

Optimization of Production in Short Cycle Press Lines

Baumer Inspection GmbH, Germany



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Baumer Inspection: Optimization of Production in short cycle press lines
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Baumer Group & Baumer Inspection GmbH Germany

An international family-owned enterprise



- Headquarter in Frauenfeld, Switzerland
- About 2.500 employees worldwide
- 37 locations in 19 countries
- Turnover about 450 Mio US\$
- D&B Rating Certificate:
 - Financial stability
 - Highest credit rating
- Executive Board: (from left to right)
 - Christoph Kluser, Sensor Solutions
 - Severino Bruno, Finance & Controlling
 - Dr. Oliver Vietze, CEO & Chairman
 - Dr. Johann Pohany, Motion Control
 - Dr. Alf Zips, Process Instrumentation

Industry segments

Baumer sets benchmarks



Factory automation



Process automation



Further industries

Extensive product range

The appropriate technology for every application



Our core business: Inspection Systems in the wood based panel industry

Decor



Decor paper
Decor foil
HPL / CPL

Boards



MDP / MDF / HDF
Board

Lacquered boards

Furniture &
Flooring boards

HPL boards

Plywood boards

Panel



Furniture panels
Flooring planks

Edge



Edge banding
Foil wrapped
boards

Lacquered edges

Baumer Inspection GmbH

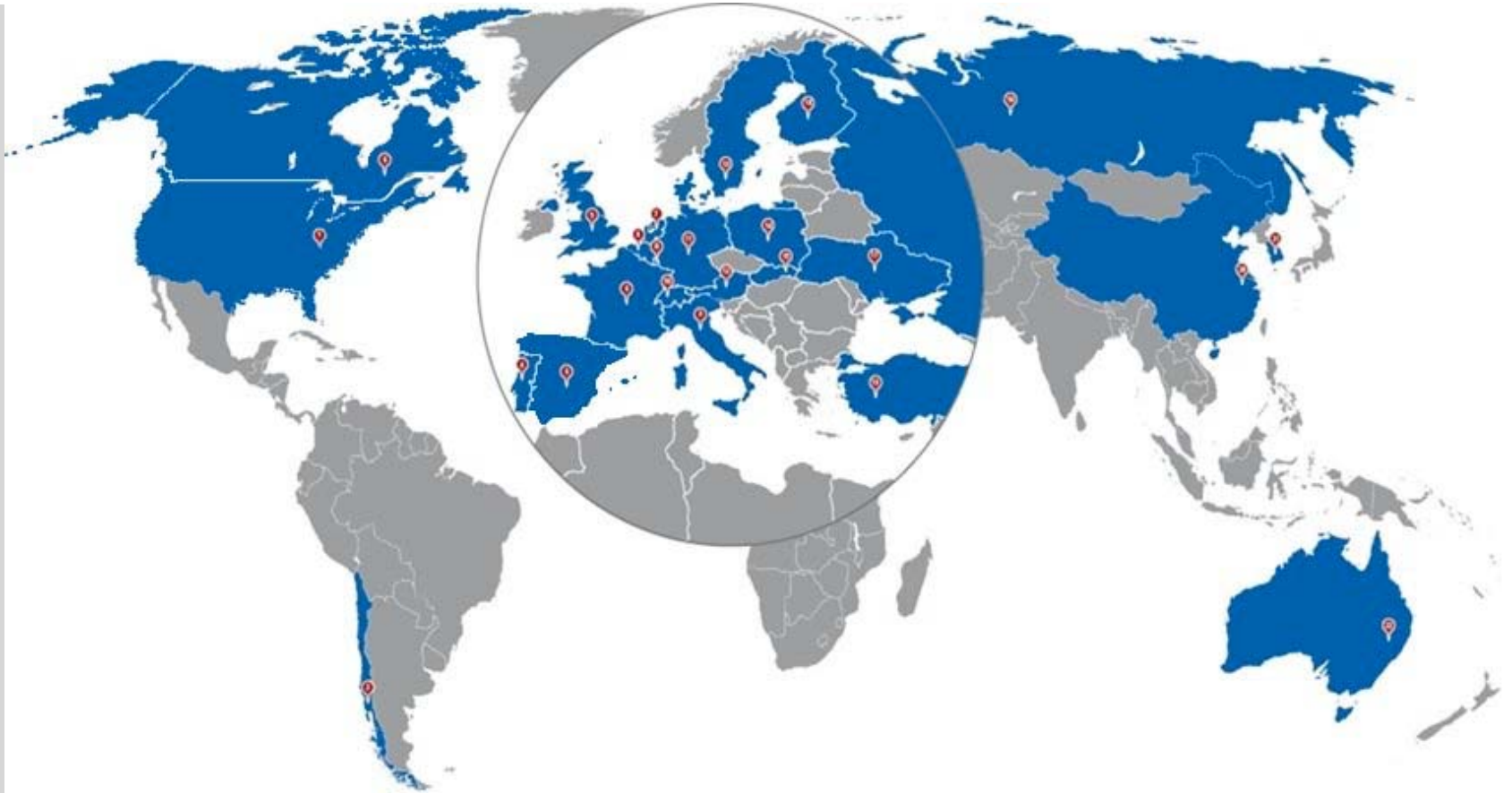
Total solutions for surface inspection and OEM partner

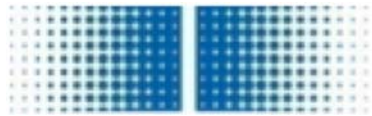


- 35 years of experience in industrial vision scanners
- 500 inspection systems in operation worldwide
- 3500 OEM systems with the label of our partner

Baumer International

Global coverage





Baumer

Baumer Canada



Baumer Inc.

