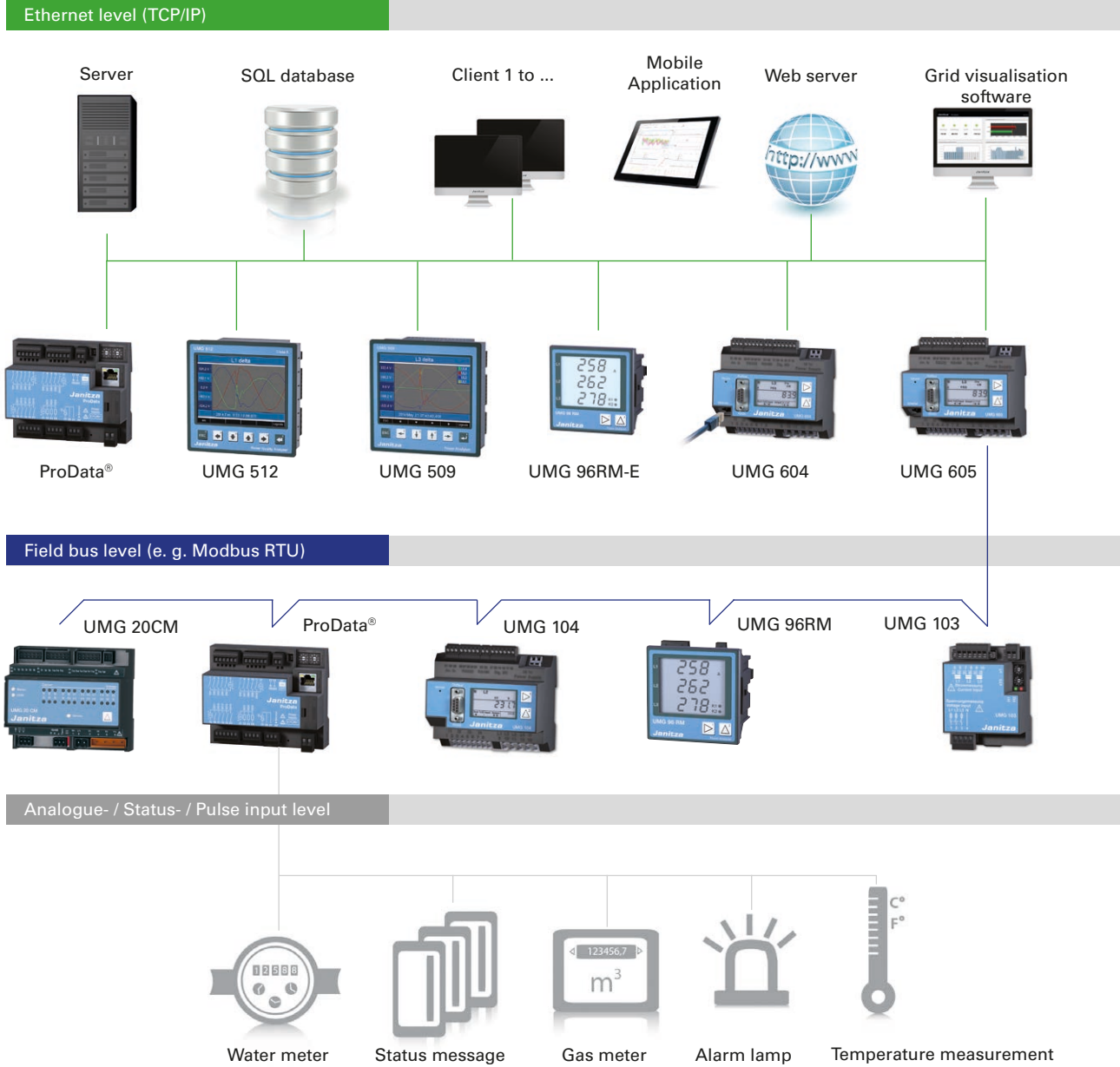




Application note: AN1020/V01

Energy efficiency that pays

Janitza electronics®



UMG 509 / UMG 604 = Janitza power analyser

UMG 512 / UMG 605 = Janitza power quality analyser

UMG 96RM / UMG 96RM-E / UMG 103 / UMG 104 = Janitza multifunctional measurement devices for energy measurement technology

