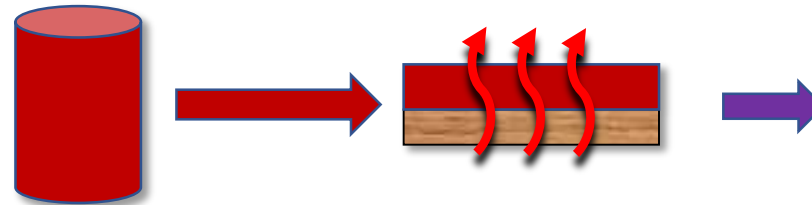
- **Monomers**
- **Oligomers**
- **Polymers**
- **Photoinitiators**
- **Additives (flow, gloss, adhesion, color, etc.)**

3 Primary Forms of UV Curable Coatings

100% UV Curable

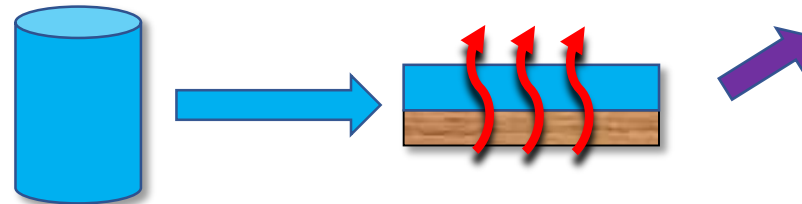


Solvent Reduced UV Curable



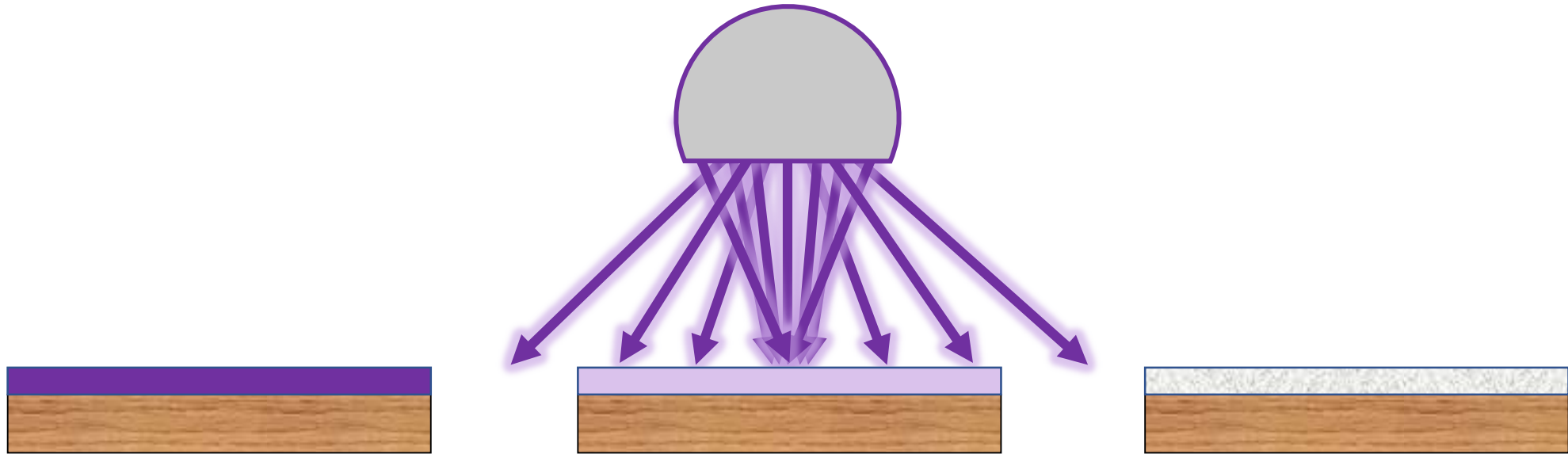
Drying Process

Waterborne-UV Curable



Ultimately Each Form
Yields an Equivalent
UV Curable Coated
Surface

Exposure to UV Light Energy Cures the Coating



Fully Cured Finish!

