

Amorphous transformers lower no-load losses

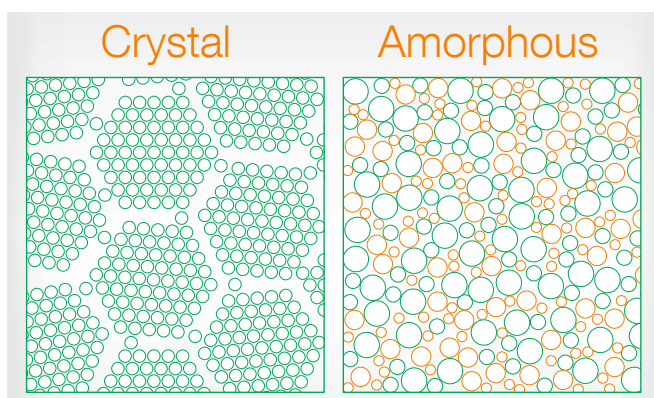
ABB is a worldwide innovation and technology leader for amorphous transformers, which can have up to 70 percent reduction in no-load losses than transformers with cores made from regular grain oriented electrical steel. SÜC Energie and H²O GmbH (SÜC) in Franconian Coburg have signed a framework agreement with ABB, to use 20 of these transformers in their distribution network.

Transformers are a little bit like refrigerators: There are cheaper models that are available but they consume much more energy and then there are energy efficient models, for which one must dig deeper into one's pocket. "For a long time in Germany, there has been a lack of incentive when it comes to more energy efficient transformers," explains Danijel Ramljak, Head of Sales Support for Transformers at ABB in Germany. That will change with the new EU regulation for transformers, which

became effective on the July 1, 2015. From then on, companies must invest in transformers that are more expensive with better efficiency levels. "The potential for improvement is immense," says Heiko Köhler from ABB regional sales. "In all of Germany more than 600,000 distribution transformers may be in use".

Amorphous transformers are especially energy efficient and fall well below the new limits by a long way – even below the more strict regulations that will go into effect in 2021.

The core of the amorphous transformer does not consist of a conventional, grain orientated electric sheet, but instead it consists of a much thinner sheet that, upon first look, resembles household aluminum foil. The material is cooled rapidly, resulting in an extremely fine, metallurgical amorphous structure. The effect: There is a quick alternating frequency for the alternating current and therefore the reversal of magnetization needs a lot less energy, than is the case with conventional electric sheets. Consequently, the no-load losses of the amorphous transformers can be reduced by up to 70 percent.



The reason for the efficiency of amorphous transformers is its core. It is made of a very thin amorphous metal that makes the reversal of magnetism much easier than the crystalline structure of conventional electrical sheets.

Profitability decides

The acquisition of amorphous transformers is more expensive than conventional ones; therefore, they have thus far been seen as a niche product in the German market. "It is firstly a question of the profitability, and secondly a question of the legal incentive schemes," Danijel Ramljak explains. Operators of distribution grids share the same views.

For Matthias Laub, head of the planning and network management department for

SÜC Coburg has chosen to use the energy efficient amorphous transformers due to profitability and environmental protection.



SÜC, in the area of electricity, the decision was clear, “We are an innovative company, that is very open minded when it comes to new technology, and we think of the long-term.” The company provides about 60,000 households and 1,000 commercial companies with energy and water. “Sure, the amorphous transformers are expensive,” says Laub. “But they also save a lot of energy – and that is over their life-span which is between 30 and 40 years.”

Trial successful since 2013

During testing of the particular designs of this contract, a reduction in the no-load losses of 50 percent below those of equivalent regular grain oriented electrical steel was noted. Due to the low losses, SÜC can feed its' self-produced energy into the network in large amounts, which shortens the amortization period of the transformers. The economic advantages are however only one side of the coin. “Through the use of amorphous transformers, it is certain that we can meet the ever stricter regulations of the EU for a long time to come. At the same time,

we can show that we are committed to energy efficiency and climate protection.” As early as 2013, SÜC decided on the trial purchase of two amorphous ABB-transformers with 400 and 630kVA. “We are very pleased with these units so far,” emphasizes Matthias Laub. A few months ago, the positive experiences led to a framework contract. In 2015, ABB will deliver 20 amorphous transformers from the 250, 400, 630 and 800kVA performance category to SÜC.

The innovative, energy efficient transformers will replace older models, but are also envisioned for use in new living and commercial areas. “For the first time, we have ordered a transformer package that is made up entirely of amorphous constructed units,” says Laub. What particularly convinced him? “No other company has as much experience in building amorphous transformers as ABB.”

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EU prescribed efficiency

Transformers hold a high potential for energy savings. The total losses in the European Union (EU) is estimated to be 100 billion kWh per year. This correlates to an emission of 40 million tons of CO₂. The new EU regulation 548/2014 sets the minimum efficiency levels of the transformers that will be sold and used in the European market. The legally binding levels set by the EU, as well as Norway, Iceland and Lichtenstein, are applicable to dry-type transformers, liquid-filled distribution transformers and for power transformers with a minimum power rating of 1kVA, that are deployed in the electricity network or industrially. The regulations introduced on the July 1, 2015, will be tightened on the July 1, 2021.