Consumption Optimization in Food & Beverage Production. Using zenon.

A dialog about challenges and solutions

zenon®

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Introduction

Industrial Production in the Food & Beverage sector is realized with the consumption of various material resources: product ingredients, Energy and auxiliary agents - like the ones used for cleaning or lubrication. The Food & Beverage industry, like many industries, faces the challenge to continually optimize consumed quantities - typically expressed relatively to the production quantity - as a basis for increasing business profit.

The standard DIN EN 16001 published in August 2009 aims to help companies to implement processes and systems in order to manage the consumption of energy in its different forms, be it electricity, fuel, steam, heat, compressed air or any other alternatives.

I recently had the opportunity to discuss this standard and the new challenges it presents with a specialist in managing consumption, named Johann, in the context of a beverage plant. He also challenged me to identify adequate solutions based on automation technology. Because I think this conversation has wider relevance in the debate about consumption optimization, I am glad to share it with you.

For me, Johann has always been a competent person with whom I can discuss automation project implementation in various areas of his plant. He participates enthusiastically in every topic related to consumption norms, and the measurement and analysis of all kinds of consumed energy. When I visited Johann in his office, I found him hidden behind reams of technical documentation and his monitor displays. He's a busy man, but I managed to pick his brain during a coffee break...

A conversation about Consumption Management

Emilian (E): What is new in the battle for optimized consumption, Johann?

Johann (J): You are so right; it is a never ending battle. Maybe that's why I like it... News? Well, In August (2009), the standard DIN EN 16001 relating to Energy Management Systems was published. I'm sure you've heard of it.

E: Yes, of course. What do you think about it?

J: As you know, we have always tried to optimize our energy consumption for every bottle of product, so we are definitely not at the beginning of this process. We began by attempting to monitor the consumption of energy wherever possible and we keep investing in this step-by-step approach. Knowing, in as detailed and accurate way as possible, how much we consume in the various plant sectors is an essential condition for implementing the proper optimization measures. However, I do recognize that I sometimes miss working to a clear organisational framework like the one provided by DIN EN 16001. The standard follows the *PDCA* methodology. It guides us to improve the management processes and to clearly specify the requirements for our own Energy Management System.

*PDCA =
Plan-Do-Check-Act*

E: Am I to understand that the standard already achieved on your plant is not so far from what DIN EN 16001 specifies?

J: Although we have gained much experience by managing our energy consumption, DIN EN 16001 provides a much clearer prioritization of our activities. And we have enough guidance to improve further – the standard highlights several key elements we could improve to make our plant more efficient. On the one hand, this helps to guide us and on the other hand, it challenges us by setting new objectives and by demonstrating better possible outcomes...

E: Could you please give me an example, Johann?

J: I've already told you about the energy counters we installed in order to measure electricity consumption, heating energy and compressed air production. However, what we didn't realize sufficiently until now is how our consumption correlates with Production. In fact, we considered the consumption Data Acquisition System as being separate to the other automation systems. We limited ourselves to make just a few connections to Production processes, like calculating relative consumption to production volume.

E: How do you plan to better correlate consumption with the production factors?

J: As the standard DIN EN 16001 clearly recommends, I see much potential in identifying the relations between consumption of electricity, gas etc. with production data or any other factors which might impact consumption. For example, we should aim to take into consideration information about shifts, batches, articles, status information relating to production equipment, evolution of process parameters, alarms, system events and so

on. As a consequence, we would have the chance to detect optimization opportunities. For instance, we could recover thermal energy or reduce the temperature in several processes. Once we identify, document and evaluate the possible optimization measures, the decision about making any subsequent necessary investments (replacing obsolete equipment, installing alternative energy resources etc.) can be made much more easily, because we can estimate an *ROI*.

In fact, to facilitate such an approach, our challenge is to connect easily with old and new equipment, which includes a wide diversity of automation technology.

E: From a solution perspective, zenon, our industrial software, is ready to support connectivity with hardware, buses or other software applications. Over 300 communication protocols, gateway technology and other features make zenon the ideal platform to collect data from the diverse automation environment in the one system. The data is then stored for later processing. But before undertaking historical analysis and statistical analysis using zenon's reporting features, for me, the online data processing looks equally important. What do you think, Johann?