UMG 20CM = Branch Circuit Monitor, Janitza Residual current monitoring (RCM) and energy data acquisition

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Energy efficiency that pays

Forumplast Folienfabrik GmbH counting on the introduction of an energy management system

Using the slogan „Uncovering energy demands“, Forumplast Folienfabrik GmbH (Amberg) is on the search for increased energy efficiency. The company’s Energy Manager has chosen to work with Janitza electronics GmbH of Lahnu as partner, and to use its expertise and state-of-the-art measuring technology to integrate bespoke, commercial efficiency solutions into the company to help identify efficiency improvements and further potential for cost reduction in the long-term.

Forumplast Folienfabrik GmbH (Amberg, Oberpfalz) has been operating in the packaging industry for over 30 years. The company operates innovative processes to produce films from environmentally-friendly plastics such as LDPE (low-density polyethylene) and HDPE (high-density polyethylene), which are ground water-neutral, physiologically harmless and recyclable. The company’s production processes run 24 hours a day, 360 days a year, and are supported by a 180-strong team. Its processes use state-of-the-art technologies and ensure optimum production and quality control. The company produces around 3,000 tonnes of film every month for subsequent use as packaging film, polyethylene film, industrial packaging, shrink film, hoses, covers, sacks, bags, etc.

Suitable energy management as the basis for improved energy efficiency

Forumplast sets great store by high-quality environmentally-friendly production. In support of its environmental aspirations, the company, with support from Janitza electronics GmbH, aims to integrate a functional energy management system (EnMS) in accordance with ISO 50001 into its existing operational processes in an attempt to identify potential weaknesses in its energy consumption pattern.

Forumplast has set very clear requirements for an optimum energy management system. These begin with research of possible sources of system disruption

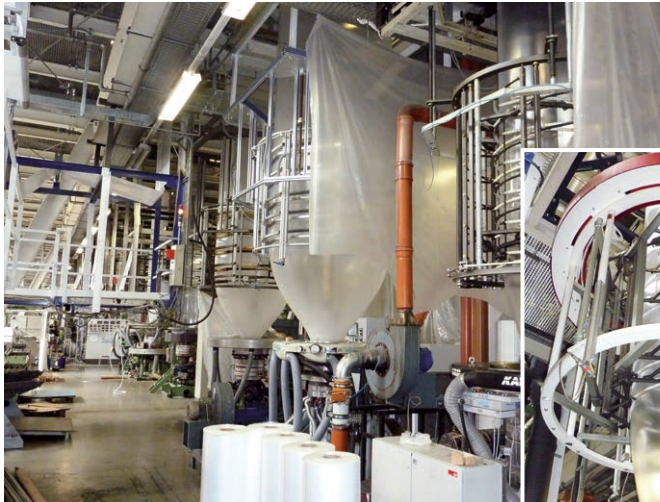


Image 1: View of the hall housing the blown film extrusion systems

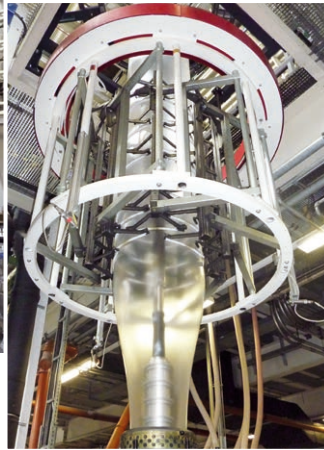


Image 2: Blown film extrusion system

excess of 20 GWh and represents the company's third highest expense factor after salaries and materials. Electrical consumers can be subdivided into blown film extrusion systems, compressed-air generation, printing, manufacturing and recycling. Under extrusion, the extruder, pull-off and winder have the highest energy consumption. Around-the-clock production for most of the year means that the company's production equipment experiences high utilisation rates, entirely ruling out machine downtime.

