

Modern X-Ray Technology for Task-Oriented Applications in Panel Production

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Head of Technology Wood-Based Composites

Measuring Systems
Spark Extinguishing Systems
Engineered in Germany



SCANNING FOR QUALITY

- Moisture, Area Weight, Thickness, Density, Blows/Delamination, Foreign Bodies
- Infrared, X-ray, Rollers, Laser, Ultrasound
- Reliable measuring and control systems as a key factor for Industrie 4.0 in wood-based composite production



Inline Measuring Systems

SICOSCAN

- Cooperation with Siempelkamp since 2007
- Integrated measuring systems for process control and automation
- Prod-IQ® with Reporting and Statistics

**ELECTRONIC
WOOD
SYSTEMS**
SCANNING
FOR QUALITY

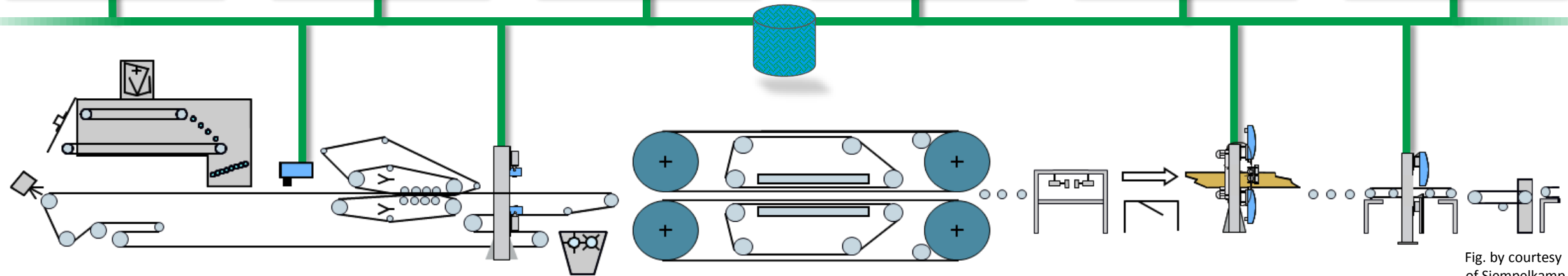


Fig. by courtesy
of Siempelkamp

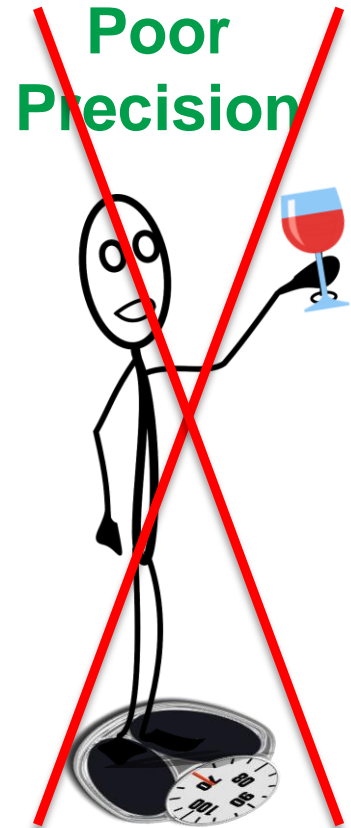
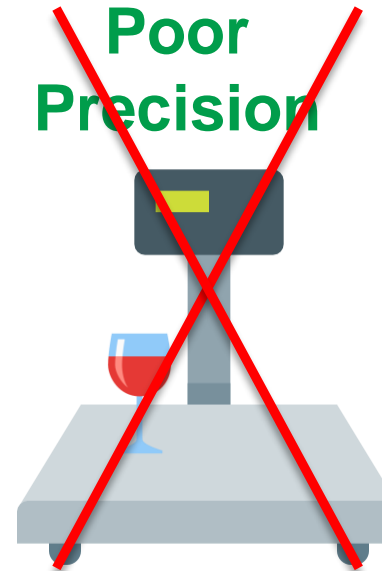
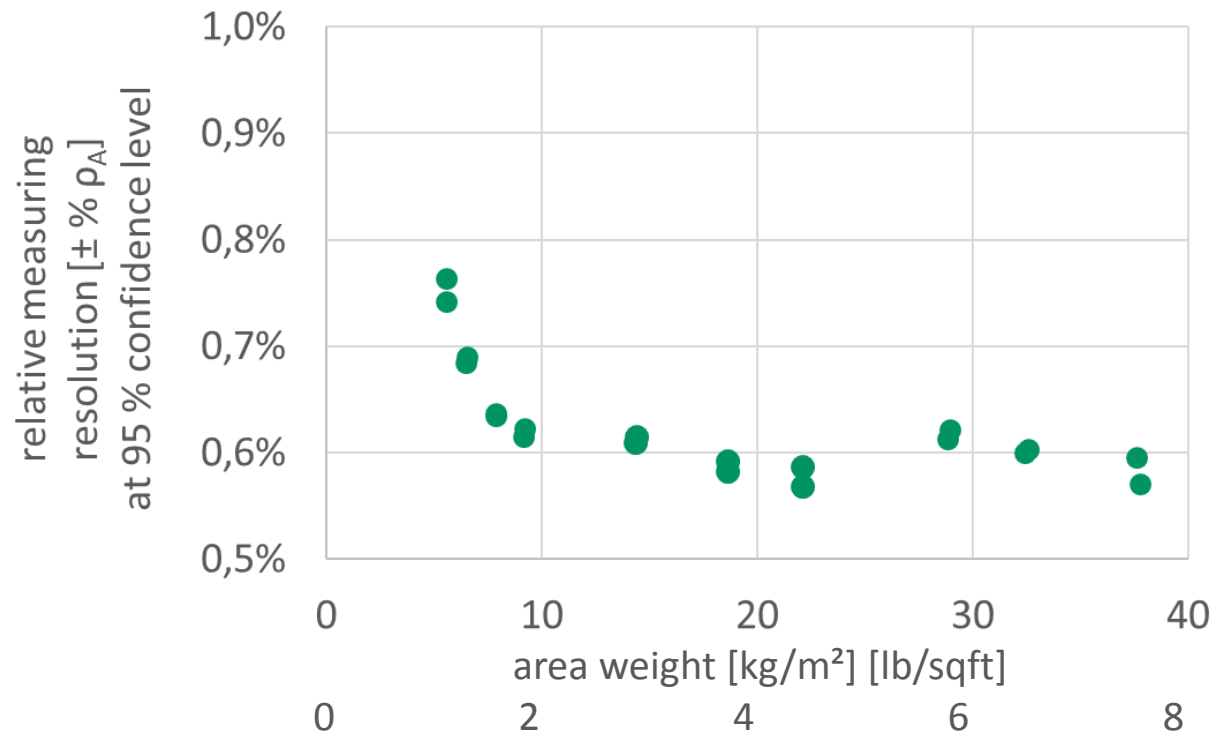
MULTIENERGY TECHNOLOGY

- Concept: X-ray Energy suited to Material Amount
- Result: Enhanced Contrast



MULTIENERGY TECHNOLOGY

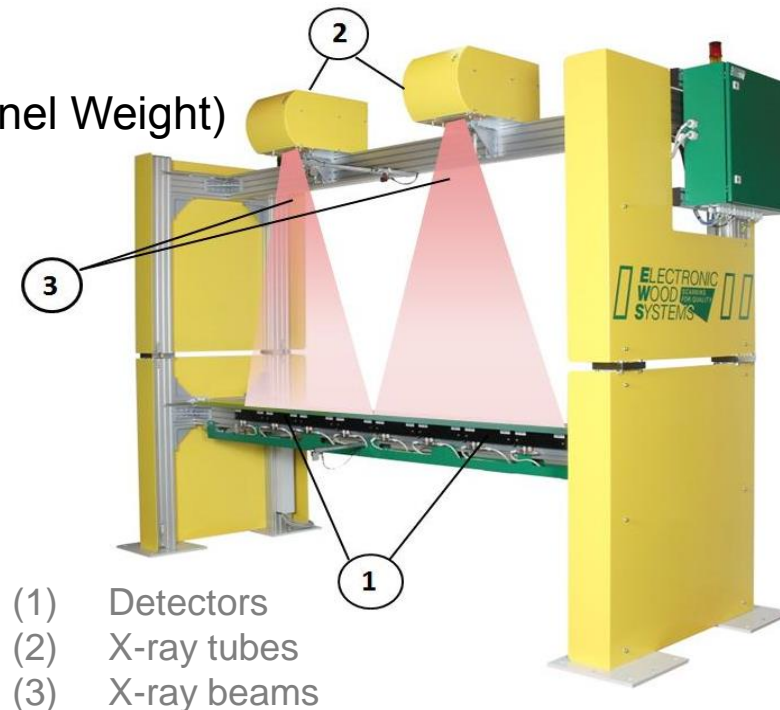
- Core feature of the latest EWS X-ray measuring systems
- X-ray energy fully automatic suited to current area weigh
- Equivalent measuring resolution along a wide area weight range