J: For us, the real-time information is a key tool for keeping processes and consumption under control. The information has to be relevant enough to drive the eventual corrective actions before it is too late. The new standard also refers to so-called *EPIs*, but does not give an indication about how they should be calculated or what values we should aim to achieve. That means that we have to define and then standardise our own EPIs, so any automation system needs to be able to give us this freedom. Basically, the EPIs we use are: cumulative counters, relative consumption, energy balances across plant areas. Of course, the online calculated values have to be compared with our internal consumption norms.

E: Have you ever considered using straton® to calculate your EPIs? Integrated within zenon, this IEC 61131-3 based SCADA logic gives you the freedom to calculate your own EPIs and then reuse these calculations in your plant wherever necessary. The full benefit is obtained when zenon´s many features for visualizing real-time information are used: graphic diagrams, your own defined symbols, trends, lists of alarms and chronological events. Additional intelligence can be brought to bear by using modules like zenon's *Load Management*, which helps you avoid the costs associated with uncontrolled peak loads.

J: I agree. Managing peak loads is a part of the entire Consumption Management System - as we call it - which saves money in a very clear way: it deals with the costs of primary energy. Using the monitoring system and production planning, we are succeeding in keeping it under control manually. I assume that we could manage it in more automatic way. I could imagine, for example, that the boilers could be switched automatically to other fuels from our storage – we can store gas but not electricity. We intend to invest in a new generator which could be switched on automatically when needed too.

E: I can understand why you prefer to reduce the manual element in this process; for improved control. As far as I know, the standard DIN EN 16001 also states something about plant personnel involvement in Consumption Management, right?

J: Yes, the standard actually gives a high level of importance to having the right personnel involvement across the entire plant. In every production area and in every position, from operators to supervisors and managers on different levels, people directly influence consumption. It is not an easy job to make their involvement effective. There are several factors to consider, all of which are based on perfect communication. People should know their targets in their areas and how they can contribute: they should always be aware of the relevant information within the plant. In conclusion, we need to flexibly "connect" people to the Consumption Management System, making a point of "communicate relevant information to the appropriate persons".

E: Such challenges also have an answer in zenon's technology. Fast and cost-effective involvement of relevant staff is assured by zenon's network technology. Once you have developed the required functionalities of your zenon-based system on a PC, the information can be conveniently made available to other members of your team, at their workplace or on the mobile devices they use without additional engineering efforts. One option is to communicate over the Web; in this case the team member will just need to run an Internet browser. For personnel already using an ERP system, such as SAP, they have the option to access the information provided by zenon directly from SAP.

J: But even if your system is easy to use, we put a lot of effort in to training here at our plant. Do you have any idea how to reduce these costs? How can the software technology support the proper training of the team who use the Consumption Management System?

E: For an existing zenon application, it is possible to use the so called "driver simulation" and "project simulation". In this way, the most relevant practical situations can be demonstrated to the trainees quickly, without having to wait for an event (such as variations of EPIs, alarms, online production information or signals) to occur in the real process. It is not only a method of familiarising them quickly with the application functionalities and interface, but they will be better prepared to act in different scenarios according to the plant energy policy.

J: I see. Your automation technology gives us a clear advantage in the battle for optimized consumption - one more reason to remain very optimistic in the face of our numerous upcoming challenges…

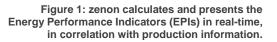# Conclusion

Johann highlighted several challenges relating to consumption management in a Food & Beverage plant. We conclude with the following **6 most important aspects** from an automation solution perspective:
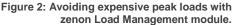
1. The standard DIN EN 16001:2009-08 contributes to the establishment of continuous improvement in the processes and systems that will lead to more efficient energy use.

2. Compatibility with more than 300 communication protocols ensures zenon users:

   ✓ easy integration of measurement devices as well as production equipment

   ✓ long-term extensibility of the energy management system with reduced costs

Figure 1: zenon calculates and presents the Energy Performance Indicators (EPIs) in real-time, in correlation with production information.

3. zenon brings real-time information and control through online-calculated EPIs, alarm management, event lists, graphical trends, symbols, personalized user interfaces and the special Load Management module.

4. zenon's network technology enables the cost effective involvement of personnel at every plant level.

5. Based on data archived by the historian module, zenon offers customizable reports for appropriate consumption analysis tasks.

6. zenon's simulation functionalities facilitate both personnel training and increased involvement of all staff in the implementation of the plant energy consumption policy.

Figure 2: Avoiding expensive peak loads with zenon Load Management module.

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