



SIEMENS

Ingenuity for life



Siemens is accompanying
Scheiter and the tire industry on
the path toward Industrie 4.0



[siemens.com/tire](https://www.siemens.com/tire)

The tire industry is an international business: the manufacturers are distributed around the globe. For the key element of tire production, the curing presses in which the tires are vulcanized, Scheiter Ges.mbH in Austria provides complete systems for supplying media such as hot water, steam, cold water, cooling water, vacuum, and nitrogen. Since the demands on the pressure and temperature of the medium are especially high, process know-how becomes particularly important. Last but not least, reliability plays a decisive role, because without a reliable supply of media, production comes to a standstill. Siemens, as a company with a global presence, is a proven, long-term partner of Scheiter in the field of drive and automation technology. It sets standards in matters dealing with Industrie 4.0 and digitalization – not only in tire production.

Vulcanization is a complex process, which is characterized by two main parameters: pressure and temperature. The inserted gives the tire its final appearance, including the

profile. But it is not just the external shape of the tire that is decisive, the internal shape is also important. For this reason, an inner membrane, the “bladder,” is inserted into the green tire and pressure and temperature are applied. The temperature profile also has to be right: e.g. the tire would become too hard if the heat is too high. The media that are pumped into the bladder are steam/hot water, steam, and steam/nitrogen, because this way, depending on the current need, the temperature or pressure curves and the hardening times can be precisely controlled. And, to define the correct temperature process, even more parameters must be considered, such as the starting temperature of the tire blank and of the machine. All in all, it is an extremely demanding process, especially considering that the vulcanization of a tire can take anywhere from ten minutes to one day in the case of tires for mining vehicles. In modern production plants, the process data of each individual tire is documented – not least to continuously check internal processes and to ensure the highest quality. Today, tire production is automated and completely digitalized.

Which medium, what temperature, what pressure?

The actual know-how in tire production is in the process sequence: What temperature and what pressure are required when for which medium? To ensure the necessary level of productivity, in some cases more than 400 tire presses are in operation in the bays of the tire manufacturers. The supply of compressed air, hot water, steam or nitrogen to the presses takes on a key role, because normally there is no separate supply infrastructure (provision, distribution, automation) for each individual press.



Fig. 1:
Piping for SCHEITER® hot water plant with recovery system including all secondary plants for the tire industry

If the supply of media fails, all of the presses and thus the entire factory come to a stop. One challenge for the automation system is also to ensure that only a specific number of curing presses can start up at the same time in order to avoid causing impermissibly extreme pressure drops in the supply lines. At the same time, however, it is also important to be economical with the media that is fed into the bladder: It is in the interest of the plant operator to recover as much media as possible due to cost considerations.

Media supply as a key technology

The specialist company Scheiter Ges.mbH. Wärmetechnische Anlagen in Vienna (Austria) has been in existence for almost 25 years. The family-owned high-tech company has comprehensive plant engineering know-how and consistently relies on long-term customer relationships. Innovation is the driving force that motivates the employees, because they are fully aware of the quality and the comprehensive customer benefits of the delivered systems. Naturally, this also applies to the media supply systems for tire presses delivered around the globe. Thus, Scheiter has succeeded in feeding around 95% of the recoverable media

back into the process, which is considerably higher than the market average. In addition, thanks to patented technology, a uniform distribution of temperature in the bladder and savings in steam of approx. 50% per cycle are achieved.

Process stability and energy efficiency

Besides the extraordinary energy efficiency, another strength of the Scheiter systems is that the pressure and temperature parameters are kept extremely stable. If the medium is removed unevenly, considerable pressure fluctuations can occur in the media infeed. With its advanced experience and technology, the company keeps this in the hot water feeder at under ± 0.5 bar (with 20 to 35 bar of pressure applied); and the temperature stability is extremely high at ± 0.5 °C. With pressure fluctuations of up to ± 10 bar, the competitors' systems are considerably less stable. Furthermore, a technological lead also means that only the highest value components are used – both in the electrical and in the mechanical part. Each system is developed customer-specifically, which means that as early as the engineering phase consideration is already given to what end product, i.e. which tires, will be produced. In addition to the manufacture of new systems, another business field is the thermal engineering and energy-oriented retrofit of existing systems – namely, heat recovery. The optimal dimensioning of a supply system plays an important role for Scheiter.



