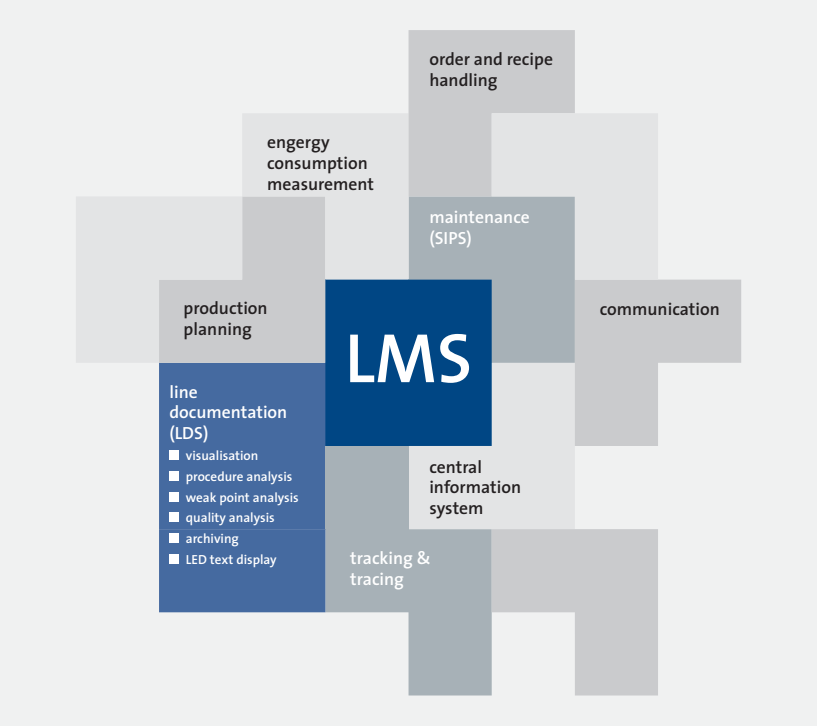
IT-Technology

KRONES Line Documentation System

KRONES

1. Present situation

Contents



Our Line Documentation System (LDS) is a product of KRONES's overall solution, our "Line Management System", for filling and packaging plants. The LDS takes over the task of an operating data acquisition system, it records data from the filling and packaging processes and evaluates and interprets this data.

Pressure due to growing costs, increasing requirements on quality and stiff competition are forcing companies to adapt and optimise their production processes continually. An essential prerequisite for the optimisation of performance data in production plants is exact knowledge of all process data. Questions regarding economic efficiency and return on investment in the beverage and foodstuffs industry have always revolved around one topic: the acquisition of the operating data.

A criterion for the integration of an operating data acquisition system in a plant control system is quality assurance. Internationally active companies in the beverage and foodstuffs industry insist that their products reach consumers everywhere in the same composition and uniform quality.

Furthermore, the widely practised strategy of filling by sub-contractors also includes the demand that the identical beverage should be produced in identical quality at all filling locations.

Besides the quality assurance of the product, an operating data acquisition system also enables quality improvements and the optimisation of the machines and plants in the production area. An operating data acquisition system provides statistical values that can be utilised in analysing weak points in production sequences and in elucidating individual production steps (manufacturing sequences). By means of the recording of performance data and the determination of performance highs and lows, a basis for the analysis of disturbances can be established.

