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Automated Tank Surface Finishing System

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AUTOMATED TANK SURFACE FINISHING SYSTEM

THE NEED

The primary motives for automating tank spraying are increased productivity, reduced cost, and increased safety. The current finishing techniques are costly and laborious, and they expose workers to significant health and safety risks. A typical refinishing operation involves sandblasting a tank to remove old paint and rust, and then painting it to protect the surface for the environment. This work is performed manually using a painting scaffold or similar device to access elevated work areas. Heavy equipment and protective clothing are required, and process byproducts are released into the environment. The procedures are hazardous, exposing workers to silica dust, harmful paint components, and possible injuries due to fall. Strenuous working conditions and worker fatigue contribute to an inconsistent quality of the applied coating.

THE TECHNOLOGY

The system uses a computer-controlled motion module to refinish the vertical exterior walls of a tank. The module is configurable for both blasting and painting and utilizes conventional surface finishing equipment for these processes. An overspray hood is included to reduce contamination of the surrounding environment during painting. The module attaches to a tank's wind girts with steel cables, and its position and velocity are controlled by servo-driven hoists. This automated system also controls the initialization and termination of the blasting and painting operations.

FIGURE 1 AUTOMATED PAINT SPRAYER

THE BENEFITS

Automation of surface finishing techniques for large storage tanks can yield significant improvements over conventional methods. Improvements include: better working conditions, enhanced surface finish quality, lower cost, and reduced environmental contamination. In addition to eliminating or minimizing safety concerns, labor costs and task duration can also be significantly reduced with an automated operation. Considering the vast amount of surface area to be coated, the cost savings can be substantial.

FIGURE 2 PAINT PATTERN

Increased productivity can also serve to reduce task duration. The system replaces one person of the three-person crew generally required to refinish a tank and removes the operators from the immediate vicinity of the work area. Daily productivity is increased by 220% for sandblasting and 1000% for spray painting, assuming a 90% duty cycle.

STATUS

The University of Texas' automated paint sprayer prototype was field tested in January, 1992 at an Amoco pipeline facility in Alvin, Texas. Since no insurmountable obstacles have been encountered thus far. Research work continues for its improvement.

BARRIERS

The advantages realized by automation of the prototype surface finishing system are encouraging and industry interest in automation is increasing. The development of the automated paint sprayer is ongoing. Industry interest has been limited due to capital development costs.

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REVIEWERS

Peer reviewed as an emerging construction technology

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