



Theme: Electric Steelworks

X-PACT[®] ENERGY ADVISOR: MORE EFFECTIVE PRODUCTION WITH REDUCES ENERGY CONSUMPTION*

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Abstract

Energy efficiency is coming to the center of attention in the metallurgical and rolling mill industry due to increasing energy costs, limited resources and political requirements. Also, a green image and energy efficient production is a clear competitive advantage. SMS Siemag, being familiar with automation and measurement equipment, provides an energy data management system which gives transparency over the energy consumptions. All energy relevant media including electricity, gas, water, compressed air and further more can be recorded. The system is manufacturer-independent and allows the use of already installed measuring technology with the possibility of subsequent extension. So potentials for improvement can be recognized and energy savings can be estimated and proven after the implementation of the measures. Being familiar with the processes in the metallurgical and rolling plants, the system by SMS Siemag allows the assignment of the energy data to the production and plant data. Only by this connection, the data can be reduced to key performance indicators allowing authoritative evaluation of energy efficiency. The results are clearly represented on dashboards and support the continuous improvement process. The system also supports the energy controlling with an automatic reporting system, cost center assignment and in support with certification according to ISO 50001.

Keywords: Energy Monitoring and Management; Key Performance Indicator; Energy Efficiency; Electric and Automation.

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1 INTRODUCTION

Rising energy costs and increasingly required flexibility in production cause the owners of metallurgical production facilities to change views of evaluation and optimization of energy consumption. Adequate energy management in line with ISO 50001 may help reduce the high cost pressure during the production process. Jens Hundrieser and Oliver Seifert [1]: "Provided an Emis system (energy monitoring information system) has been implemented correctly and suitable measures have been taken, savings of 5 to 20% are typical, with 8% being realistic. The period of amortization of these systems is normally one to two years." SMS Siemag offers the X-Pact[®] Energy Advisor which is an energy data management system beyond mere monitoring and allows the plant owners energy-saving production.

2 ENERGY SITUATION AT A GLANCE

The X-Pact[®] Energy Advisor records other energy-relevant utilities in addition to electrical energy such as fuels, gases, compressed air, heat or water. This results are in a holistic energy management. Automatic aggregation of the measured values allows a clear and highly efficient representation of the measured values of both long periods of times and short intervals in such a way that all analyses can be made directly in the system. The energy efficiency of the plant is displayed to the operator in screens by dial indicators or traffic lights and an easy overview of the energy situation is provided in this form.

The evaluation of the installations using efficiency indicators allows the comparison with values of previous periods or other sections. Consumption data of the overall plant or individual plant sections is compiled in reports. Consumptions may be allocated in total or proportionally to the relevant cost centers for consumer-related cost-accounting. This equally allows handling the controlling of energy consumptions in the X-Pact[®] Energy Advisor.

3 COMPUTATION OF CHARACTERISTIC LINES AND COEFFICIENTS

The absolute energy consumption data is not sufficient for an assessment of the energy situation. In the energy data management of SMS Siemag, the type of product and its quantity are recorded as well. This allows to set up a relationship of consumption and production and to express it by using coefficients. These values which have been computed from various measuring values make it possible to compare different situations or installations.

If coefficients depend on production data or production conditions which cannot or must not be accounted for as a quantity in the coefficient, characteristic lines are made use of. A characteristic line takes into account that under certain conditions in the production process, the coefficients may take on different values. For instance, at high capacity utilization, lower energy consumption per ton of the product may be achieved than during periods with low production rates. If the coefficient is plotted against the influencing variable, it is possible to compare equivalent circumstances and to evaluate various plant conditions in a meaningful way. Positive and negative limit values can be defined for the coefficients and characteristic lines and are used for assessing the current production process.