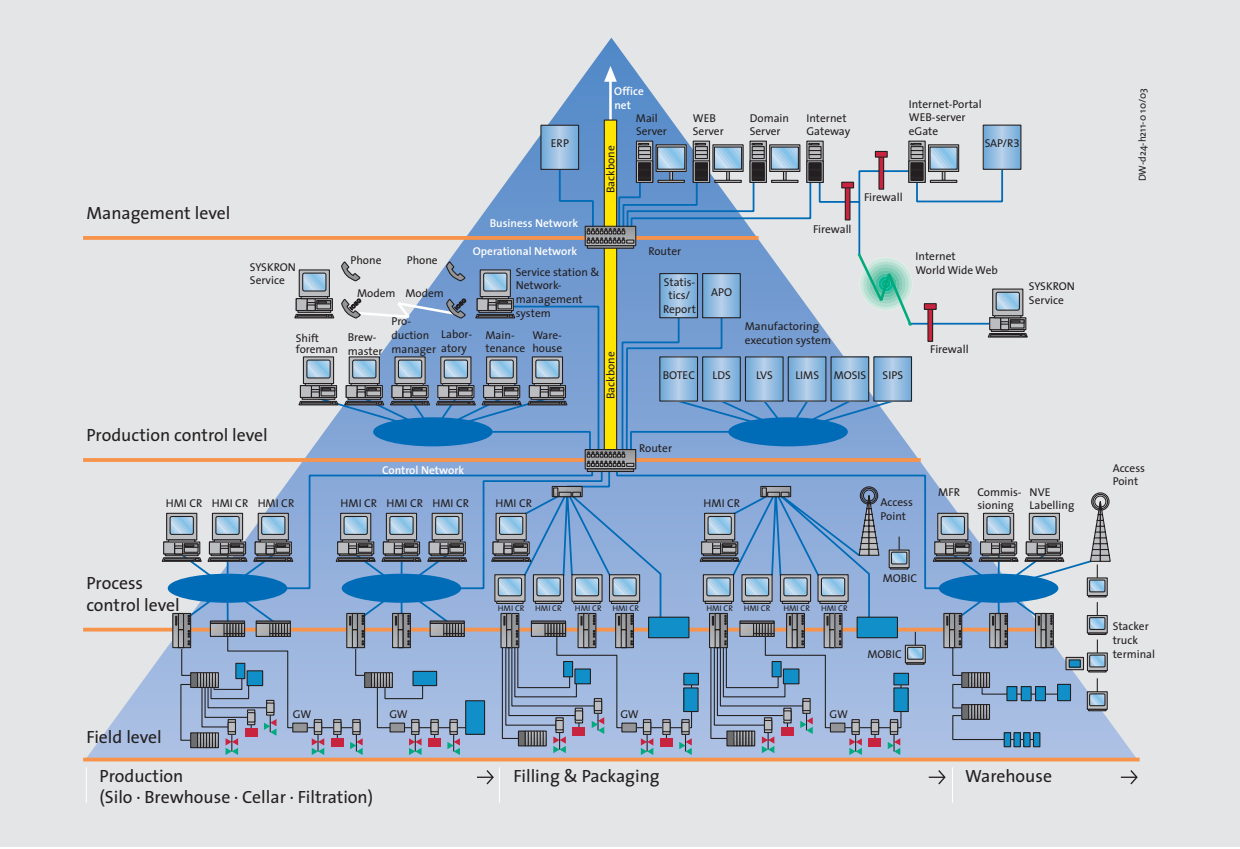
Based on the recorded data, conclusions can be drawn at any time regarding the profitability of a plant, which on the other hand, contribute to increasing its degree of efficiency. Optimisation procedures can thus be carried out for an entire group of many individual machines.

2. Approach to a solution

The automatic Line Documentation System LDS can:

- evaluate data on-line – for fast and simple error detection
- detect weak points in filling and packaging processes reliably and eliminate them
- evaluate material losses and help to prevent them in the future
- detect seasonal and personnel influences – offering the possibility of reacting to output fluctuations

Structure of the KRONES portfolio



The KRONES LDS is an efficient line documentation system that provides all the necessary aids and software tools that are required to achieve optimisation of a plant and to increase productivity.

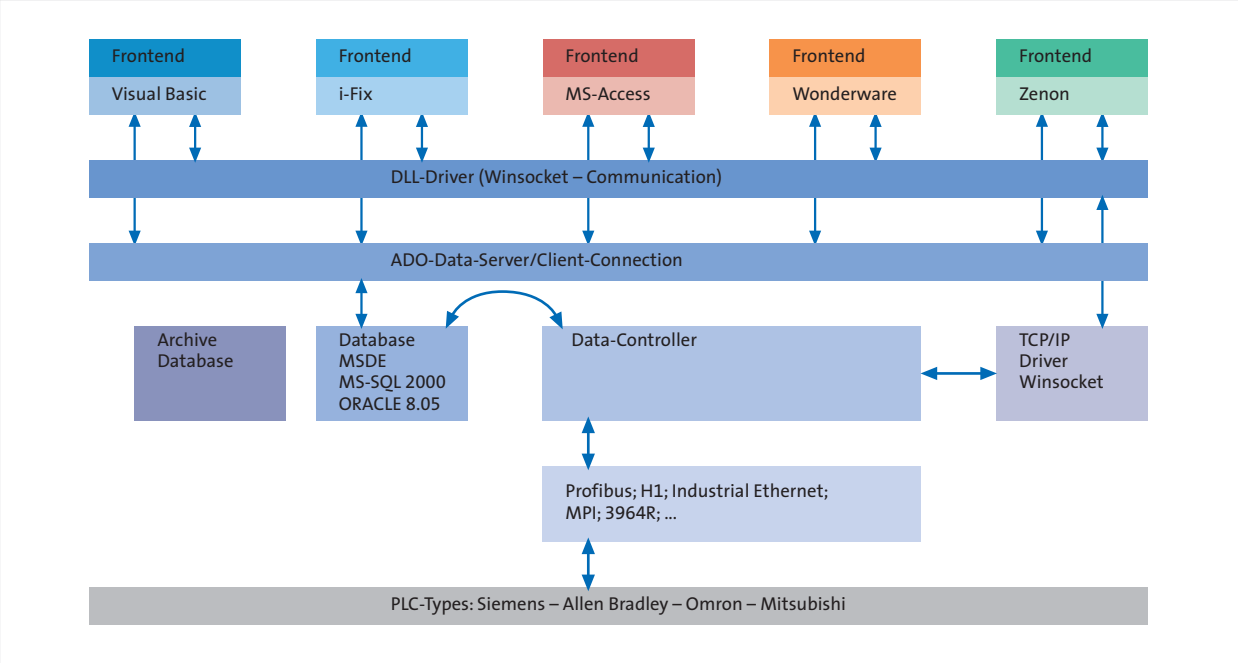
The structure of the information system is built up from bottom to top, from the field component level of the production processes where individual signals are collected, passing through the process control level, that contains all the relevant operating data and uses all the various display forms, up to the production control level, that leads to deductions based on this data concerning company wide information and decision processes.

