

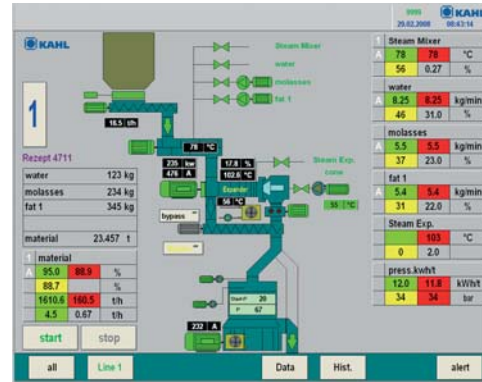
# Electrical Control System of the ExPander

**Control – regulation – visualisation – operation of KAHL plants with the annular gap expander**

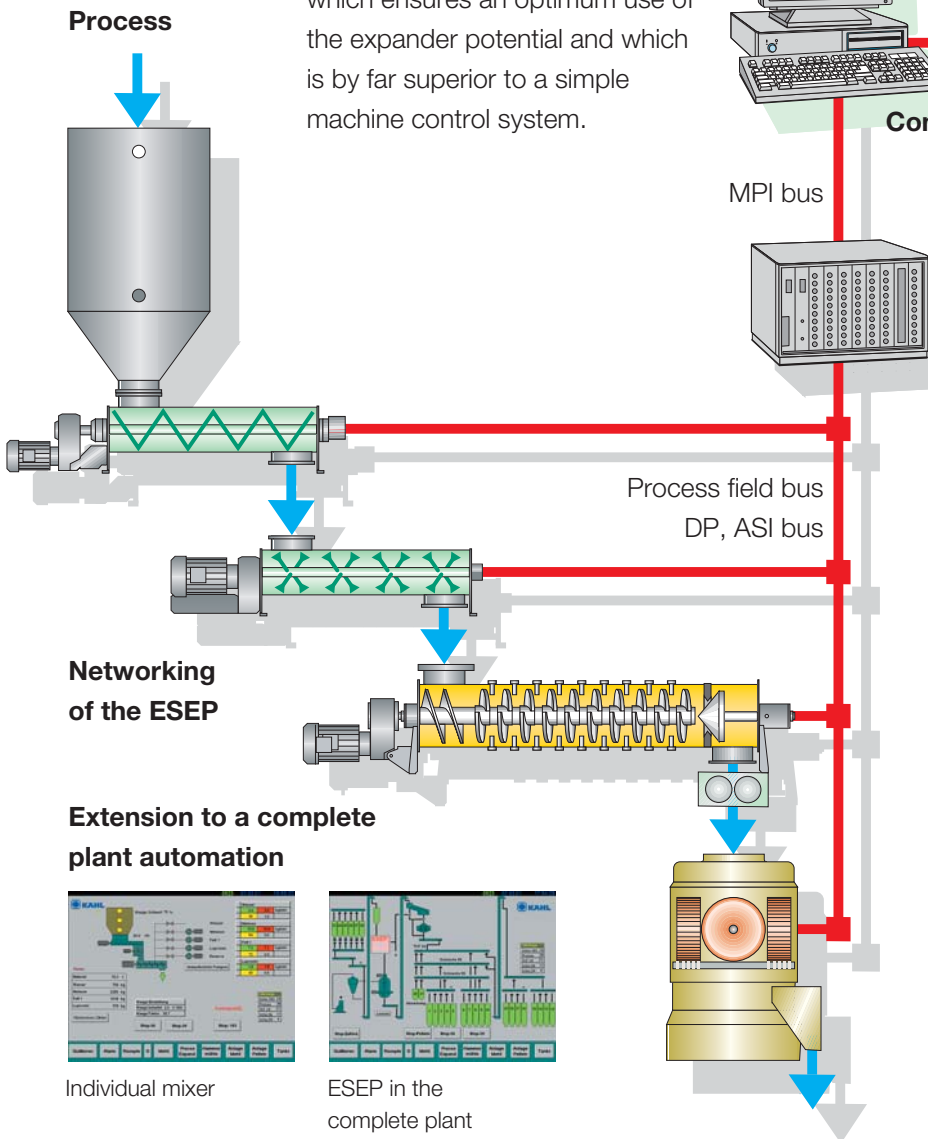
A sophisticated machine such as the annular gap expander requires an appropriate control system. Therefore, the **ESEP**, the **Electrical control System of the ExPander**, has been developed by the company KAHL.

After a complete revision and the addition of components, the ESEP now includes more than 12 years know-how of process and automation technology with the annular gap expander.

The result is an automation system which ensures an optimum use of the expander potential and which is by far superior to a simple machine control system.



