By putting intelligence into transmission products, digitalization offers huge opportunities to optimize the whole energy system and make it more compact, efficient, smarter, and faster.
Digitalization of transmission products
Sensformer® and Sensgear® well received by grid operators

ABSTRACT
The digitalization of transmission products offers huge opportunities to optimize the whole energy system and make it more compact, more efficient, smarter and faster by putting intelligence into the products. With Sensformer® and Sensgear®, Siemens is a pioneer in the market. Together with its customers, Siemens wants to get the most out of digitalization in energy transmission.
The energy system is changing rapidly

The integration of an increasing amount of renewable energy poses major challenges on grid operators. The higher number of power producers and the intermittent energy flow raise the complexity of grid management significantly. At the same time the expectation towards grid operators regarding profit generation, health, safety, and environmental protection are increasing. How can the conservative industry meet these challenges? And how can equipment suppliers support grid operators?

The digitalization of transmission products is a field that Siemens has been contributing to for several years now, most noticeably with Sensformer technology, the comprehensive digital transformer portfolio launched in 2018. Meanwhile the complete transmission products portfolio was updated under the premise of the digitalization imperative, including sales of other transmission products with Sensgear technology from April 2019 onwards.

**Digitalization is a chance and an enabler**

Digitalization offers huge opportunities to optimize the whole energy system and makes it more compact, more efficient, smarter and faster by putting intelligence into the products. Nevertheless, Siemens builds its new products on a proven foundation. The physics of the products, as well as performance and quality, stay the same. Siemens adds a cybersecure digital layer to the products to make them connective for grid operators.

A well thought out technology roadmap shows a very easy entry into digitalization without any additional risk for customers. Sensformer and Sensgear are very user-friendly and deliver technical key data and understandable information at very little or even no extra costs. The information is available anywhere at any time and uploaded into the cloud in what is almost real-time. The grid operator remains owner of the data, which is generated by his assets.

Siemens offers advanced features for data analysis to enhance equipment productivity and support decision-making, while for security reasons there is no interference with the existing control and protection environment of the grid operators. The analysis of the collected data in combination with historical malfunction data provides the opportunity to predict the lifetime of products and calculate effects of utilization on lifetime in advance. Grid management will be more flexible and more efficient than ever before. In addition, the digital twin technology, which mirrors the physical asset in a digital way, allows users to get more out of their assets without increasing their capacity by temporarily run-
ning the Sensformer asset under controlled overload conditions. These digitalization measures will therefore increase safety and reliability of operation while decreasing CAPEX or reducing re-dispatching costs caused by congestion measures. Simultaneously, Sensformer and Sensgear increase environmental protection by predicting or identifying oil and gas leakages as soon as they arise.

Customers value the opportunities Sensformer® and Sensgear® provide

Digitalization is currently the dominating topic at all fairs, colloquia and technical discussions. Utilities and grid operators are setting up resources to manage the topic of digitalization and to benefit from the opportunities digitalization provides. The introduction of Sensformer in 2018 was the first step and it was very well received by transformer operators all over the world. Especially the availability of status information and the alarm messages in case of asset overload and ageing emergencies are very much appreciated. Cloud-based application and cyber security were major concerns about digitalization brought up to Siemens. That’s why they are addressed with top priority.

The experiences and feedback gathered during operation of digitalized products has been incorporated into further innovations with digital twin technology – like the Sensformer advanced features of aging calculation based on the individual asset design and load. Customers’

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cybersecurity concerns are addressed by a concept applying the latest state-of-the-art security standards. Together with other industrial leaders, Siemens is a member of the Charter of Trust for cybersecurity founded in 2018 and thereby commits to develop and apply mandatory cybersecurity certifications for critical infrastructure.

To sum up the last 15 months of the journey to digitalization, Siemens Sensformer and Sensgear are already making a mark in the networks of grid operators. Over 500 Sensformer products have already been delivered. The paradigm shift in the industry has started to happen. Siemens is also making inroads with Sensgear technology, receiving the first 39 Sensgear orders from customers in Europe and Middle East until September 2019. Besides, Siemens is in discussions with leading network operators in Europe and Americas who want to upgrade Sensformer with Sensformer Advanced, which offers extra insights through additional sensors and a digital twin model, allowing them to better manage temporary overloads and optimize equipment longevity.

**Transmission as a commitment**

With digitalized transmission products, Siemens is a pioneer in the market and the opportunities for customers and the company itself are enormous. Sensformer and Sensgear deliver a user friendly customizable and scalable ecosystem providing transparency and more productivity to products under different conditions. Customers will manage their grids more efficiently and consequently more profitably.

Nevertheless, the industry is at the beginning of learning what this technology can bring and it is getting much more information and another view on the products. Siemens constantly focuses on supporting customers to secure and expand the installed transmission base in the best possible way.