

UV-Coatings Technology Delivers Best Economic Value Statement

By Dan Sweetwood and Michael Kelly

It is critically important to understand the full economic value statement for implementing UV technology in your coating process.

UV=ROI+E™

All projects are typically based on Return On Investment (ROI), but UV technology offers one better, UV=ROI+E™ (Return On Investment and the Environment.) You can also define the ROI+E—economic value of UV as faster, smaller and cleaner.

- Faster—line speed, coating cure and coating optimization.
- Smaller—floor space, work-in-process, energy consumption, maintenance costs, capital equipment cost and quality costs.
- Cleaner—zero volatile organic compounds (VOCs), no hazardous air pollutants (HAPs), no N-vinyl pyrrolidones (NVPs), reduced reporting, and improved health and safety.

Faster

Line Speed

Faster line speed, faster coating cure and faster coating optimization are directly correlated to:

- Increased production capacity
- Faster throughput
- More production flexibility
- Potentially lower piece price

All these items are easy to measure financially and typically have a major dollar impact. Productivity is everything and the ability to increase line speed is

critical to improving productivity. UV coatings allow you to increase your line speed and secure the benefits of increased productivity. It is important to have the ability to measure the benefits of increased production and there is a need to understand per unit costs.

Coating Cure

Some plastics cannot be heated and some substrates require immediate curing after coating. For these situations, UV technology may be the only solution. In addition, cycle time can be cut dramatically, thus allowing much better response to customer needs. The financial gain is more difficult to measure and the measurement here is specifically based on application.

Coating Optimization

Coating optimization has everything to do with coverage and reclaim (Figures 1 and 2). With 100%-solids UV, coating coverage is 1,604 square feet at 1 mil with no evaporation, etc. Reclaim can also be achieved using a variety of industry-proven techniques. The financial gain can be measured in coating usage and calculated to a per-part cost of coverage.

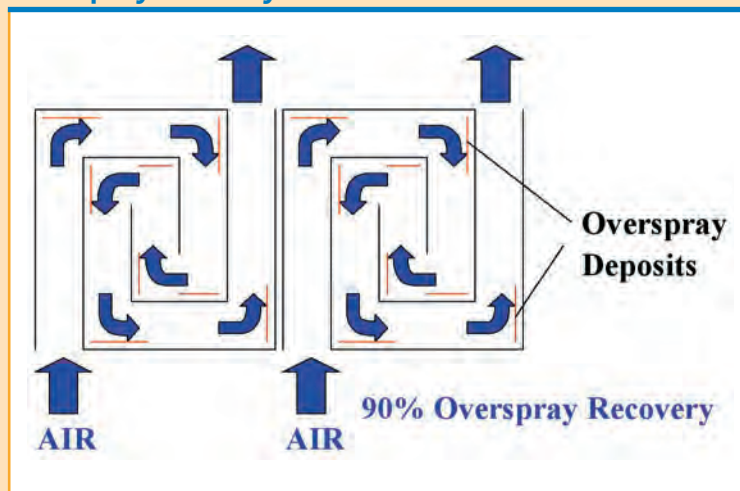
Smaller

Floor Space

Spray systems typically consume the same floor space across coating technologies. UV-light systems are typically much smaller—10-15 feet in

FIGURE 1

Overspray recovery



length—compared to conventional ovens (Figure 3). Air-dry solutions typically require more floor space and/or overhead. Therefore, financially one must measure the following:

- Need to understand your floor space costs/typically per square foot.
- Comparisons made between the different coating technologies.

Work -in-Progress

Work-in-process (WIP) has associated costs because it ties up capital. The larger your WIP inventory, the larger your quality risk. That is, by the time you figure out that there is an issue, your entire WIP may be affected. To conduct a good financial assessment you need to:

- Understand your WIP costs.
- Know how much inventory is tied up “hanging around.”
- Understand how much can be saved by reducing the cost of a quality “incident.”

Energy Consumption

Energy costs continue to be volatile year-to-year. UV-lighting technology offers fast shutdown and start-up. Savings from reduced energy usage fall straight to the bottom line. UV lights

can be turned off, whereas ovens, etc., take time to shutdown and to start up again. To financially measure the gain one needs a true financial understanding of the energy costs per KW and must include all involved equipment (i.e., the whole application chain from pre-treatment to cleaning to application and curing.)

Maintenance Costs

Typically, UV systems are much smaller, use fewer conveyors, less mechanics, etc., but UV lights require a regimented maintenance schedule for

cleaning reflectors, measuring light output, changing filters, rotating bulbs (arc lamps), etc. One needs to understand the true manpower and process costs that are associated and measure the costs of extra conveyor with continued maintenance. It is good practice to follow the standards and procedures defined by the manufacturers. A well-designed process will be significantly less to maintain than a poorly designed process.