X-ray Measuring Applications in the Outfeed Section

X-RAY PANEL SCALE

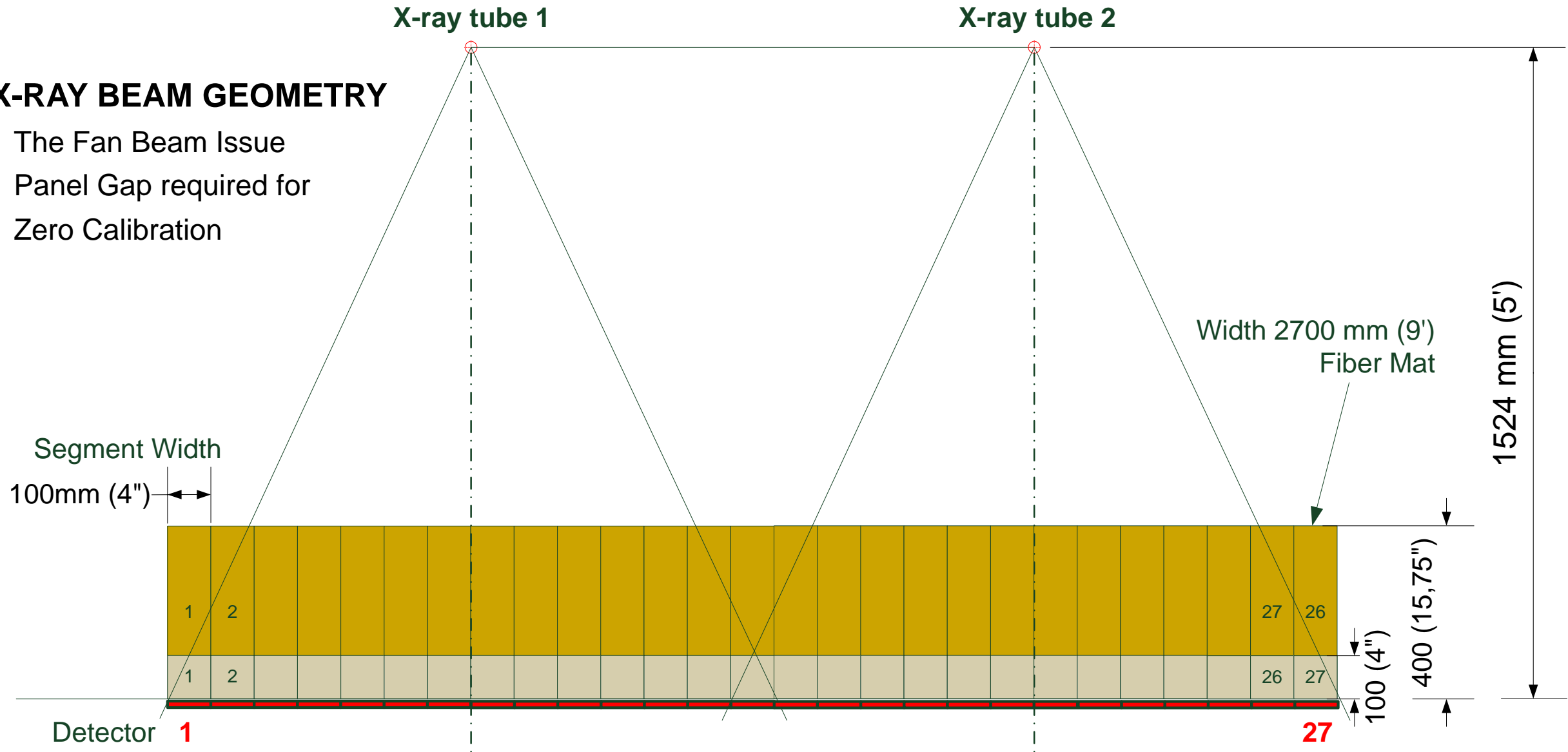
- Continuous, non-contact
- Mean Panel Weight and Cross Profile
- Not affected by vibrations at any Production Speed
- Low-power X-ray Units with sensitive Detectors
- MultiEnergy Technology for consistently high measuring Resolution ($\pm 0.6 \dots 0.8$ % of Panel Weight)
- Pre-calibration and individual Verification
- Self-adjusting measuring Parameters via Recipe data
- Minimum Space Requirements for Installation
→ in Place of one Roller of the Conveyor