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Fax +1 905 335 8320

Baumer USA

Baumer Ltd.

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CT 06489 Southington
USA
Phone +1 860 621 2121
Fax +1 860 628 6280





MFC4.0: the start of the project

Analyzing and specifying the design of the MFC4.0 system started end of 2014 .

ColourBrain® MFC4.0

The start of the project

- **What our clients told us:**
 - Detection of every defect!
 - More information how to optimize production & reduce rejects!
 - Make it easy to operate and make it robust!

- **We focused the new MFC4.0 on three main targets:**
 1. **Optimizing inspection** for a reliable detection of all defects.
 2. **Classification and grading** of defects including a data base system for analyzing these defects.
 3. **Easy to operate** user interface

ColourBrain® MFC4.0

Safe detection of all defects

Heat Lines

- ❖ **New cameras:** designed and produced by Baumer.
- ❖ **New algorithms** for optimized detection of heat lines.

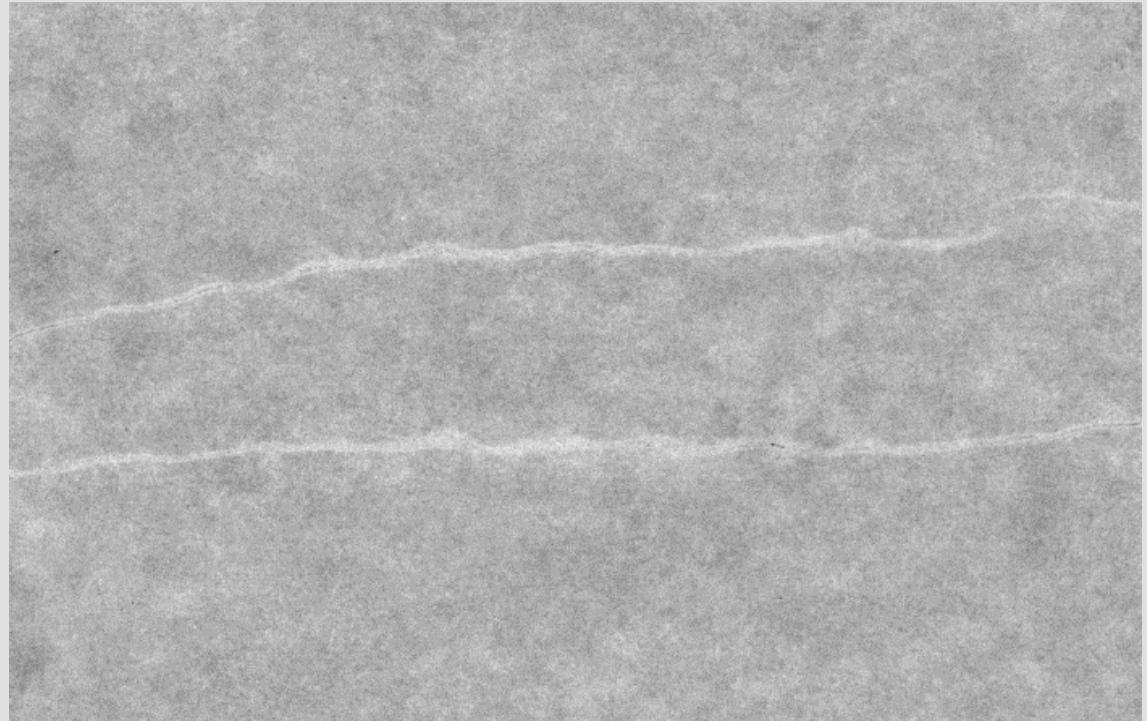


ColourBrain® MFC4.0

Safe detection of all defects

Paper Wrinkles

- ❖ **New LED illuminations**
with special color and high intensity.