What does it cost to implement? And ...

UV

Technology

Can we pay it off in a reasonable time?

Some Estimates on Finishing Equipment and Lines

Handheld UV Lamps:

Est. \$2K - \$5K



Lineal Molding Line:

Est. \$60K - \$180K

(plus conveyors)



12" Sanding/Denibbing



15" Spray Booth



15" UV Cure Oven

5' Wide Roll Coat Flatline:

Est. \$650K - \$1.5M





Estimate Your Finishing Cost

Performance Finishes by Van Technologies

Finishing Cost Calculator

6/5/17

Enter information and Data in Blue Highlighted Cells

Enter Job Description: **100% UV Process Lineal Molding: Stain, Seal & Topcoat**

Process Data

Select Job Description:	Enter Linear ft
Select Length Unit of Measure:	ft
Select Width Unit of Measure:	in
# Individual Coats Applied:	3
Enter Zero ...	0

Account For Any Edges & Ends in Length and Width Data

Enter Linear ft	Enter Width (in)
80000.00	4.00

Select Process:	Enter Auto
Enter Line Speed (fpm):	75.00
Enter # Lengths or Units Positioned Across Line:	1
Operating Time/Day (hr.):	7.00
Setup Time Required (hr.):	0.50
Cleanup/Maintenance Time Required (hr.):	0.50
# Coating Application Stations/Pass:	3

Labor Rate (\$/hr.):	Enter \$20.00
# Laborers:	3
Overhead Rate (\$/hr.):	\$30.00

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Coating Data

	Coat 1	Coat 2	Coat 3	Coat 4	Coat 5
Coating Type:	Stain	Sealer	Clear Topcoat	---	---
Wet Thick. (mil):	2	1.25	1	0	0
# Sides Coated:	1	1	1	0	0
Transfer Effcy. %:	65	95	95	0	0
\$/gallon:	\$25.00	\$55.00	\$55.00	\$0.00	\$0.00

	Coat 6	Coat 7	Coat 8	Coat 9	Coat 10
Coating Type:	---	---	---	---	---
Wet Thick. (mil):	0	0	0	0	0
# Sides Coated:	0	0	0	0	0
Transfer Effcy. %:	0	0	0	0	0
\$/gallon:	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Lineal Molding: Stain, Seal & Topcoat

Coating Cost Summary:	# Coats:	3
	Total Gallons:	90.52
	Total Applied Coating Cost:	\$3,444.13
	Total Applied Coating Cost/sqft:	\$0.1292
	Total Applied Coating Cost/Linear ft:	\$0.0431

Process Cost Detail:	# passes	1
	Hrs. Req. to Apply Coating(s):	17.78
	Setup + Cleanup/Maintenance Hrs.:	1.00
	Total Job Time Req.:	18.78
	Days Req.:	2.68

	Total Labor & Overhead Cost:	\$1,690.00
	Total Labor & Overhead Cost/sqft:	\$0.0634
	Total Labor & Overhead Cost/Linear ft:	\$0.0211

Total Cost Summary (Coating + Process Cost):	
Total Finishing Cost:	\$5,134.13
Total Finishing Cost/sqft:	\$0.1925
Total Finishing Cost/Linear ft:	\$0.0642

Total Finishing Cost

Estimated: \$0.064/lin. ft.

Add value of material lumber, milling/molding process, labor and overhead to yield total product cost.

Now, calculate product price at desired, competitive, or allowable profit margin. Time for equipment investment can be determined.

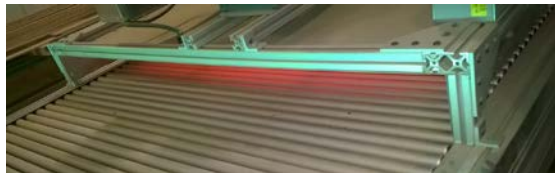
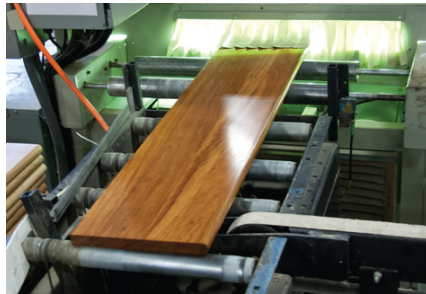
Does it require special equipment to process?