X-ray Measuring Technology Basics

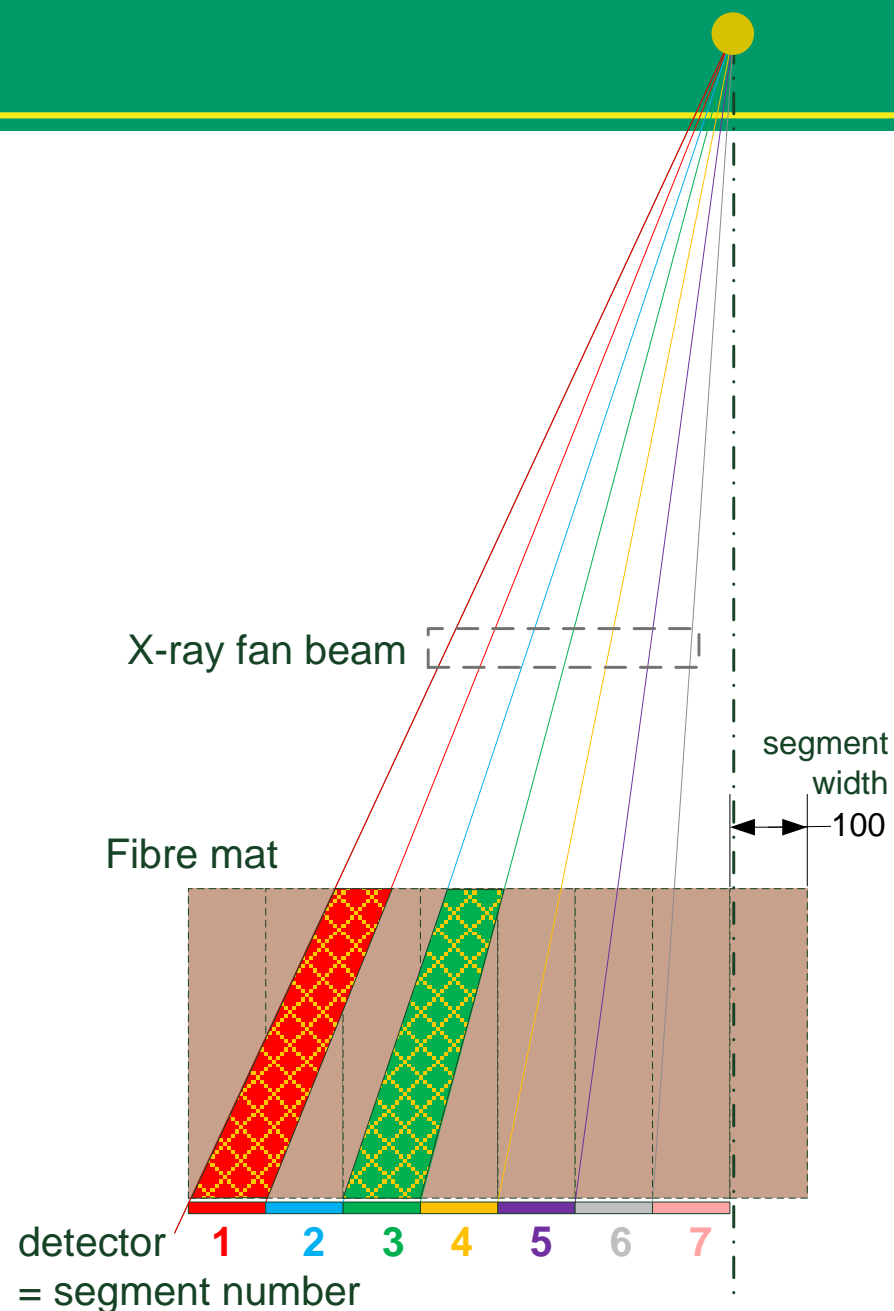
X-RAY BEAM GEOMETRY

- The Fan Beam Issue
- Panel Gap required for Zero Calibration

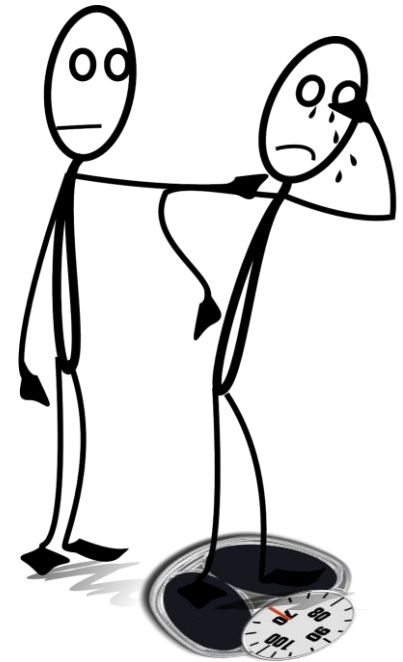


X-RAY BEAM GEOMETRY

- Systematic Influence on Measuring Accuracy
- Geometrical Error
 - More or less negligible for Panels
 - Considerable for Flake and Fiber Mats
 - Up to 72 % Impact from neighboring Segments (Worst Case Segment 1)
- Correction impossible

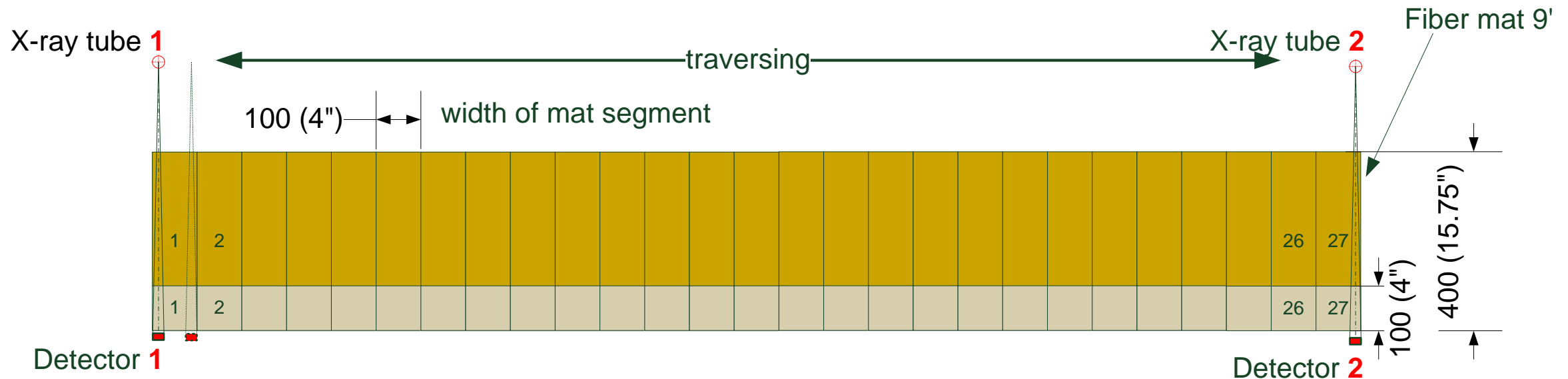
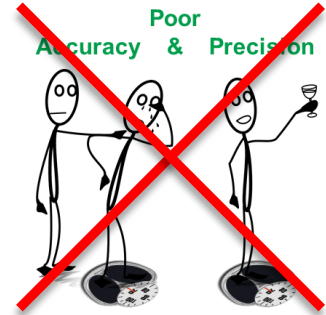


Poor Accuracy



X-RAY BEAM GEOMETRY

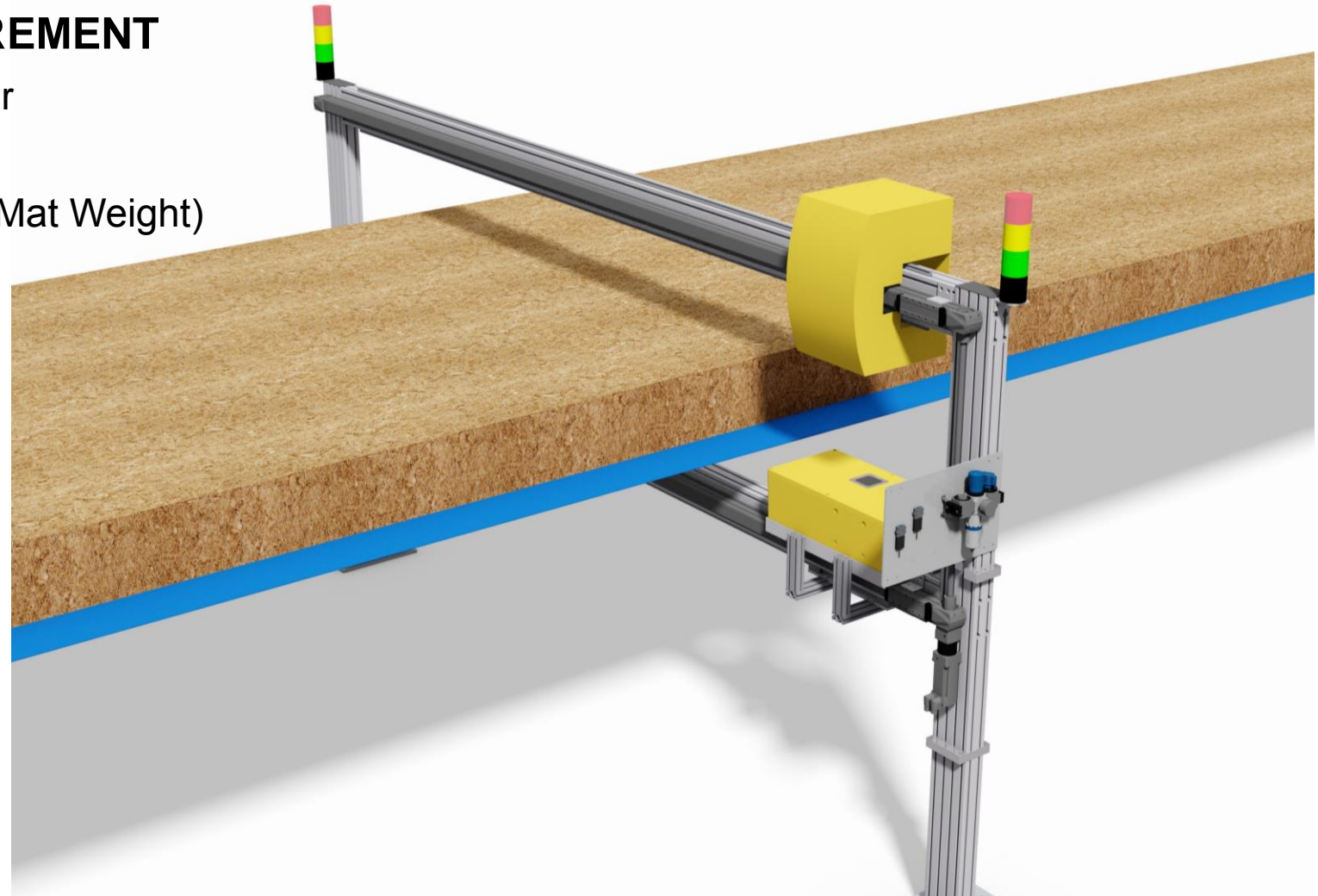
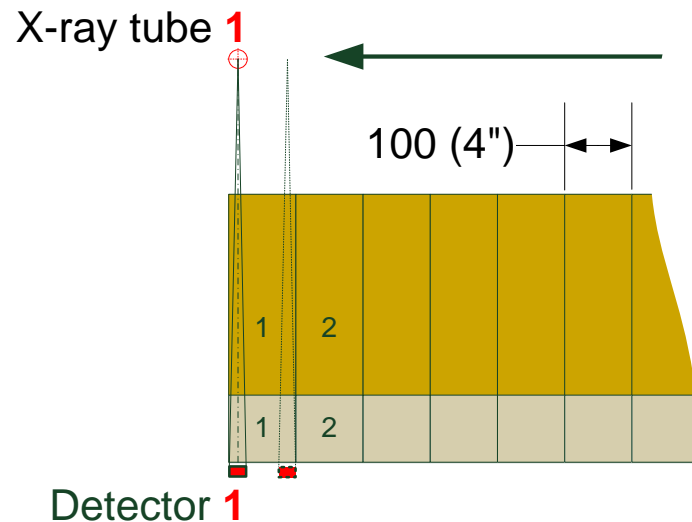
- Traversing Measuring Head(s) with narrow-beam X-ray Device
- Minimized geometrical measuring Error
- For continuous Flake and Fiber Mats
- Zero Calibration next to the Forming Belt