Data provides explanations about economic efficiency

In the beverage industry the profitability of a plant is reflected in its output coefficient. In order to determine the degree of efficiency of a filling plant, the line documentation system LDS evaluates all the data that is available as individual bits, bytes, words or double words in the stored-program control devices of the connected machines: production and consumption figures, operating and filling time periods as well as degrees of efficiency. The quality of the manufactured units is monitored and documented without interruption by the LDS. Statistical evaluations that are effected under Excel provide explanations about the economic efficiency of the entire plant and enable the regulation of the process sequences by means of suitable measures.

3. Functional description

Structure of the LDS



Structure and method of functioning

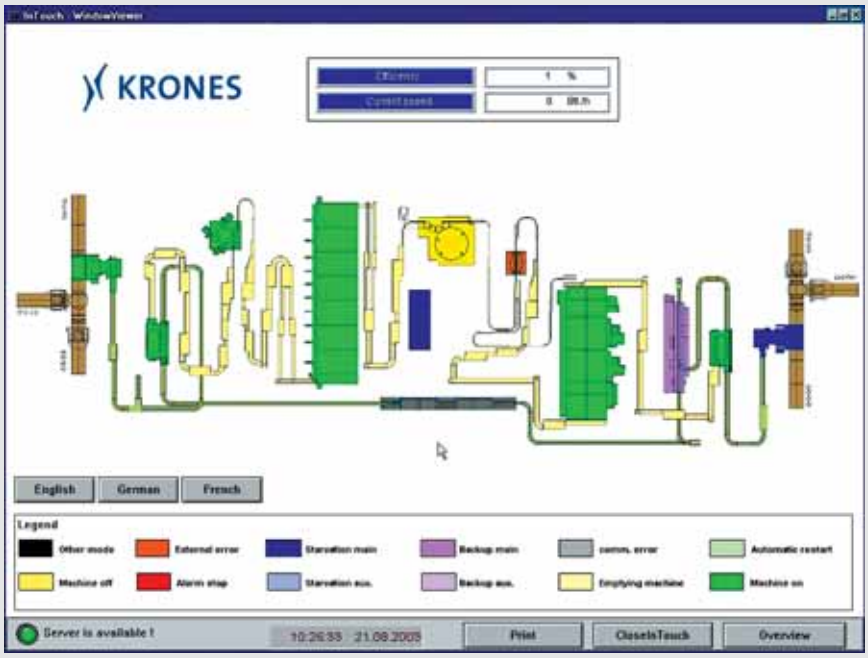
Data Controller
The Data Controller is the active part of the KRONES LDS, that directly picks up the data such as measured values and disturbances from the plant, stores these in the database and continually supplies any connected client PCs with on-line data via a network connection. In order to assure gap-free recording of the data, the Data Controller must be active at all times. Counter readings, trend values, operating statuses and disturbances are picked up from the plant in real time, i.e. <= 1 second, processed technically and recorded with protocol in the database. Counter readings are thereby always stored along with the respective shift and product set ID.

The Data Controller also controls the reset of a plant that is necessary to synchronise counter readings and to reset times for operating statuses and for the calculation of degrees of efficiency.

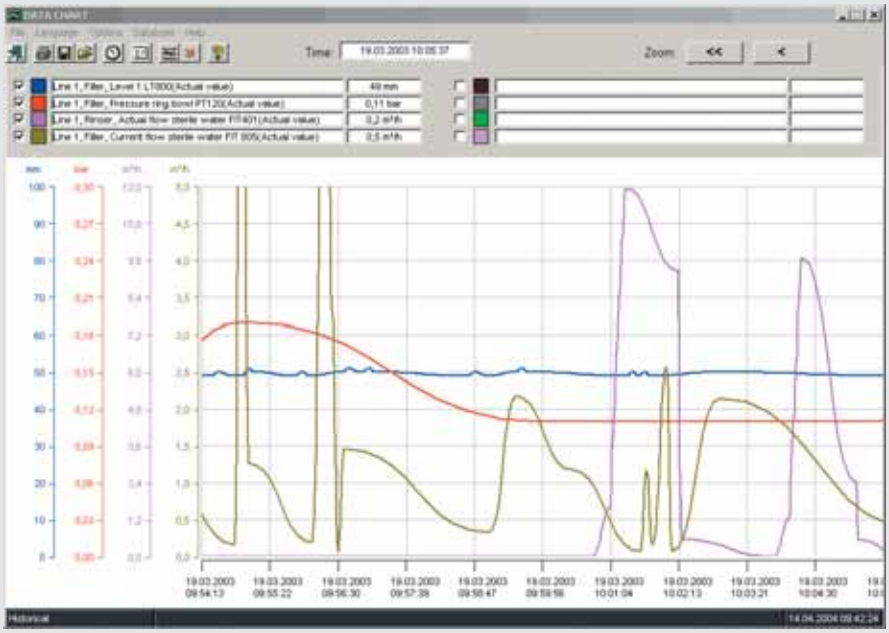
Data Configurator
The Data Configurator serves to effect the fast and flexible setting of the parameters for the KRONES Line Documentation System.