UV

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Will it work on our parts?

Some Specialized Equipment Options



100% UV Curable Coating Application Process

	Automatic Spray*	Roll Coat	Curtain Coat	Flow Coat	Vacuum Coat
Reclaim Spray Booth	+	-	-	-	-
Sanding/Denibbing Station	+	+	+	+	+
UV Cure Oven	+	+	+	+	+

** Manual spray of 100% UV curable coatings is not recommended without full PPE.*

Solvent or Waterborne-UV Curable Coating Application Process

	Manual Spray	Automatic Spray	Roll Coat	Curtain Coat	Flow Coat	Vacuum Coat
Reclaim Spray Booth	-	+	-	-	-	-
Sanding/Denibbing Station	+	+	+	+	+	+
Drying Oven or Process	+	+	+	+	+	+
UV Cure Oven	+	+	+	+	+	+

All Types of Wood Components can be UV Finished



Will it help our finishing operation?

UV

Technology

Will we be more competitive?

Potential Finishing Operational Advantages

Smaller Footprint

Highly Cost Effective!

Highly Efficient

Reduced Labor

Lower Cost

Considered “Green”

Rapid Curing for Increased Productivity

Superior Finish Quality and Durability

Easy to Apply!

Conserves Energy

Let's Compare a Conventional Finish to a UV Curable Finish:

Same Finish Build – must apply 4X film thickness

Same Stain Cost/Gal.

Transfer Efficiency at 65% (vs. 95% for UV)

Sealer Cost of \$14/Gal.

Topcoat Cost of \$20/Gal.

**Same Labor & Overhead Cost –
Not Likely**

**Same Production Rate –
Not Likely**



Performance Finishes by Van Technologies

Conventional Finish Cost Estimate

Finishing Cost Calculator

6/5/17

Enter information and Data in Blue Highlighted Cells

Enter Job Description: **Conv. Process Lineal Molding: Stain, Seal & Topcoat**

Process Data

Select Job Description:	Enter Linear ft
Select Length Unit of Measure:	ft
Select Width Unit of Measure:	in
# Individual Coats Applied:	3
Enter Zero ...	0

Account For Any Edges & Ends in Length and Width Data

Enter Linear ft	Enter Width (in)
80000.00	4.00

Select Process:	Enter Auto
Enter Line Speed (fpm):	75.00
Enter # Lengths or Units Positioned Across Line:	1
Operating Time/Day (hr.):	7.00
Setup Time Required (hr.):	0.50
Cleanup/Maintenance Time Required (hr.):	0.50
# Coating Application Stations/Pass:	3

Labor Rate (\$/hr.):	Enter \$20.00
# Laborers:	3
Overhead Rate (\$/hr.):	\$30.00

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Coating Data

	Coat 1	Coat 2	Coat 3	Coat 4	Coat 5
Coating Type:	Stain	Sealer	Clear Topcoat	---	---
Wet Thick. (mil):	2	4.00	4.00	0	0
# Sides Coated:	1	1	1	0	0
Transfer Effic. %:	65	65	65	0	0
\$/gallon:	\$25.00	\$14.00	\$20.00	\$0.00	\$0.00

	Coat 6	Coat 7	Coat 8	Coat 9	Coat 10
Coating Type:	---	---	---	---	---
Wet Thick. (mil):	0	0	0	0	0
# Sides Coated:	0	0	0	0	0
Transfer Effic. %:	0	0	0	0	0
\$/gallon:	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Final Cost Comparison

Lineal Molding: Stain, Seal & Topcoat

Coating Cost Summary:	# Coats:	3
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Total Cost Summary (Coating + Process Cost):	
Total Finishing Cost:	\$5,134.13
Total Finishing Cost/sqft:	\$0.1925
Total Finishing Cost/Linear ft:	\$0.0642