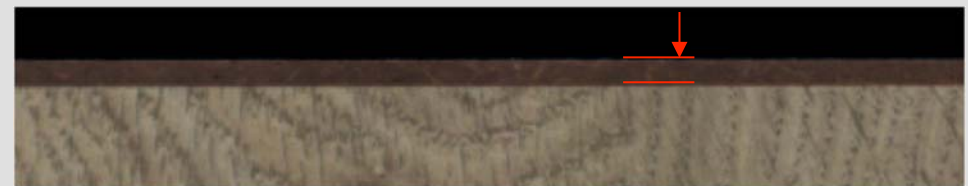
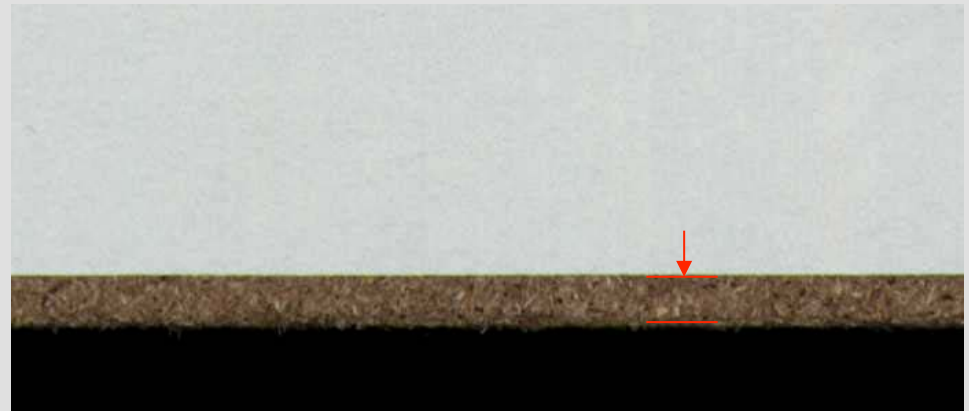


ColourBrain® MFC4.0

Measurement of paper alignment

Measurement of paper alignment

- ❖ Measurement of the paper alignment at all 4 edges of the panel.



ColourBrain® MFC4.0

Detection of Melamine Problems

**Melamine
crystaline
spots,**

heatlines,

**Spots of
„boiled“
melamine**

- ❖ Many problems are caused by wrong parameters of the short cycle press.
- ❖ Sometimes very hard to be detected by the human eye.
- ❖ Small spots, sparkling just under a special angle of illumination.
- ❖ Heat lines with a very low contrast.
- ❖ **Many of those problems will cause serial defects.**
- ❖ Those defects only could be seen with a lot of different angles of inspection and with illuminations of high intensity.
- ❖ Those requirements could not be fulfilled by the human inspector.

ColourBrain® MFC4.0

Detection of Melamine Problems

**Melamine
cristaline
spots,**

heatlines,

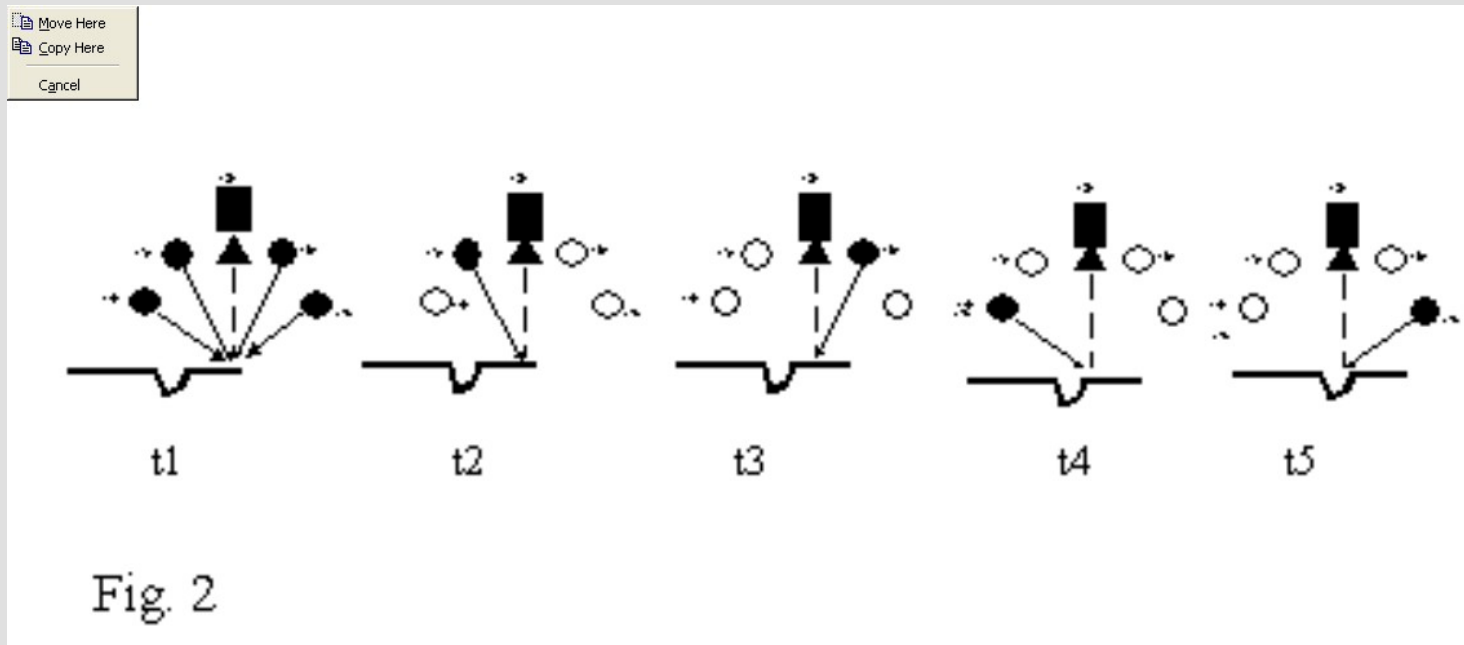
**Spots of
„boiled“
melamine**

- ❖ Baumer Inspection developed a special way of illumination called **“flashing sky”**.
- ❖ This technology was patented and is used in the new ColourBrain® MFC4.0 under the name:

