Acrofusion makes SolChar Incinerator possible.

Acrolite fiber optic solution able to transmit light energy required to create biological charcoal.

Acrolite recently had the opportunity to collaborate with researchers at the University of Colorado in an endeavor that sought to end these pressing global issues. With funding from the Bill and Melinda Gates Foundation's "Reinvent the Toilet" challenge, the team at the university has created a revolutionary household-scale prototype: the Sol-Char Toilet.

The Challenge

It is shocking that in this day and age, approximately 40% of the world's population lacks access to basic sanitation facilities, and that many of those people resort to open defecation. Each year an estimated 700,000 children die unnecessarily from diseases related to poor sanitation.

Through the use of solar power, this toilet operates off the grid with no piped water, and treats human waste on-site to make char—an odorless product chemically identical to charcoal, which can be used for fuel or soil amendment.

The university's project required the implementation of custom light transmission to control solar energy consistently, efficiently, and simply. Acrolite supplied fiber optic bundles, which were used with great success.

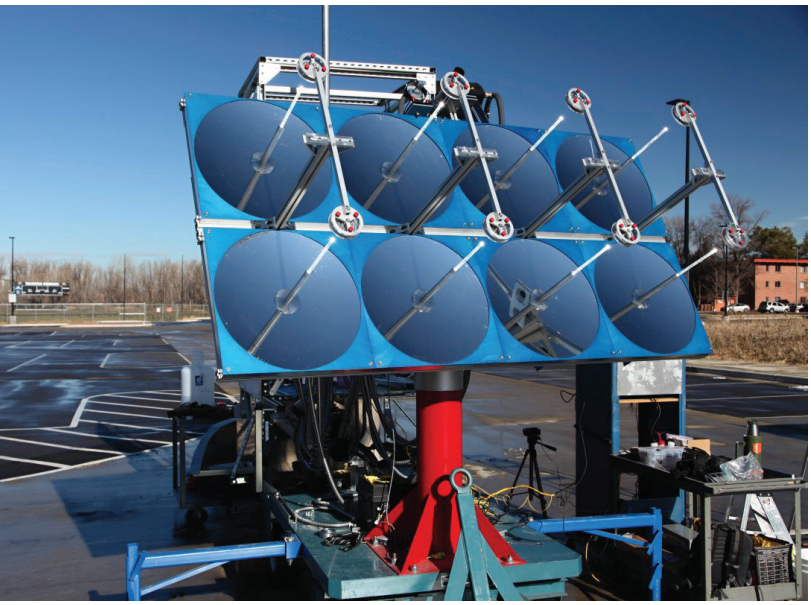
The Science

Solar tracking is necessary to achieve high concentrations of energy and reactor temperatures. Therefore, a sensor detects changes in the sun's position every 10 to 40 seconds and signals the drive motors to adjust accordingly. Parabolic dishes direct the sunlight to a small focal point; this light is then delivered to fiber optic bundles located at the focus of parabolic concentrators. The fiber optic cables are fed to the reaction compartment of the Sol-Char, where the various individual cables are terminated at an outer lid positioned over the waste collection container.

Acrofusion

Through a proprietary process, Acrolite has developed a solution for transmitting up to 20% more light through fiber optic cables than industry standards. We call this process Acrofusion™, and it's only from Acrolite. This process can also withstand higher temperatures, making Acrofusion™ the only capable fiber optic solution for the SolChar project.

The innovative transmission of solar power illuminates the inner collection container and disinfects the waste though convection and radiation heat transfer. This reaction compartment is comprised of two containers that are alternated between “collection” and “reaction” modes via a simple carousel system that is either powered with photovoltaic energy or manually controlled.



The SolChar incinerator can transform biomass for up to 4 people in standard configuration.

Why Acrolite Fiber Optics?

The use of Acrolite’s proprietary Acrofusion™ fiber optic light transmission simplified the prototype compared to other solar concentrators. The bundles allow the reactor to remain stationary and separate from the tracking components of the parabolic dishes, and out performed other state of the art bundles at a fraction of the cost. Without Acrolite’s fiber optic cables, complicated mechanical systems would have been required to locate the reactor at the focal point.

Result

In 2012, The Bill and Melinda Gates Foundation’s “Reinvent the Toilet” challenge awarded grants totaling $3.4 million to four winning designs—the Sol-Char being one of them. The project was covered by Tech Insider, CNBC Sustainable Energy Report, Yahoo! News, Colorado Public Radio, and Huffington Post, among many others.

Acrolite is extremely happy to have assisted in the creation of the Sol-Char prototype, and would like to thank the University of Colorado and all those involved: Karl Linden, Scott Summers, Alan W. Weimer, Rita Klees, Alan Lewandowski, Richard “Chip” Fisher, Lauren Hafford, Ryan Mahoney, Jeanette Neethling, Cori Oversby, Elizabeth “Zee” Travis, Barabara “BJ” Ward, Tesfayohanes Yacob, Dana Hauschulz, Dragan Mejic, Sara Beck, Josh Kearns, and Anna Segur.

For more information about the Sol-Char project, visit colorado.edu/solchar/.

The portable SolChar includes the solar collector array connected to a bundle of Acrofusion™ cables to transfer heat energy.