To ensure durable and safe working processes and effective monitoring of all operating, consumption and cost data, Forumplast has elected to implement an energy management system.

to allow subsequent countermeasures to be implemented, followed by clear energy controlling, which is important for incorporating and viewing bills from energy suppliers, own readings and automatic readings captured by measuring devices, building control systems, data loggers, PLCs, etc.

In order that an appropriate solution can be found and adapted, Janitza has obtained an accurate overview of the entire operation and production systems. Annual electricity consumption by Forumplast is in

The use of state-of-the-art measuring equipment allows for timely identification and rectification of power quality problems. In addition, it also supports improved reliability of supply, reduces maintenance costs and increases the service life of production equipment. As the number and accuracy of on-site consumption data measurements increase, the more detailed the picture of the energy demands of the company and its production equipment. Without this, energy saving potential would be much harder to demonstrate. A well-conceived energy management

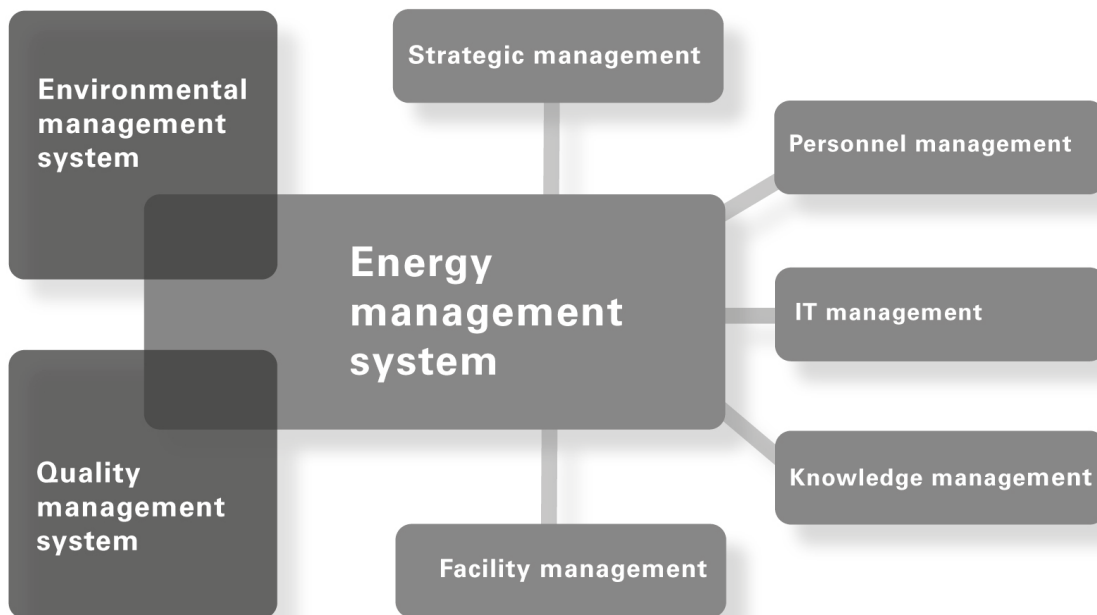


Image 3: Integration of the energy management system in other management systems (e.g.: ISO 9001 or ISO 14001)

system helps to improve transparency through precise measurements of energy demands, visual processing and temporal assignment. Actual improvements may be developed individually.

Setup of an energy management system (EnMS)

An energy monitoring system with hardware and software package for comprehensive evaluation of data is at the core of any energy management system. User-friendliness and clarity are also important features.

measuring device could be integrated into the existing communication network with relative ease. Decision-makers at Forumplast also identified considerable benefit in alarm management.

In the event of problems, including those related to production and energy supply during periods when no one is on site, key information may be accessed remotely, requiring only an internet browser and an IP address to access the UMG 508 device’s homepage. The homepage provides access to both online data and historical data.

