# AUTOMOTIVE UV CURING: PAST, PRESENT, & FUTURE

Kevin Joesel

Heraeus Noblelight Americas LLC

SAE INTERNATIONAL

Heraeus

# Why Should I be interested in UV Technology?

**A better questions may be, why should I consider UV technology…..**

**FAST!**

**PROPERTIES!**

**COLD CURING!**

**GREEN!**

# Drivers for UV Curing

**Increased production speed, fast and cool cure**

**Improved physical properties, product performance**

**Environmental compliance, green technology, reduced energy requirement**

**Cost-effective, lower applied cost, less waste, reduced WIP, less floor space**

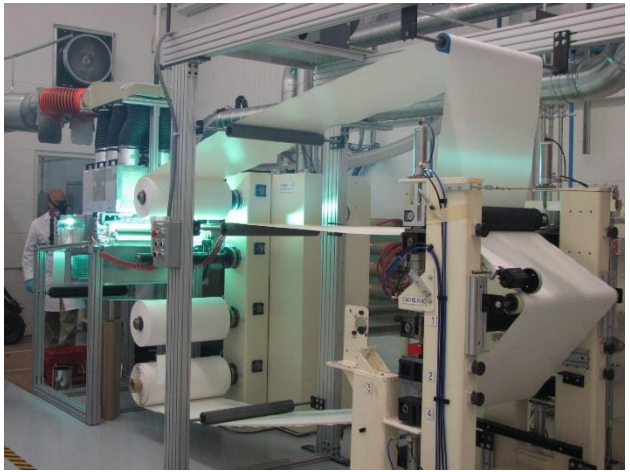
***Thermal vs UV***

***It is all about the difference in reaction rates***

In very general terms, the rate of reaction for the free-radical reaction is $10^6$ times faster than a condensation reaction. One million times faster! If the curing of a coating, ink, or adhesive is the rate limiting step in your process, you have to consider UV curing technology. -

