



SBIR/STTR SUCCESS



Compact Membrane Systems is developing a patented new technology for separating olefins from paraffins, which enables clients in the petrochemical industry to increase performance while using less energy and lowering costs.

COMPACT MEMBRANE SYSTEMS

When customers in the petrochemical, power, marine and other industries need sophisticated chemical separation techniques, they rely on Delaware-based Compact Membrane Systems (CMS) to provide these critical services. One significant service is the process of separating olefins from paraffins that is necessary in order to enhance the performance of existing capital infrastructure – but traditional techniques have been costly and labor intensive.

PHASE III SUCCESS

\$1 million in yearly revenue from projects originally funded by the SBIR program.

AGENCIES

DOE, EPA, NASA, HHS, USDA

SNAPSHOT

Compact Membrane Systems is an advanced materials company that specializes in membrane separation technologies applied to dissolved gas sensing, dehydration, solvent recovery, olefin/paraffin and aggressive chemical separations; founded 15 years ago, the Delaware-based company currently employs over 20 individuals.

COMPACT MEMBRANE SYSTEMS

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Compact Membrane Systems is developing a new technology for performing this process, and it enables petrochemical suppliers to achieve higher yield, while using less energy and at a reduced cost. By easily integrating the process into existing infrastructure, clients can achieve a high return with a modest financial investment.

“We perform the world’s toughest separations, helping industrial companies in a more environmentally-friendly way that was never possible before,” explains Erica Nemser, CEO of Compact Membrane Systems. “Our technologies add value in a range of industries from nuclear power plants, to paper mills, to coal conveyors to global transport. We have the potential to save our clients millions of dollars, reduce risk, reduce waste and environmental impact, and increase uptime.”

The process of olefin/paraffin separation began as a Phase I Small Business Innovation Research (SBIR) project with the U.S. Department of Energy (DOE), and soon flourished into a Phase II project. The estimated combined production of polyethylene and polypropylene by U.S. manufacturers is about 29 million metric tons. Annual reactor vent stream losses of the olefin feedstocks are estimated to have a value of \$330 million and represent an equivalent energy loss of 16 trillion BTUs. CMS’ solution drastically reduces these costs by recovering olefins from vent streams for reuse in the reactor.

“The SBIR process has been instrumental in enabling our technical development,” adds Nemser. “If you look at the research on advanced materials, they have an extremely long development timeline. Take PVC piping, for example. That took more than a decade to get to market and that is drainpipe. There is a very long adoption cycle because people are risk averse when you talk about new technologies – they want to use a ‘watch and wait’ approach. That is why SBIR is critical for the funding of this research; it is a de-risking step.”

With funding provided by SBIRs from other U.S. agencies, CMS was able to build a suite of differentiated membrane separation technologies that have broad commercial applications. Another area of expertise is the separation of gases, the removal of dissolved gases from liquids, or the dispersion of gases into liquids. CMS has developed membrane contactors specifically for gasification/degasification and dehydration applications.

For example, CMS has a patented process to remove water from lubricants and solvents. This technology greatly lowers operational costs and reduces the environmental impact of frequent oil replacements in the case of lubricant systems, and the burning and discarding of large quantities of chemical waste and byproducts, in the case of solvents. In both cases, CMS provides a means of removing this water using a membrane system without damaging the materials being dried or removing their performance additives. While there are strong environmental benefits, CMS' customers also see the strong business and economic benefits. Water in lubrication oil reduces the oil's life and can lead to expensive machine damage and shutdown. As a result, this technology is increasingly crucial to a number of applications: power plants, paper mills, coal conveyors, cooling towers, steam turbines, wind turbines, marine systems, and more.

Heeding customer desire for advanced technology that can outperform alternatives and is easy to use, the oil dehydration systems are compact, light, and low maintenance. They are small enough to fit through ship hatches and down steps by one person, or to be lifted into a turbine nacelle. Once set up, the system runs with minimal oversight and management, and fewer moving parts than conventional technologies, like vacuum or absorption oil purification systems. Membrane systems are compact and light, so they can remove unwanted gas or water vapors from liquids without the problems of bulkiness, foaming, material loss, or pressure control associated with mechanical gas-liquid contactors.

CMS continues to pursue market growth, expanding to additional industries and commercial areas including energy and power production and distribution, feedstock and polymer chemical processes, semiconductor manufacturing, pharmaceutical and bioreactors, commercial printing, and many more.

Nemser credits being located in the state of Delaware as another big advantage of the company. In addition to having access to brilliant and talented engineers, CMS has been able to take advantage of state grants as well that have helped to fuel the company's research and development goals. All manufacturing is done in-house within CMS' manufacturing facility. The company is enjoying an exciting time with the recent surge in demand, and has just launched its brand new website – www.compactmembrane.com.

"Our goal is really to become a substantial player in the advanced materials realm, and to address some of the industry's greatest needs," adds Nemser. "That means launching new applications, growing our current product line, and working with strategic partners on the development of technologies that are still in the R&D phase."

CMS is continuing its work within the SBIR program and is currently developing new technologies including novel catalyst and water purification systems for the National Institutes of Health (NIH) as well as performing continued research and development for the DOE. CMS is also developing a new technique on processing green solvents for the Environmental Protection Agency (EPA), as well as unique separation systems for the United States Department of Agriculture (USDA).



The wind turbine industry could greatly benefit from CMS' patented process of removing water from lubricants, which helps oil perform better while avoiding acid and corrosion issues associated with water.