This configuration tool enables the operator to expand the system on his own to include additional lines, machines, counters, analog values and bit sizes.

Pre-configured parameters can be altered by the customer any time on site without difficulty.



Visualisation Data Monitor



Trending Data Chart Display possibilities for 8 curves that can be freely generated and displayed in a single diagram

LDS Front end modules

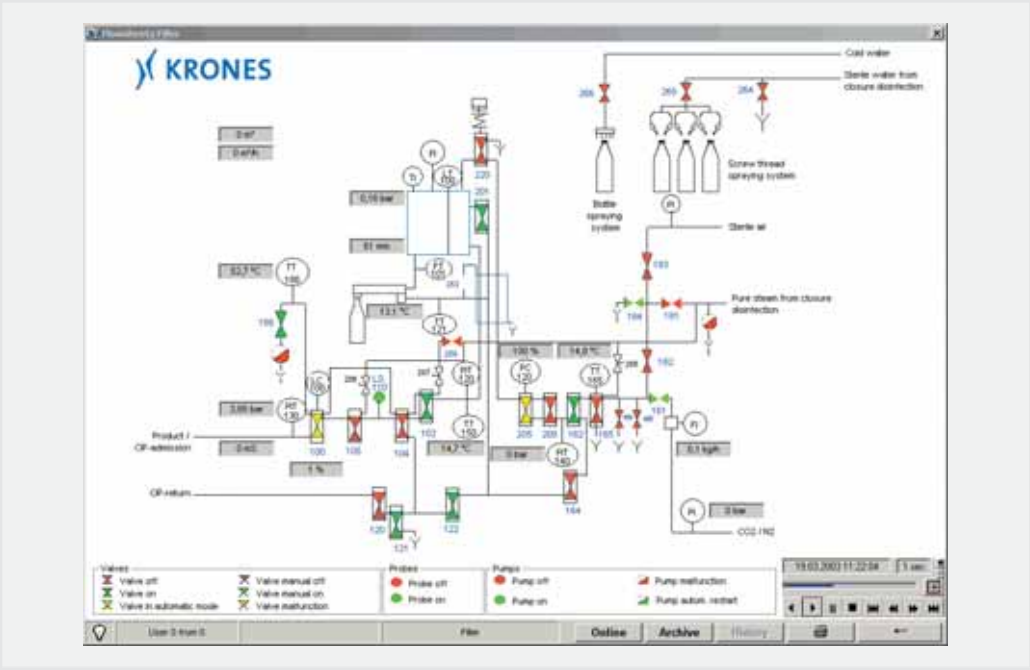
Visualisation Data Monitor
The visualisation module provides the user with a fast overview of current statuses of his complete plant and of individual aggregates. Visualised data is transmitted directly by the server to operator terminals via TCP-IP (Ethernet).

The purpose of the visualisation is the displaying of machine and plant statuses, current and cumulative quantitative data, LDS values as well as data about disturbances or for the elimination of disturbances. The course and progress of the filling procedure can thus be directly monitored in this manner.