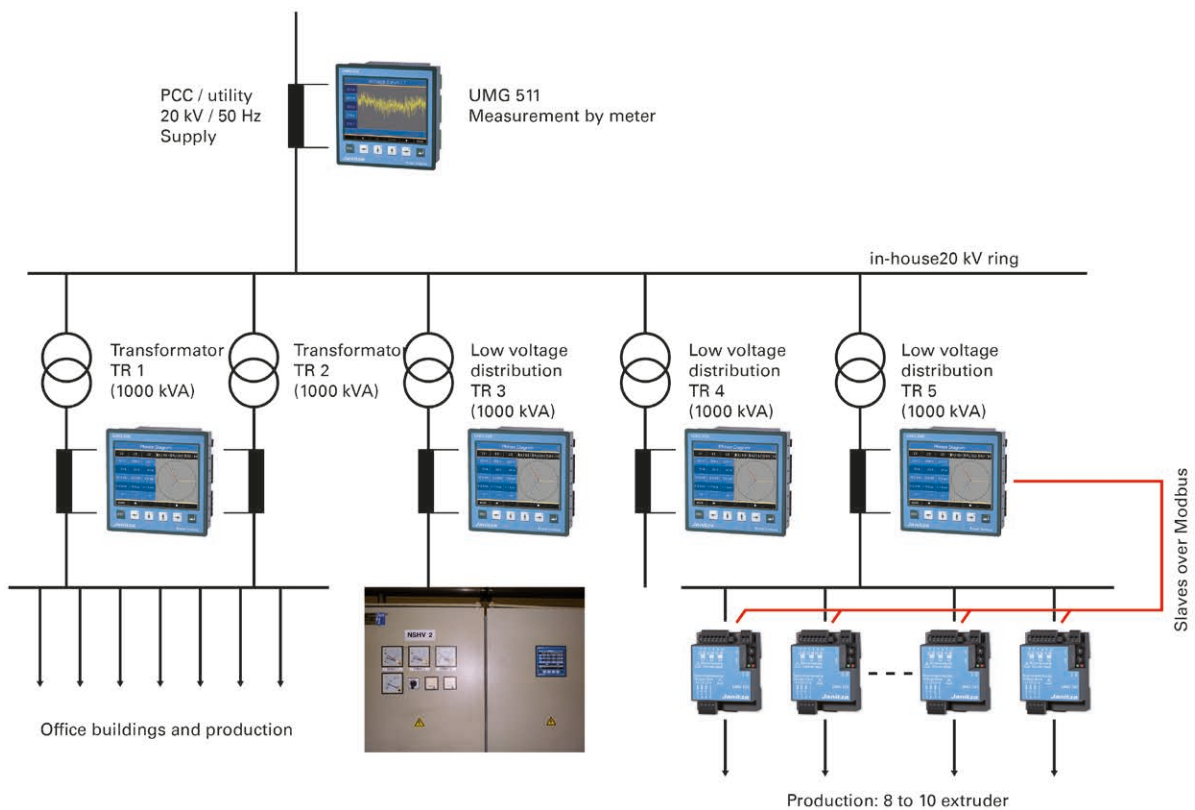


Image 4: Setup of the EnMS at Forumplast

The UMG 508 power analyser sets the stage for continuous power quality management. In addition, the UMG 508 also analyses electrical disturbances in the event of network problems, which Forumplast identified as an essential criterion. For each current measurement input, the UMG 508 is equipped with a separate meter, and thanks to its generous memory capacity of 256 MB, enables comprehensive logging of all measurement data over several months, without the need for an interim readout. This helps to provide a high level of reliability for data security, even with redundancy. With a number of communication interfaces and protocols, including RS485 (Modbus, RTU, Gateway), Ethernet TCP/IP, BACnet, HTTP, FTP, SNMP, SMTP, SNTP and DNS, the

Incidents (such as temporary voltage dips) can also be communicated by email. When setting up an EnMS it is important to ensure that the various data are prepared and made available to the relevant target groups in a purposeful manner.