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4 USE IN METALLURGICAL PLANT AND ROLLING MILL TECHNOLOGY

Figures 1 and 2 illustrate an example for key performance indicators and characteristic lines. The required energy for melting a heat is put in relation with the produced quantity. The result of this is the key performance indicators of the specific consumption in kWh/t. Under equal production conditions, this value is of significance and allows a quantitative comparison. If however the charge mix changes for instance, the typical specific consumption values differ accordingly. These values can now be subsumed for a charge mix and plotted on the x-axis as a bunch. For each charge material mix, different limit values apply. To analyze the prevailing situation, the current charge material mix is defined and the corresponding limit values are used for the representation of the assessment. The yellow dot in Figure 2 corresponds to an outlier which is just above the desired limit and hence in the yellow dial indicator range for the given charge mix. The same specific consumption would just have been reasonable in case of cold DRI charging, with the indicator in the green dial indicator field. It is evident how important it is to consider the production conditions as well in order to achieve a reliable evaluation of the energy situation.

Apart from a transparent representation of energy consumption values, the X-Pact[®] Energy Advisor can be used to provide concrete recommendations to the operating staff how to proceed to ensure an optimized operating practice in terms of energy.

Dedusting may be used as an example to illustrate this. During the dedusting process, the fans run at different speeds with the corresponding varying energy consumption values in different process phases. If ventilation is not reduced during tapping, a signal is displayed for the operating staff that the energy consumption requires action. A recommendation is output as to the further control of the plant and any uncertainties of the operators are eliminated. These technically simple actions which involve only small investments may result in energy savings which must not be underestimated.

5 SMS SIEMAG AS A COMPETENT PARTNER

SMS Siemag as a leading plant manufacturer of metallurgical plant and rolling mill technology is sufficiently competent in energy management. As early as during the planning stages, SMS Siemag attaches great importance to the energy-efficient design of the customer's new plants. X-Pact[®] Energy Advisor is a software system supplied by SMS Siemag which is customized for the plant and in which the limit values are predefined. The knowledge encompassing all plant units of the electrical and automation equipment as well as process technology is an asset here. The system can be customized for the customer's installation following an analysis even if installations supplied by others exist.

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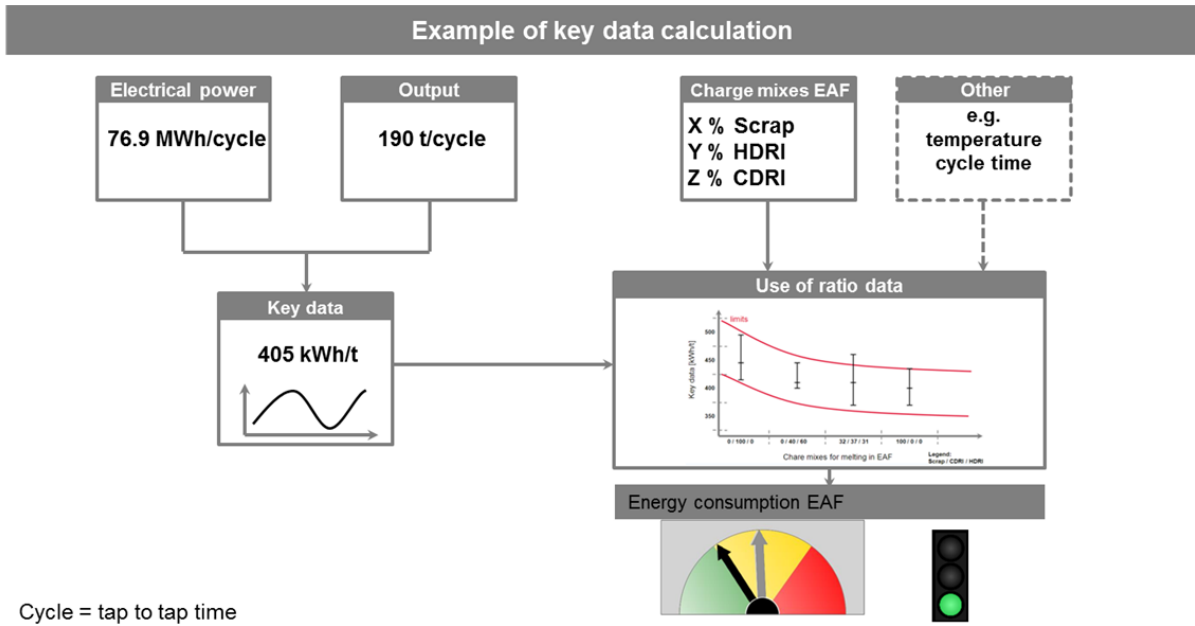