Conv. Process Lineal Molding: Stain, Seal & Topcoat

Coating Cost Summary:	# Coats:	3
	Total Gallons:	255.74
	Total Applied Coating Cost:	\$4,756.84
	Total Applied Coating Cost/sqft:	\$0.1784



Total Cost Summary (Coating + Process Cost):	
Total Finishing Cost:	\$6,446.84
Total Finishing Cost/sqft:	\$0.2418
Total Finishing Cost/Linear ft:	\$0.0806

Final Cost Comparison

UV

\$0.0642/Linear ft

Conventional

\$0.0806/Linear ft

Final Cost Comparison

The UV Finish Process is 20% Less than the Conventional Finish Process!

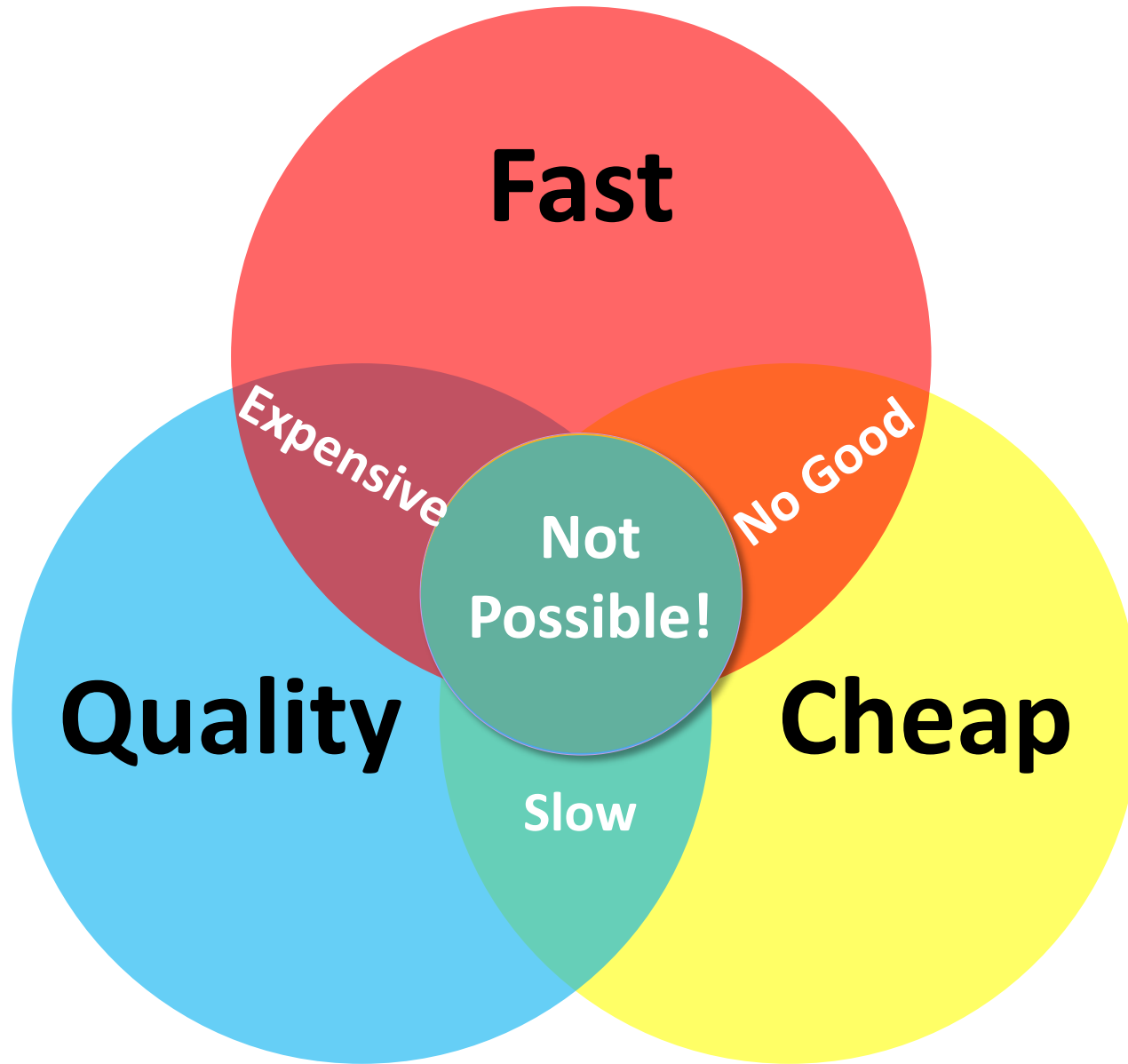
20%
Savings!



