

# PETROLEUM

## Project Fact Sheet



## ROBOTICS INSPECTION SYSTEM FOR STORAGE TANKS

### BENEFITS

- Estimated energy savings approaching 12 trillion Btu by the year 2010
- CO<sub>2</sub> emission reductions exceeding 8,000 tons per year by the year 2010
- Savings of billions of dollars to the petroleum and chemical industries

### APPLICATIONS

The Solex robotic tank inspection system is designed to inspect the bottom of aboveground storage tanks containing petroleum and other petrochemical products while they remain in service.

## ROBOTICS INSPECTION SYSTEM MINIMIZES THE NEED TO EMPTY AND VENT STORAGE TANKS FOR CLEANING

As the average age of bulk liquid storage tanks used in the petroleum, chemicals, and forest products industries increases, so does the need for environmental and safety inspections. Conventional inspections involve draining, cleaning with water or solvents, ventilating, containing waste residues, and certifying tanks as gas-free for manned entry. Inspection of the tank bottom, interior structures, and structural coating systems can be carried out only after completion of this series of hazardous, costly, and time consuming activities.

This expensive process can be avoided by using a remotely operated robotics inspection vehicle submerged in the liquid. Solex Environmental Systems, in conjunction with the Texas Natural Resource Conservation Commission, has used NICE<sup>3</sup> funding to demonstrate Maverick, a robotics inspection system designed to eliminate the expense of draining, cleaning, and ventilating the tanks prior to inspection. Process waste cleaning and disposal are vastly reduced, and venting requirements and associated emissions are minimized. The robotics system also minimizes personnel exposure to toxic waste materials, and the cost of maintenance inspections is lowered. With successful deployment in the petroleum and chemical industries, this technology could provide energy savings approaching 12 trillion Btu by the year 2010.

### STORAGE TANK INSPECTION



**Solex Environmental Systems demonstrated Maverick's storage-tank inspection capabilities in a large fuel oil storage tank at the Colonial Pipeline facility in Francisville, Louisiana.**



## Project Description

**Goal:** Successfully demonstrate the operation of Maverick, a robotic system for inspecting in-service, aboveground petroleum and petrochemical storage tanks.

Maverick performs floor inspections from inside the tank while submerged in refined products including gasoline, diesel, and up to No. 3 fuel oil. The robot is a remote-controlled, submersible system that travels on the interior tank floor. The instrument payload includes a multi-channel ultrasonic sensor system to map and correlate metal thickness data, an onboard video system to record inspections, and a sonar-based tracking system. The system is certified for safe operations in Class 1 Division 1 Group D environments.

## Progress and Milestones

On August 3 and 4, 1998, Solex demonstrated Maverick's capabilities in a large fuel oil storage tank (120,000 bbls, 160 ft. diameter, 51 ft. high, 20,000 sq. ft. bottom, dome with internal floating roof) at the Colonial Pipeline facility in Francisville, Louisiana. The equipment was demonstrated to Colonial Pipeline, Koch Ventures, and representatives from the Texas Natural Resource Conservation Commission, Louisiana Department of Natural Resources, and the U.S. DOE Office of Industrial Technologies.

### MAVERICK INSPECTION SYSTEM



**The Maverick robotics inspection system is designed to eliminate the expense of draining, cleaning, and ventilating liquid storage tanks prior to inspection.**

## INDUSTRY OF THE FUTURE—PETROLEUM

*Petroleum is one of nine energy- and waste-intensive industries that is participating with the U.S. Department of Energy's (DOE) Office of Industrial Technologies' Industries of the Future initiative. Using an industry-defined vision of the petroleum industry in the year 2020, the industry and DOE are using this strategy to build collaborations to develop and deploy technologies crucial to the industry's future.*

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NICE<sup>3</sup>—National Industrial Competitiveness through Energy, Environment and Economics: An innovative, cost-sharing program to promote energy efficiency, clean production, and economic competitiveness in industry. This grant program provides funding to state and industry partnerships for projects that demonstrate advances in energy efficiency and clean production technologies. Total project cost for a single award must be cost-shared at a minimum of 50% by a combination of state and industrial partner dollars. The DOE share for each award shall not exceed \$400,000 to the industrial partner and up to \$25,000 to the sponsoring state agency for a maximum of \$425,000. Each award may cover a project period of up to three years.

### PROJECT PARTNERS

NICE<sup>3</sup> Program  
U.S. Department of Energy  
Washington, DC

Solex Environmental Systems, Inc.  
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Texas Natural Resource Conservation  
Commission  
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