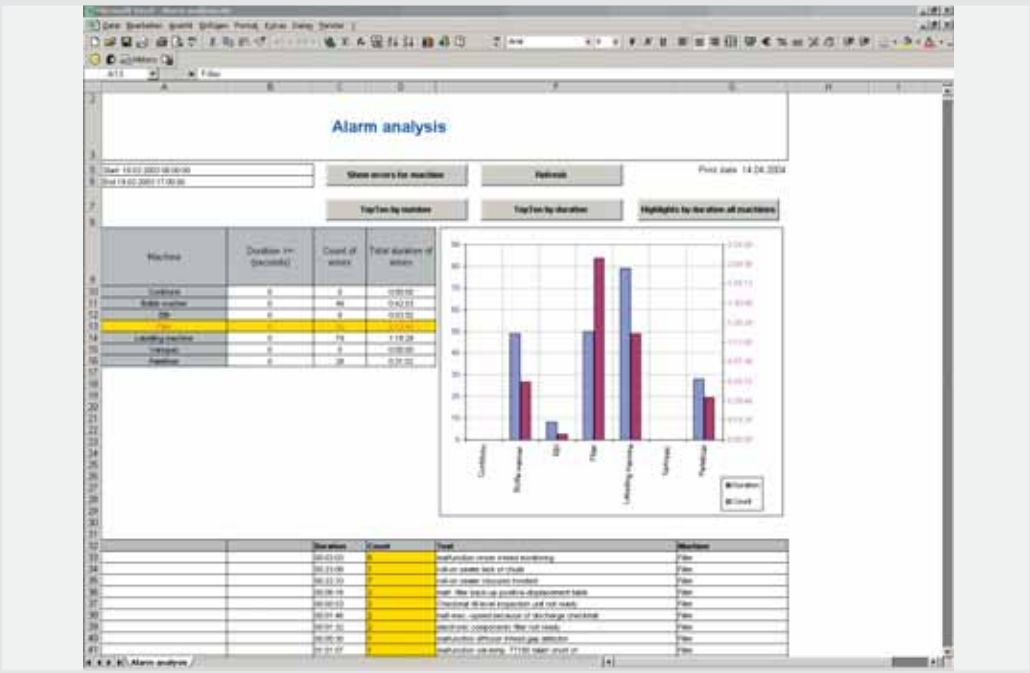
Trending Data Chart
Trending provides the operator with a display of process data in simple and clearly summarised form. A configuration menu enables the definition of various curves from predefined process data that display the time sequence of the individual parameters. Due to the automatic recording of analog values such as temperature and mixing relationships during production, exact statements can be obtained at any time regarding the quality of the manufactured product. Degree of efficiency and production performance are other decisive aspects that can be simply and precisely displayed by the Data Chart.

Taking into consideration the growing importance of the subject of environmental protection, Trending also contributes for example to the saving of auxiliaries such as chemicals.

Process technology



Data Report



Process technology
Process flow diagrams contain numerous elements that are documented by the LDS. For example, for each individual valve of a filler, the function of the valve in the system can be documented with respect to time which in review may lead to an explanation of possible malfunctions. The recording of temperature and other analog values hereby serves to facilitate the analysis of operating errors.

Data Report
Technical reports provide information for those entrusted with making decisions in various departments and hierarchy levels within a company.

The need for information naturally depends hereby on the tasks to be fulfilled and varies considerably according to the different levels. For this reason individual reports must be prepared for all persons bearing responsibility for the process so that with the aid of these reports they can fulfil their tasks in the areas of planning, control and documentation.

According to a business administration level model, the tasks in a company are classified hierarchically and can be passed on from top to bottom for processing.

The Data Report is a module with which reports can be generated at any time regarding for example, operating down-times, degrees of efficiency, plant load utilisation, consumption values, pressures, temperatures or batches.

Besides the evaluation of historical data, the database structure of the LDS also makes it possible to prepare on-line reports that directly transmit and visualise current information.

Archiving tool Data Archive
The KRONES LDS offers an automatic archiving tool that enables the operator to save (backup) his on-line database.

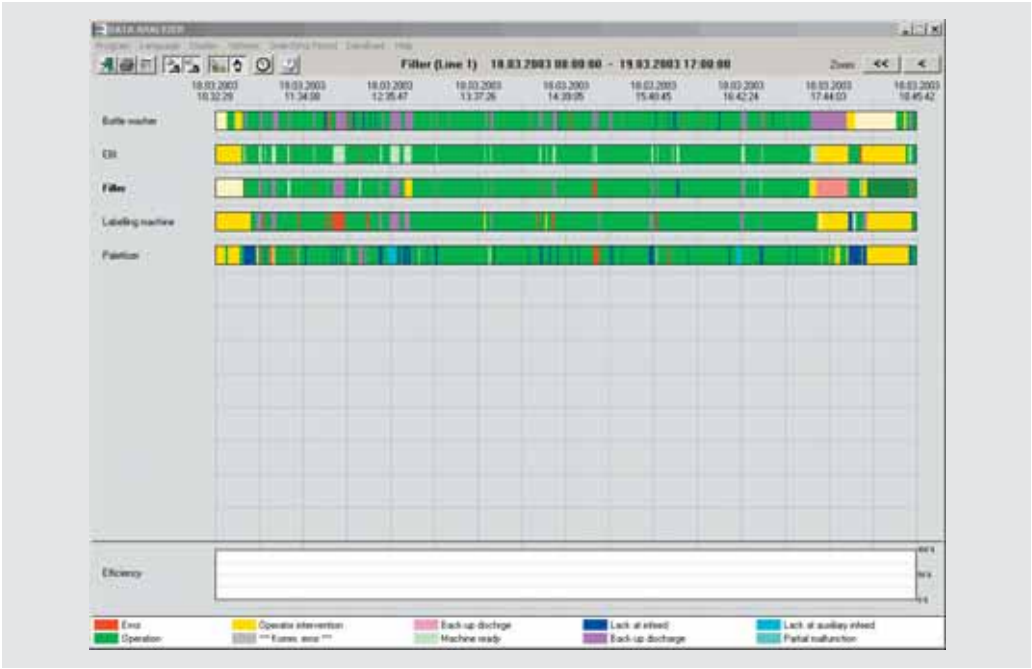
Two database instances run simultaneously on the system. The customer thereby has the advantage of accessing the existing database in real time or otherwise, of accessing the archived database.

