SOFTWARE PROVIDES PERFECT INSIGHT

REHAU-Group has optimized overall Energy efficiency and realized significant saving potentials thanks to implementing the WiriTec® C-Plattform

REHAU-Group is a specialist manufacturing company in polymers and generates an annual turnover of more than 3.5 billion Euro. A stable, independent and family owned corporation. More than 20,000 corporate employees are active world-wide in more than 170 locations. Across Europe, about 12,000 employees work for REHAU, out of which 8,000 in Germany only. REHAU provides solutions for the building and automotive sector as well as for the industry. Since over 70 years, REHAU has endeavoured to make polymer products even lighter, safer, more comfortable and more efficient. REHAU delivers innovative products to countries all around the globe.

Standort REHAU Rheniumhaus

Initial situation

At REHAU, the knowledge about the necessity to introduce an Energy Data Management software has developed gradually over the past years in several steps. At the beginning, the ISO 50001 certification helped a lot by reaching a structured overview to identify top energy consumers, i.e. major cost drivers, not only in the German but also in the European REHAU sites. In this context, it was very important to Frank Stegemann, to carry out a proper and reliable data capture. Thanks to the recently established inventory lists, the major energy consumers were detected and subsequently equipped with sensors.

„It was very interesting to see that internationally well-known software companies approached us stating that the introduction of an Energy Data Management software would run all by itself, without any further effort involved on behalf of the corporation. Many of them made comparable statements, which made us really sceptic", as Frank Stegemann, Director Building and Energy Services, points out. Therefore, a well-structured, thorough market analysis became indispensable.

Market analysis and system selection

Based on a precise bill of requirements containing 140 positions having different priorities, ten software manufacturers were closely examined. The overruling decision criteria were subdivided yet another time: Out of 140 points, 80 were defined as excluding criteria.

Thus, not only the functionality of the specific systems, but also their license model, the system's openness and the user friendliness were assessed. The successfully assessed solution providers were invited to carry out on-site presentations during an afternoon at the REHAU Group.

Finally, two software companies entered the last round of presentations. It was in the summer of 2016 when the decision was taken for the WiriTec Energy Management platform, which has reached a convincing result having gained 541 out of 548 possible points. One major element in the decision was the respective licensing model according to server and not according to data sets. „With 12 production sites in Germany and the resulting tremendous amount of data sets a licensing based on data sets cannot be handled any more, „ as Frank Stegemann underlines. „If we had a licensing based on the number of data sets, we would be obliged with each and every extension a new budget request, which will be impossible to monitor anymore. Furthermore, such a model would keep additional production sites from joining the WiriTec platform in a broad roll-out thus being pretty counter-productive to reach significant energy savings". And many more key benefits of the WiriTec software platform did convince the users: The grid diagrams, the pretty variable representation in the charts, the chart comparison options and, above all, the extremely intuitive GUI. „It was equally important to us to have users and administrators clearly separated from each other, such that the casual user will actually see only what he needs to have", as Markus Weiß, Energy Specialist at REHAU; underlines.

„The system is very intuitive in its inherent structure, everything happens exactly what I

expect to happen during system operation. In general, a software solution needs to be very easy to handle, such that you really like to work with. Otherwise, users will just go back to Excel“. Frank Stegemann completes this important insight by stating: „We have quite different user profiles in our production sites; there are engineers, technicians, master craftsmen, journeymen, which already achieved in their career. They all have developed their individual approach; however, they also need to reach results as quickly as possible. The challenge is to establish a system that will satisfy all different user groups the same way“.

For this reason, specific Energy Management-Workshops are held twice a year that focus on the WiriTec-Software for two hours respectively. In these workshops, exercises are distributed among the participants that are solved in competition. Thus, an additional incentive is created for continuous improvement in the daily use of the system.