Capital Equipment Costs

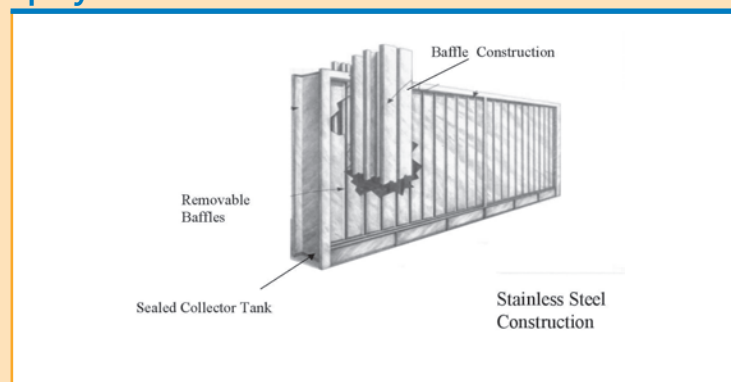
UV systems typically cost less than any oven-based curing technology and typically require shorter conveyors, less material handling, and less mechanics overall. To measure the financial advantage, one needs to compare competitive technology bids and understand the true costs of additional material handling equipment. This needs to be done for non-oven-based technology and air-dried systems.

Quality Costs

With UV technology quality problems are immediately noticed and addressed. With other technologies you must wait until the product is dry and/or fully cured before testing. Once you get around to testing for quality compliance, you may have a great deal of scrap. Having immediate feedback on

FIGURE 2

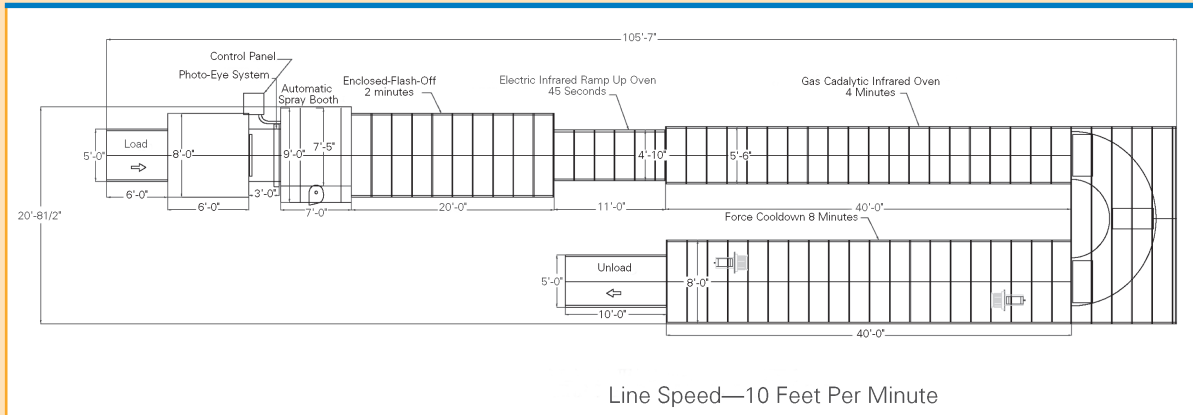
Spray booth/baffle construction



One method to reclaim 100% solids UV coatings.

FIGURE 3

Flatline finishing system



the quality of your finished product will certainly lower your quality costs.

Cleaner

Zero VOCs, No HAPs/NVPs

100%-solids UV systems typically have zero VOCs and no HAPs/NVPs. When reviewing your UV-coating choice, make sure you verify compliance. Exempt solvents still have VOCs—100% solids are defined as zero solvents. The financial assessment may be conducted by measuring workman's compensation claims and by measuring costs incurred in eradicating VOCs.

Reduced Reporting

With 100%-solid UV systems, there are many benefits including the ability to shut down specific VOC-related equipment and eliminate specific VOC reporting requirements. The advantages can be measured in terms of equipment shutdown and reduced usage (i.e., VOC scrubber costs can be calculated) and by the reduction or elimination of VOC reporting to specific government agencies.

Improved Health and Safety

With 100%-solid UV systems, you will eliminate the health and safety issues typically associated with

solvent-borne paint systems. However, sound safety practices still need to be followed when using UV coatings. Again, measuring time away from work, compensation claims and external environmental impacts can assess this. ▶

Summary

Understanding the true costs of each area is critical to your ROI+E™—Return On your Investment and the Environment.

Faster

- Line Speed
- Coating Cure
- Coating Optimization

Smaller

- Floor Space
- Work-In-Process
- Energy Consumption
- Maintenance Costs
- Capital Equipment Cost
- Quality Costs

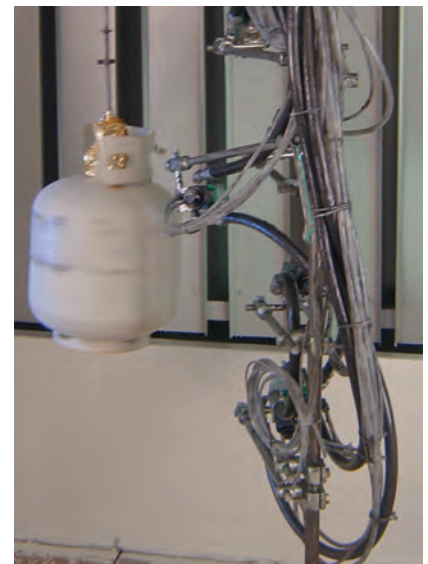
Cleaner

- Zero VOCs/No HAPs/NVPs
- Reduced Reporting
- Improved Health and Safety

—Dan Sweetwood is director of sales and Michael Kelly is president of Allied PhotoChemical, Kimball, Mich.



Thermal oven control panel.



Spray cylinder.