Auto Print
Modern systems, such as also the KRONES LDS, are equipped with functions that enable the operator to carry out paperless information transfer within a company.

By means of a configuration surface, the operator can select in which program format (Excel, Word or user-specific worksheets) he wishes to transmit his information.

For this purpose the user has at his disposal the possibilities of conventional printout on a printer or transmission via email. With the KRONES module Auto Print it is also possible to automatically generate reports and to send them by email to an arbitrary number of users.

Data Analyzer



Data Analyzer
The Data Analyzer module enables the operator to monitor the runtimes of individual machines (e.g. fillers). The individual operating statuses are then displayed in a clear overview Gant diagram.

All errors and disturbances that have occurred are arranged in classes and can thus be displayed with colour coding and accordingly assigned.

The fast overview of individual machines or lines guarantees immediate localisation and evaluation of disturbances that occur. Daily reports that can also be generated by the Data Report module, reveal reliably in percentage form the causes of disturbances in the line.

Weak point detection and the analysis of disturbances

For the optimisation of the production process, it is decisive that weak points in the sequences be identified and revealed quickly and reliably.

The LDS recognises and displays very different types of disturbance sources; it records automatically over long periods of time all disturbances that trigger a machine stop as well as consequential disturbances in individual machines or aggregates.

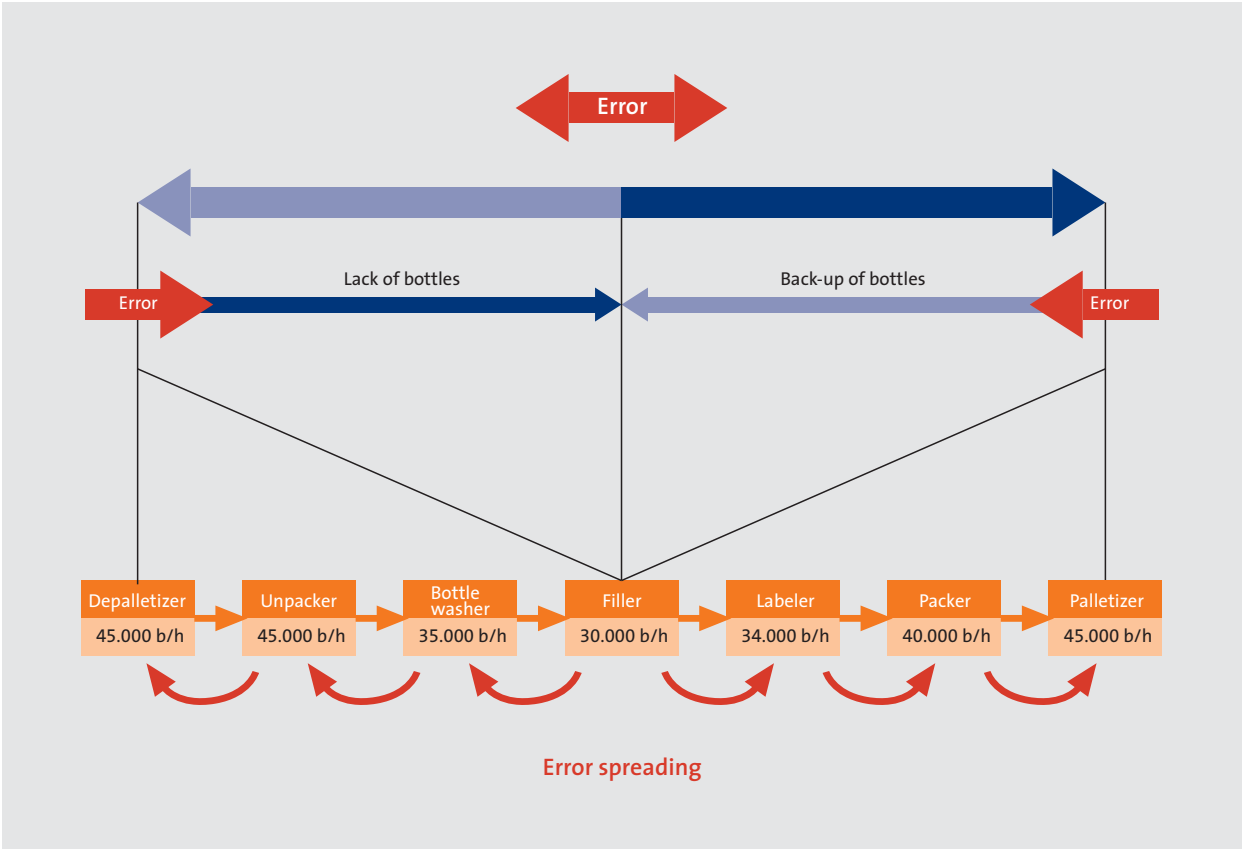
The visualisation of this data can be effected in flow diagrams, bar diagrams, graphs or tables. Fast information, depending upon the operator, can thus be called up about the status of the plant or of individual aggregates.