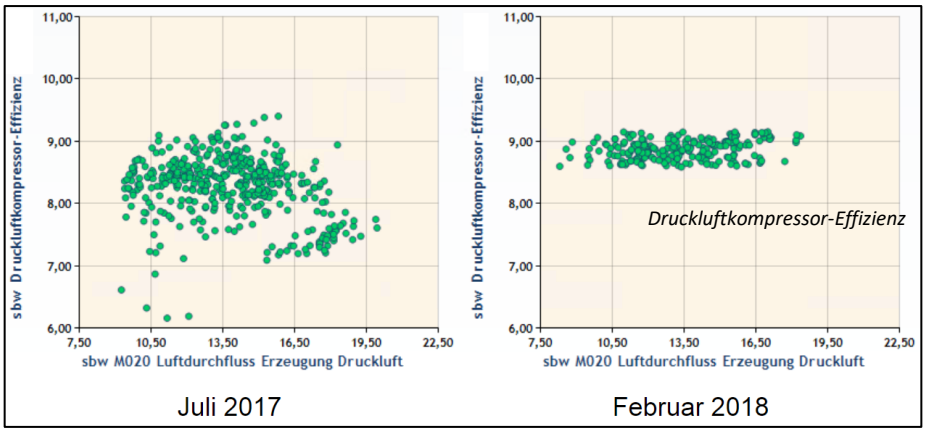
In this context we should not forget that WiriTec offers a universal data logger called “WiriBox® which fits perfectly for new and old production sites. The WiriBox can be implemented to building with no own central BMS .

System implementation and benefits achieved

„Our objective was to define KPIs for each system. We had to install sensors, particularly power meters, flow meters, sensors for temperature and pressure. The plausibility of different consumption values needed to be validated, particularly power consumption values, heat quantities of heating systems, flow volume in water pumps, compressed air and cooling generators”, as Frank Stegemann describes the various steps that had to be taken during system implementation. The following questions had to be addressed: How does the generation of compressed air look like when having different production loads? How many kilowatt hours do you need to generate one cubic meter of compressed air? After the implementation of the WiriTec platform it was pretty easy now to find adequate answers to these questions.

Furthermore, the individual production sites have been encouraged systematically to install the necessary sensors. „There will be good return on these investments“, Frank Stegemann points out, „because it has been obligatory for new construction or large refurbishments projects to plan and subsequently install respective sensors right from the start since we have introduced the WiriTec® C-platform in 2016. This is far more cost-effective than retrofitting existing systems, as you will take advantage of an overall discount during the construction projects.

Thanks to the implementation of the software, totally unexpected saving potentials could be identified that nobody thought to be realistic. Thus, the efficiency KPI of compressed air devices revealed an inexplicable connection of an outdated back-up compressor over a six-month period, although those devices were accurately set and adequately programmed. Eliminating this condition allowed to save around 10,000 € per year. In the same way, both start-up and switch-off periods of compressed air devices have significantly been optimized and idle times minimized. In addition to that, switching-on and off of cooling generators could be tremendously optimized thanks to the results delivered by the WiriTec-software. This brought about the effect that only the actually needed amount of cooling generators have to operate at a sufficient temperature difference.



Yet another example of realized saving potentials can be found in an entirely different field: An exterior temperature sensor was installed at an exterior wall as command variable for controlling the free cooling mode. This sensor is exposed to different solar radiation intensity during the day. In spring and autumn time, due to the rapid heating of the sensor at sunrise and clear sky, the inefficient cooling generators were switched on for several hours, although free cooling mode would have been possible in many cases. Only via the weather data implemented in the WiriTec-system this faulty switching could be detected. The invest carried out for eliminating measures by shadowing the sensor at the

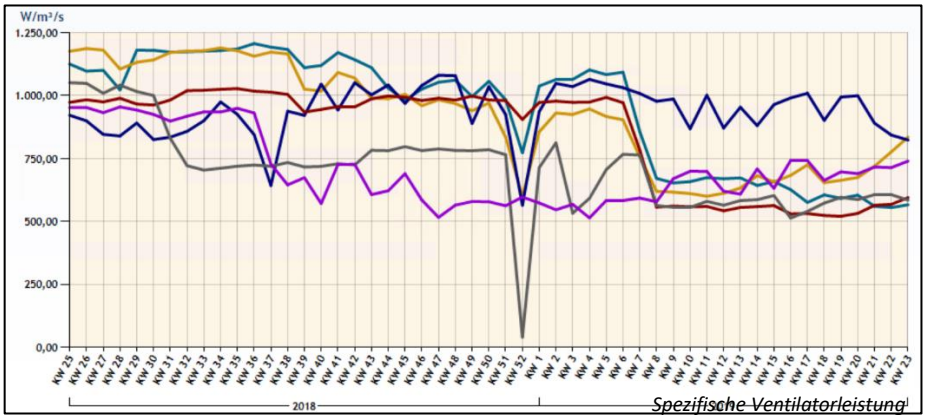
exterior wall are neglectable; however, it generated yet another 10,000 € saving per year.

