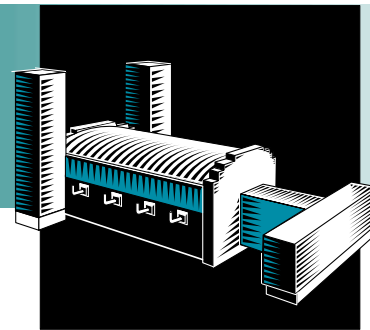


# GLASS

Project Fact Sheet



## ENHANCED CUTTING AND FINISHING OF HANDGLASS USING A CARBON DIOXIDE LASER

### BENEFITS

- Improved product quality and reduced material costs as a result of minimizing waste and defects
- Reduced energy use
- Reduced hazards to workers since exposure to sharp edges and broken pieces will be minimized

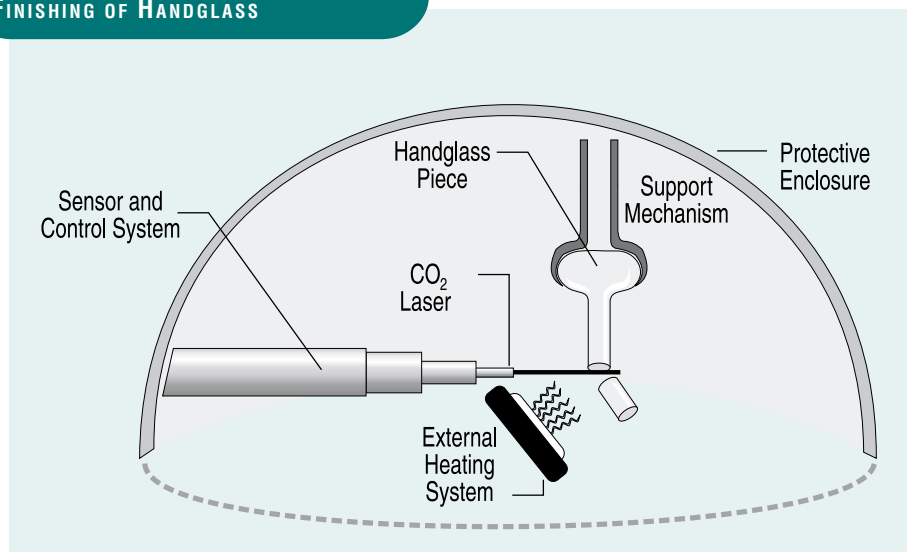
### APPLICATIONS

Handglass manufacturers of all sizes can use this enhanced technology since the system's speed and efficiency offer increased throughput and reduced costs without an exorbitant investment—it is estimated that costs can be recouped in under two years. In addition, the improved production capability will encourage the timely introduction of new handglass products.

### LASER-ENHANCED TECHNOLOGY WILL IMPROVE PRODUCTIVITY

Existing glass-cutting methods often result in considerable loss of glassware and require subsequent finishing of the edges, which is labor-intensive and can result in further product losses. Depending on the piece, glass properties, and worker skill level, losses can be as high as 80 percent in some product lines or 40 percent total scrap. The Federal Energy Technology Center, Fenton Art Glass, Pilgrim Glass, and West Virginia University are working to develop laser-enhanced cutting and finishing methods that will dramatically decrease waste and improve productivity in the manufacture of handblown glass. Specifically, the partnership will develop a bench-scale prototype system using a sensor-controlled, moderate-power, carbon dioxide laser to precision-cut the glass and produce a finished edge. A major component of the work will involve development of the operating parameters to make the system feasible for use in handglass factories.

### LASER-ENHANCED CUTTING AND FINISHING OF HANDGLASS



Laser-cutting the glass while still hot will create a fire-polished edge and minimize the need for further finishing.



## Project Description

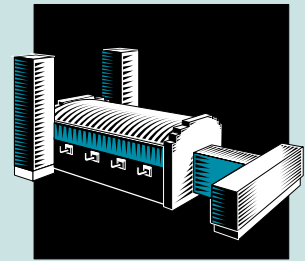
**Goal:** Use a carbon dioxide laser to enhance the cutting and finishing process of handglass, thereby improving energy efficiency and product quality.

The laser will cut the glass while it is still hot, producing a fire-polished edge that will minimize the need for further grinding or polishing. Throughout the process, the laser will not generate any photochemical by-products that could discolor the glass. Researchers will also develop a heating system to keep the glass hot while the laser is in use. A sensor system will control the entire process; it will turn the laser on, monitor the cutting, and disengage when the cutting is complete. The process will be portable, will use readily available electrical power and cooling water, and will be designed for use on a variety of glass products.

## Progress and Milestones

After extensive laboratory studies and a prototype design phase in which test partners will have input to ensure compatibility with factory practices, the prototype system will be tested at several industry factories.

Prototype testing has dictated a laser power of 1000 watts is required to cut glass efficiently in a reasonable time interval. A robotic glass handling system is being developed by Umbrella, Inc. for use in the factory prototype. The robot is easily programmed to handle any glassware and will include a vision system for piece recognition. The factory prototype system will include the robot glass handler and computer control system from Umbrella, Inc., and a 1300 watt CO<sub>2</sub> laser from Continental Laser Energy.



## PROJECT PARTNERS

National Energy Technology Laboratory  
Morgantown, WV

Fenton Art Glass Company  
Sutton, WV

Pilgrim Glass Corporation  
Ceredo, WV

West Virginia University  
Morgantown, WV

## FOR ADDITIONAL INFORMATION, PLEASE CONTACT:

Elliott Levine  
Office of Industrial Technologies  
Phone: (202) 586-1476  
Fax: (202) 586-3180  
elliott.levine@ee.doe.gov  
<http://www.oit.doe.gov/glass>

Please send any comments,  
questions, or suggestions to  
[webmaster.oit@ee.doe.gov](mailto:webmaster.oit@ee.doe.gov)

Visit our home page at  
<http://www.oit.doe.gov>

Office of Industrial Technologies  
Energy Efficiency  
and Renewable Energy  
U.S. Department of Energy  
Washington, D.C. 20585



December 2000