In addition to the UMG 508 as the master device for direct connection to the company’s Ethernet, the UMG 103 was also installed as a slave device for measurements, placing significant importance on the continuous measuring equipment of the measuring devices. In conjunction with a high sampling rate of voltage and current measurement inputs, this helps to ensure a very high accuracy of measurement. An RS485 interface with Modbus protocol

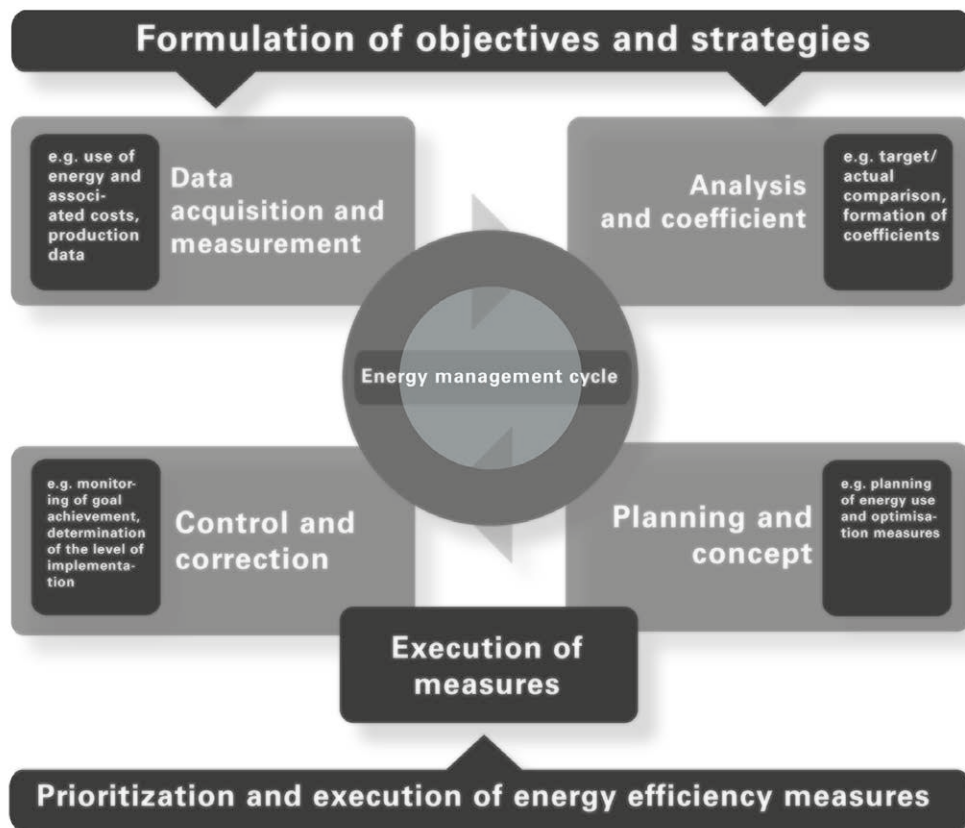


Image 5: Energy management is a closed control loop with the goal of continuous improvement

was used for the connection between the slave measuring device and the master device, enabling communication of measurement data within the company and integration into a comprehensive energy management system.

The measurement devices were configured using the programming and network visualisation software GridVis®, which allows measurement data to be viewed online as instantaneous values, or can be used to generate line graphs, bar charts or histograms of the historical values stored in the data logger or database. The topology view provides an instant overview of the entire electricity network. To ensure constant availability of all data, all measured values and logs are stored and managed in the MySQL database.

In addition to a high-performance database, it must be ensured that the data server is equipped with adequate resources, including generous RAM (working memory), a high-capacity hard drive, RAID functionality and state-of-the-art Quad Core processor technology.

The reports now allow Forumplast to query and analyse energy consumption and power quality at any time. The data can be exported for further processing, e.g. in Microsoft Excel. The results of energy analyses are now taken into account when planning measures and

in organisational and technical measures aimed at reducing energy consumption, with a particular focus on the economic efficiency and impact of modernisation on the associated maintenance processes and system availability.

The energy efficiency measures can be subdivided into three groups.