X-ray Measuring Applications in the Forming Line

TRAVERSING AREA WEIGHT MEASUREMENT

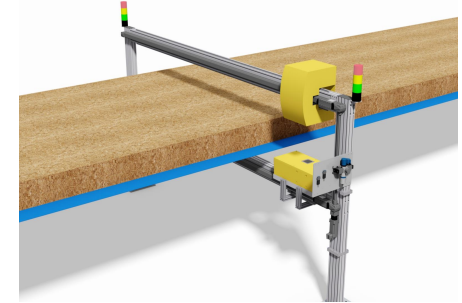
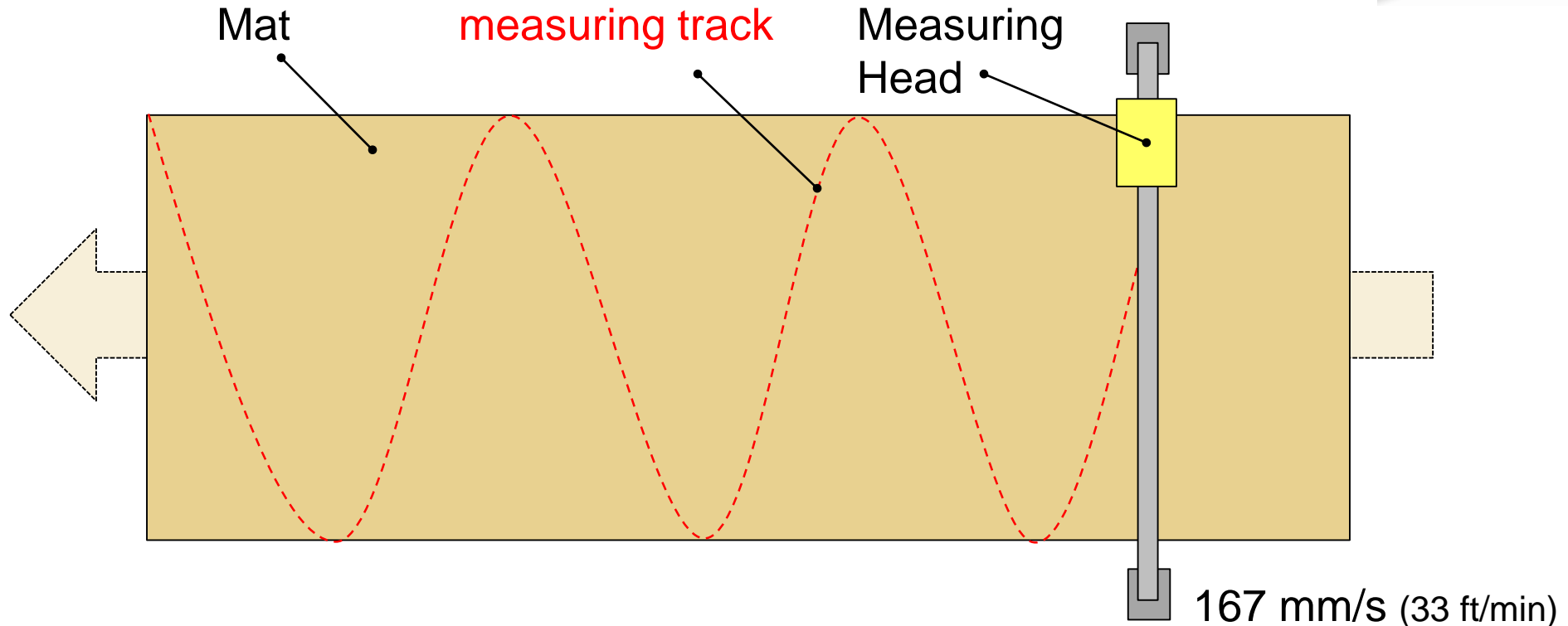
- Low-power X-ray Unit with sensitive Detector
- MultiEnergy Technology for consistently high measuring Resolution ($\pm 0.6 \dots 0.8$ % of Mat Weight)
- Pre-calibration and individual Verification
- Self-adjusting measuring Parameters via Recipe data



X-ray Measuring Applications in the Forming Line

TRAVERSING AREA WEIGHT MEASUREMENT

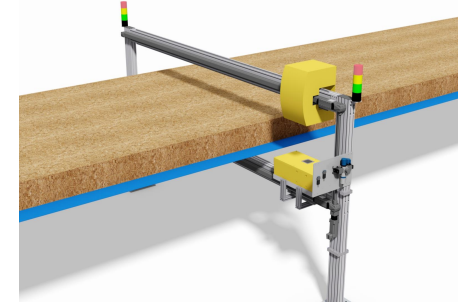
- Reliable Measurement of systematic Mat Forming Variation
- Cross Profile
- Longitudinal Trend



X-ray Measuring Applications in the Forming Line

SICOFORMER

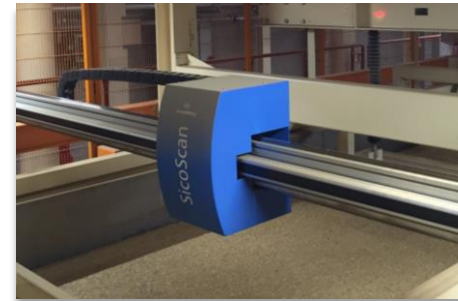
- communicating area weight measuring systems with MultiEnergy X-ray technology
- integrated into the mat forming station of multi-layer panels
- full integration of the measuring data for intelligent process automation possible



1st SL
former

MSX-1

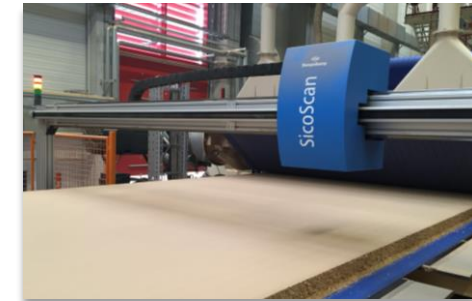
1st CL
former



2nd CL
former

MSX-2

2nd SL
former



pre-
press

MSX-3



X-ray Measuring Applications in the Forming Line

ECOSCAN NEO – HIGH-PERFORMANCE X-RAY MAT INSPECTION

- High-precision area weight measurement by self-adjusting flying measuring heads
- Intelligent foreign body detection across the mat by self-learning algorithm