Relevant disturbance data are available immediately after occurrence and it is then possible to introduce appropriate measures to eliminate the fault.

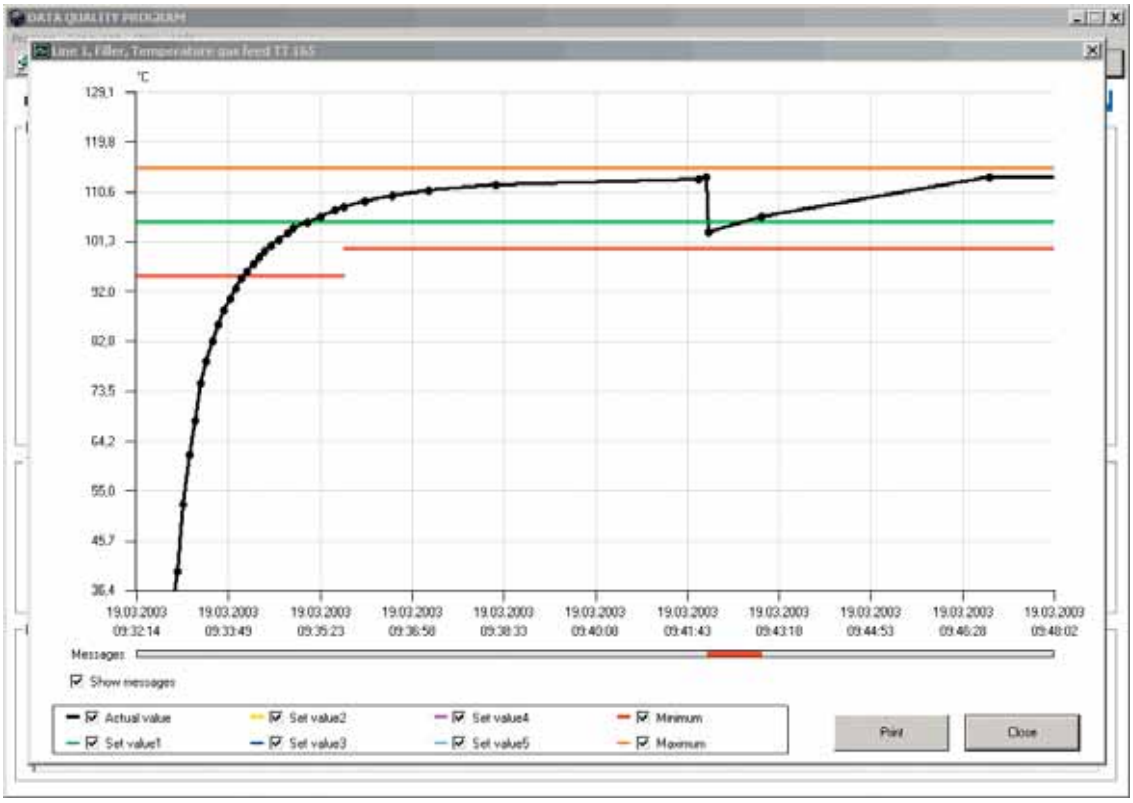
Also reliably recognised by the LDS are faults that only occur sporadically as well as disturbances that only occur very briefly.

The causes for the disturbances can hereby be traced for example back to a particular sensor. Weak points are documented in down-time statistics and disturbance lists, the careful evaluation of which can lead to an increase in the degree of efficiency or can prevent a reduction of it.