“ Brilliance Module “

ColourBrain® MFC4.0

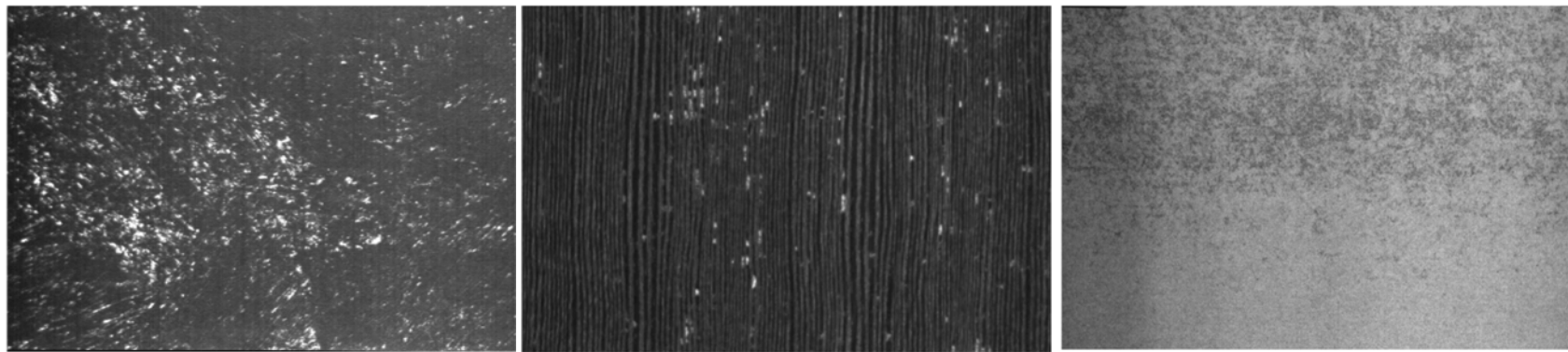
The Brilliance Module



- Very fast flashing illumination by LED Modules.
- Different angles of illumination can be implemented.
- Different lines of the LEDs can also be used for illuminating with different colours.

ColourBrain[®] MFC4.0

Melamine cristaline spots, Spots of „boiled“ melamine



ColourBrain® MFC4.0

The Brilliance Module

- Precondition for this technology are very fast and very sensitive cameras and a very fast image analysis.
- We have developed own cameras.
- These cameras have an integrated pre-processing on board.
- These cameras are proprietary and only produced for Baumer.

Monitoring Production

Q-brain®: classification and grading of defects according their root cause in the production process.

Q-brain®: developed by Baumer Inspection

A SupportVectorMachine classification

To optimize a production process the production manager should have as much information as possible and all the data in detail.

To assist this, Baumer developed a new tool to classify defects according to their cause and their relevance on quality

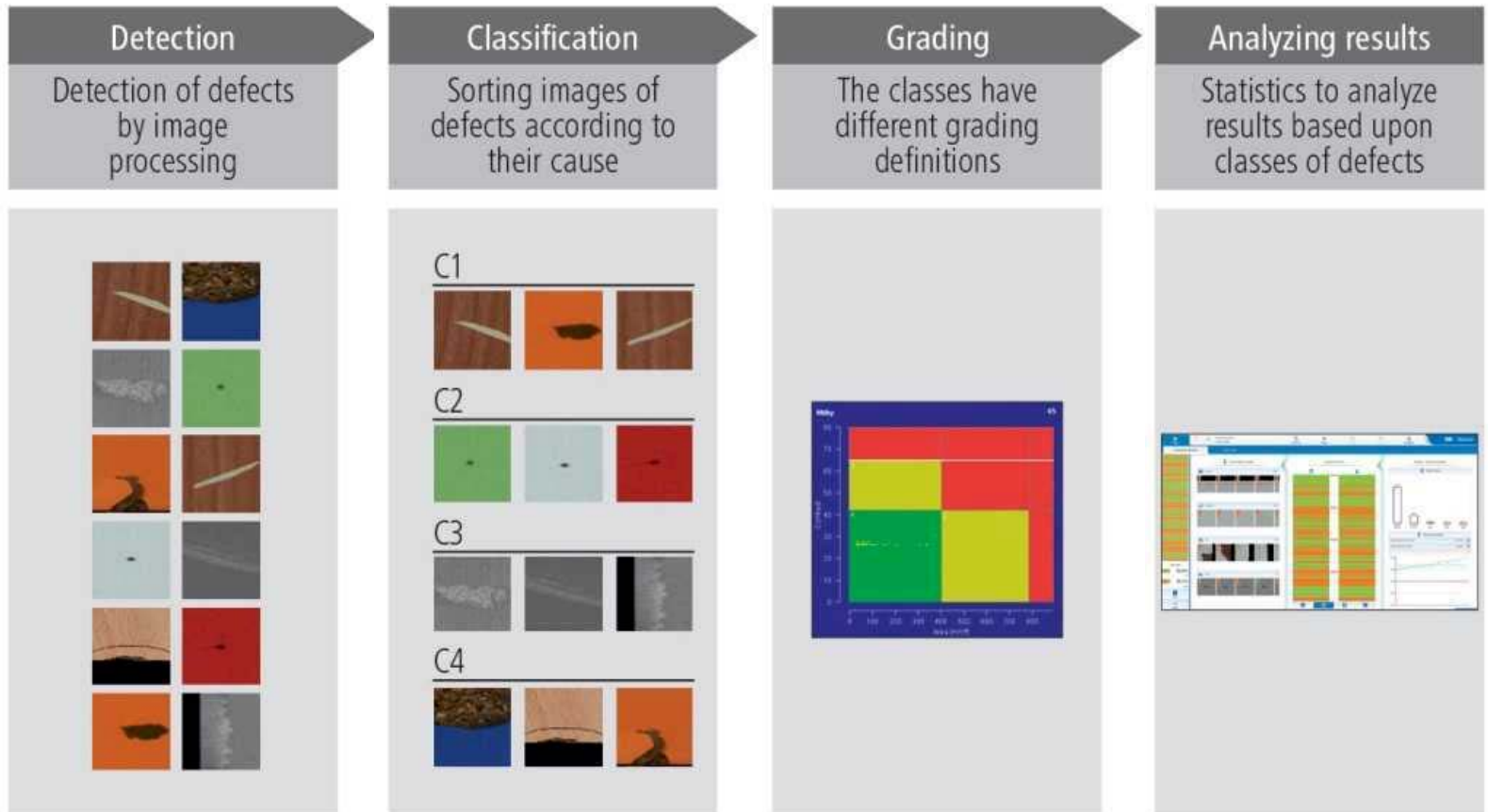
**That new classification is based upon
a SupportVectorMachine classification
and is called Q-brain®**

