How edge computing gets the right drive

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Seamless across the system, digitalization, cloud computing: One trend follows the other in quick succession. For manufacturers as well as users of plants and machines, it isn't always easy to clearly understand the practical benefits of megatrends such as these. As a consequence, automation experts such as Siemens are putting considerable emphasis on developing sustainable and strategically sensible holistic solutions. Here, edge computing plays an important role. Also from the perspective of drive technology, this is of strategic significance when it comes to increasing efficiency and sustainability. In addition, topics such as simulation and virtualization are being increasingly promoted.

With the appropriate Edge applications, Siemens wants to play its role to help optimize automation and machinery construction. This is to be incorporated in Siemens drive technology during 2020.

Today, industrial workflows massively differ from what previous generations experienced. The reason: The seamless digitalization of increasingly larger fields of activity – ideally from development up to operation including service for plants machines and systems – is now having a positive impact in all industrial landscapes. Here, Siemens is using its decades of experience in automation, drive and application know-how to develop new innovative solutions and services. This is reflected in the fact that for many years now, this digitalization trend represents the necessary drive for an "Industry of the future".

And the term "Drive" propels us right to the center of this topic: Initially, digitalization and sustainability predominantly concentrated on the control and SCADA environments. Now, the field level is on the move, and with it, drive technology. This means: Today, a wide spectrum of very detailed digital data can be harvested from drives, and in the future, this data can be better leveraged than ever before. Keyword: Edge computing.

Edge computing heralds in a new era
Future-oriented automation strategies intensively concentrate on cloud computing (e.g. MindSphere from Siemens) and in turn, the Internet of Things (IoT) has become the focus of state-of-the-art overall solutions. In the meantime, edge computing is developing. It envelops this large, digital nucleus and heralds in a new era for cloud-based digitalization strategies at the boundaries – hence the name edge. From the perspective of drive technology, this signifies a higher degree of transparency, intensive data analysis and completely new possibilities when it comes to development, operation and optimization. The name of the game is to leverage the information, which drive converters supply en masse – predominantly with fine granularity –

and use this data efficiently to generate valuable know-how. This allows time-to-market, productivity and availability to be increased without having to intervene in specified (new systems and machines) or available (existing systems and machines) control architectures.

What does this mean from a practical perspective? In principle, it simply means that a huge quantity of data, which can be harvested from state-of-the-art drive solutions, is preprocessed in a knowledge-based way. Siemens has developed solutions to address this, which are based on the company's own know-how and can be leveraged to precisely analyze high-frequency operating data (data in the microsecond range). Edge applications are required to efficiently use and process high-frequency data and large data quantities.

Edge applications for distributed – which means local – data preprocessing

The real challenge involves assigning all of the measured values along the time axis over the complete operating time of electric drives with existing automation know-how. Siemens has already been successful in doing this balancing act with solutions such as its "Analyze MyDrives" Mindsphere App. At the end of 2020, this IoT-concentrated cloud service will be supplemented to include a distributed Edge application. This will allow Siemens drives to be simply linked to the Industrial Edge platform, therefore facilitating simple entry into the next level of electric drive digitalization.

This means that manufacturers of systems and machines – as well as the companies operating them – are able to digitally evaluate data from individual drives or drive groups easily and at a low associated cost. And it is not necessary to intervene in existing control architectures or programs. The data is digitally analyzed locally by preprocessing it in very close proximity to the drive. The results of the analysis are transferred to the control system or the cloud via a data link, which eliminates cabling and computer resources.

Edge platform as the next step in the value-added chain

With this as background, Siemens will integrate its Sinamics drives and other field devices into the Industrial Edge platform using the appropriate Edge devices. This gives companies the opportunity to embark on the next step in the value-added chain. This is because this local data preprocessing provides important information so that the drive train can be further optimized. Here, optimization involves perfectly adapting the drive train to the prevailing operating conditions.

In this context, this predominantly means line condition monitoring. With detailed data about the actual condition of a drive, requirement-oriented service and maintenance strategies can be easily implemented. This allows the availability of drive solutions and therefore the complete system or machine to be increased, and technical improvements to be implemented in parallel. However, not only service and maintenance are addressed, but also the ability to make predictions in plenty of time if the evaluated data indicates that something has changed either in the application or the machine. Keyword: Target groups want to know the condition of their system or machine. However, in the future, Edge applica-

tions will play an even more important role in the entire design process than just optimizing operation in the field.

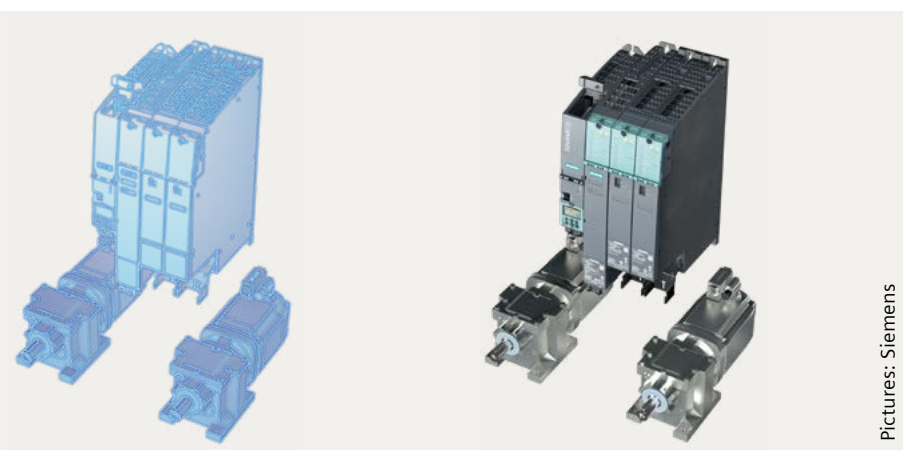### Digital twin for future visualization strategies

In conjunction with the appropriate engineering tools, which Siemens has already been providing for some time – such as the TIA Portal with SINAMICS Startdrive, CAD Creator, etc. – drives can already be digitally used and/or processed from development through to operation. This also involves perfectly coordinating the digital twins from production and performance using precise (edge-based) analysis of drive data, facilitated using the Edge platform and the Edge App. The trajectory to reach these objectives encompasses simulation models of machines and all of the relevant drive components.

We still have some time to go before this is achieved. However: In parallel with the trend towards seamless digitalization, system and machine builders as well as end users are increasingly wanting a complete virtualization. Without having to handle any physical hardware, they want to be able to carry out design and commissioning work and engineer drives in this virtual environment. The advantages are quite clear. Time-to-market cycles are shortened, quality increased, efficiency boosted and faults resolved before they are even made.

Edge computing

Edge computing represents another additional cornerstone to establish precise behavioral models and in turn to virtualize systems and machines. As a consequence, Edge applications will also play a central role in drive technology, which is reflected in the fact that Siemens will launch an Edge Drive App in 2020. These Edge applications are seamlessly embedded in the Digital Enterprise and Totally Integrated Automation (TIA) success story, and are therefore an important cog in the large workings of a state-of-the-art, fully digitalized industry of the next decade.

Siemens supports the virtualization trend so that systems and machines can be developed, built and optimized even more efficiently.

Pictures: Siemens

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