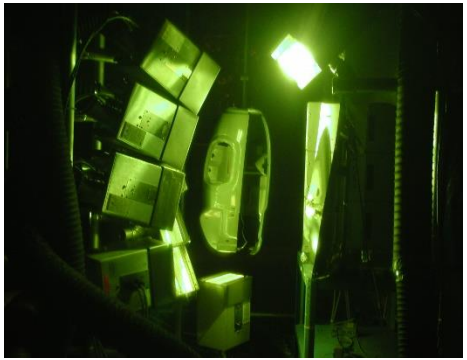
Dr. Robert Matheson, DuPont

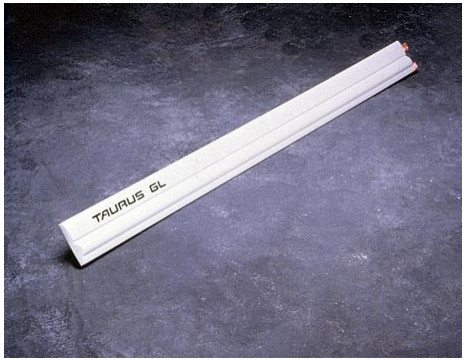
# Printing/Converting



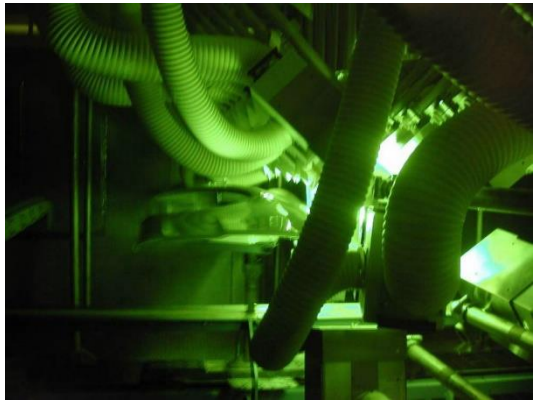

# UV Industrial Coatings

# Automotive Past

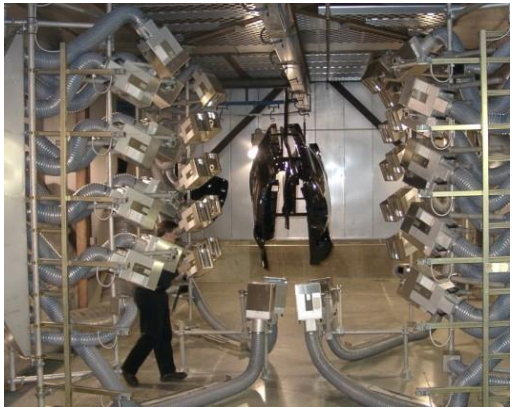


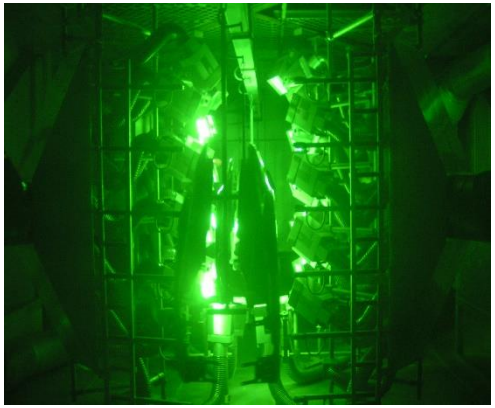


# Automotive Past – SMC Primer Surfacer/Dynaseal®

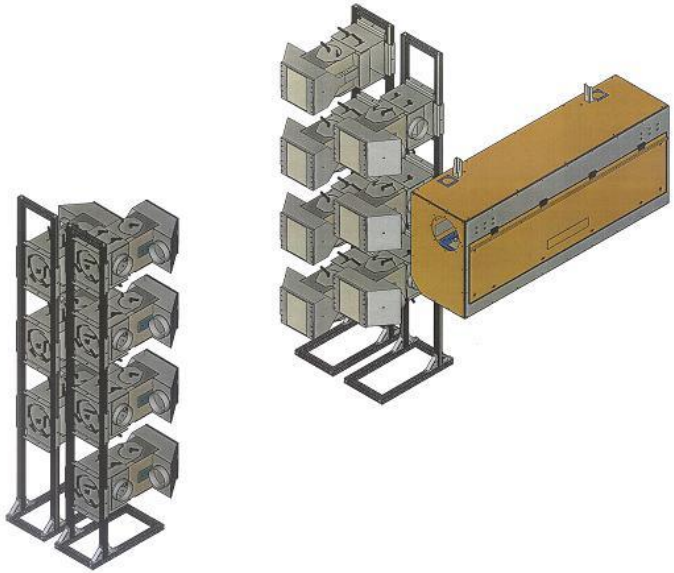


# Automotive Past – SMC Primer Surfacer/Dynaseal®

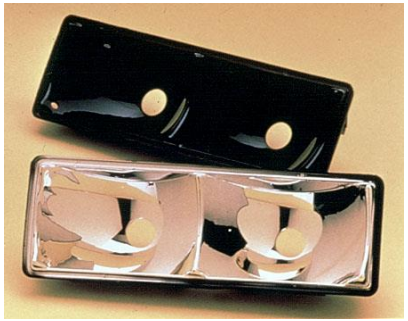




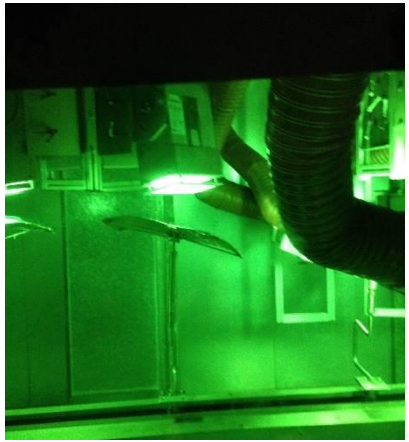
# Automotive Past – UV Clearcoat (Pilot)

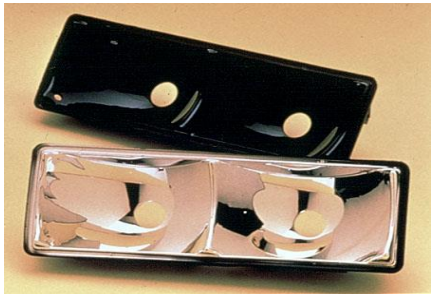



# Automotive - Present

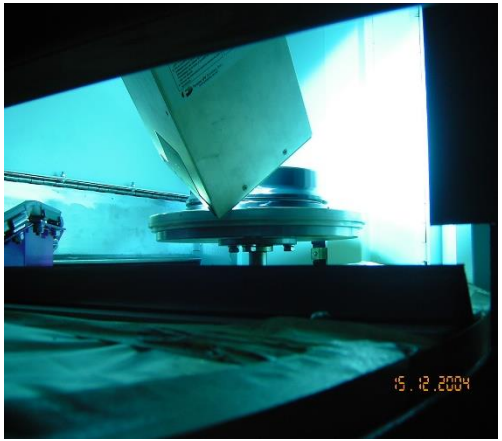


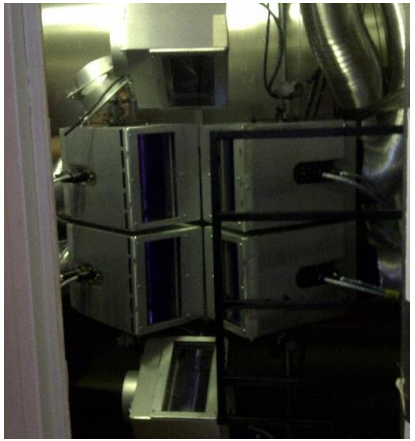
# Present – Automotive Headlamps





# Automotive  Present – Glass, Brakes, Interior Parts (Piano Black)



# Automotive Present:  UV Post-Cure Films

## HIGH PRESSURE FORMING | EXAMPLE

. AUTOMOTIVE



## HIGH PRESSURE FORMING | EXAMPLES

. FUNCTIONAL

# Automotive Present:  UV Post Cure Films

## HIGH PRESSURE FORMING | MACHINERY PAMK

niebling Formtechnologie

. Detach protective film
. Pick-and-Place
. Barcode Scanning
. Heating
. High Pressure Forming
. UV-Curing
. Punching
. Camera Inspection
. Pick-and-Place