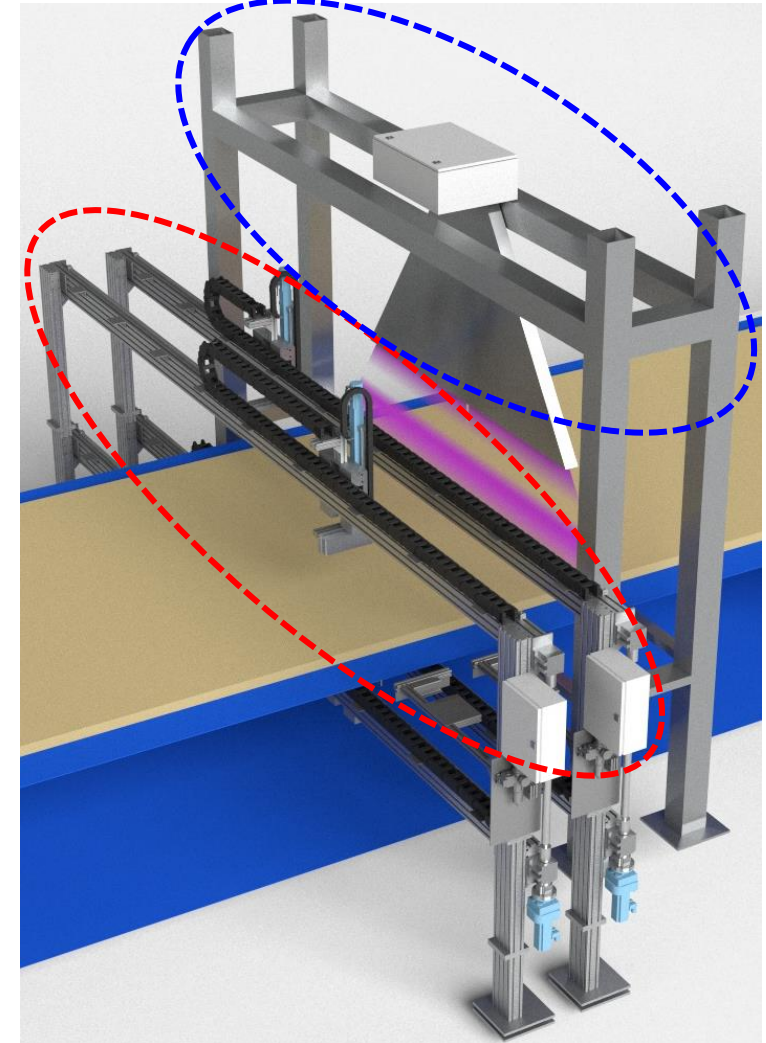
CONCEPT

Task-Orientation

One System – Split Functions

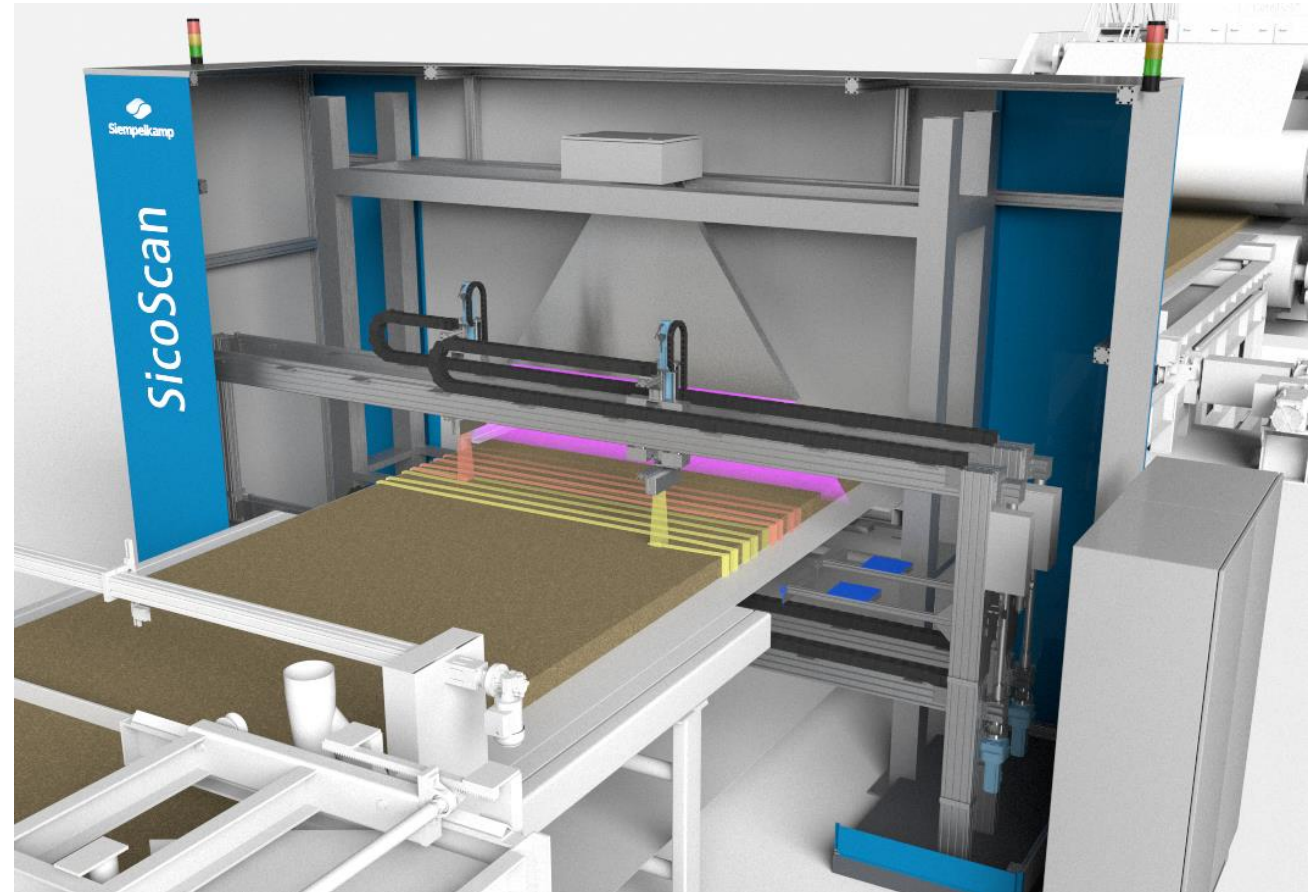
Two individual X-ray Scanners

- Area Weight Measurement
- Foreign Body Detection



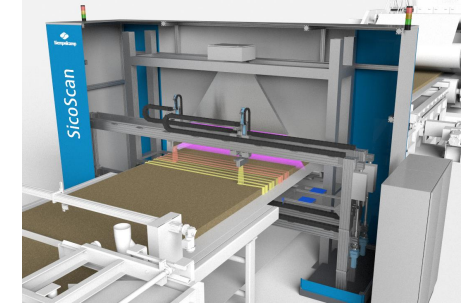
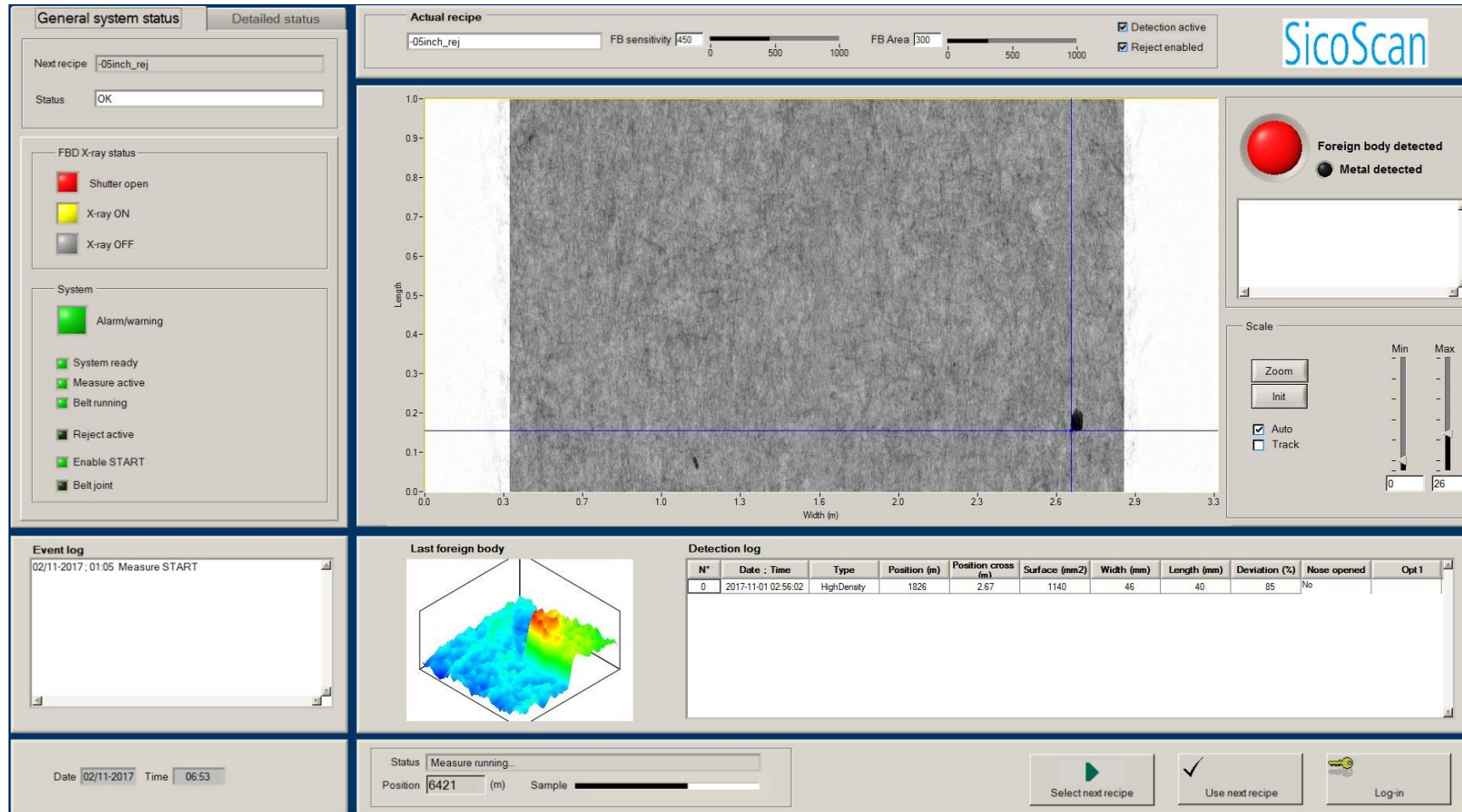
ECOSCAN NEO – FOREIGN BODY DETECTION

- High-power X-ray Fan Beam covers the complete Mat
