

INVENTIONS & INNOVATION

Project Fact Sheet



MOBILE ZONE SPRAY BOOTH TECHNOLOGY FOR ULTRA-EFFICIENT SURFACE COATING OPERATIONS

NEW TECHNOLOGY SAVES ENERGY AND REDUCES POLLUTION DURING SURFACE COATING OPERATIONS

Benefits

- Net heating energy savings could be as high as 85% for makeup air
- For 1,000 units installed, potential to save the equivalent of 238,000 barrels of oil annually for a two-shift operation and 353,000 barrels of oil for a three-shift operation
- Reduces the size of heating, cooling, and pollution control equipment between 60% and 98%, saving associated capital and energy costs
- Meets or exceeds EPA, NFPA, and OSHA standards
- Maintains or improves production speed and quality
- When coupled with pollution control equipment, allows the use of any type of paint in any quantity without regulatory restrictions

Applications

The Mobile Zone can be used in any industry that applies surface coatings to its products. Typical applications might include applying sprayed surface coatings to chairs, tables, motorcycles, tractors, railroad cars, and aircraft in either side-draft or down-draft booths.

Volatile organic compounds (VOCs) released during the application of spray coatings can create fire or explosion hazards in paint booth enclosures, expose workers to toxins, and create air pollution emissions. In an effort to safeguard against these hazards, the National Fire Protection Association (NFPA) specifies acceptable solvent vapor levels inside surface coating enclosures and the U.S. Environmental Protection Agency (EPA) governs the amount of resultant contaminants that can be discharged to the outside environment. To meet these safety and environmental regulations, paint booths are usually ventilated with 100% outside air, which must be heated or cooled to maintain comfort levels inside and outside the booth. Extensive capital and energy expenditures are often required to maintain temperatures and to control pollution emissions.

MOBILE ZONE SPRAY BOOTH TECHNOLOGY



By separating the painter from the objects being painted, the Mobile Zone spray booth technology reduces energy consumption and protects the painter from toxins found in surface coatings, all while maintaining or improving production speed and quality.



A new spray booth technology, called a Mobile Zone, has the potential to greatly reduce the amount of energy needed to heat and cool ventilation air during surface coating operations. The Mobile Zone system separates the human painter from the objects being painted by housing the painter in a separate, mobile cab during spray coating operations. The painter remains in the clean air cab during the entire painting process, eliminating the need for protective gear. In addition, the smaller cab space results in less air that must be heated and cooled for production requirements.

Project Description

Goal: The project goal was to create a Mobile Zone prototype and conduct prototype testing.

In a common, conveyORIZED side-draft paint booth, the invention consists of a mobile cab occupied by a painter. The cab is mounted on a set of tracks (tracks hang on both the floor and ceiling) and the painter controls cab motion. The recirculated air is discharged to the paint booth through perforations in the inner wall, providing laminar flow. Clean makeup air, which has been filtered and heated or cooled, flows through the cab. An overhead conveyor system moves the work pieces through the paint booth and in front of the mobile cab. As the pieces move in front of the cab, the painter sprays the paint or other coating.

The air from the paint booth is exhausted through dry particulate filters located in the wall opposite the mobile cab. Part of the exhaust air is discharged to pollution abatement equipment while the remainder is recirculated. Pollutants are removed from the exhaust air by incineration or adsorption. These processes require thermal or electric energy to operate. If the amount of exhaust air is reduced, the size of the equipment and the energy required for pollution abatement equipment are also reduced.

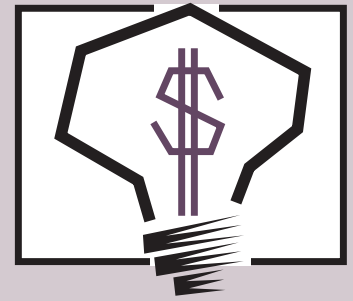
Clyde Smith developed this new technology with the help of a grant funded by the Inventions and Innovation Program through the Department of Energy's Office of Industrial Technologies.

Progress and Milestones

- Work done under the Inventions and Innovation grant has been completed and a successful prototype was created.
- System installed in July 2001 for painting vehicles and helicopters at Ft. Hood, Texas under contract with U.S. Army Construction Engineering Laboratory.
- The invention is protected by U.S. patent 4,926,746, received on May 22, 1990.

Economics and Commercial Potential

Economic and commercial potential for the Mobile Zone invention has not yet been fully established. However, with the introduction of a partnership between the inventor and the U.S. Army Construction Engineering Laboratories and installation of the first commercial Mobile Zone unit, the invention's potential seems promising.



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and to conduct early development. Ideas that have significant energy-savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

For project information, contact:

Clyde Smith/William Brown
5945 Long Meadow Road
Nashville, TN 37205
Phone: (615) 481-8763/804-2080
Fax: (615) 352-8763
clyde.smith@home.com

For more information about the Inventions and Innovation Program, contact:

Lisa Barnett
Program Manager
Inventions and Innovation Program
Phone: (202) 586-2212
Fax: (202) 586-7114
lisa.barnett@ee.doe.gov

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Office of Industrial Technologies
Energy Efficiency and
Renewable Energy
U.S. Department of Energy
1000 Independence Avenue SW
Washington, D.C. 20585-0121



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