A tool to help improving quality

Q-brain®

- A tool to classify defects according to their image.
- To classify defects according to their cause.
- To classify defects according to the affect on total quality of board.

Images of defects are dedicated to the cause in the production process.

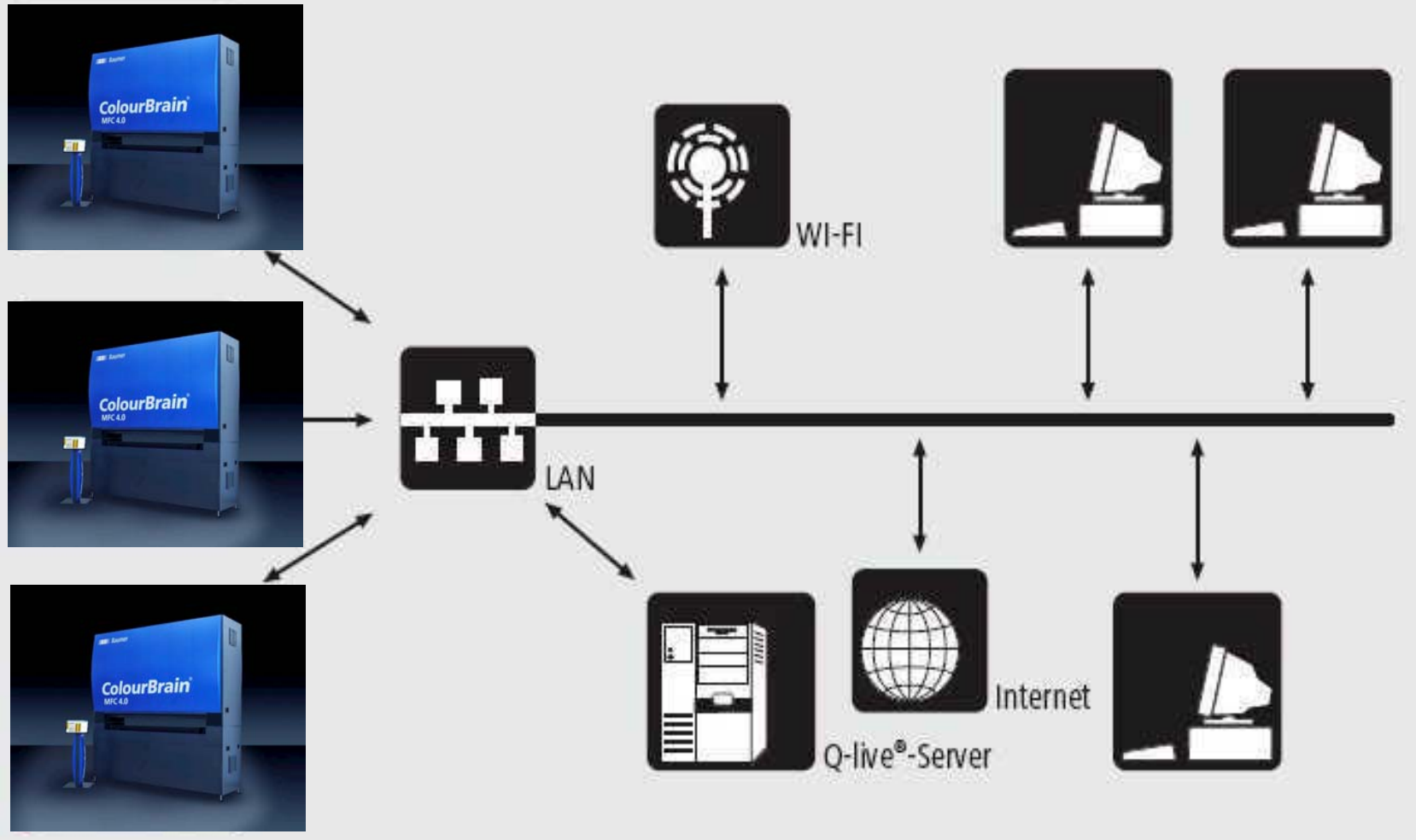


Analyzing detected flaws