- Full-width Line Detector with fine spatial Resolution (1.6 mm Pixel Pitch at 2 ms Sample Interval)
- Intelligent Data Evaluation by self-learning Algorithm
- Consideration of common Signal Variation and regular Mat Inhomogeneity to avoid false Detections
- Individual Detection Limits via Recipe Data



X-ray Measuring Applications in the Forming Line

ECOSCAN NEO – FOREIGN BODY DETECTION



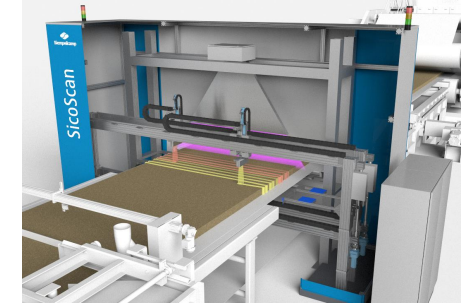
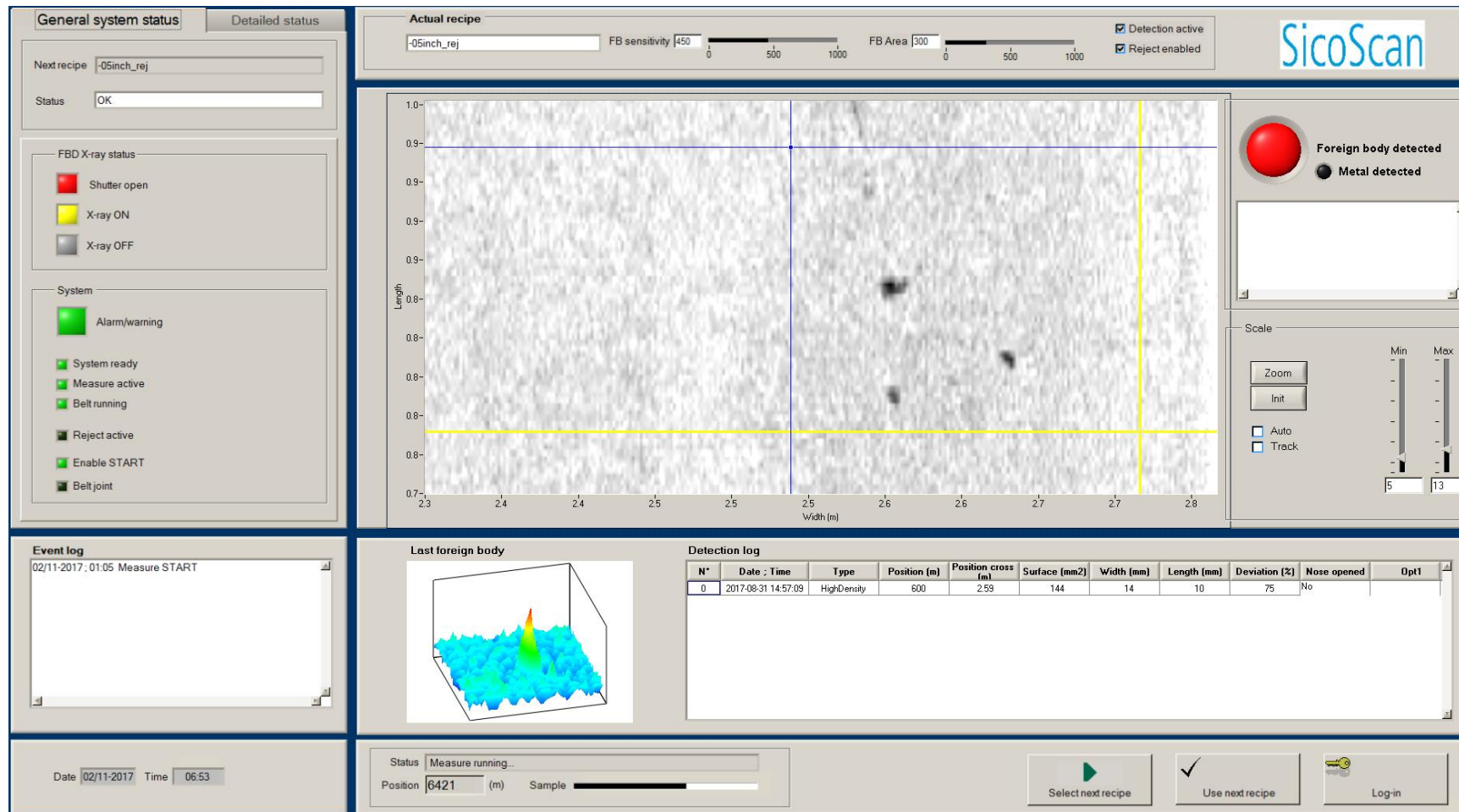
OSB