Fig. 2:
SCHEITER® hot water direct exchanger with heat and media recovery system incl. thermic degassing



Fig. 3:
Switch board for SCHEITER® hot water plant with recovery system including all secondary plants for the tire industry

And Scheiter has comprehensive know-how – supported by the latest measurement technology – in regard to knowing how the system must be laid out for which medium, at which temperature. As a result, the systems remain stable both at very low loads and during overload (20 to 120% of the rated load).

Reliability is essential in automation

It is clear that a technology company like Scheiter must also have in-depth knowledge of and master the products of all suppliers. This starts with container construction and naturally includes control and automation engineering. Standardization is becoming increasingly more important in tire production as well under the aspect of Industrie 4.0 and rapidly advancing digitalization. Both Scheiter and its customers therefore appreciate the advantages of the Siemens SIMATIC S7-1500 control, which is seamlessly integrated into the automation architecture of the plant and which masters the respective process-related tasks due to its wide range of functions. The TIA Portal makes the configuration and programming especially easy. The control algorithms integrated in the operating system of

the controller allow the precise managing of all temperatures and pressures without much programming effort and thus allow Scheiter to easily implement the tasks required for supplying the media. For the tire producer, this controller, which is also distributed in the other plant units, has the advantage that the maintenance team will encounter familiar automation components in the media supply system as well. Thus, the media supply system provided by Scheiter can be easily and cost-effectively integrated into the maintenance concept at the plant end. All of the field devices, such as valves, flow meters or temperature sensors, are connected via PROFINET, the open fieldbus standard as per the PROFIBUS User Organization (PNO). They are all coordinated by the central SIMATIC S7-1500 controller and their measured and control values are visualized in the control room so that the operation of the media supply can also always be easily guaranteed.

Customers benefit from Siemens as a global company

The right portfolio – up to distributed, mobile operator control and monitoring devices – rounds off the range of performance, for example with the distributed control units attached to the curing presses, which allow the data to always be visible even in this area. Siemens products and systems not only stand for functionality, but also for a high degree of reliability. And, as already mentioned, this is the decisive factor in supplying media to tire presses: without it, nothing runs. In terms of reliability, Scheiter has had extremely positive experiences with the automation solutions from Siemens. Because the hot water systems require supervision, the required control cabinets are installed within view of the media supply system. Accordingly, these are found in a rather harsh environment. The efforts of Siemens to achieve maximum reliability can be seen in a concrete example: The SIMATIC S7-1500 controller is G3-certified. This means a very high degree of resistance to the effects of sulfur. A welcome characteristic in the harsh conditions of the tire industry. And this capacity for resistance has a direct effect on the life span of the controller. Because longevity is also a concern for many users – along with all of the consequences: Because no knowledge is ever lost at Siemens. Even when there is a generation

change, customers can be confident that the systems will be compatible and the supply of replacement parts will be guaranteed over the long term. Energy monitoring is also a trend now. The Energy Suite from Siemens provides planners, system integrators and users with software tools for keeping an eye on energy consumption. Siemens customers can thus be assured of a very appealing Total Cost of Ownership (TCO). The global availability and worldwide service round off the range of performance of Siemens in the international tire industry.

Further improvements to be expected

At this point, a brief glance at the future is permitted: Siemens is currently cooperating with various tire manufacturers to develop a library for the TIA Portal, which will be provided to both the tire manufacturers and especially to suppliers like Scheiter to allow the uniform, standardized programming and visualization of controllers, valves and other automation components. This is another step, both toward simplifying operation and for maintaining the supply of media, and also any other production machines used in the manufacturing of tires.

Author:

Scheiter GmbH
Susanne Scheiter

Siemens AG
Peter Haan
Digital Factory
Factory Automation

Products:

TIA PORTAL

Siemens AG
Digital Factory
Factory Automation
P.O. Box 48 48
90026 Nuremberg
Germany

Subject to change without prior notice
Produced in Germany

DFFA-B10482-00-7600
Dispo 06303
02180.1

© Siemens AG 2018