

- fossil energy
- environmental
- energy efficiency
- other

## ROBOTIC PIPE-ASBESTOS INSULATION REMOVAL SYSTEM

### Description

#### States Impacted:

Tennessee, Colorado, Idaho,  
Washington, South Carolina

#### Benefit Areas:

Environmental Quality  
Improved, New Application of  
Existing Technology

#### Participants:

Carnegie Mellon University,  
Federal Energy Technology  
Center, Oak Ridge National  
Laboratory

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Asbestos insulation removal at Department of Energy (DOE) processing plants across the United States, especially the steam and process lines within the nuclear weapons complex, is a complex matter. Many of these facilities, built in the 1940's and 1950's and slated for dismantlement within the next decade, used large amounts of asbestos insulation. Now, awareness to the carcinogenic nature of the insulation products has resulted in the deregulation of critical removal procedures and worker safety regulations by the U.S. Environmental Protection Agency (EPA) and the Occupation Safety and Health Administration (OSHA), respectively. In fact, removal of the asbestos warrants the use of a remote device, since the high labor costs and high level of radioactive contamination are factors in manual removal.

Under a contract with DOE's Federal Energy Technology Center, Carnegie Mellon University has developed a mobile pipe-external robotic crawler known as "Big On Asbestos," or BOA, to remotely strip and bag asbestos containing lagging and insulation materials (ACLIM). The 4-foot long, 135-pound robot can strip ACLIM from various diameter pipes in industrial installations moving at about 30 feet an hour. Under this two-phase program, CMU has developed and tested a proof-of-concept prototype. CMU has also completed regulatory, market, and cost/benefit studies, followed by demonstrations at the K-25 plant, Oak Ridge, Tennessee.

### Goals

The goal of the project was to develop a more effective method of removing asbestos insulation from industrial piping throughout the DOE nuclear weapons complex. The method was to offer cost savings and reduced exposure to workers compared with conventional removal methods.

### Tangible Benefits

**National:** Since DOE has about 7,000 facilities slated for decommissioning, the BOA system has much potential to improve both the cost and safety features. Projections are that the system could cut cost of stripping asbestos from pipes by 25 to 50 percent. In addition, it will decrease the number of abatement personnel required and as a result, it reduces the risk of worker exposure to hazardous asbestos fibers that become airborne when the insulation is removed. The robot also offers increased removal rates, as well as continuous removal and packaging for easy processing and disposal.

This technology was judged one of the most innovative new designs and products in U.S. during 1997/1998 by a renowned trade journal competition. The projected cost savings of 25 to 50 percent over baseline will depend on whether a glove bag or full containment is employed. Projected savings to DOE are expected to be approximately \$21 million.

**Regional/Local:** The 4-inch pipe demonstration at Oak Ridge in 1997 showed removal of 30 linear feet per hour, compared to 3 to 6 feet per hour by conventional methods. DOD and EPA have also shown a keen interest in utilizing this technology.