

REALITIES IN THE MECHANICAL TUBE MARKETPLACE

By Michael Kelly

Delivering the best product to your end customer is key in today's manufacturing environment and has been a continuing message for North American manufacturing companies. This is not new by any means but is receiving more emphasis and attention as end customers are more involved in their suppliers' manufacturing supply chain.

In the mechanical tube marketplace, this is defined as the following:

- **Reduced overall product cost** – a reduction of overall pricing / measured in reduction of price per linear foot.
- **Continually improved product performance** – increased white and red rust protection / measured by increased hours of ASTM B117 Salt Fog exposure.
- **Embracing a sustainable manufacturing process** – improved sustainability in the manufacturing process would equate to less emissions / measured as an overall reduction in VOCs and HAPs (Volatile Organic Compounds and Hazardous Air Pollutants)

Most of the mechanical tube manufacturers incorporate some type of coating system into their tube manufacturing process. In most cases it is a water-based coating system, utilizing a flood and wipe or vacuum application and some type of air flow and/or thermal drying system at end-of line, before tube cut-off.

This coating system provides an in-line coating that is applied to the mechanical tube, which delivers enhanced outdoor protection from humidity and temperature during transport, yard storage and end-processing.

In their quest to continue to reduce overall tube costs, the mechanical tube manufacturer must continuously review their internal processes. One of the areas for review has been the type of coating applied to the mechanical tube. So, over the past decade, many mechanical tube manufacturers have reviewed their water-based coatings against UV / ultraviolet coatings solution.

Water-based Coatings

There is a significant number of mechanical tube manufacturers utilizing water-based coatings for their coating needs today. For manufacturing lines running less than 150 feet per minute, the investment cost for implementing a water-based coating line can be lower than a traditional arc lamp UV line. A simple flood and wipe, with induction heating or heated air tubes, will typically do the trick and provide a temporary rust inhibitor for the tube. Utilizing induction heating will greatly reduce the humidity and temperature issues that impact water-based coating applications.

The cost per gallon for water-based coatings is much lower than

UV coatings, since percent solids for water-based range from 18 percent to 30 percent; but you also get less coverage per gallon. This is where the ROI calculator in Table 1 will assist you in understanding coverage per gallon when comparing water-based coatings to UV coatings.

The UV Alternative

Ultraviolet coatings technology offers a unique opportunity to dramatically improve your manufacturing process, improve your sustainability footprint, and deliver actual ROI – less coating cost per linear foot of pipe or tube.

Mechanical tube manufacturers are quick to embrace UV coatings once a detailed cost analysis is completed, as outlined further in this article.

Reduced Overall Product Cost

FUNCTIONAL PIPE COATING MODEL		
Linear Foot Comparison:	1.5	Inches Diameter
Target Coating Thickness	0.3	Mils Thick
Description	Water-based	UV
Coating cost per gallon	\$ 17.40	\$ 66.20
Percent Solids	24.5%	100.0%
Percent Water	75.5%	0.0%
Coverage at 1 mil - Square Feet	393	1,604
Coverage at 1 mil - Square Inches	56,589	230,976
Diameter of Pipe (inches)	4.71	4.71
Linear inches per gallon	12,009	49,015
Linear feet per gallon @ 1 mils thick	1,001	4,085
Linear feet per gallon @ 0.3 Mils thick	3,336	13,615
Cost per linear foot coated specified inch diameter pipe	\$ 0.0052	\$ 0.0049

Table 1: Water-Based – \$17.40 per gallon / 24.5% solids versus UV – \$66.20 per gallon / 100% solids.

The UV coating is less cost than the water-based coating, at roughly seven percent less per linear foot. There is also reduced coating transportation costs, less handling costs, less storage space, etc.

Continually Improved Product Performance

Outlined below are ASTM B117 Salt Fog testing on G40 galvanized mechanical tube pieces. These were tested for 912 hours.



Embracing a Sustainable Manufacturing Process

UV is inherently cleaner than water-based coatings with no VOC or HAPs. Plus, eliminating the handling / exposure of flammable water-based coating on the plant floor makes for a safer and cleaner overall coating operation.

In the example below, the water-based coating contains 1.86 pounds of VOCs per gallon, where UV contains zero pounds of VOCs.

Example: Yearly VOC savings of 108,628 lbs with UV Coatings

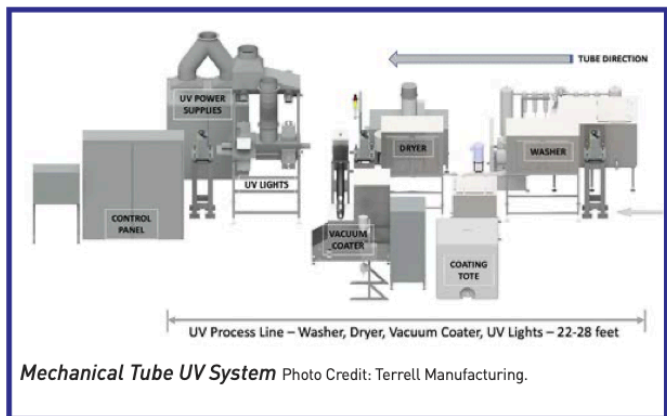
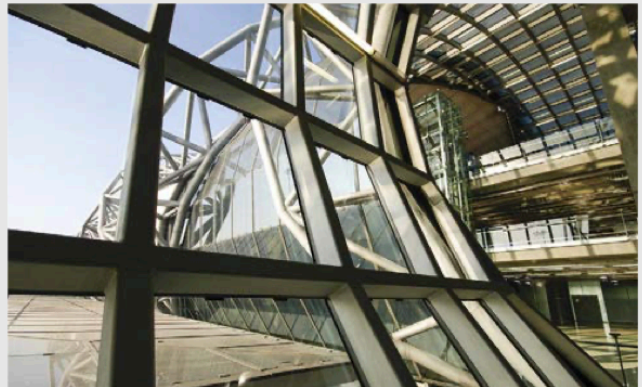
FUNCTIONAL PIPE - VOC SAVINGS		
Description	Entered Data	Measurement
Water-Based Coating VOC's / Gallon:	1.86	Lbs / Gallon
Water-Based Percent Solids / Gallon:	24.5%	Percentage
UV Coating VOC's / Gallon:	0.00	Lbs / Gallon
UV Coating Percent Solids / Gallon:	100.0%	Lbs / Gallon
Amount of Coating Consumed:		
Description	Entered Data	Measurement
Water-Based Coating per YEAR	58,400	Gallons
UV Coating per YEAR	14,308	Gallons
VOC COMPARISON - WATER / UV		
Description	Water-based	UV
Percent Solids	24.5%	100.0%
VOC's per coating	1.86	0.00
Amount of VOC's based on consumption	108,624.00	0.00
Total VOC's emissions SAVED per YEAR:		108,624

Table 2: Water-based and UV Coatings - Comparison of VOC - Emissions saved.

UV Process Solution / Equipment

Outlined in the equipment layout below is a small footprint solution for coating mechanical tube with UV coatings. Typically, the galvanized tube is washed and dried, then is coated via a vacuum coater, then cured with UV microwave lights. This takes place in a physical footprint ranging from 22 to 28 feet.

Examples of mechanical tube applications.



Conclusion

If nothing else, the COVID-19 pandemic re-emphasizes and reinforces the importance of a stable supply chain. Delivering the best product to the end customer is key in today's manufacturing environment.

In the mechanical tube marketplace, reduced overall product costs, continually improved product performance, a lower physical equipment footprint in the manufacturing plant, and a sustainable manufacturing process, all combine to achieve these goals. ■

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