Weak point detection and disturbance analyses



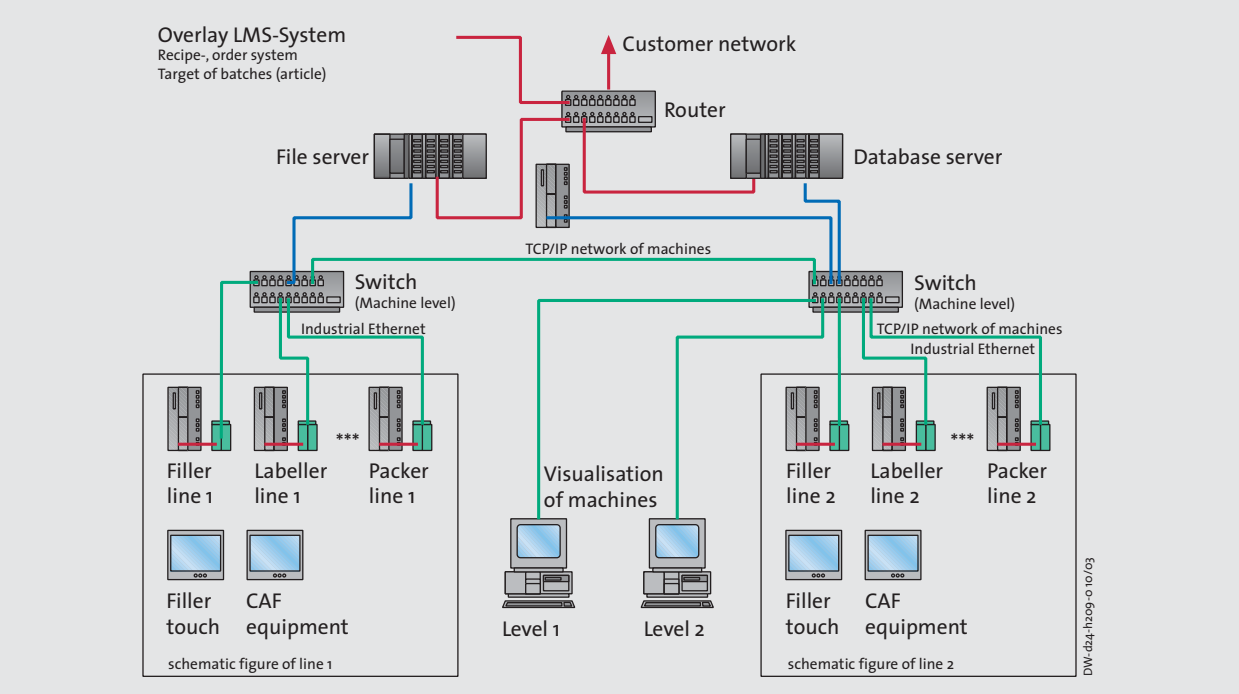
Data Quality Program



Data Quality Program

Besides reference values and actual values, it is also possible to store analog values, together with limiting values min./max., in the LDS. By integrating corresponding interfaces in the individual PLC units of the plant components, the time periods for which there was a jump above or below limiting values can be recorded in a protocol. The storing of messages or disturbances is defined via configuration entries. In case of deviations of the actual production parameters from predefined values, e.g. for the continual exceeding of a limiting value, a message signal is output that is displayed in the protocol of the historical database.

4. Specifications



The KRONES LDS requires no auxiliary measurement or testing devices but rather it utilises all the data that is available in the connected aggregates or in the PLC controls. The PLC controls are equipped with corresponding communication processors. It is thereby possible to directly collect and evaluate the source data from the respective plant component.

The system with its adjustable parameters and modular structure accelerates planning and increases the flexibility of the software, whereby subsequent setting of other parameters and expansions are also possible.

All data significant for the technical process such as counters, analog values and disturbances are included and managed in a parameter list. The highly efficient client server database that is employed MS-SQL Server 2000 guarantees data safety of the KRONES LDS software, even for the processing of greater amounts of data over longer periods of time.

The fast information flow and the precise transmission of data is effected via networks such as Profibus and Industrial Ethernet. Due to its object oriented structure, the KRONES LDS software offers interface possibilities to many Microsoft applications, such as Excel or Access, which enable the user to carry out his data evaluation individually with his own reports.

5. Advantages

The KRONES LDS continually records and documents all data relevant to the technical process and to the production process involved. Longterm statistics and evaluations of process and production characteristics are enabled by the LDS. Thus the system is not only an important tool in the control and weak point analysis of machines and plants, but it also supplies decisive information for production logistics and production planning.

Technical Benefits

- Analysis and detection of plant disturbances
- Weak point analysis
- Fast and effective elimination of faults
- Analysis of process and product characteristics
- Long-term statistics and control mechanisms
- Optimisation of the plant
- Continual tracing of production flow

Economic Benefits

- Increase of the output coefficient
- Increase in productivity and reduction of the costs per unit produced
- Quality assurance and quality improvement of the products
- Documentation and traceability throughout the entire production process
- Process optimisation due to long-term recordings
- Direct automatic transfer of production data
- Greater transparency due to a direct information flow in all areas of the company

Based on KRONES experience in filling and packaging processes, customer oriented solutions for operating data acquisition evolve independent of plant capacity. The results are intelligent filling and packaging plants in which the software tools responsible for recording the operating data and for the plant diagnosis provide information in the form of a variety of data.

A competent partner for IT solutions is thus available for all areas of the filling and packaging industry.

Automatically more

Does the concept "automation" mean merely the independent running of a production plant? That would not be enough for us. By automation we mean much more: increases in productivity and transparency, quality assurance and above all cost savings.

That's why KRONES personnel is a composite of many competent abilities. Which on the other hand opens possibilities for implementing effective processes in the areas of production, filling, packaging and logistics.

With the result that our customers thereby – "automatically" so to speak – receive more for their money.

KRONES is the solution company for

- process control technology, production automation
- production information and analyses
- production planning and optimisation
- storehouse management systems and material flow solutions

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