Drive generation change

Benninger Zell GmbH, Germany

Totally Integrated Automation in impregnation systems for technical fibers with SINAMICS

For years now, Benninger Zell has been depending on Totally Integrated Automation for its impregnation systems for tire cord and other technical fibers. The global market leader has now completed the change to the latest generation of drives – the SINAMICS S120. The machine manufacturer as well as the end-users both profit to the same extent. At the beginning, various manufacturers of transport belts became involved with the mining industry in the US and China as well as with the manufacturer of cord fibers for the tire industry. The conveyor belts used in mining are used to transport earth, ores and coal – often along stretches of several hundred kilometers. The width of new transport belt conveying systems has been increased from 1.6 up to 3.2 m; this places high demands on the drive system and the design of the belts. The “core” of the textile fiber must bear the majority of the forces that occur.

The advantage of textile-based conveyor belts: if they break, they can be more simply spliced than steel-armored versions. This has led to a certain end-user preference – and in turn, to a whole series of orders that Benninger Zell has in-house.

Stability to the power of three

An absolute must for the consistently high quality of the impregnation – and the success recipe for this company belonging to the Swiss Benninger AG – is the absolute constant tensions, temperatures and times during impregnation. This secures the optimum adhesion of the rubber or plastic coatings that are subsequently applied to the material – even under extreme loads and continuous bending cycles. For years, Benninger Zell achieved this demanded stability – especially in the continuously running center section of its systems – using control and drive technology from Siemens.

A redundant PC system enters the set-points, which communicates with the SIMATIC S7-400 system control via Ethernet. Several tension units with driven roll pairs are connected to the SIMATIC PLC control via Profinet. These roll pairs are precisely coordinated with one another, therefore guaranteeing that the continuous material web is precisely stretched – or that is to say constant tensions and bumpless changeover between stretching and tension. According to Benninger Zell, the speed of the drives must be controlled with an extremely high precision and a synchronous operation tolerance of 0.1% continuously maintained. As a consequence, the company critically views any potential change to a proven, running system.
New drive generation with advantages:
Having said that, Benninger Zell wants to sustainably secure its leading position in the market – and of course innovation represents the best way of achieving this. This is the reason that the company has now brought its drive solutions up to the latest state-of-the-art technology. It is called SINAMICS S120 and still has the high closed-loop control quality of MASTERDRIVES – its predecessor. The SINAMICS family is seamlessly integrated into the well-proven SIMATIC STEP 7 system platform; this means the maximum degree of seamless integration in the configuring/programming as well as the communication and data management between the control, HMI and drive levels. And as a consequence, significantly simplifies a lot of work – from engineering up to (remote) diagnostics. Benninger Zell has consequentially used the modularity and scalability of the new SINAMICS system and has developed a drive concept that is also applicable for future systems as it is simple to transfer and adapt. In this case, a SINAMICS CU320 Control Unit is used for the motors for the unwinder, process section and winder plant areas respectively. The digital system interface DRIVE-CLiQ connects the associated components with one another and eliminates all of the signal transmission problems that used to sporadically occur for cable lengths of over 100 m. The machine manufacturer also sees an additional advantage in the fact that the interaction between the SINAMICS converter and the standard Siemens induction motors is intensively checked to ensure that it functions perfectly in the field. This is an additional detail that shortens the time to market as well as the commissioning of a system. The drive line-up of a typical impregnation system for transport conveyor belts includes nine single-motor drives (DC/AC) with power ratings of up to 30 kW for the material web transport, six auxiliary drives (DC/AC) as well as six fan drives (AC/AC). Also part of the system are 18 smaller MICROMASTER 440 units to power the motors for the lateral guides controlled via the SIMATIC ET 200.

Saves space, costs and effort
The modular system design with its autonomous control modules (Control Units) and power units (Motor Modules) in a compact booksize format saves space in the control cabinet so that in the future, smaller standard control cabinets can be used – which of course, are more favorably priced. The common DC busbar also means that disconnectors, fuses and copper busbars can be eliminated, therefore significantly reducing the installation and wiring costs. The parameter assignment of the motor modules used in the system (available for one or two motors) is saved on the compact flash memory card in the Control Unit. This means that it is immediately available when service is required. This keeps downtimes short and the productivity of these systems – which basically run around the clock – at the highest level. Not only this, but with the changeover to the new generation, Benninger Zell has again secured the long-term availability of spare parts, which for system lifetimes of up to 30 years is an advantage for future customers that should certainly not be underestimated. As a well known brand, many users prefer Siemens as they know they can offer spare parts and support around the globe. The changeover to the new drive standard in the impregnation systems of Benninger Zell went smoothly during their day-to-day business without any problems of note. Siemens drive specialists supported Benninger’s inhouse team for two days during the hot phase while the system was being commissioned.

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