Q-live®: a data base system for statistical analysis of rejects

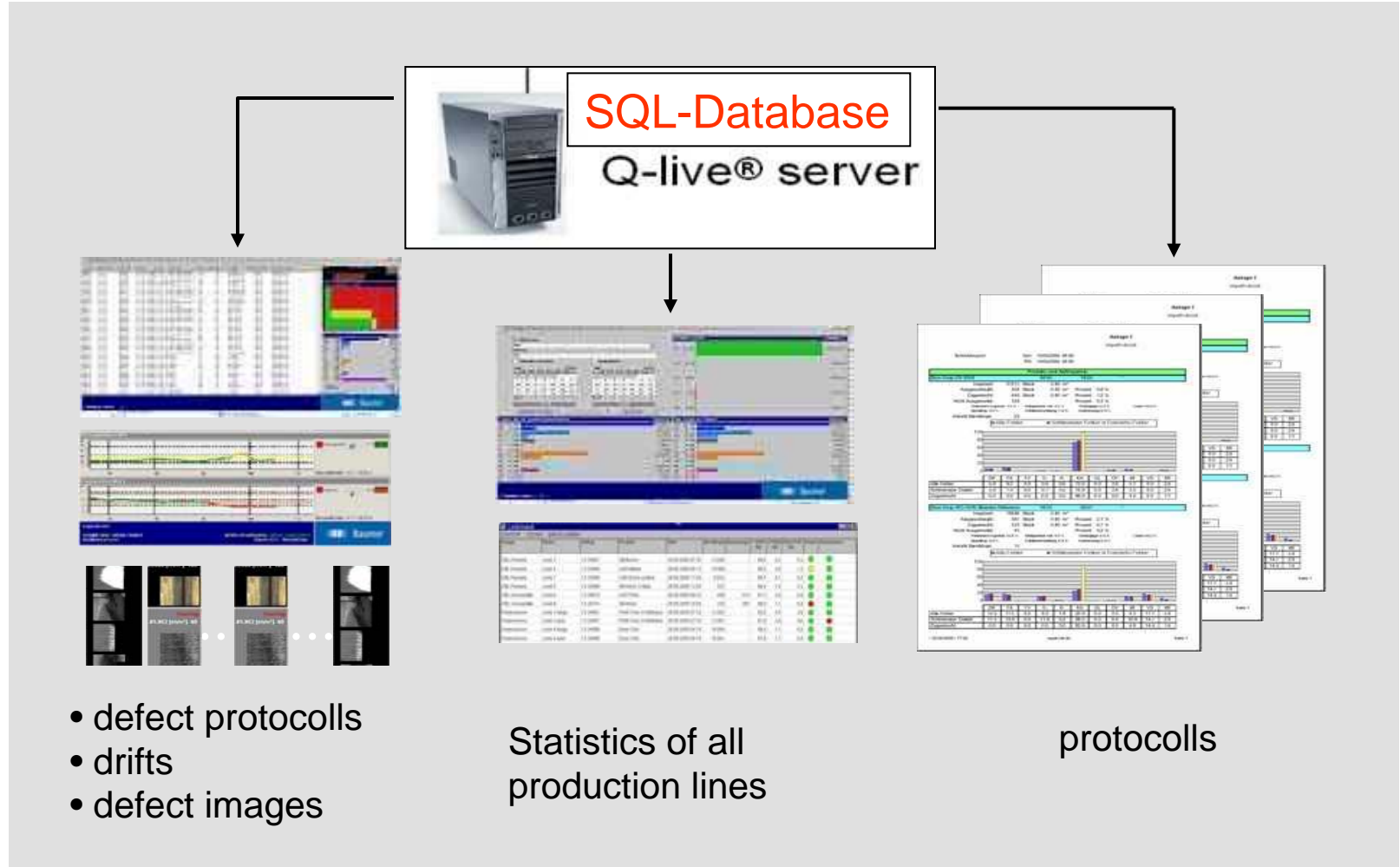
Q-live® Data base

The data base system to analyze production



Q-live® Data base

The data base system to analyze production



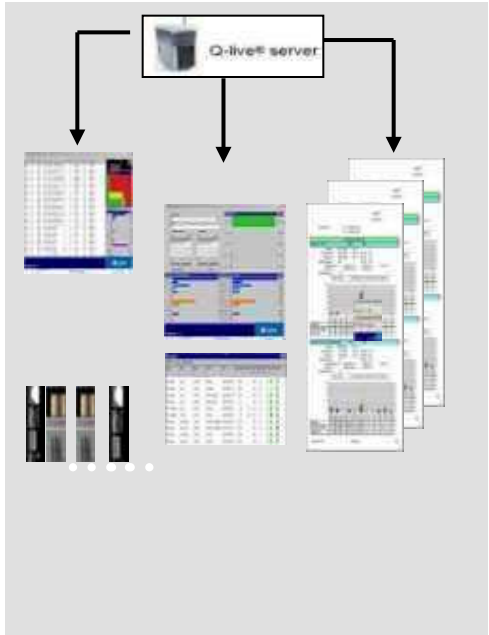
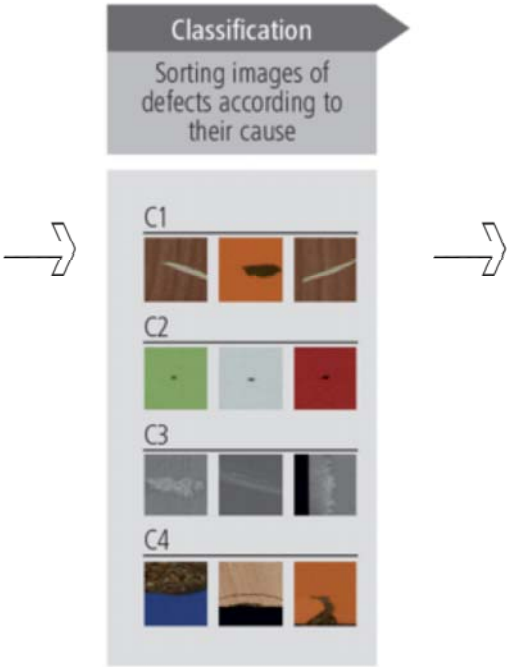
MFC4.0 & Q-brain® & Q-live®

