Press Release

EISENMANN Sets New Standards in the Carbon-Fiber Process
Operation with two different ventilation systems is possible for the first time with an innovative carbon-fiber pilot oven

Böblingen, Germany, 23 February 2011. Carbon fibers are considered to be the design material of the 21st Century as they feature outstanding mechanical properties and, moreover, are far lighter than steel or aluminum for instance. For around three years now, EISENMANN, the internationally operating plant manufacturing company, has been offering oxidation ovens and related exhaust air purification systems for manufacturing carbon fibers, and over 50 systems have been sold to date worldwide. This success story is attributable to a reliable oven and exhaust air purification system, matched optimally to the material and to ongoing research and development work in this field. This also includes the new oxidation pilot oven at the EISENMANN technology center. With this, the plant engineering specialists have, for the first time, created the option of testing the two most popular ventilation methods in the process of producing carbon fibers in one and the same oven.

Flexible pilot oven for determining the most suitable ventilation system

The quality of the subsequent carbon fibers is crucially dependent on oxidation. What is important above all is achieving highly precise process control with an absolutely homogeneous temperature and velocity distribution of the recirculation air inside the oven. The two most popular and most efficient ventilation variants are Vertical-Down and Center-To-End ventilation systems. The variants are named for the air ducting in the oven.

The particular variant that is best suited depends on the relevant fiber type and can be determined in oxidation tests. As of summer 2011, customers will have available a pilot oven with both ventilation systems for this purpose at the EISENMANN technology center. Moreover, such a pilot oven can also be used in a pilot plant to determine the suitable process parameters on this basis.

In addition to further optimizing the oxidation process, the plant manufacturing specialists use the pilot oven to trial newly developed subassemblies and modules to set new standards in respect of economy, energy efficiency and reproducibility of the processes. The aim is to substantially cut the production costs of carbon fibers so as to be able to fully utilize the market potential of this promising material.

The carbon-fiber production process

The raw material is converted to a carbon fiber in a multi-stage thermal process with downstream surface treatment. The first process step, oxidation, serves to stabilize the raw material. In order for this to occur, the oxidation ovens have a temperature
range of 180 to 280°C. This process may last between 60 and 120 minutes depending on raw material.

This is followed by two-stage carbonization which occurs with exclusion of oxygen at temperatures of 350 to 1800°C in corresponding ovens. Carbonization is followed by electrolytic surface treatment and sizing of the fibers. Throughout the entire production process, pollutants are released, and these must be treated in corresponding exhaust air purification plants.

The Process & High Temperature Technology Business Unit of the plant manufacturing specialist in Böblingen, Germany, offers innovative oven technologies for the oxidation process and efficient exhaust air purification plants with energy-recovery systems, matched optimally to the process. The latter boost the efficiency of the overall system still further.

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EISENMANN (www.eisenmann.com) is one of the leading international suppliers of general finishing technology, materials flow automation and environmental technology as well as high temperature technology. Close to 2,800 qualified employees develop new technologies and facilities for production, assembly and distribution. Engineers, technicians and specialists from various disciplines handle the planning, design, construction and start-up operation of the most advanced systems, including maintenance and system operation.
Photographs:

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Schematic representation of a production line for carbon fibers.

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