

BÄUMER



WISDOM
THAT WORKS

SOPHIE

YOUR **MES**
FOR THE FOAM INDUSTRY

SAY HELLO TO SOPHIE

YOUR **MES**
FOR THE FOAM INDUSTRY



MES FOR THE FOAM INDUSTRY

With SOPHIE, Bäumert offers the first ever production control system which has been specially developed for the foam processing industry.

With the modular MES (Manufacturing Execution System) SOPHIE, Bäumert makes artificial intelligence available and usable for the foam processing industry. SOPHIE interconnects the entire foam production, thus increasing the potential of digital technologies for the whole value chain.

More EFFICIENCY. More TRANSPARENCY. More SECURITY.

EFFICIENCY

The production is constantly being optimized on the basis of continually gathered data: **costs sink, quality increases** – sustainably.

TRANSPARENCY

With SOPHIE, the production becomes completely transparent. Using the collected **data streams**, all processes are comprehensively **analyzed**, visualized and rendered transparent with key figures. If a data history is available, this can even be done retroactively!

SECURITY

SOPHIE means double security: state-of-the-art information technology ensures the **security of our customers' data** and systems. But with Bäumert as your partner, the future is secure as well, as the potentials of future developments are being safeguarded.

INTELLIGENTLY LOOKING AT THE BIG PICTURE



Data is also collected during the conventional manufacturing of foams. However, even in the best of cases, this data is collected systematically only within the limits of very isolated solutions for individual subsystems, and then stored in the ERP system (Enterprise Resource Planning System).

There is no comprehensive data history that provides a view of the big picture. Or it may have to be built manually and with great effort by collecting the data from different systems and sources. A productive and useful exchange of data does not take place.

SOPHIE – All the data in a single place

With SOPHIE, Bäumer is offering a unique solution. SOPHIE collects all the machine and plant data into a database and renders it transparent in order to quickly make it usable.

SOPHIE increases production efficiency

SOPHIE captures the entire foam processing – from the tank storage to the final product.

The system collects, visualizes and analyzes the data generated along the production chain, thus allowing access to performance, process and quality data. Thanks to better planning along the entire production chain and the constant feedback by the system, SOPHIE not only increases efficiency, it also makes the production more sustainable and environmentally friendly by helping to reduce raw materials usage, manufacturing costs and capacities.

Big Data and artificial intelligence

“Big Data” makes it possible to analyze the surrounding conditions during the processing of foam. The experiences gained under identical or similar conditions help to adjust machines in a manner that guarantees a consistently optimal product quality. SOPHIE works according to the principle of artificial intelligence: she learns and becomes more and more efficient. The larger the amount of data which SOPHIE

can use, the better and the more effective she becomes. She derives recommendations of action from this data and optimizes production according to the individual goals of the customer: waste reduction, lead time, product quality, unit cost reduction, flexibility, inventory reduction etc.

THE KEY BENEFITS AT A GLANCE:

- **Optimization of material costs:** Resource-efficient operation with an optimal utilization of materials.
- **Quality guarantee:** Production of homogenous quality products thanks to process safety and gapless material monitoring – independent of the operator.
- **Transparency:** High transparency of the entire process chain.
- **Fault analysis:** Early detection of faults and defects in manufacturing products and gapless product tracing in the event of a complaint (which batch, which raw materials, which supplier, etc.)
- **Perfect production:** Optimal production flow, order handling included.
- **Synchronization:** Logistics processes are perfectly integrated into the production.
- **Always up-to-date:** Real-time retrieval of the production status.

SOPHIE

ALL MODULES AT A GLANCE

The MES SOPHIE consists of
eight individual modules:

IT IS THE INTERPLAY OF ALL
MODULES THAT REVEALS
SOPHIE'S TRUE STRENGTH: THE
COMPREHENSIVE NETWORKING
OF THE ENTIRE PRODUCTION.

SOPHIE
identify

*The tracking
module*

SOPHIE
prepared

*The planning
module*

SOPHIE
optimize
*The intelligent
module*

SOPHIE
connect
*The interface
module*

SOPHIE
produce
*The manufacturing
control module*

THE ENTIRE
PRODUCTION,
SMARTLY
NETWORKED

SOPHIE
inventory
*The stock management
module*

SOPHIE
measure
*The quality control
module*

SOPHIE
data
*The database
module*

SOPHIE data

The database module



THE HEART
OF OUR
TRANSPARENT
PRODUCTION

The database SOPHIE data is SOPHIE's heart.

All production-related data is stored here. This includes information from all machines and plants involved in the production. This information makes it possible to analyze the production, evaluate it and render it transparent – and, ultimately, to optimize it further.