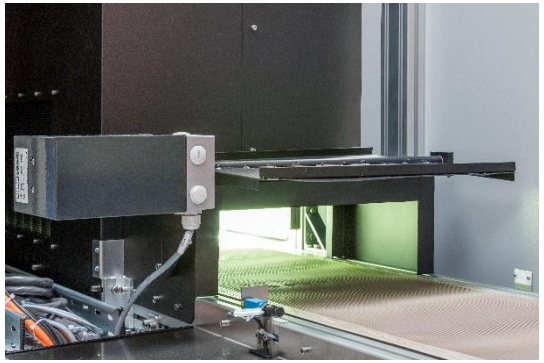
---

. fully automatic production
. cycle time approx. 10-15 sec.

**PAMK 400**
400 x 245 [mm]

“ in-line process ”

# Automotive Present – UV Post Cure Films



# Automotive Present: PVD Processing

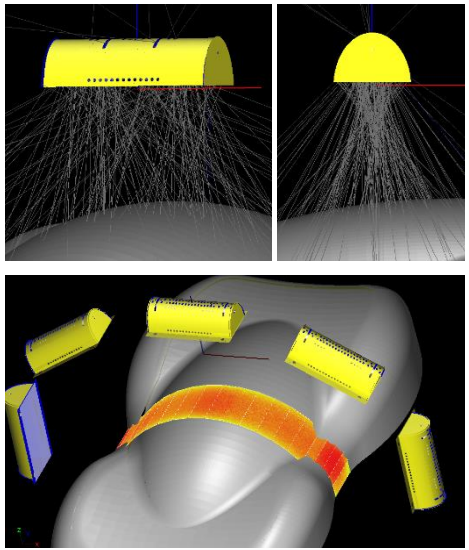
œrlikon
balzers

## ePD
CHROME LOOKING PLASTIC
METALLISATION ON A NEW LEVEL


## INUBIA I6 & I12
THE FULLY INTEGRATED AND AUTOMATED SOLUTION
FOR HIGH-VOLUME PLASTIC METALLISATION

# Automotive Future – Finishing 3D Printed Part

# Automotive Future:  Simulation

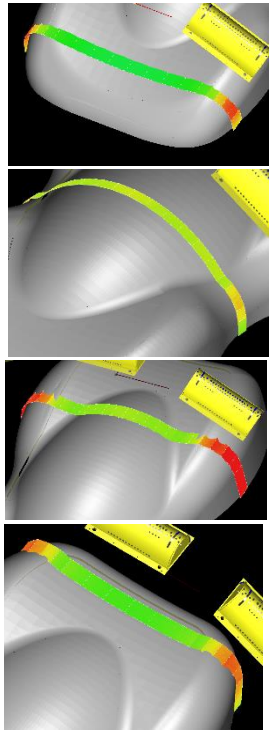


Irradiance ($mW/cm^2$)

| | |
|---|---|
| 2000 - | 2500 |
| 1500 - | 2000 |
| 1400 - | 1500 |
| 800 - | 1400 |
| 400 - | 800 |
| 0 - | 400 |

Total Energy for 15 fpm ($mJ/cm^2$)

| | |
|---|---|
| 6613 - | 8266 |
| 4960 - | 6613 |
| 4629 - | 4960 |
| 2645 - | 4629 |
| 1323 - | 2645 |
| 0 - | 1323 |



18

# Summary

The benefits of UV curing are mostly derived from the speed of reaction.

UV curing has been a proven and economical solution for many industries and applications.

UV curing is a long established process for automotive coatings.

UV applications continue to grow as new coatings are brought to market

UV 3D curing has a multitude of solutions.

UV curing is an “enabling” technology.

# Acknowledgements

Heraeus:
- Dick Stowe, Dawn Skinner – Application Engineering
- Matthias Robisch – Europe Sales
- PK Swain, David Xu –R&D Engineering

Neibling Company
Red Spot Paint
Conforming Matrix
German UV Consortium
Axalta (DuPont)
BASF

SAE
RadTech International
Bayspring Consulting
Ford Motor Company

Kevin Joesel
Heraeus Noblelight America LLC
910 Clopper Road
Gaithersburg, MD  20878

kevin.Joesel@heraeus.com
248-730-2986 (m)
240-