Energy efficiency measures in planning

- Checking energy usage
- Checking supply agreements
- Optimising uptime (e.g. switching off machines during times of non-production)
- Using systems and machines with a high level of efficiency
- Further increasing the energy efficiency of the entire system
- Optimising performance (e.g. peak load optimisation)
- Multiple utilisation of energy (e.g. heat recovery)

Energy efficiency measures: organisational measures

- For procurement (e.g. bringing lifecycle costs to the fore)
- Changes to workflows
- Optimisation of regulation and control

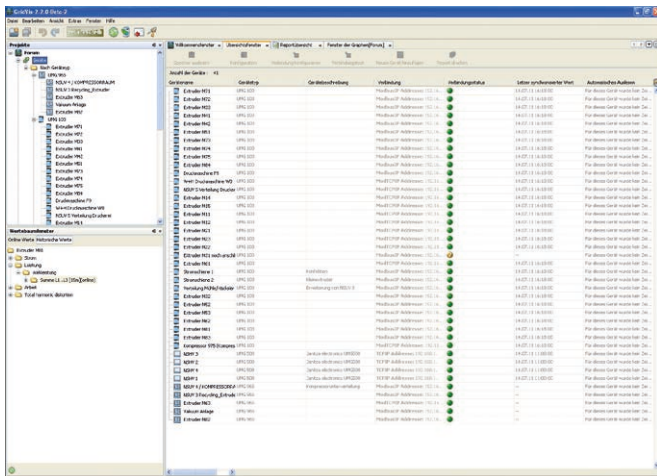


Image 6: Overview of all available devices integrated into the GridVis® software

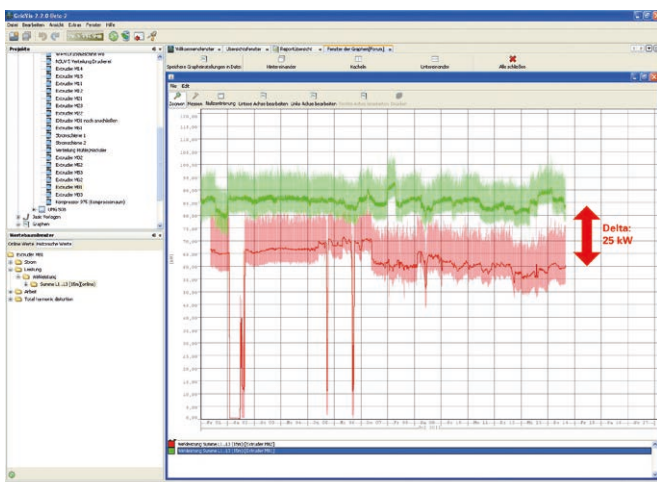


Image 7: Comparison of effective power at the extruders with and without energy efficiency measures

- Promoting awareness and conduct of employees
- In maintenance and servicing
- Training and incentives

Energy efficiency measures: Technical measures

- Use of energy-efficient motors (energy costs represent more than 95% of the lifecycle costs of an electric drive)
- Use of heat recovery
- Reduction of leaks in the compressed-air network
- Optimisation of system regulation and control
- Optimisation of steam generation
- Peak load optimisation/smart use of energy storage

Examples of energy efficiency measures implemented at Forumplast:

The use of a class IE2 motor on a system with a 30 kW pump drive (coolant, heating, etc.) helped to reduce

energy consumption by 5022.69 kWh (2962 kg CO₂). The added cost of €370.00 was paid off within 10 months.

The use of compressors has also had a significant impact on electrical losses. The use of three compressors (90 + 38 + 55 kW, average power 100 kW) initially produced a figure of approx. 12 kWh/m³ of air. By implementing appropriate measures, such as a reduction in the leakage rate, pressure modifications and optimised compressor performance, it has been possible to reduce this figure to approx. 6 kWh/m³. Improved compressor efficiency and optimum dimensioning (cf. also the volume measurement) contributed to a saving of €32,000, with a utilisation of 8000 h x 100 kWh / H x €0.08 : 2 (optimisation).