SOPHIE connect

The interface module



«MAKES THE
SYSTEMS TALK
TO EACH OTHER»

SOPHIE connect is the basis upon which the different systems communicate with each other. The module automates the transfer of data, for example during the order handling.

In addition, SOPHIE connect features various interfaces which link the different systems to each other.

COMPATIBLE SYSTEMS

➤ Enterprise Resource Planning (ERP) or Manufacturing Execution System (MES)

Enables the automated exchange of the various order data from the customer's order system (e.g. ERP). This data indicates the production status. It is also returned back to the order system.

➤ Customer-specific systems

At the customer's request, we will program special interfaces for ERP systems such as SAP, NAV or other SQL based systems.

➤ Third-party machines

On request, we will develop standardized interfaces (based on OPC-UA) to enable the transfer of data to third-party machines.

SOPHIE CONNECT IN PRACTICE

Painstakingly copying Excel lists from one system into another? Entering hand-written data? What an ordeal! The base module SOPHIE connect ensures that data is simply transferred automatically – and puts an end to the ineffective, error-prone, back and forth copying of data.

SOPHIE produce

The manufacturing control module

GIVES YOU
CONTROL OVER
THE ENTIRE
PRODUCTION
HALL



Using her centralized control, SOPHIE produce automates the whole production chain. The module then controls the entire production hall.

SOPHIE produce enables the organization and automation of foam processing procedures on modern production lines, from foaming to completion.

In non-automated plants, each machine has to be operated individually using its own special software. With SOPHIE produce, in-line machines can be tasked and controlled centrally.

This enables a quicker and coordinated processing of customer orders: the machines automatically receive the necessary data and execute the required steps - from the foaming, cutting to length, warehouse management, cutting and order picking to the glueing, packaging and many more.

BENEFITS:

- **Intelligent networking**
Automated production control thanks to the networking and automating of the entire value chain. Individual machines no longer need to be controlled manually.
- **Quality assurance**
Data-based production control guarantees consistent quality. This reduces waste and lightens the workload of the final product inspection.
- **Detection of quality issues**
As faulty products are reliably detected, they can rapidly be removed.
- **Fault transparency**
Since all data is stored centrally, the production route of a product can be traced in the event of a customer complaint.

SOPHIE PRODUCE IN PRACTICE

Wow, 50% fewer manual production steps! This lightens the workload on the colleagues and reduces costs as well as the waste rate. In addition, throughput is increased thanks to process integration, which in turn increases output.

SOPHIE inventory

The stock management module



JUST LIKE TAKING INVENTORY - BUT CONSTANTLY AND IN REAL-TIME

SOPHIE available provides a comprehensive inventory of the tank storage, curing racks, crane storage, short block storage and glue drying racks. The inventory information can be retrieved centrally at any time. The relevant data is either recorded by third-party systems or by our machines.

SOPHIE INVENTORY STORES THE FOLLOWING STORAGE DATA

- **Tank storage**
Raw materials, including a level indicator, manufacturer's code, filling date, content information, ID number, pump number.
- **Curing racks**
Number of blocks, their storage position, quality and measurements as well as the long block ID and the curing status.
- **Crane and short block storage**
Number of blocks, their storage position, quality and measurements as well as the long block ID.
- **Glue drying racks**
Number of glued mattresses, their storage position and the mattress ID.

BENEFITS:

- **Material allocation**
Since foam blocks are clearly marked as reserved, there are no accidental multiple allocations of one and the same block.
- **Data overview**
All data is managed within a common data overview and can be accessed there. Storage locations such as the curing rack 1, curing rack 2, crane storage etc. are combined into a single overview.
- **Smart search**
The search function lets you find blocks based on different data areas, e.g. quality, storage location, etc.
- **Information on material and machines**
The system includes information on storage locations and qualities. Additionally, the stroke cycles of plants can be set in order to determine the maintenance cycle of a crane and thus prevent defects.
- **History**
With the transport history, quality differences can be tracked. This enables an easy identification of blocks belonging to the same batch that are stored in different places, for example.

SOPHIE INVENTORY IN PRACTICE

If memory serves, there should be material of the appropriate quality left in residual block storage for this small customer order. But is there enough material to fulfil the order? Thanks to SOPHIE inventory, nobody needs to go into residual block storage and painstakingly gather together the blocks. Using the module's search function, you immediately know if there is enough material and where the blocks are stored.

SOPHIE prepared

The planning module



SOPHIE prepared plans process steps. For this purpose, the module sends orders directly to the available software elements provided by Bäumers or other providers. Customers who control their foaming recipes and foaming machines by digital means can integrate their software into the superordinate MES SOPHIE. It generates cutting programs and complex nestings. Glueing programs and software for choosing the mattress cover and planning the packaging are also compatible with SOPHIE prepared.

