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Fiber-Optic Laser Technology for Decontaminating Metals

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EMERGING CONSTRUCTION TECHNOLOGIES

Safety – Safety Equipment & Method in Construction

FIBER-OPTIC LASER TECHNOLOGY FOR DECONTAMINATING METALS

THE NEED

Waterjet and abrasive blasting techniques has been used for decontaminating metals. Decontaminating metals is as varied as removing lead paint from a bridge to cleaning metals contaminated by radioactive material. The use of both techniques can pose environmental problems because the cleaning process created additional waste. Often that waste is hazardous. There had been needs in industry to safely clean radioactive and hazardous contaminants with less waste.

THE TECHNOLOGY

The fiber-optic laser technology resulted from a collaboration between INEEL (Idaho National Environmental and Engineering Laboratory) scientists and researchers at another Department of Energy facility, Ames Laboratory in Ames, Iowa.

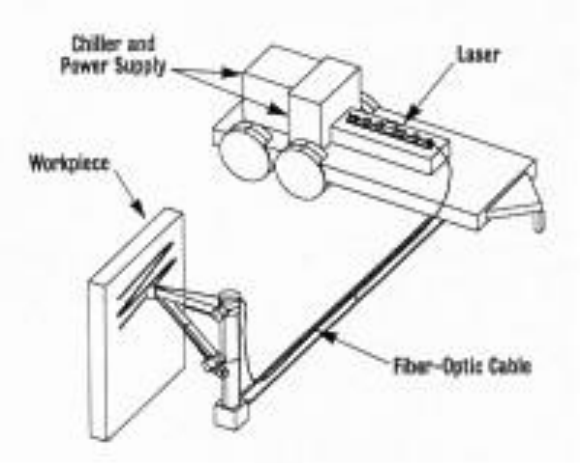

FIGURE 1FIBER-OPTIC LASER SYSTEM (ENR)

Unlike other metal cleaning technologies, the fiber optic laser system does not produce a secondary waste stream such as water, blasting material or solvents. This reduces waste disposal costs, which can be a significant expense in industrial cleanup. It also reduces environmental risk when waste materials are hazardous.

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The technology uses a powerful, pencil-thin laser beam that is focused onto the contaminated area. The laser beam generates shock waves that eject particles of contamination into the air. Contaminants are then immediately sucked into a vacuum filter for disposal.

The system decontaminates metal surfaces such as tools and machinery, and removes hazardous surface coatings. Using fiber optics to deliver the laser makes the system flexible and compact. The optical head, which aims the laser beam, is small enough to be hand-held. In hazardous or radioactive environments, it can be positioned by robot or remote manipulator arms to keep workers safe.

The Benefits

- Improved Safety -- Can be performed remotely, separating workers from contamination.
- Less Secondary Waste -- Unlike most traditional techniques, this generates minimal additional waste (only the air filters are contaminated during the process).
- Less Equipment Contamination -- Expensive equipment not exposed to contamination.
- No Hazardous Chemicals -- Unlike traditional techniques, this decontamination method uses no chemicals and therefore, raises no concerns over safe chemical handling or disposal.
- Reduced Waste Volumes -- The effectiveness and cost-efficiency of this technique may allow certain materials to be recycled rather than stored or disposed of.
- Lower Waste Classifications -- Effective and cost-efficient surface decontamination may allow some difficult-to-handle categories of waste (primarily mixed waste) to be reclassified as easier-to-handle low-level or hazardous wastes.
- Reuse of Valuable Metals -- Metals unusable because of surface contamination may be cleaned sufficiently to allow reuse.
- Reduced Costs-- Automated efficient technique reduces costs of not only decontamination but also overall waste storage and disposal as waste volumes and classifications are reduced.

Status

INEEL, through the Technology Transfer Office at Lockheed Martin Idaho Technologies Company, has licensed the technology to an Atlanta-based industrial cleaning products and service company, ZawTech International Inc.. The license agreement gave the company rights to manufacture and market the technology in Canada, Mexico and U.S. The technology has been marketed as Laser ZAWCAD. Boeing's airplane refurbishment plant in Wichita, Kansas has been used the technology since October 1998.

Barriers

With the base price of $300,000, plus any application-specific wand or nozzle, the system is very expensive.

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Reviewers

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