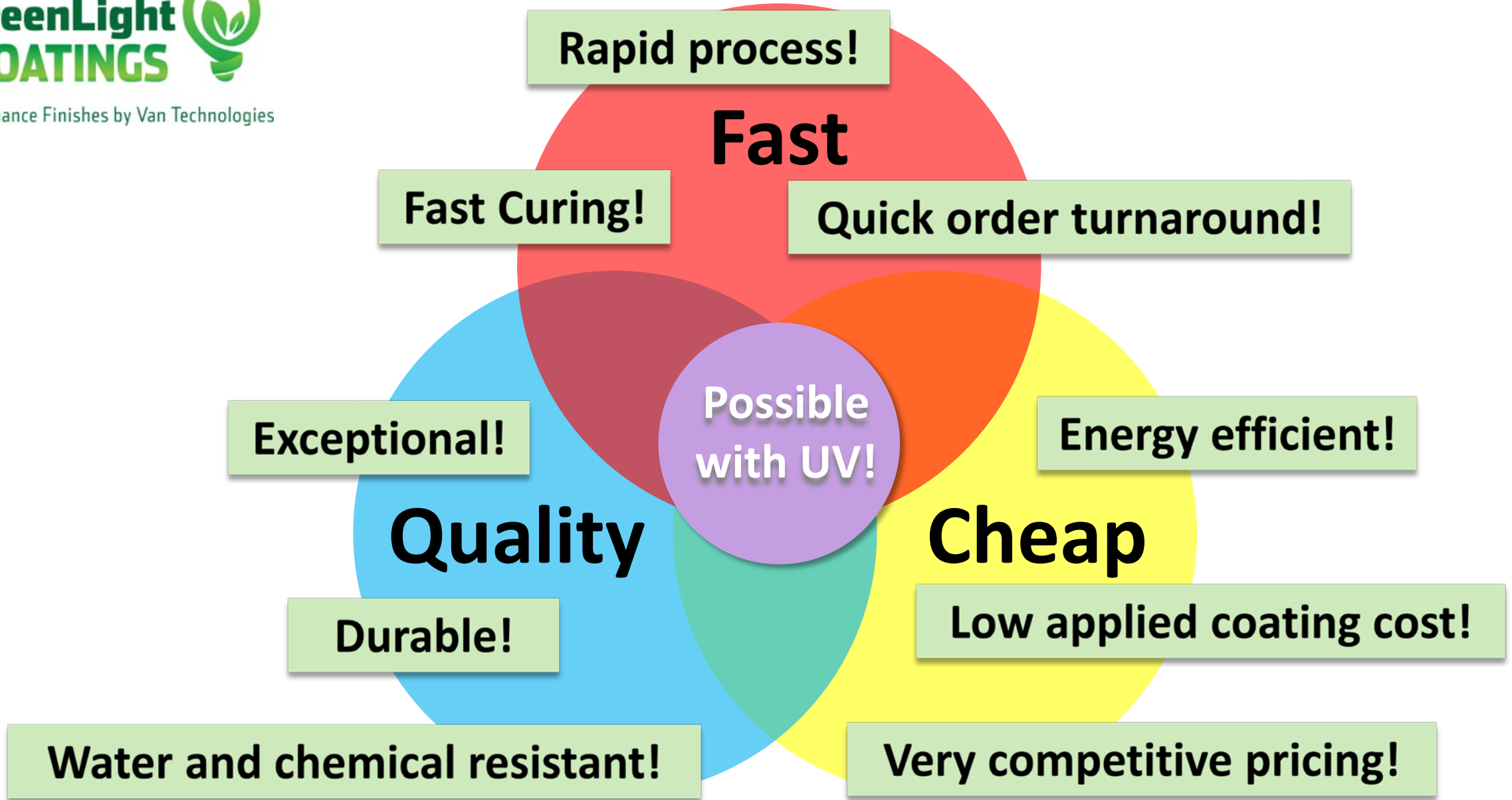


Will our customers appreciate it?
technology

The
Pick
Any 2
Slide



The
Pick
Any 2
Slide



Is it hard for our finishers to learn?

UV

Technology

Is it hazardous and/or is it safe?

Process Variables

- **Wood Surface Temperature**
- **Prep Sanding of Wood Surface**
- **Wet Applied Film Thickness**
- **Line Speed/Cure Speed**
- **UV Lamp Configuration/Type/Power**
- **Intercoat Sanding**
- **Etc.**

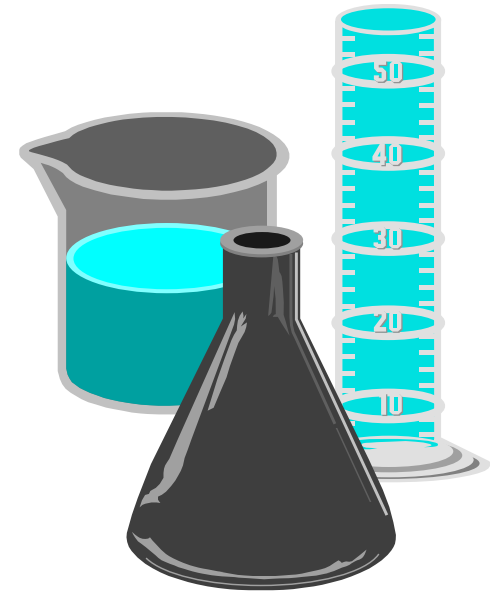
Quality Monitoring

- **Temperature – Wood & Coating**
- **Coating Viscosity**
- **Wet Applied Film Thickness/Weight**
- **Speed**
- **Radiometer - UV Energy Density/Dose & Power**
- **Adhesion**
- **Gloss**
- **Color**
- **Etc.**

UV Safety

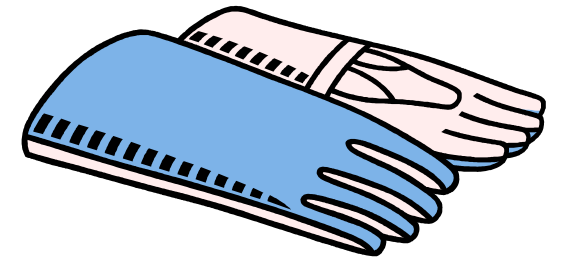
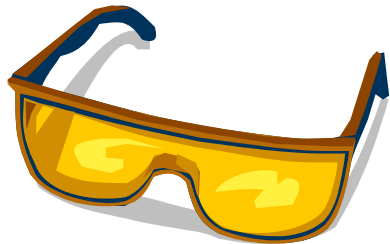
Chemical Hazards

- May cause skin & eye irritation
- May cause respiratory tract irritation
- May cause skin sensitization
- Minimal ingestion hazard
- Typically low in volatile content



Personal Protection

- Wear safety glasses/goggles with UV protection as necessary
- Wear appropriate gloves (butyl/nitrile)
- Avoid contamination of clothing
- Wear impervious safety shoes
- Use respiratory equipment for mists/spray



UV Materials

Storage and Handling

- Maintain head space for oxygen requirements of the inhibitor
- Avoid contamination with peroxides, strong oxidizers, strong acids & amines, and metals such as copper & iron
- Store in closed containers at the temperature the product will be used
- Protect from sunlight & room light
- Do not use steam or electrical drum/pail heaters
- Avoid freezing