GOOD
PREPARATION
MEANS BETTER
PRODUCTION

SOPHIE prepared combines different Bäumers software solutions into a single module

- Bäumers Mattress Nest
- Bäumers Cube
- Bäumers Nest
- Bäumers Rail Nest (in planning)
- WinCAP 3
- Superior Mode 2D Nesting
- QuickSelect
- Bäumers Sales Block Nest (in planning)

BENEFITS:

➤ Collection of recipes

A selection of foaming recipes guarantees a consistent quality. The mixing ratio of chemicals influences the density, shape retention, surface structure, fire behavior and insulation capacity of foams.

➤ Quality assurance

During the foaming, other parameters such as the temperature, humidity and air pressure are crucial as well. SOPHIE prepared provides a collection of data so you can rely on past experiences in order to achieve an even foam thickness, material density and quality.

➤ Integration

SOPHIE prepared networks the various Bäumers software solutions for the preparation of the cutting and the nesting.

➤ Data packaging

The module provides the data which are necessary for the automated order picking, glueing, covering and packaging to run as smoothly as possible.

SOPHIE PREPARED IN PRACTICE

Entering every single step individually for each machine? A thing of the past! With SOPHIE prepared, entire daily productions can be entered. The system takes account of different qualities and measurements and automatically triggers modern machines in networked plants.

SOPHIE measure

*The quality
control module*



SOPHIE DOES
REAL PRECISION
WORK

With the module SOPHIE measure, the 3D measurement of long and short blocks, sheets and finished mattresses becomes very easy.

To this end, smart measurement bridges are placed at various points of the production. When a block passes through, they register its dimensions and, if necessary, collect environmental data such as temperature, humidity and air pressure. The 3D representation allows the detection of faults within the block.

BENEFITS:

➤ Safe temperature

The inner temperature of freshly foamed long blocks is constantly measured. Thereby the reaction behavior of the block is monitored, which allows conclusions to be drawn about the curing process. If a critical temperature value is exceeded, an alarm is triggered and the block is automatically removed from block storage.

➤ Reliable

All blocks are repeatedly measured at various points of the production.

➤ Smart

The weight of the cured block is compared to the blanks. This allows conclusions to be drawn about the quality of the recipe in order to adjust it if necessary. This way, quality constantly increases with experience.

➤ Constant quality control

For quality control purposes, sheets and mattresses can be measured immediately before the glueing and the packaging, respectively. As any faults in the still unglued sheets are detected and removed early on, SOPHIE measure drastically reduces waste. Before every individual production step, there is a quality check which automates the removal of faulty sheets.

➤ Fault identification

Defects in blocks are marked after the measurement so the operator can react quickly and flexibly. Faulty products are quickly identified and removed.

SOPHIE MEASURE IN PRACTICE

Oh no: a block has been foamed too high! But thanks to SOPHIE, this problem gets detected before the block is transported further and blocks the cutting machine with its excess height. The foaming of subsequent blocks is adjusted accordingly, and waste is reduced to a minimum.

SOPHIE identify

The tracking module



COMPLETELY
TRACEABLE
PRODUCTION

From foaming to packaging and shipping, each product passes through a large number of steps. The module SOPHIE identify makes every individual step accurately traceable, both during production and afterwards.

➤ Tank storage

In order to obtain an optimal foam quality, SOPHIE identify takes into account integrated trace heating, insulation or heat exchange systems, the manufacturer's information on the chemicals, temperature, humidity, air pressure and much more.

➤ Foaming

Based on the data on the raw materials, the timing and the surrounding conditions, the foaming process becomes traceable and transparent.

➤ Fresh block storage

Here, data such as the storage time and location of a block, the block's temperature curve and changes of the block's measurements is gathered.

➤ Crane storage

Here again, storage time and location, as well as the transport history provide relevant information on the history of the final product.

➤ Cutting of short blocks

The complete data gathered on the long block is attached to the short blocks that are cut from it in the form of a unique block ID.

BENEFITS:

