

**2007 European Biodiesel Processing Technologies
Technology Innovation of the Year Award**

Hielscher Ultrasonics GmbH, Germany

The 2007 Frost & Sullivan European Technology Innovation of the Year Award in Biodiesel processing technologies goes to Hielscher Ultrasonics GmbH of Germany in recognition of the company's development of novel ultrasonics technology for bio-diesel production. While there are other players in this arena, the company's technical features place it in a class by itself.

Hielscher Ultrasonics is based out of the city of Teltow, near Berlin. It specializes in developing advanced ultrasonics for industrial liquid processing applications and laboratory use. With its extensive expertise in the field of ultrasonics, the company has developed a wide range of equipment that can be employed in biodiesel manufacturing.

Growing interest in biofuels has ignited intense research into biodiesel manufacturing, which has traditionally been a transesterification batch process. In this process, vegetable or animal fat are made to react with an alcohol in the presence of a catalyst so as to produce biodiesel and glycerin by-product. In its original form, the reaction is a batch process, which takes approximately 8 to 10 hours. Continuous processes are preferred to batch processes as it is easier to control the output quality and generate steady supply. There are continuous variants of the transesterification process, though they are yet to become popular.

Some of the newer manufacturing techniques being explored employ sonochemistry--the use of ultrasound in chemical reactions. Based on the principle of cavitation, such techniques are being tested in a wide range of processes from ethanol manufacture to steam reformation. While cavitation can be produced through a number of processes including high-pressure nozzles and mechanical agitation, ultrasonics remains one of the more energy-efficient options as it converts approximately 85% of the electric utility into mechanical energy.

According to Hielscher, ultrasonication could also help reduce the settling time from over eight hours to less than half an hour. Additionally, because of the severe agitation and cavitation in Hielscher's process, the reaction is more rigorous than normal,

thereby needing lesser amounts of both the catalyst and alcohol. Using special ultrasonic transducers, it is also possible to convert it into a continuous process thereby providing more control over the operational parameters in real time. Initial results promise a 99% yield in less than one hour. Conventional processes would take more than four hours to generate comparable yield.

Hielscher has developed a variety of high performance ultrasonic transducers that are designed to be retrofitted into the process line. Ultrasonic processing costs result from the investment for ultrasonic devices, electricity costs and maintenance. But even this would make economic sense to manufacturers because such technology could significantly boost the output and installed capacity of an existing plant, more than offsetting the additional cost of the ultrasonics. Extensive testing has demonstrated that quality improves and fewer raw materials are required by using such equipment. This would translate into a direct positive impact on the bottom line for biodiesel manufacturers.

It is in recognition of Hielscher Ultrasonics GmbH's innovative application of ultrasonics technology to biodiesel manufacturing that Frost & Sullivan is pleased to acknowledge the company's work with the prestigious Award for Technology Innovation of the Year.

Award Description

Frost & Sullivan's Technology Innovation Award is bestowed upon a company (or individual) that has carried out new research, which has resulted in innovation(s) that have or are expected to bring significant contributions to the industry in terms of adoption, change, and competitive posture. This award recognizes the quality and depth of a company's research and development program as well as the vision and risk-taking that enabled it to undertake such an endeavor.

Research Methodology

To choose the award recipient, Frost & Sullivan's analyst team tracks innovation in key hi-tech markets. The selection process includes primary participant interviews and extensive primary and secondary research via the bottom-up approach. The analyst team shortlists candidates on the basis of a set of qualitative and quantitative measurements. The analysts also consider the pace of research and technology innovation, and the significance or potential relevance of the innovation to the overall

industry. The ultimate award recipient is chosen after a thorough evaluation of this research.

Measurement Criteria

In addition to the methodology described above, there are specific criteria used to determine the final rankings. The recipient of this award has excelled based on one or more of the following criteria:

- Significance of the innovation(s) in the industry, and across industries (if applicable)
- Potential of the products of innovation(s) to become industry standard(s)
- Competitive advantage of innovation vis-à-vis other related innovations
- Impact (or potential impact) of innovation(s) on company or industry mind share and/or company bottom line
- Breadth of intellectual property related to the innovation(s), that is, patents, scientific publications, papers in peer-reviewed journals.

About Best Practices

Frost & Sullivan Best Practices Awards recognize companies in a variety of regional and global markets for demonstrating outstanding achievement and superior performance in areas such as leadership, technological innovation, customer service, and strategic product development. Industry analysts compare market participants and measure performance through in-depth interviews, analysis, and extensive secondary research in order to identify best practices in the industry.

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