Saving potentials realized in production thanks to Predictive Maintenance

Stand-by-periods of extrusion systems could be reduced significantly. „We were able to recognize when a machine is not in active production mode, but continues to run in stand-by-mode, though. The WiriTec-software gave us perfect insight.“, Frank Stegemann underlines, „. In addition to that, the analytic results provided by the WiriTec-software leaded to a subsequent systematic control of the respective energy manager for extrusion and blow-moulding equipment“.

Furthermore, the power consumption and air flow of ventilating devices was measured to be able to determine the SFP-value (Specific Fan Power). Via optimization of flows in the ventilation ducts, the reduction of rotational speed of the ventilators to a demand related level as well as by replacing filters by highly efficient ones, the SFP KPI could be significantly improved in many ventilation systems. In this context, it is very important to retain that all ventilation systems have been brought to the same technical level regarding KPI, degree and level of efficiency. “We apply at selected ventilation facilities a predictive maintenance model“, Markus Weiß explains. „In case the SFP-threshold value goes beyond 1200, the WiriTec-software immediately reacts. We are currently saving 20,000 € altogether per filter and per machine across a year’s period.

In case you change the filter only four weeks later than at the point in time it reached the threshold value, you create an additional power consumption of about 5,000 € per ventilation unit, which means a considerable amount of money with six ventilation systems. And we save that amount.“ The preventive measures undertaken so far show the expected results: „We can turn the process to an ideal state which is not error-prone any more”, Frank Stegemann emphasizes „it is just one example out of many, however the most striking one, certainly“. At REHAU, the predictive-maintenance method is also in place for screws in air compressors or preventing the abrasion of pump impellers.



Software ergonomics and user experience

At REHAU, a user group has been established that is acting as system administrators for the most important production sites. Markus Weiß, being also the central interface to the software manufacturer, took over the task to train this user group. In the scope of internal trainings and workshops, he is regularly passing on his expertise to his WiriTec-system administrators, who in return are looking after the WiriTec-System of their respective production site. „The system administrators work as independently as possible“, Markus Weiß confirms, „I am just checking if they create the correct KPIs. The nicest thing about the new software is the fact that usually a one day administrator training is sufficient“, as Weiß continues. Currently there are six administrators and 80 active users altogether. REHAU has got 28 production sites in Europe, one in England, three in France, one each in Spain, Russia, Poland, Austria and Turkey, and two in Hungary and the Czech Republic. In these countries, users work successfully with the English version and the complete English software release of the WiriTec software. The user training is carried out in workshops having 30-40 participants each. Every workshop is held in English as well as German.

Significant load management savings

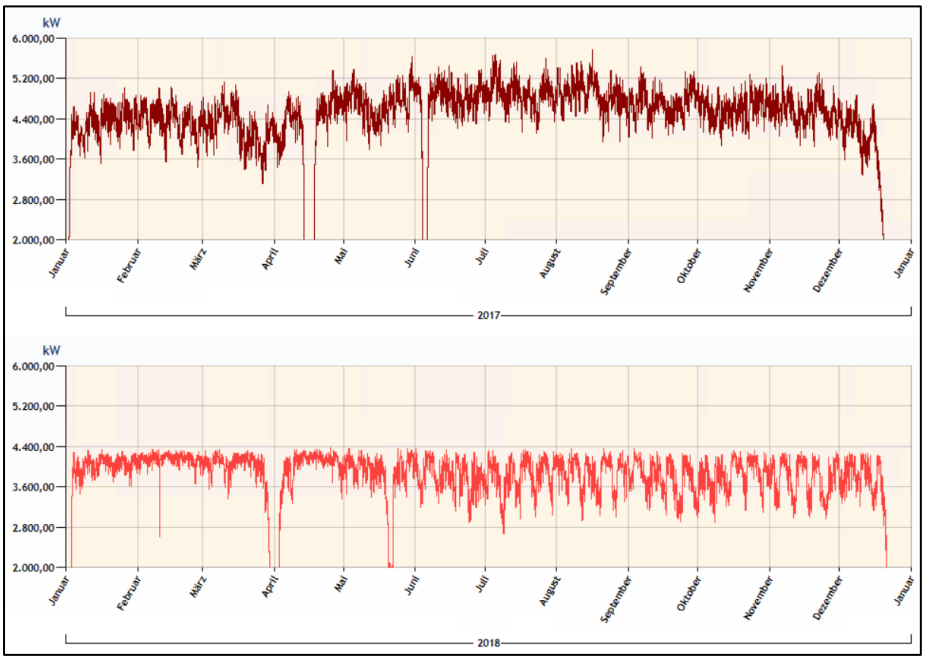
One of REHAU’s key objectives is the sustainable and protective handling of important resources. This objective can be reached if the focus is on ecological as well as on economical way of operations. Here is an example: In 2018, a fully automated load management system has been implemented in the production site in Wittmund, also based on the WiriTec® C-platform. Markus Weiß reports on the specific achievements: „We activate or de-activate preliminarily defined electrical loads entirely automated, depending on the operational conditions. We visualize both measuring and