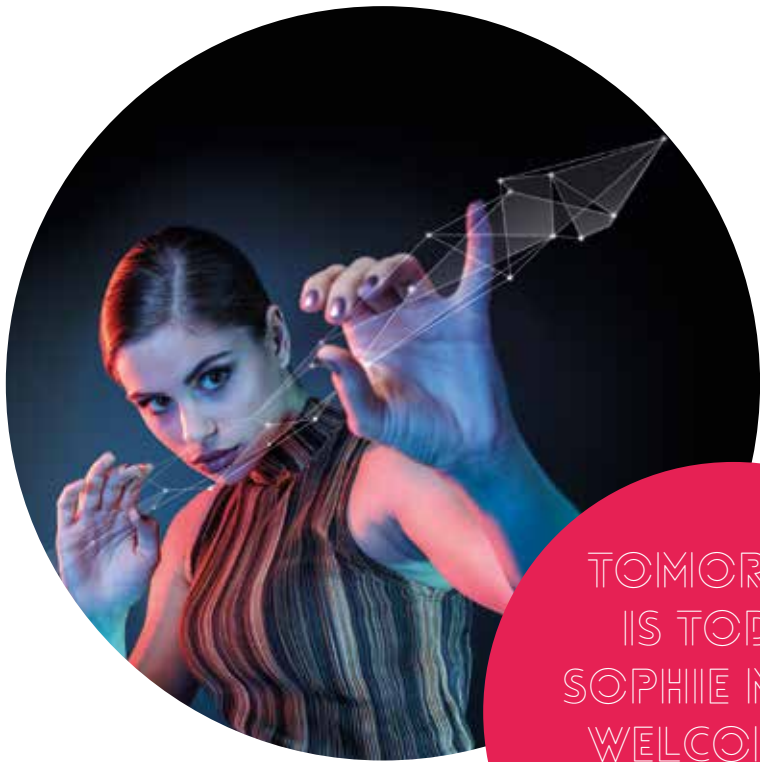
- If the final product consists of several layers, as is the case for sandwich and multizone mattresses, data is available for each individual layer. The recipe with which the layer has been produced is entirely traceable – from the foam production to the covering and packaging.
- This data can be used in the event of customer complaints or recall campaigns.

SOPHIE IDENTIFY IN PRACTICE

A large chemical group has issued a recall! Their TDI (toluene diisocyanate), a base material for the production of PU, is contaminated with dichlorobenzene (DCB). The mattresses made from it may under no circumstances be released for sale!

In the future, thanks to SOPHIE, it will be easy to find out which products have been produced using the contaminated TDI and where they have been delivered. This way, we can issue a recall for them. But there is more to it than that: Since both inventory goods and delivered goods are clearly identifiable, production can continue without interruption as you can also clearly see which products are not affected by the contamination.

Better safe than sorry.



TOMORROW
IS TODAY:
SOPHIE MEANS
WELCOMING
ARTIFICIAL
INTELLIGENCE

SOPHIE optimize

The intelligent module

SOPHIE optimize makes the future tangible.

While everybody is talking about artificial intelligence, SOPHIE optimize takes a decisive step towards the future: based on its collection of mass data from the modules, this module autonomously develops production and process changing decision proposals. This way, using sophisticated algorithms, SOPHIE facilitates

improvements in all production areas by taking control and intervening when necessary. This goes far beyond the mere gathering of data. This intelligent module - in the truest sense of the word - provides data which enables predictive planning of the various production steps.



SOPHIE

YOUR **MES**
FOR THE FOAM INDUSTRY

Integrated software solutions

from Bäumert

B+ Connect

A modular service platform consisting of four modules.

B+ Support: interface with Bäumert's service.

B+ Shop: secures the parts supply.

B+ Maintain: organizes maintenance activities.

B+ Focus: visualizes processes

Bäumert Cube

System for the three-dimensional nesting of cuboids on vertical cutting machines.

Mattress Nest

A software for the accurate and fully automated nesting on foam cutting machines.

A special nesting algorithm ensures optimal utilization of material during the cutting of short and long blocks. Mattress Nest creates cutting programs for untrimmed blocks on horizontal contour cutting machines. System requirements: WinCAP 3.0.3 or higher and POS 2.2 or higher.

Bäumert Nest

A system for the automatic nesting, the optimization of block utilization and the automation of complex nesting processes.

Requirement: WinCAP 3.0.3 or higher.

Quick Select

A software for quick and easy order picking on vertical contour cutting machines.

All parts of the executed cutting program are displayed on a screen, including their name and location, and are allocated to their respective consignments. Labels printed by the system can then be glued onto the contour part.

Rail Nest

A software for the automatic generation of rails for spring mattresses on CNC contour cutting machines.

Status: Currently in development.

Sales Block Nest

A software that allows for the nesting of short blocks intended for sale directly within the corresponding

long blocks. The software monitors the inventory of short blocks and decides if blocks can be taken from storage or if they need to be cut to size.

Status: Currently in development.

Superior Mode 2D Nesting

A superior mode which allows the automated creation of entire cutting programs for a cutting line consisting of a horizontal cutting machine (BSL/BST or BSA) and a vertical contour cutting machine (OFS-VS).

The scope of application includes mostly sheets and parts for the production of furniture.

System requirements: WinCAP 3.0.3 or higher and Bäumert Nest.

WinCAP

A programming software for the quick, easy and largely automated creation of cutting programs for CNC contour cutting machines.

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