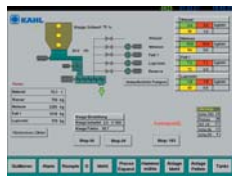
ESEP main display



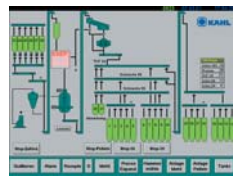
- Full automation of the complete expander line
- Constant product quality at a high throughput rate
- Low manpower requirements
- Up to 3 lines on a PC
- Better monitoring of the production process
- High availability due to the use of proven quality components
- High process flexibility, adjustable and extendible without any problems
- Rapid and economic commissioning
- Field bus system saves installation work

**Networking of the ESEP**

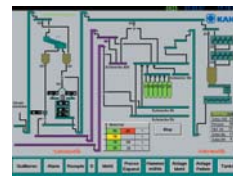
**Extension to a complete plant automation**



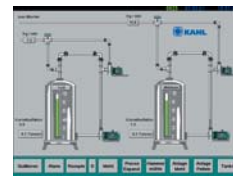
Individual mixer



ESEP in the complete plant



Hammer mill



Individual tanks

# ESEP: Electrical Control System of the Expander

The ESEP consists of two main components:

## Switch cabinet with Siemens PLC S7-315

It controls and regulates the process. Therefore, it is usually installed in the process environment, i.e. close to the machines. The optional use of a field bus system (process field bus DP, ASI-Bus) minimizes the installation efforts and the switch cabinet can be installed independently of the machine site.

## Visualization and operator station on PC basis

It represents the interface to the operator (HMI: "human machine interface") and it is implemented by means of Windows XP and the visualization software Intouch by Wonderware. Here, the entire process is displayed and operated. With one operator panel up to 3 expander lines can be monitored and operated.

PLC control system and PCs communicate via an MPI bus by Siemens, so that an independent installation of the HMI in the control room is possible.

As is shown in the overview, the ESEP represents a fully integrated solution for the operation of the annular gap expander which not only supports mere automation tasks but also meets the requirements of modern production management.

Also available is a variation which has been optimized especially for use of the Kahl extruder OEE.

The functions of the ESEP realized by means of PLC and PC are represented in the following overview:

### Automation of the expander line

- Fully automatic operation according to the pre-selected process parameters
- Minimized downtimes
- Control and regulation of:
  - the proportioning screw
  - the mixer
  - the expander
  - the crusher/breaking device
  - the pelleting press
  - the cooler (option)
  - the preceding and following conveying elements (option)
  - auxiliaries
- Regulation systems
  - load-dependent regulation of expander and pelleting press
  - throughput regulation t/h
  - regulation of the energy input into the expander (kWh/t controller)
  - steam and water regulation in the mixer
  - regulation of up to 2 further liquids in the mixer (e.g. molasses and fat 1) as well as of one liquid after the pelleting press (fat 2) (as an option)

### Visualization

- Display of all plant conditions by means of process displays in full graphics.
- Process displays provide for an easily comprehensible representation using colour codes
- Display in trend diagrams of all relevant process quantities (user-defined combination).

### Operation

- Intuitive, ergonomic operation via mouse click within the process displays requires a minimum training period and avoids faulty operations.
- Operation of several lines (up to three)
- Simple adjustment and optimization of controller parameters and timers of the PLC control at the PC without knowledge of programming.
- Rapid commissioning and fault diagnosis by means of individual activation of all drives from the PC
- Simple modifications of the plant configuration (e.g. additional liquid) and of calibrations at the PC

### Formula manager

- Allocation of the specific process parameters for each formula in the formula data bank
- Set-up of batch balances

### Logging and filing

- Logging of all relevant process quantities with user definable sampling rates and filing in standard CSV files, e.g. for further processing in quality management systems
- Transmission of archives files with DDE via the PC network
- Logging of alarms and fault indications
- Important for product liability and quality assurance (ISO 9000)

### Maintenance management

- Wear statistics for expander and pelleting press
- Statistical analyses for the optimization of maintenance intervals and the determination of bottlenecks (optional)

### Modem service and hot line (option)

- Remote maintenance of PLC control and visualization
- Fast and inexpensive assistance by the KAHL service team in case of problems with automation and process technology
- Video monitoring of the machines and video conferencing via internet with the KAHL service team

### Further options

- Integration into existing automation and process control systems
- Interface to Manufacturing Execution Systems (MES)
- Batch tracking
- Additional visualization stations (e.g. for the plant manager) linked via intranet/internet
- Registration of process data via field bus systems (process bus DP, ASI bus)
- Manual level, independent of the PLC, with emergency interlocking for temporary manual operation in case of a failure of the automation system
- Supplementation by cooler control system, supply and discharge system up to a complete automation of the works



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