

InnovationNews

The latest on research and products

www.siemens.com/innovationnews

SIEMENS

Air Compressor of Unrivalled Power for Plastics

Siemens is supplying compressor trains to China for the world's largest propylene plant. Each one can compress 700,000 cubic meters of air to 2.4 bar every hour, which is the highest flow rate of an axial-flow compressor in the world. The plant will start up in 2013 and produce propylene as the source material for the plastic polypropylene. In a first, the compressor train for this plant will be implemented as an axial-flow compressor driven by gas turbines. The plant is the first propane dehydrogenation project (PDH) in China and has a capacity of 600,000 metric tons propylene per year. It will be operated by the Chinese Tianjin Chemical Industry Group Co., a chemicals company specializing in plastics processing.

There is a growing demand for plastics and thus for propylene in China, as in all of Asia. With the construction of PDH plants, China is meeting this demand and at the same time developing an industry for processing natural gas. Up to now, propylene has been obtained mostly along with ethylene as a result of petroleum cracking in refineries. But since the demand for propylene is increasing faster than that for ethylene, dedicated production of propylene is becoming increasingly important. The process with the highest selectivity for propylene (over 85 percent) is based on the Catofin technology of U.S. company CB&I Lummus. In this technique, propylene is manufactured in a catalytic process by dehydrogenating propane — i.e. removing some of its hydrogen. The propane gas usually comes from natural gas.

In the Catofin process, the catalyst must be repeatedly heated up and regenerated with compressed, heated air in alternation with the dehydrogenation reaction. In the new plant, this air is supplied by two Siemens compressor trains. Until now, axial-flow compressors of this sort have only been used in blast furnaces or refinery processes. In the project in Bohai, China, they are now being used for the first time in a propane dehydrogenation plant in the petrol industry.

Another novelty is the combination of an axial-flow compressor with a gas turbine. Gas turbines are a suitable drive system at the Chinese plant, because they can be run on both propane gas from the plant and natural gas from a pipeline. Gas turbines and axial-flow compressors both have high efficiency rates. The combination of the two systems is therefore also very efficient.

(IN 2011.12.5)

Photo: <http://www.siemens.com/ct-pictures/in20111205>

Optimizing Electric Motors for Cars and Aircraft

Siemens Corporate Technology and partners are pursuing research projects aimed at improving the range and efficiency of electric motors. The project Plug&Play Range Extender is examining how a module made of a small, fuel-efficient combustion engine and an alternator can increase the range of electric cars. In the project PELiKAn (a German acronym for the phrase "Power Electronics in Motor Vehicles and Aeronautics"), the aim is to use highly efficient power electronics to improve efficiency in aircraft and motor vehicles. Both projects are receiving support from the German Federal Ministry of Education and Research (BMBF).

As the electrification of aircraft and motor vehicles gains ground, factors like the efficiency, required installation space, and weight of individual components are playing a crucial role. Power transformers are key components for which ever higher switching frequencies are required. At present, the energy required for the activation of a power switch is lost, which limits the maximum efficiency to 95 percent.

The partners in the PELiKAn project are therefore working to develop compact and reliable voltage transformers with an efficiency of up to 99 percent. The aim is to achieve this level of efficiency with "regenerative drive circuits," which reduce the drive power needed by storing energy in a buffer. Researchers also expect that new types of semiconductor materials, such as silicon carbide, and higher maximum operating temperatures will further reduce the switching losses and forward losses experienced by switches. Siemens is working on the three-year PELiKAn project with partners Daimler, EADS, Infineon, ZF Electronics, and the Fraunhofer Institute for Integrated Systems. The scientists of the global Siemens research department Corporate Technology are particularly focused on new switching concepts and on regulation and control technologies.

In the project Plug&Play Range Extender, the consortium of FEV, Siemens, Daimler, and the RWTH Aachen University will first define the requirements for a large-scale integrated Range Extender Module. In addition, marketable automotive designs will be drawn up. In a later phase, a vehicle with the Range Extender Module will then be built.

(IN 2011.12.6)

Photo: <http://www.siemens.com/ct-pictures/in20111206>

Executive Editor: Dr. Norbert Aschenbrenner, Klaudia Kunze,
norbert.aschenbrenner@siemens.com;
klaudia.kunze@siemens.com (+49-89-636 33 446)