Fine Threads for Tires of the Highest Quality

For its thread treatment plants, Mehler Engineering + Service Gmbh requires above all a reliable drive system. The modular Sinamics frequency converters impressed the company’s automation team with their control characteristics and simple handling and are now used to drive the servomotors.

Tires, inner tubes, and seals owe their extreme strength to the integrated tire cord. Fine threads – for example, made of polyester or polyamide – form the base for this sturdy final product. However, in order to achieve the desired strength, the threads used must be individually pretreated in thread treatment plants.

Drives as a quality factor

Mehler Engineering + Service Gmbh (MES), Germany, which is based in Fulda and has roughly 80 employees, specializes in building these kinds of thread treatment plants. Up to 120 threads run in parallel in one creel – at speeds of up to 200 m/min. MES recently delivered a plant about 80 meters long and 8 meters wide, containing drawing units, an immersion system, and idle rolls for even cord tension. The servomotors required for this are driven by Sinamics S120 frequency converters. Detlef Haas, automation planner at MES, emphasizes: “The drive system is a decisive quality factor because only when the production parameters are maintained and the threads are treated correctly does the quality remain consistent.”

In the drawing units, the threads receive the necessary mechanical pretreatment. The differences in speed required for stretching or shrinking are achieved through frequency modulations over the basic frequency. However, the threads go through the immersion unit at a consistent production speed. The threads are immersed in the liquid with the aid of several rolls. At the end of the plant, idle rolls ensure the smooth passage of the threads through the drying zone, using a dynamic torque control with friction compensation. Then the threads are wound onto cross coils or parallel coils.

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Detlef Haas, Automation Planner, Mehler Engineering + Service Gmbh

Versatile converter for individual solutions

“The Sinamics frequency converters proved to be especially beneficial for us due to their control char-
characteristics and their simple handling,” explains Haas. The modular design of the units is considered their essential advantage, as it allows the free combination of operating and control performance. The Drive-cliq system handles the data connection in this process. This digital interface connects not only the individual power modules with the control unit but also the motors with the transducers. “It could hardly be easier,” sums up Haas.

Another advantage of the Sinamics S120: the drives are available with output ranges between 0.12 kW and 4,500 kW. At MES, a typical drive size of up to 50 kW is sufficient. The power is usually supplied through a 600 V direct current busbar, because in the case of multiple applications such as the thread treatment plants, a distributed DC/AC drive concept has proven to be especially advantageous and space saving. Not least, the Sinamics frequency converters can control a wide variety of motor types. Furthermore, they are even capable of recovering energy using line modules, thus benefiting the energy balance of the company.

“In addition to the purely technical advantages, however, the devices also impress with their handling,” says the automation planner Haas, referring primarily to the simple programming and parameterization of the frequency converters.

At MES, Starter – the standard commissioning tool for all drives of the Sinamics family – is used at the control level. “We consider this to be very practical, since the settings are stored and archived with the program. This saves us the otherwise necessary manual data input,” says Haas.

All important safety functions included

One of the key reasons MES chose the Sinamics converters was the fact that they include all important safety functions. “Only very few frequency converters offer such a comprehensive functional spectrum,” stresses Haas. For example, the devices are able to execute several different safety functions. The SLS (Safety Limited Speed) safety function plays a particularly important role in the thread treatment plants, because when, for example, the threads need to be newly drawn in during set-up, the drives must turn at correspondingly slower speeds. And the option to program all the safety technology from the control system and parameterize the devices from there further simplifies the engineering.

Positive results

The example of the thread treatment plants by MES clearly shows the value of modern drive technology. MES benefits from the many advantages offered by the modularly designed Sinamics S120 frequency converters, which significantly simplify both the planning and the commissioning of the plants. “We value the system solutions from Siemens, which is why we have been using them for years,” confirms Haas.

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