Press release

Steel Europe

September 5, 2017

Electrical steel from thyssenkrupp plays a key role in power supply and e-mobility

Electrical steel is possibly the most important yet most underrated material of the future. It will be vital to our energy supply and the success of the transition to renewables. Electrical steel plays an important role wherever electricity is produced, transformed and used efficiently. E-mobility is a prime example. thyssenkrupp is well prepared to meet these challenges.

Demand for electrical energy is growing all the time. The aim is to meet these rising requirements primarily with renewable sources. Electrical steel from thyssenkrupp supports the transition to renewables. The iron-silicon alloy of the steel determines the efficiency of generators, transformers and motors, which should be as high as possible, and their energy losses, which should be as low as possible. “Electrical steel from thyssenkrupp is used wherever there is a need for energy efficiency,” says André Matusczyk, CEO der Automotive business unit at thyssenkrupp Steel Europe (Duisburg).

The company manufactures products that are used for example in the generation of renewable electricity: The new generation of non-oriented electrical steels plays an important role here, for example in the modern generators used in hydro and wind power plants. The steel combines and strengthens the magnetic flux inside the generators, allowing mechanical rotational energy to be converted into electricity without major losses. “The efficiency of the generators and the power plants depends to a large extent on the material properties of the electrical steel,” says Matusczyk.

Transformers regulate voltage

“To be able to transport electricity over large distances it needs a higher voltage than it has when it is generated,” says Dr. Jens Overrath, CEO of the Electrical Steel business unit in Gelsenkirchen. For this, transformers are used that include grain-oriented electrical steel. “The voltage for transportation is around a thousand times higher than in domestic wall sockets. To be able to use the electricity once it has been transported, the voltage needs to be reduced again – and we need transformers for that too,” says Dr. Overrath. A particular

challenge for Electrical Steel and its grain-oriented products is meeting the EU's Ecodesign directive, under which requirements for the efficiency of transformers are being gradually tightened to allow energy to be transported with even lower losses.

New premium grades reduce noise levels

The loss rate in Germany is currently between two and three percent. "In the future more differentiated electrical steel grades will be needed for this. We are already well positioned with regard to these premium grades, and are participating in these developments with our high-grade grain-oriented products," says Dr. Overrath. Over the past 20 years the company – a business unit of thyssenkrupp's steel division – has already improved the energy efficiency of electrical steel by almost 40 percent – and there's more to come. The new premium grades help reduce both energy consumption and noise levels. "The electrical steel is only 0.18 millimeters thick and makes transformers quieter," says Dr. Overrath.

Improved magnetic properties

While the Ecodesign directive applies to grain-oriented electrical steel, the non-oriented grades from the Automotive business unit are governed by the Energy Efficiency Act. Manufacturers of industrial motors need to meet specified levels of efficiency, e.g. for household appliances. Efficient electrical steel is also an indispensable element of e-mobility, both now and in the future. "Without steel there can be no e-mobility. Electrical steel is a vital component of electric motors," says Matusczyk. To this end thyssenkrupp also supplies high-strength electrical steel grades to allow the construction of high-speed motors. Their improved magnetic properties, e.g. in the rotor, make motors more efficient and thus give electric cars a greater range. These properties are guaranteed even at higher frequencies and thus ensure the efficiency of the electric motor even under high loads. "And that is a key aspect in gaining acceptance for electric cars," says Matusczyk. The material also displays great resistance to the effects of processing, such as may occur during stamping, allowing intricate rotor designs and lowering costs by using less material in the magnets.

Non-oriented electrical steel grades are tested for use in vehicle motors at thyssenkrupp's dedicated E-Mobility-Center in Bochum. "We test how the product behaves in the final application at various stages of processing, because an electric motor for a car has to meet

different requirements than an industrial motor," says CEO Matusczyk. It has to perform very different tasks: From cruising to uphill starts, from sudden acceleration for overtaking to stop-and-go city traffic. In addition to the use of special electrical steel to improve the efficiency of electric motors, modern steel solutions are also used in car bodies. thyssenkrupp has been involved for years in projects such as Deutsche Post's "StreetScooter". Important aims included reducing weight cost-efficiently with steel and providing maximum protection to the battery of an electric vehicle in the event of a crash. "The question is not whether e-mobility will take hold, but when," says Matusczyk. "We are prepared."

Smarts grids needed

For consumers, issues such as vehicle range and the availability of charging stations play a very important role. The more charging stations are needed, the more feed-in points and distribution transformers will be required. "If the number of electricity users rises, distribution capacity will have to be increased. It doesn't matter what the electricity is used for," says Dr. Overrath. E-mobility is exacerbating this situation because the distribution networks in Germany and Europe are currently inadequate. "The transition to renewables and intelligent energy distribution go hand in hand." That calls for intelligent distribution networks, so-called smart grids.

Fluctuating demand for electricity already needs to be managed and balanced. With increasing use of renewable energies, which are not continuously available, this task will become more complex in the future. A data network will therefore operate in parallel to the power grid to coordinate the generation, storage and distribution of energy with the help of new transformer concepts. "The demand is there," says Dr. Overrath. "We can already supply the grain-oriented electrical steel needed for these smart transformers." This shows: thyssenkrupp provides solutions for the transition to renewables.

thyssenkrupp Steel Europe AG, Kaiser-Wilhelm-Straße 100, 47166 Duisburg, Deutschland, T: +49 203 52 -25168, press@thyssenkrupp.com, www.thyssenkrupp-steel.com