Minimalistic brewer

Eight liters of water are usually required in order to brew one liter of beer. In its new brewery, Tucher has been able to significantly reduce this consumption.

Ultramodern systems engineering, along with the consistent acquisition of all material and energy flows, also ensure minimum electricity and gas consumption. The construction of an entirely new brewery was an investment in the future of Tucher. The declared aim of this investment was to implement a modern, future-oriented brewing process that uncompromisingly focuses on quality, efficiency and the conservation of resources in order to achieve high profitability. After more than one year of operation, the facts are now on the table. The result: The usual consumption of seven to eight liters of water per liter of beer brewed could be reduced by almost 50 percent. Since the wort boiling time was drastically reduced, the energy and gas consumption could be cut by half. Tucher is also setting benchmarks with its new administration building: In an exemplary manner, the waste heat from the brewing process is used for heating office and social rooms. Thanks to this efficiency concept and the useful energy values of which clear evidence is now available, the traditional Tucher brewery occupies a front row position in terms of eco-friendliness, efficiency and cost effectiveness when compared to other breweries of its size.

Minimized consumption values are the result of numerous individual measures. In addition to ultramodern systems engineering designed by GEA Brewery Systems, the brewmaxx process control system is contributing significantly to this success story because it effectively acquires all material and energy flows in the brewing process. brewmaxx not only optimizes the process, but also detects resource wastage and losses. The energy management system implemented on the basis of brewmaxx permanently reduces the consumptionof useful energy to an absolute minimum. Expensive load peaks are prevented automatically. The auxiliary plants are fully integrated in the process control:

from the brewhouse to the water and sewage treatment plants, from the chemicals room up to the refrigerating system. In addition, materials and energy management are integral parts of the brewmaxx process control system.

The consistent interfacing of ancillary plants to the energy data management system enables e.g. the acquisition of consumption values for cleaning processes. brewmaxx records the consumption data of primary and secondary energy carriers, including electricity, oil and gas, water, heating and sterile steam and hot water, along with the consumption data of all other media such as cooling agents or gases (CO2, N2) or also operational data from the water and sewage treatment plants.

Brewing process and energy data acquisition interlinked in real time

Each energy management system focuses on the avoidance of expensive peak loads. The modular concept of consumption data described above provides ideal prerequisites for effective energy management. On the basis of a multi-stage approach, this data can be used in order to successively set up reports, limit values, messages and load sheds and implement them in automation concepts for the individual stages. The full integration of energy management in the process control system is therefore a logical consequence. It is the only way to perform efficiency-optimized interventions in the process, even including coordinated load shedding without technological problems. To this end, the control system not only calls up all process- relevant data from parameterized energy counters, but also consumption data, and saves it and then displays it on the user interface both as topical values and in chronological order as reports. In an initial phase, these tools generate e.g. consumption analyses that support the plant operator in the detection of units or process stages with critical consumption values and also leaks. Unnecessary load peaks through the simultaneous call-up of resources from different plant sections can be visualized. Sources of resource and energy wastage are detected in terms of their corresponding period and location. As a next step towards comprehensive energy management, limit values must be defined with several alarm and response thresholds:

INFO

Company:	Tucher Bräu GmbH & Co. KG
Sector:	Breweries
Location:	Nuremberg - Fürth
Country:	Germany

- Energy Level 1 – Switching off unimportant consumers;
- Energy Level 2 – Switching off technological consumers;
- Energy Level 3 – Hard switch-off;

Since the entire plant structure, including all consumers,individual actors and sensors and even all product and resource properties, is parameterized via brewmaxx, e.g. switch-off and restart priorities, minimum operating times before the switch-off time and also minimum and maximum downtimes can be defined and parameterized for each individual unit.

This ensures that all relevant units are parameterized in such a way that they make an active contribution to saving energy whenever they are not actually required in the process. In any case, if these units are expected to run under full load, they are available. In terms of energy management, process necessities are taken into consideration, even including loadrelevant, automated switch-off strategies. The example of Tucher clearly demonstrates that the brewmaxx process control system with integrated energy management helps to avoid cost-intensive parallel consumption.

With a clear conscience, Tucher could smoothly combine the Beer Purity Law with an saving commitment.

Energy saving mode also in ancillary processes

As soon as Level 1 has been reached, the process control system initiates the energy saving mode for all those units which are in stable operation - including e.g. the air condition-ing system. At the same time, a message is displayed in order to request the operators to consider the current energy situation when starting new process steps and to postpone energy-intensive process steps for a few minutes if required.

As a rule, the mere fact that Energy Level 1 has been reached, along with the response of the process control system, enables comprehensive savings which immediately result in reduced energy demand. Energy Level 2 is reached if, in case of a high energy demand situation, an insufficient number of units can be switched over to energy saving mode or switched off. The process control system now switches off technological consumers such as the cooling zones of a fermenting tank or the restoration of the pH value of the CIP. At the same time, a message is displayed in order to notify the operator. This approach is based on distributed logic, which means that the PCS notifies the operators that e.g. Level 2 is active. All rele-vant classes – also in ancillary plants – switch over to the cor-responding energy saving mode which can be activated in each individual case without damaging the product. This ensures that the cooling compressors never switch over to energy saving mode at a time when the wort has fully de veloped and the cooling power is urgently required. On the other hand, the cooling of fermenting tanks can be switched off for a certain time in defined process states without any negative effect on the product. The plant operators are closely involved in this multi-stage concept. In this way, the Tucher brewery has been able to enhance their employees‘ awareness for energy issues. Today, it is a matter of course that the operating person nel would e.g. postpone a certain cleaning process in order to avoid additional power consumption during an energy- critical phase. The hard switch-off of cooling compressors or the heating boiler is restricted to exceptional cases in which Energy Level 3 is reached.

In the future, this energy management concept based on brewmaxx could be extended in such a way that the energy consumption of plant sections, and thus also that of the overall plant, can be determined in advance. Production scheduling can be optimized in order to conserve resources and avoid load peaks instead of exclusively considering the maximum quantity to be produced, which is still the case today. Thanks to brewmaxx, the highest possible degree of energy efficiency can be determined in advance by defining a tolerance range for the optimum, i.e. the lowest possible energy consumption.