Figure 1. Example for determining a coefficient and corresponding characteristic line for an electric arc furnace.

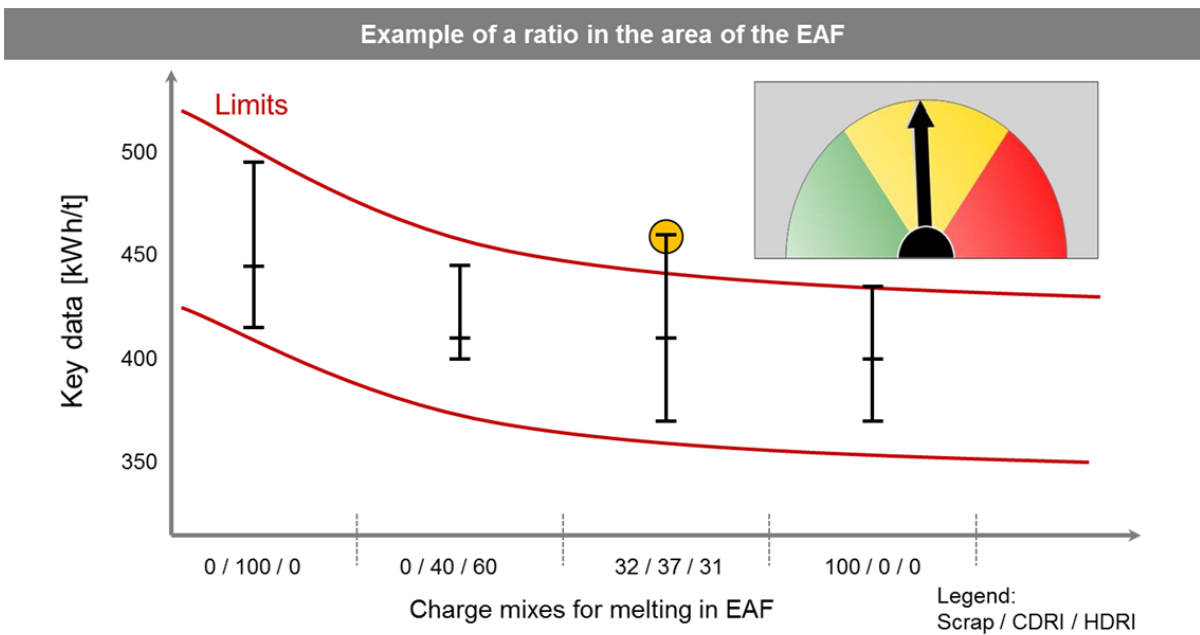


Figure 2. Example for assessing the energy situation, using the characteristic line. The current energy situation can only be analyzed and represented using a dial indicator if the charge material is accounted for.

6 CONCLUSION

With the X-Pact[®] Energy Advisor, SMS Siemag offers an energy data management system which relates the energy consumptions to the production data. This increases the transparency and allows the continuous improvement process using key performance indicators as defined in ISO 50001. The results are clearly represented on dashboards, showing the most important information at one glance. Competitive advantages can be achieved by recognizing improvement potentials and estimating and proving the energy savings. Using the know-how from SMS Siemag both in the

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processes of metallurgical and rolling plants as well as in electric and automation, efficient measurement concepts can be applied recording all energy relevant media, smartly integrated in the existing automation landscape.

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