

The Future is ergonomics

FOCUS ON PEOPLE | The Food & Beverage production environment is a very dynamic one. Competition, creativity, continuous improvement processes and the pressure for high performance impact daily on the professional life of any production team, be it in an independent plant or in an international group. Constantly-evolving technological developments and possibilities as well as plant characteristics such as product range, production equipment and target markets can be subject to spectacular changes. Maybe the only real constant for members of a production team is the continuous company orientation towards more efficient operations. How do the people in this working environment cope with this situation?

THE COMPANY CULTURE and the implemented management concepts and standards affect the entire environment of a production plant. What is the impact of the working environment on the way each member of a production team succeeds in their job? Especially in the Food & Beverage industry, it is difficult today to imagine this environment without the automation and IT tools. How capable is the deployed industrial software of bringing more comfort and motivation? Of making top performance easy? Of enabling stress-free efficiency?

Here, ergonomics comes into play. Yes, ergonomics has a role to play in software too. Let's see how...

■ Complex or simple?

Machine operators in different plants across the world can be significantly different: in

terms of level of education, experience, age, etc. However, the challenges they face are similar. They must interact with the machines without error, even as machines are getting more and more complex. Any failure can mean reduced productivity or may even be dangerous. Operators have to maintain control, often simultaneously on different equipment, and are often required to react quickly. No breakdowns are tolerated; rapid changeovers and perpetually-improving OEE (overall equipment effectiveness) are required. In the frame of concepts such as TPM (total productive management), it is increasingly expected that operators are directly contributing to process optimization.

How comfortable are operators in fulfilling all these expectations? How many kilometers do they walk in a working day? How steep is their learning curve? Does motiva-

tion or personal experience create a barrier to high-performing technology?

Such critical topics are addressed when an HMI/SCADA (human machine interface/supervisory control and data acquisition) software has been built with a focus on ergonomics. For machine producers, it is essential that the development environment offers all the necessary easily-configurable components plus complete freedom to implement their usability concepts. For a machine operator, the graphical interface must be clear and easy to understand – independent of language, machine complexity or capacity to recognize colors – so he can quickly navigate through the available options of the HMI application without confusion to ensure effective process operation. The user-centered design, in contrast with classic applications, dramatically reduces the effort to understand the different forms of process information and offers a pleasant interactive experience [1].

Multi-Touch technology represents a new milestone regarding intuitive and safe machine operation. The learning curve is far less steep and new interface design concepts can be realized based on the natural Multi-Touch gestures known from electronic gadgets. Zooming, option selections, user login and secured actions gain new dimensions of simplicity. The combination of this technology with 3D machine visualization grants the user, for example, rapid localization of certain machine alarms (fig. 1) – not only useful, but a pleasant working experience.

Open communication with any other system is a basic principle of truly independent software, and is essential to support the



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Fig. 1
The Multi-Touch and three-dimensional human machine interface empowers the operator to be fast, precise and enthusiastic



complete integration of the machine operator within the production team. Complete vertical integration, including an ERP-to-HMI communication, guarantees the rapid and secure flow of operational instructions, such as changeover commands about materials or packaging, according to the latest production planning. Vice versa, the ERP acquires valuable information from the operator via the HMI regarding machine performance or product quality, making the continuous improvements process vivid and creative.

An ergonomic software solution supports the machine operator not only to complete his tasks successfully, but to remain motivated and healthy.

How many secrets does the production process have?

Packaging managers, brew masters and process specialists are all supervisory people who play a crucial role in respect to plant performance. Process design, quality control, equipment efficiency and energy costs are their responsibility. Their actions directly impact the way the plant business goals and policies are transposed in practice. Plan-Do-Check-Act processes informed by the implementation of standards such as ISO 22000 [2] or ISO 50001 [3] are also driven by them – but at what cost?

How easy is it for production managers to manage all of this? Before understanding where something can be improved, how much time do people invest in recording production data? How quickly are they able to transform huge amounts of data into valuable performance indicators [4]? Are their optimization decisions based on reliable data and calculations?

Production supervisors face numerous and complex challenges. An ergonomics-oriented approach, close to people and illuminating where routine is killing creativity, can build a sustainable solution, bring comfort and reduce costs.

Valuable and complete analysis is possible when the software is able to connect to any source of relevant data across the plant. In an advanced software this is realized by numerous native communication protocols. For a production supervisor, this means saving the time which used to be spent on manual data collection, and always being precise and informed. Real-time-calculated key performance indicators, such as OEE, EnPIs (energy performance indicators) or quality indicators give clear insights about



Fig. 2 Managing a packaging line: the real-time overview is an access point to comprehensive information

where a quick reaction could ameliorate process issues. The time gained by reducing the effort of building a flow of process data is available for creative optimization, bringing more professional satisfaction and improved performance.

Ergonomics also means the ability to easily focus on the required piece of information. Software must facilitate adequate top-down analysis and appropriate context filtering, such as by time, location, production entity etc. Software will bring the plant on the supervisor's desk. On an office PC it provides complete real-time information, plus comprehensive reports for historical analysis. But is this good enough?