Powerful tools to optimize the production process

ColourBrain®
Inspection system

Q-brain®
Classifikation

Q-live® Data base
and statistics



Definition of quality

Easy to operate user interface and automatic settings

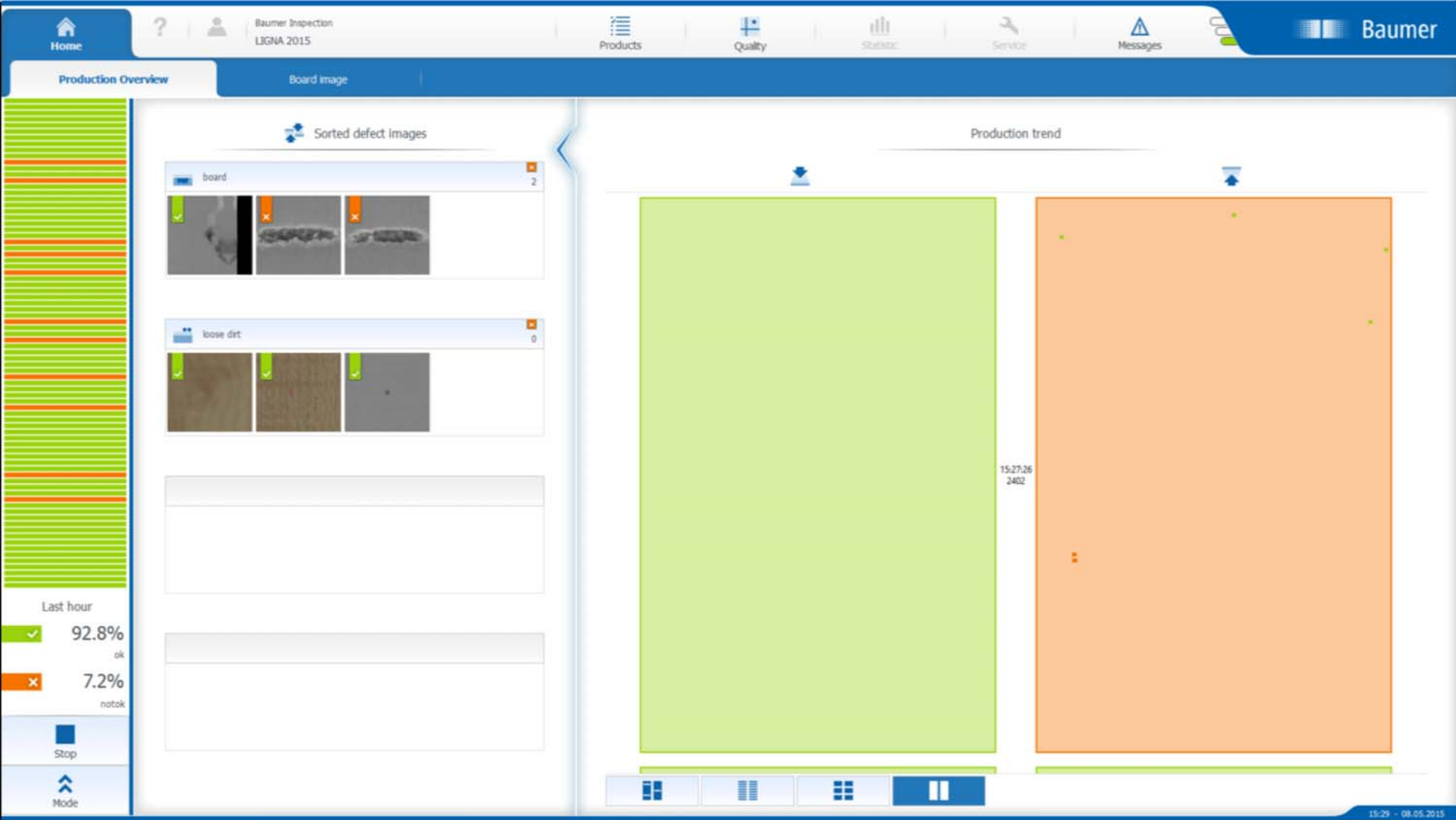
MFC4.0: Flexibility

A totally new concept of User interface



MFC4.0: Flexibility

A totally new concept of User interface



MFC4.0: Flexibility

A totally new concept of User interface

The screenshot displays the MFC4.0 software interface. At the top, a navigation bar includes icons for Home, Help, User, Products, Quality, Statistics, Service, and Messages, along with the Baumer logo. Below this, a secondary bar shows 'Production Overview' and 'Board image'. The main area features a large image of a board labeled 'Image of board 2402 - 15:27:26'. To the left, a vertical bar shows a production status with green and orange horizontal stripes. Below this bar, a summary for the 'Last hour' shows a 93.2% success rate for 'ok' (green checkmark) and a 6.8% failure rate for 'notok' (orange X). At the bottom, there are buttons for 'Color' and 'Reflex' in both directions. On the right side, a 'Defects' panel shows a list of 'All defect types' with a count of 6. It displays six small images of defects, with green checkmarks for the first four and orange X's for the last two. Below the images, a legend identifies 'loose dirt' and 'board' as defect types.

MFC4.0: Flexibility

A totally new concept of User interface

The screenshot displays the MFC4.0 software interface. At the top, a navigation bar includes icons for Home, Help, User, Products, Quality, Statistics, Service, Messages, and the Baumer logo. Below this, a secondary bar shows 'Production Overview' and 'Board image'. The main area features a large image of a board labeled 'Image of board 2402 - 15:27:26'. To the left of the image is a vertical bar with green and orange horizontal stripes. Below this bar, a summary for 'Last hour' shows a green checkmark for 93.2% 'ok' and an orange 'x' for 6.8% 'notok'. At the bottom of the image area are four buttons: 'Color', 'Reflex', 'Color', and 'Reflex'. On the right side, a 'Defects' panel shows 'All defect types' with a count of 0, followed by a section with 6 defects. These defects are shown as small images with green checkmarks or orange 'x' marks. Below the defect images is a legend for 'Defect types' with 'All defect types', 'loose dirt', and 'board'.