**There are a few things
to keep in mind:**

**Implementing UV Curing is NOT a
PLUG & PLAY proposition!**

It is an integration of:

- People
- Process
- Chemistry

P²C

**Work with the right coating and
equipment manufacturers!**

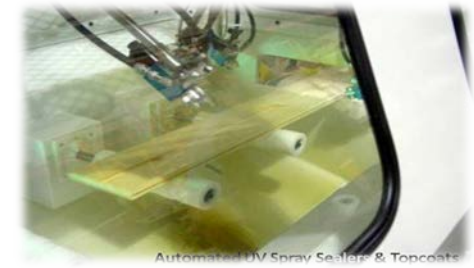
**For Predictable,
High Quality
Results!**



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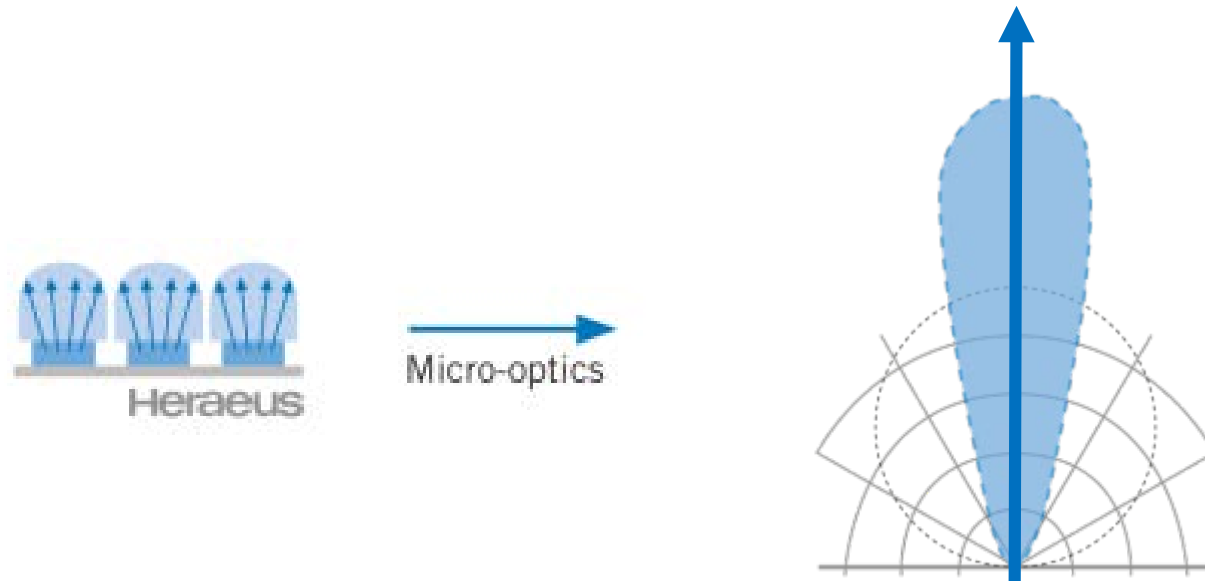
New Trends in UV Curing

UV LED's



- **Excellent Optical Performance of High Productivity**
- **High Output**
- **Easy to Install and Modular for Flexibility in Curing Applications**
- **Multiple Wavelengths Available**