Both requirements and available technology have already made further steps. The required information can be available exactly where it is needed, adapted to each user. Mobile technology is a mature real-

ity in state-of-the-art automation software which can give more freedom in plant optimization [5]. A diagnostic of efficiency or of consumption losses is even more successful when the software analysis methods are combined with direct process observation. Modern software is independent from the hardware used and even from the operating system. Even the smartphone in your pocket can play the role of "news channel" on line performance.

Ergonomics in industrial software means production supervisors can be confident when they take decisions, and act comfortably on the way to top performance.

The move towards real-time plant management is observed in many plants throughout their complete hierarchy. It is characterized by the need for contracted information cycles, even in the case of the production reports. A weekly report availa-

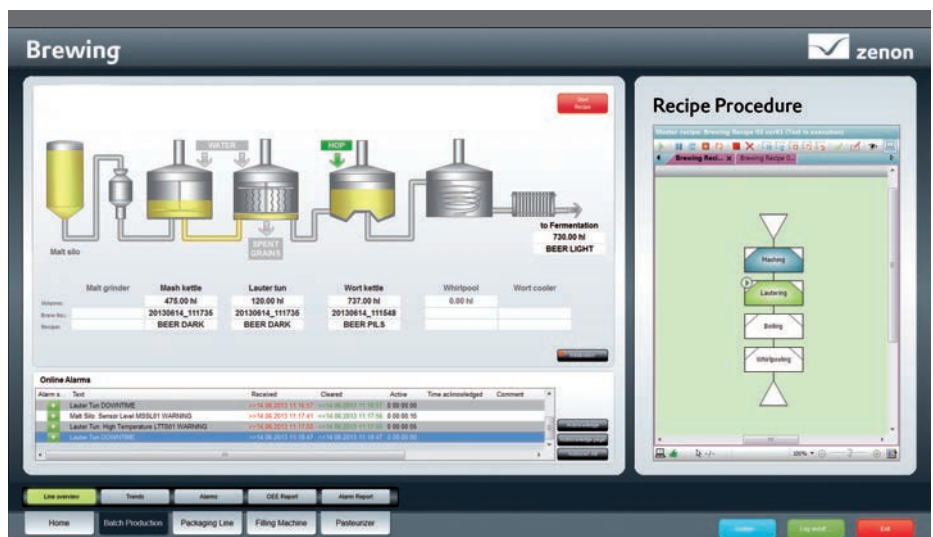


Fig. 3 Brewing processes under control, with flexible recipe management



Fig. 4 Dynamic Production Reporting for OEE and ISO 50001 analyses

ble on Monday morning is often not enough anymore [6]. Reports must even be able to use even real time data to perfectly reflect the current situation on the plant floor. The moment of analysis and decision is not limited anymore, but triggered by how the key indicators are behaving. Drastic or late corrective actions are replaced by rapid, smaller, more effective actions, with a more preventive character [7].

Plant management, such as technical, maintenance and production managers, can profit from such technology. The level of detail they require is much reduced, compared to what is required on the plant floor. For them, the data aggregation gains essential importance. Therefore, a template-based approach to the generation of reports is recommended, containing global indicators, dashboards or waterfall charts, with interactive drill-through analysis. Even better if this is available simply using an internet browser readily accessible on any device.

Plant managers need many answers as questions abound, such as: how does the energy cost reduction per produced bottle compare with last year? Where should one invest first to really improve the packaging line efficiency? Is it possible to produce greater quantities of beer without investing in additional brewing equipment?

But all the information to answer these questions can quickly become a deluge – overwhelming. An ergonomic software for plant management must therefore be a ‘vision booster’. They need state-of-the-art, reliable tools which don’t limit their initia-

tives: relevant, accurate, consistent, interactive and pleasantly-presented information, with “anytime and anywhere” availability.

■ Cost-effective flexibility

Looking to these huge possibilities offered today by software technology, any plant manager will keep the costs in mind – both for the initial investment and, moreover, for keeping the system alive, up-to-date, complete. The dynamism of the food & beverage market drives changes to products, recipes, packaging and so on which, in their turn, guarantees the production infrastructure will not remain unchanged for any length of time. Continuous improvement processes, especially in light of standards such as ISO 22000 and ISO 50001, demand a high capability to add new data sources and to modify information flows using industrial software. So what are the costs of this flexibility?

From the ergonomics perspective, there are several principles which enable high flexibility at reasonable cost. Extensibility is vital: at any time, supplementary connections to new equipment, measuring device or other software package must be possible.

When a software structure consists of out-of-box modules, which are configured by setting parameters rather than writing original lines of code, in order to realize a complete application, be it an HMI, a process control system, a line management system, an energy data management system or a building management system, development becomes more rapid and more

cost-effective. Specific mechanisms for efficient engineering should be available, such as reusability, centralized and decentralized parameters, automatic engineering wizards and so forth. If a few more members of the production team have to be involved and require access to the application, this needs to be quickly realized so using client-server and web-server technology, backed up by the adequate automation and IT security, is the common-sense approach.

Ergonomics in engineering makes ‘high technology’ available to a wide range of members of the technical staff. The continuous demand for maximum reliability, rapid integration, and new functionalities is not associated with increased effort, extended discomfort or never-ending time pressure anymore.

Software technology has to continuously challenge limits by getting closer to its users to creatively solve their particular professional demands. The food & beverage production plant with its persistent appetite for top performance is the perfect environment for visible benefits and for further great opportunities: The future is ergonomics. ■

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