Further energy efficiency could be achieved through heat recovery. Feeding the waste heat from the compressors into the heating system helps to heat the warehouse buildings and sustainably reduce heating oil consumption.

The benefits of introducing an energy management system

Accurate measurements and evaluation are contingent on a functional energy monitoring system. This solid data basis helps to identify load peaks and principal consumers (energy guzzlers) as well as the potential for energy saving. The transparency of consumption is also improved, paving the way for the implementation of subtle measures to reduce energy consumption and lower energy costs. In addition, reliability of supply is also improved. With the roll-out of an energy management system, Forumplast has been able to meet the statutory legal conditions and stay true to its core ecological principles. The use of a more favourable energy mix has also allowed for the amendment and optimisation of energy contracts. Tax benefits, namely compensation schemes, have had a positive impact on the energy efficiency of this energy-intensive company (Art. 41 of the Renewable Energy Act), and the new energy management system has helped to sustainably underpin more effective processes. To reach a satisfactory conclusion, it is vital that the company provides training and increases the awareness of the system amongst its employees.

Conclusion

The introduction of an energy management system at Forumplast in accordance with ISO 50001 has identified and harnessed considerable potential for efficiency improvement and cost reduction. The energy management system has been optimised for integration into the existing operational processes and offers user-friendliness, even in the event of subsequent modernisation. Production has stabilised and processes

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can now be monitored permanently (including remotely). In addition, continuous reliable documentation has been made possible. The company's energy consumption can be analysed and compared with bills provided by energy companies, power quality problems can be identified and energy costs reduced. The resulting reduction in charges under the Renewable Energy Act (Art. 41) has also opened up a six-figure (Euros) savings potential.

For Forumplast, the main aims of energy management have been satisfied, and this is backed up by the figures available. The search for energy efficiency is certainly not a dead end. It is an on-going process which continues to open up new savings potential through new technologies, optimised processes and encouragement of employees.



Company profile

Janitza electronics GmbH®

Janitza electronics GmbH is a German company and has been active for 50 years in the manufacturing of systems for efficient power application, energy measurement and cost savings. As a globally renowned manufacturer of network monitoring and energy management systems, digital integrated measurement devices, power factor controllers and compensation systems, the company stands for the highest quality standards and innovations. Products are manufactured according to leading-edge expertise with state-of-the-art production technology. At Janitza, quality management is an ongoing managerial task (e.g. ISO 9001). Comprehensive know-how, competent consultancy and concept generation, right through to the commissioning of tailored solutions, ensure fulfilment of customer wishes and requirements.



Forumplast Folienfabrik GmbH

Manufacturer of packaging films for the processing and manufacturing industry

Founded in Nuremberg in 1976 Forumplast (Amberg / Oberpfalz) produced – with more than 30 years of experience in the packaging industry – sheets of the environmentally friendly plastics LDPE and HDPE.

2001The company relocates to the newly constructed factory buildings in Amberg's Immenstetten industrial estate. .The result was one of the most modern film productions in Europe.

The company is family owned. As a medium sized company with over 180 employees, more than 30 extrusion lines and a monthly capacity of over 3,000 tons can be met flexibly and inexpensively every wish.

The use of modern technology takes the company for granted and allows for optimal production and quality control. Motivated employees and innovative ideas are a guarantee that customers can expect in the future with the know-how of Forumplast.



Important Message

Janitza electronics GmbH® offers a collection of application reports addressed with in-depth expertise on the topics of Power Quality Monitoring (PQM), power management (PM) and Power Quality Solutions (PQS). Furthermore, case studies and reference projects are treated. These application notes are meant to our worldwide distributors and agents, as well as its own sales people to train and provide the necessary basic knowledge. On the other hand, they should serve to answer repetitive questions quickly and new trends technically to be transmitted. Each issue covers a self-contained application theme, a specific solution or a technical topic of general interest .

It is to share the broad application know-how of Janitza electronics GmbH® and its experts, which was established with partners from the PQM, PM and PQS over a long-term period around the world.

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