controlling data on the WiriTec software platform, thus creating a much higher acceptance among the employees in the production arena. Acceptance on behalf of the employees is paramount in this process. We managed to convince all divisions concerned easily, as we already had achieved many saving effects before the introduction of a load management system thanks to the WiriTec software ".

This is how the process runs in every day practice: A controlling service mechanism on the WiriTec® C-software platform gets the data from the sensors, analyses this data and passes switching commands to a Siemens S7 device.

Then, switchable loads will be activated or de-activated. The most important point in this context is that the system's intelligence is centered in the WiriTec-Software and not scattered in individual controlling devices. In 2018, the load management was carried out successfully according to the regulations for intense utilization of the net. The result was an effective energy saving of about 540,000 €. In 2019, around 450,000 € have been saved in Wittmund and approximately 45,000 € in Viechtach thanks to the introduction of load management (atypical utilization of the net). The preconditions of other German REHAU production sites have been assessed accordingly. The central energy management department around Frank Stegemann and Markus Weiß is in very close exchange with those responsible in the respective production sites, and are preparing further roll-outs in case the on-site conditions are appropriate.

In this project, REHAU also helps realizing the United Nations' Sustainable Development Goals (SDG). With this project called „Development and implementation of a fully automated load management system" at the production site in Wittmund, REHAU group supports the goal „clean energy at low cost" via conscious handling of energy and resources.



Lastmanagement Jahreslastgang

Interaction with the software-manufacturer

After initial on-site visits of REHAU's personally dedicated WiriTec consultant to train all energy managers, Markus Weiß subsequently became the key contact for the interaction with the software manufacturer.

In order to extend the system range, additional import interfaces were defined for data protocols that were not yet available at WiriTec. These interfaces were realized by the software manufacturer and refer to the production management system "EVF" as well as the solutions „OpenWeatherMap" and „e-Point". „The cooperation is in fact very customer centric and personal, what we really appreciate. There is always transparency in pricing and licensing, and the developers go forward in our direction. All projects have been completed according to our expectations", Markus Weiß confirms with great satisfaction.

Outlook

As a next step, a production data analysis is on the agenda. It will contain an energetic KPI per item number and order. This will include also a specific recommendation to the production planners which item should be produced on which technical facility, in order to be able to select the production line most energy efficient with respect to the individual item.

In addition to that, this analysis concerns also cost calculation. In future, this analysis will help to precisely indicate the energy related costs of each order for subsequent consideration during product price calculation.

WiriTec GmbH

Die **WiriTec GmbH** ist ein innovatives, inhabergeführtes Softwareunternehmen, das sich auf die Entwicklung von effizienten Lösungen für Energie- und Ressourcenmanagement spezialisiert hat. Dank speziellem Know-how und performanter Kommunikationssoftware verbindet die WiriTec bewährte und fortschrittliche Messtechnologien auf der Feldebene mit der IT-Welt. Unsere ganzheitlichen Energiedatenmanagement-Lösungen sind nach ISO 50.001 zertifiziert und unterstützen den gesamten Prozess von der Messdatenerfassung über die zeitnahe Verbrauchsvisualisierung bis hin zu Verbrauchsprognosen, Abrechnungen, Energieumlagen und aussagekräftigen Energiekennwerten. Unsere zahlreichen Kunden in Deutschland und Europa sind in nahezu allen Marktsegmenten beheimatet, haben seit Jahren viele Projekte mit unseren vollständig webbasierten Lösungen erfolgreich umgesetzt und signifikante Einsparpotenziale realisiert. Im Verbund mit unserem Schwesterunternehmen, der **speedikon FM AG**, bieten wir umfassende IT-Lösungen von der Feldebene bis zur kaufmännisch-technischen Datenverarbeitung an.