MFC4.0: Flexibility

A totally new concept of User interface

The screenshot displays the MFC4.0 software interface, which is a quality control dashboard for wood inspection. The interface is divided into several sections:

- Navigation Bar:** Located at the top, it includes icons for Home, Help, User, Products, Quality (active), Statistics, Service, Messages, and the Baumer logo.
- Sub-navigation:** Below the main navigation bar, there are tabs for "Grading" and "Settings".
- Defect Images:** On the left, a section titled "Defect images: 15:31:36 - 15:34:30" shows a grid of images. The top row has four images, the middle row has four images, and the bottom row has one image. A green checkmark is visible on the left side of the bottom row.
- Quality Matrix:** In the center, a "Quality matrix" is displayed as a 3x3 grid of colored squares (orange and green). Below the matrix, there are three buttons for "Sensitivity": "Sensitive", "Tolerant" (selected), and "Very tolerant".
- Defect Types:** On the right, a section titled "All defect types" shows a list of "Quality templates" with "03-bright-smooth" selected. Below that, a "Defect types" list includes "loose dirt", "board", "decor", "process" (selected), "3D", "fixed dirt", and "undclassified".
- Summary and Controls:** At the bottom left, a summary shows "Last hour" with a green checkmark, "93.2% ok", and "6.8% notok". Below this are "Stop" and "Mode" buttons. At the bottom center, there are "Reset" and "Apply" buttons.



Conclusion

ColourBrain® MFC4.0

Conclusion

ColourBrain® MFC4.0:

- Purchase orders for 11 Systems within one year.
- The first three systems in Europe in full operation.
- First system installed in North America in ramp up.
- Another five systems installed in Europe before summer.

ColourBrain® MFC4.0 Conclusion



ColourBrain® MFC4.0

Conclusion

ColourBrain® MFC4.0:

- Optimized modules with new cameras, new optics and illuminations and new and more algorithms, detecting every defect
- Totally new designed user interface to keep operation easy.

QBrain® classification:

- A new way to classify detection according to appearance and cause
- A classification to get information in detail about level of production
- A tool to optimize production by analyzing causes for downgrading

QLive® database:

- A database system constantly monitoring production
- With many powerful statistic tools to analyze results

We at Baumer thank you for your attention

