



An Integrated Approach to VOC Control at Vistawall Architectural Products



Total Enclosure Paint System Design

cost of the capital equipment required for VOC abatement. (See Figure 1)

Tellkamp Systems' integrated VOC abatement approach uses spray booth recirculation with automated filtration, total paint system enclosure and regenerative thermal oxidation to exceed the EPA requirements for air quality.

Recirculating spray booth airflows has proven to be a cost-effective means of reducing the overall volume of exhaust airflow requiring VOC destruction. The Tellkamp Automatic Recirculating Spray Booth design allows for a large reduction in the spray booth exhaust volumes while still providing the proper air velocity

Midway, Tennessee - Vistawall Architectural Products worked with Tellkamp Systems, Inc. to install a high performance horizontal liquid paint system for aluminum extrusions. The paint line project at Vistawall included a dip tank pretreatment system, automated wastewater treatment, and a three coat horizontal paint system with an integrated VOC abatement system.

Cost effective compliance with EPA guidelines was a critical issue in the design of the paint system and VOC abatement equipment. Vistawall partnered with Tellkamp Systems to implement a horizontal paint system that would meet all State and Federal guidelines without compromising Vistawall's high performance and capacity requirements.

AIR VOLUME REDUCTION STRATEGY

The horizontal liquid paint system at Vistawall utilizes Tellkamp's proven Air Volume Reduction techniques to minimize the size and

Paint System Exhaust Air Volume	Typical Paint System Design	Tellkamp Systems, Inc. Air Volume Reduction Design
Automatic Primer Booth #1	13,000 cfm	1,500 cfm
Automatic Primer Booth #2	13,000 cfm	1,500 cfm
Manual Topcoat Touch-up Booth #1	13,000 cfm	—
Manual Topcoat Touch-up Booth #2	13,000 cfm	—
Automatic Topcoat Booth #1	13,000 cfm	4,000 cfm
Automatic Topcoat Booth #2	13,000 cfm	4,000 cfm
Automatic Clear Coat Booth #1	13,000 cfm	1,500 cfm
Automatic Clear Coat Booth #2	13,000 cfm	1,500 cfm
Solvent Flash-off Areas	2,000 cfm	2,000 cfm
Paint Cure Oven	3,000 cfm	3,000 cfm
Total Exhaust Air Volume	109,000 cfm	19,000 cfm

Figure 1. Airflow Comparison

over the work. This is accomplished by recirculating a portion of the spray booth exhaust and exhausting a reduced airflow rate to the Roxidizer® RTO for VOC destruction. In order to assure fire safety and NFPA compliance the solvent vapor concentration is monitored in the spray booth with a multi-point analyzer. If the solvent concentration exceeds the set point, the paint application equipment shuts down automatically until the problem is found and corrected.

Paint overspray is collected on an automated filter mechanism which simplifies spray booth filter changes. Static pressure drop across the exhaust filter is monitored, as the filter loads with particulates the filter mechanism automatically indexes clean filter media into the air stream restoring proper airflow through the filter media, and assuring proper paint transfer efficiency and spray booth airflow patterns.



Extrusions Entering the Spray Booth

BENEFITS OF SPRAY BOOTH RECIRCULATION

Reducing the volume of paint system exhaust as part of an integrated VOC abatement strategy has several important benefits. The reduced volume of paint system exhaust air allows installation of a significantly smaller regenerative thermal oxidizer for VOC destruction. The airflow capacity of the Roxidizer® RTO installed at Vistawall is 80% less than would have been required had Tellkamp's Air Volume Reduction techniques not been used in the paint system design. In addition to the size and cost of the equipment, the operating costs of the air pollution control equipment are also greatly reduced. (See Figure 2)

VOC Abatement Design	Typical Paint System Design	Tellkamp Systems, Inc. Air Volume Reduction Design
Paint System Exhaust Volume	109,000 cfm	19,000 cfm
Supplemental Natural Gas Requirement (\$5.00/MMBtu assumed)	7,833,000 Btu/hr. (\$39.16/hr)	190,750 Btu/hr. (\$.098/hr.)
Electrical Requirement (\$0.08/kWh assumed)	190 kW/hr. (\$15.24/hr.)	41 kW/hr. (\$3.28/hr.)
Estimated Hourly Operating Costs	\$54.40/hr.	\$4.26/hr.
Annual Operating Costs (assumes 2,000 hours of operation)	\$108,800/year	\$8,520/year
Air Make-up Unit Utilities	\$18,430/year	\$3,420/year
Annualized Operating Costs	\$127,230/year	\$11,940/year

Figure 2. Comparison of Hourly Operating Costs

of the country, AMU's also provide heating capabilities to adjust the temperature of the replacement air entering the building. Spray booth recirculation results in a smaller AMU with substantially lower equipment and operating costs.

When all factors are considered in a comparison of the hourly utility requirements for Tellkamp's Air Volume Reduction design and a typical non-recirculating paint system design the reduction in equipment operating costs is quite dramatic. The Vistawall paint system using Tellkamp's design provides a savings of \$115,290.00 per year based on one shift of paint system operation.

VOC CAPTURE AND VOC DESTRUCTION PERFORMANCE

To prove compliance with State and Federal guidelines an independent laboratory tested the horizontal paint line and integrated VOC abatement system at Vistawall. The performance of the integrated system exceeded all expectations.

The high performance paint system provides an overall reduction in VOC emissions of 98.5%. The total enclosure design of the system captures 100% of the VOC emissions generated from the liquid painting operations. After the VOC emissions have been captured they are sent to the Roxidizer® Regenerative Thermal Oxidizer where greater than 98% of the emissions are destroyed.

The very high VOC removal efficiency of the horizontal liquid paint system allows Vistawall Architectural Products to paint large amounts of aluminum extrusions using high performance paint while complying with all air quality permit conditions.



Model 20 Roxidizer® RTO



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