- Resin Lumps or Stone
- Inhomogeneous Mats



X-ray Measuring Applications in the Forming Line

ECOSCAN NEO – FOREIGN BODY DETECTION



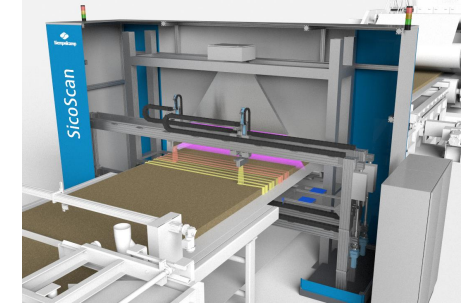
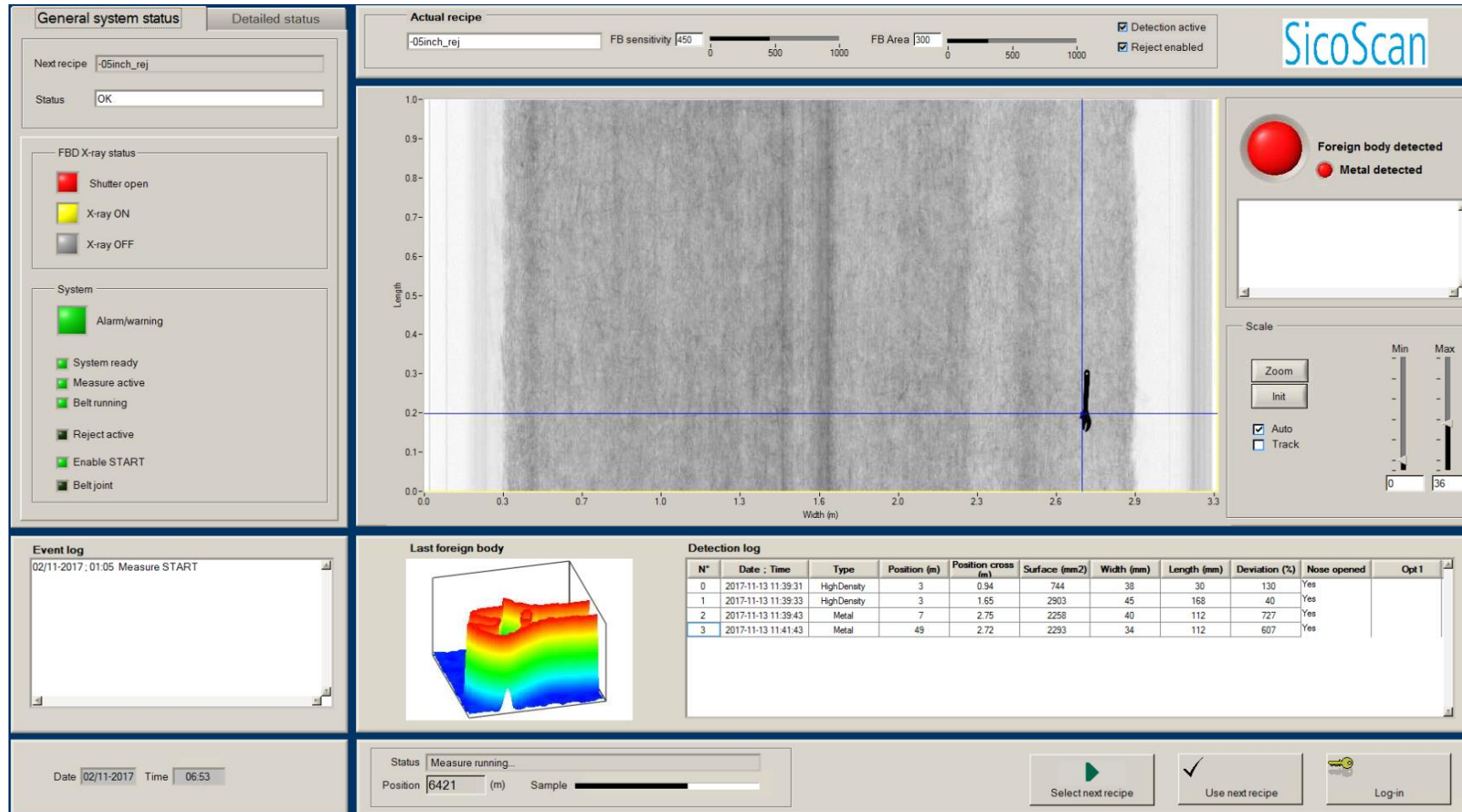
MDF