Advancement of UV LED's



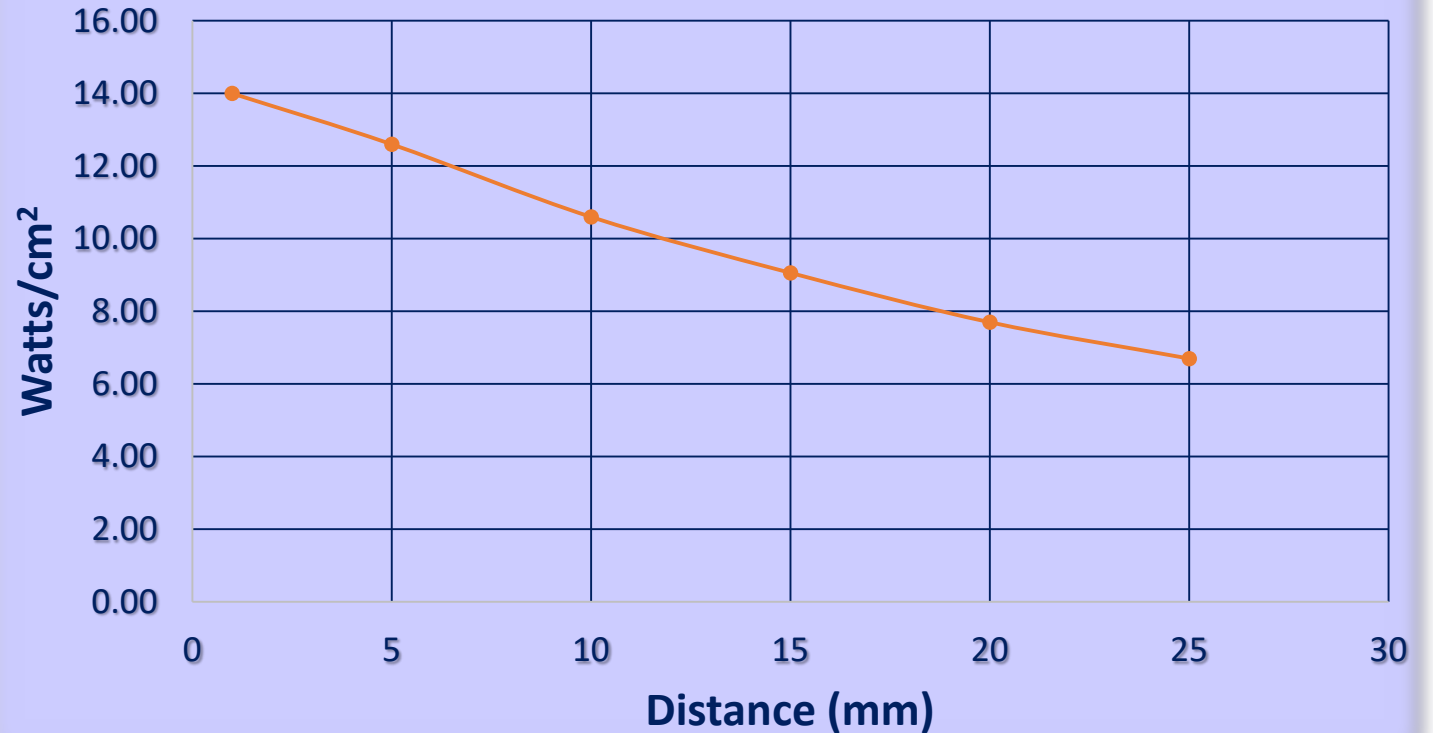
UV LED Lamps are Improving with Significant Advances in Optical Focus and Power but ...

Courtesy of: Heraeus



At 4", the
extrapolated
irradiance is
0.62 W/cm²
(620 mW/cm²!)

Irradiance vs. Distance from Part Surface: (OmniCure AC9 Series)



UV LED 395nm

Distance (mm)	1	5	10	15	20	25	Est. @ 4"
W/cm ²	14.00	12.60	10.60	9.06	7.70	6.70	0.62

UV LED Opportunities

Instant On/Off

Long Lifetime (>20,000 hours)

Low Energy Consumption

Adaptable with Multiple Wavelengths

Compact Size

Low Process Heat

Can Combine with Conventional UV Lamps

Suitable for Clears and Pigmented Systems

Some Challenges with UV LED

Finishing Multiple Profiles and 3D Surfaces

Variable distances need to be accommodated

Suppliers are working to develop/formulate specific coatings having cure response consistent with UV LED's

Sources of quality UV LED compatible coatings

Present Cost is High vs. Conventional UV Lamps

As market acceptance advances, costs will become more affordable