- Small Resin Lumps or Rubber
- Light Fiber Mats at high Speed



X-ray Measuring Applications in the Forming Line

ECOSCAN NEO – FOREIGN BODY DETECTION



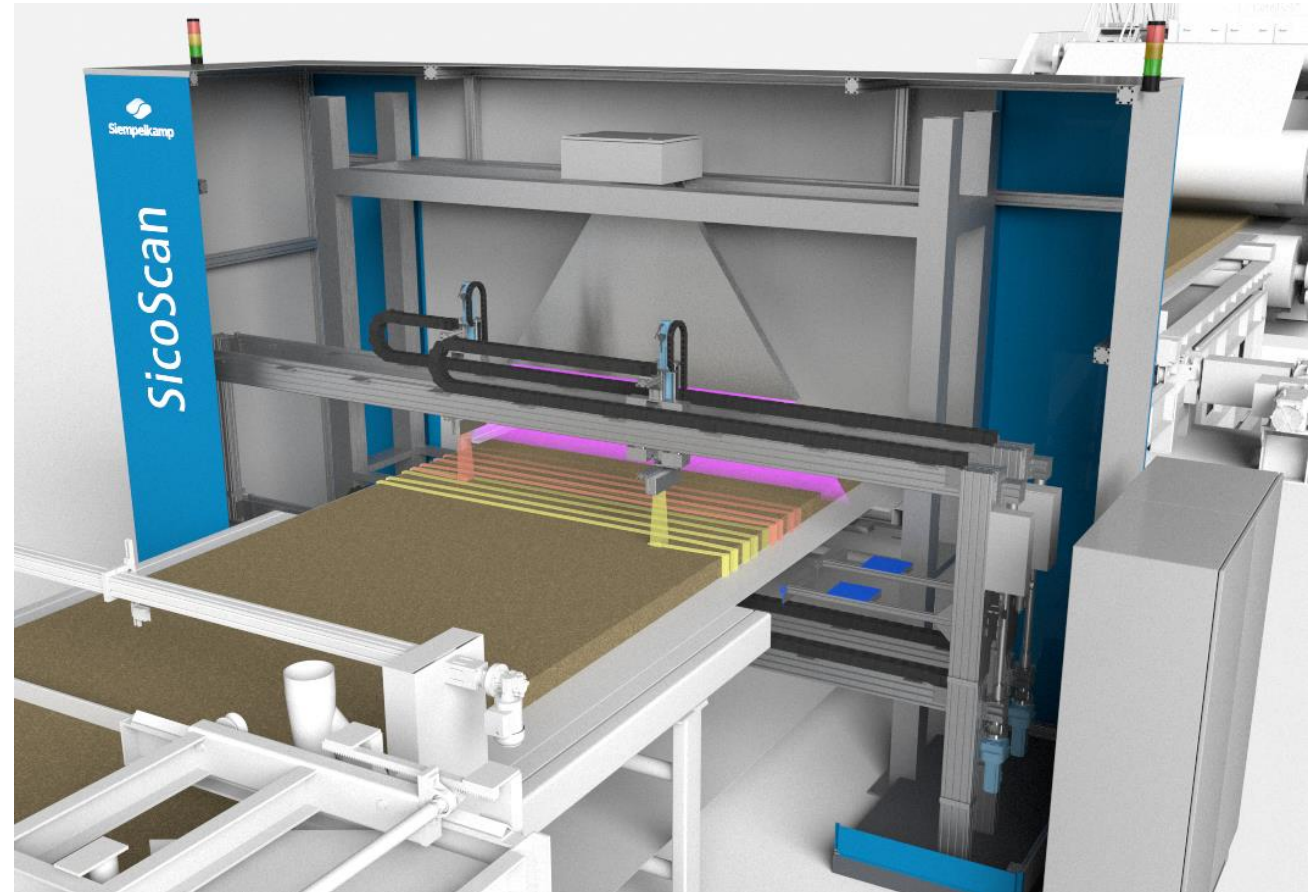
ALL PRODUCTS

- Metal
- Always all Sizes

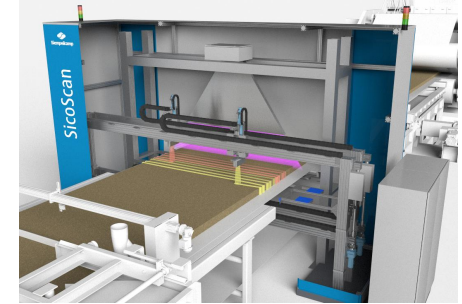
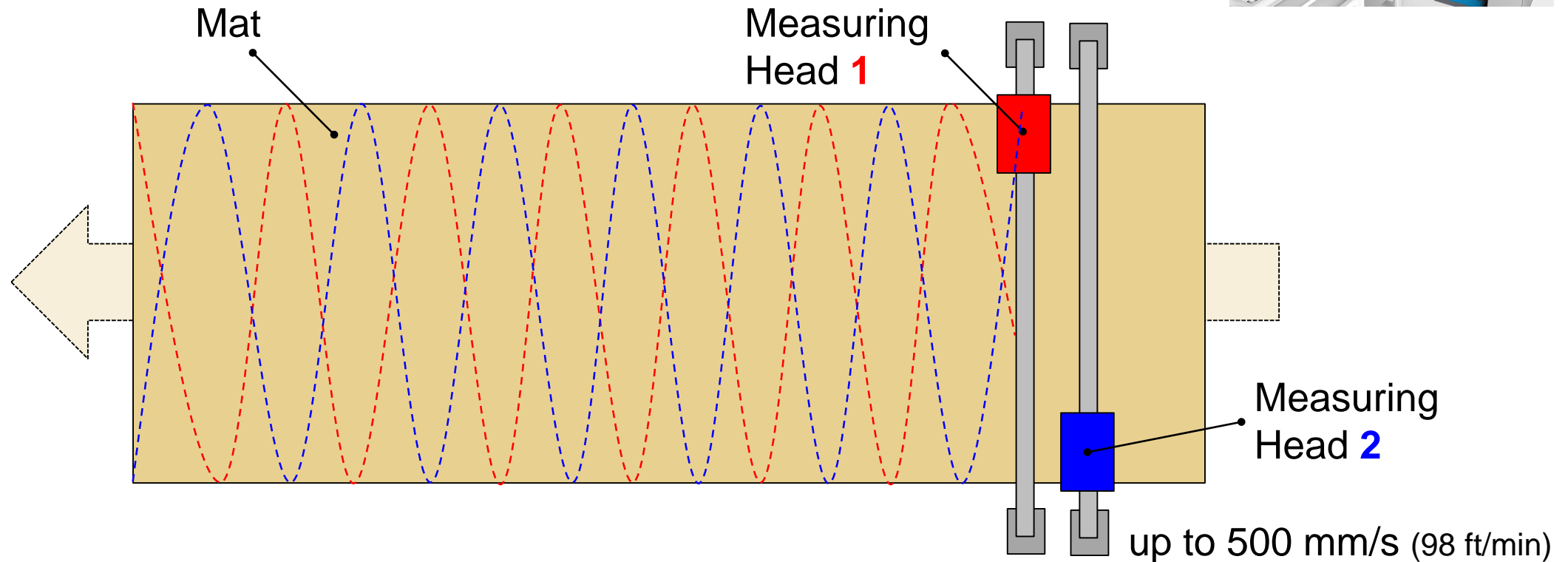


ECOSCAN NEO – AREA WEIGHT MEASUREMENT

- Two low-power X-ray Units with sensitive high-speed Detectors travel synchronized across the Mat (e. g., one cross-scan of an 8 ft mat each 2.5 s)
- Compensation of Forming Belt Variations
- Advanced MultiEnergy Technology for consistently high measuring Resolution (± 0.5 % of mat weight)
- Reliable Inspection of $< \pm 2.5$ % area weight tolerance (along wide production range)
- Accurate absolute Values of Area Weight by pre-calibration and individual Verification
- Self-adjusting measuring Parameters via Recipe data

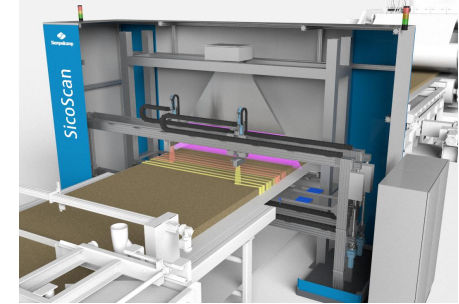
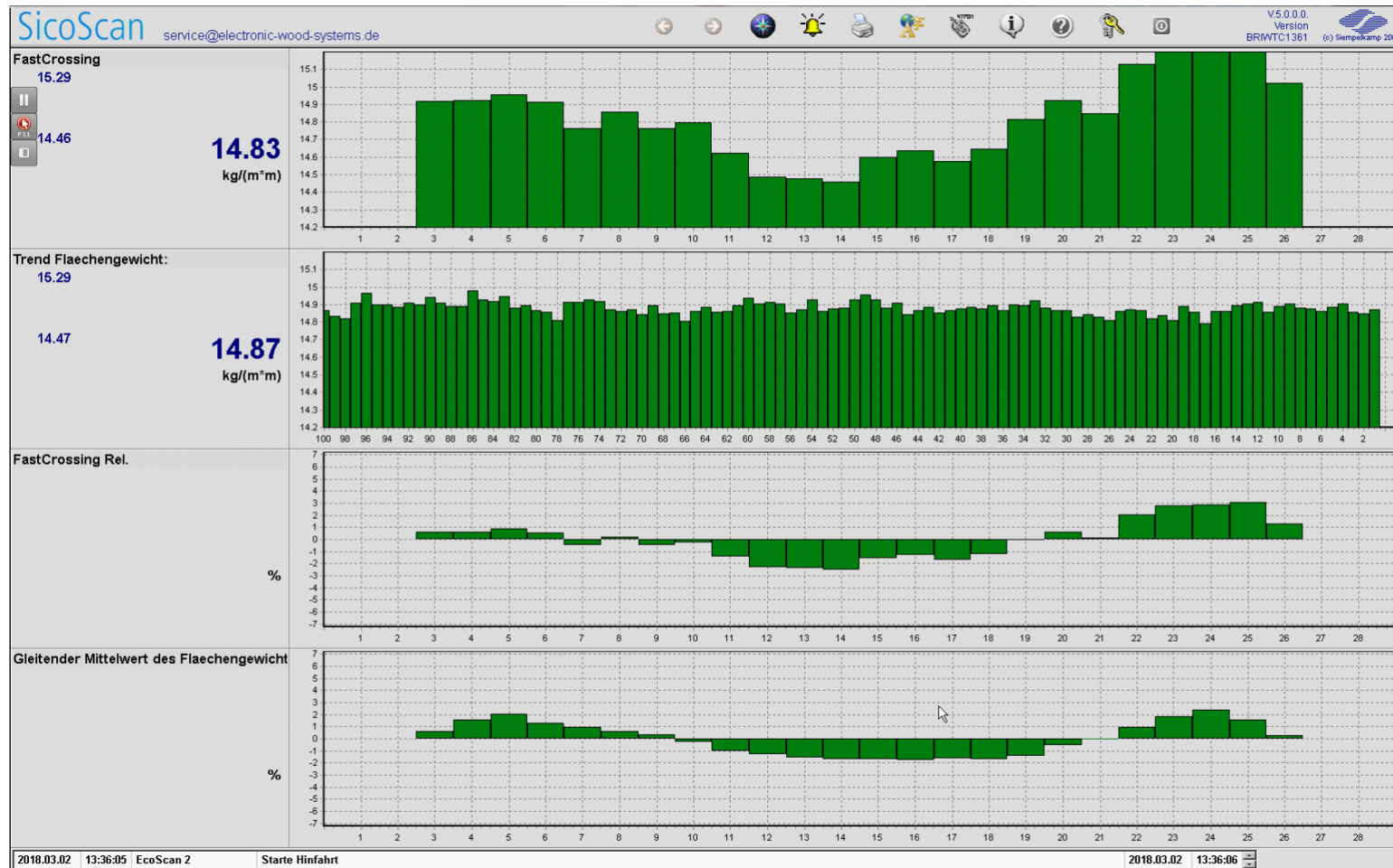


ECOSCAN NEO – AREA WEIGHT MEASUREMENT



X-ray Measuring Applications in the Forming Line

ECOSCAN NEO – AREA WEIGHT MEASUREMENT



MAT FORMING AUTOMATION

- Mechatronic Approach by Siempelkamp
- Control Loop powered by EcoScan NEO
- Oscillating chute
- Helical equalizer rollers

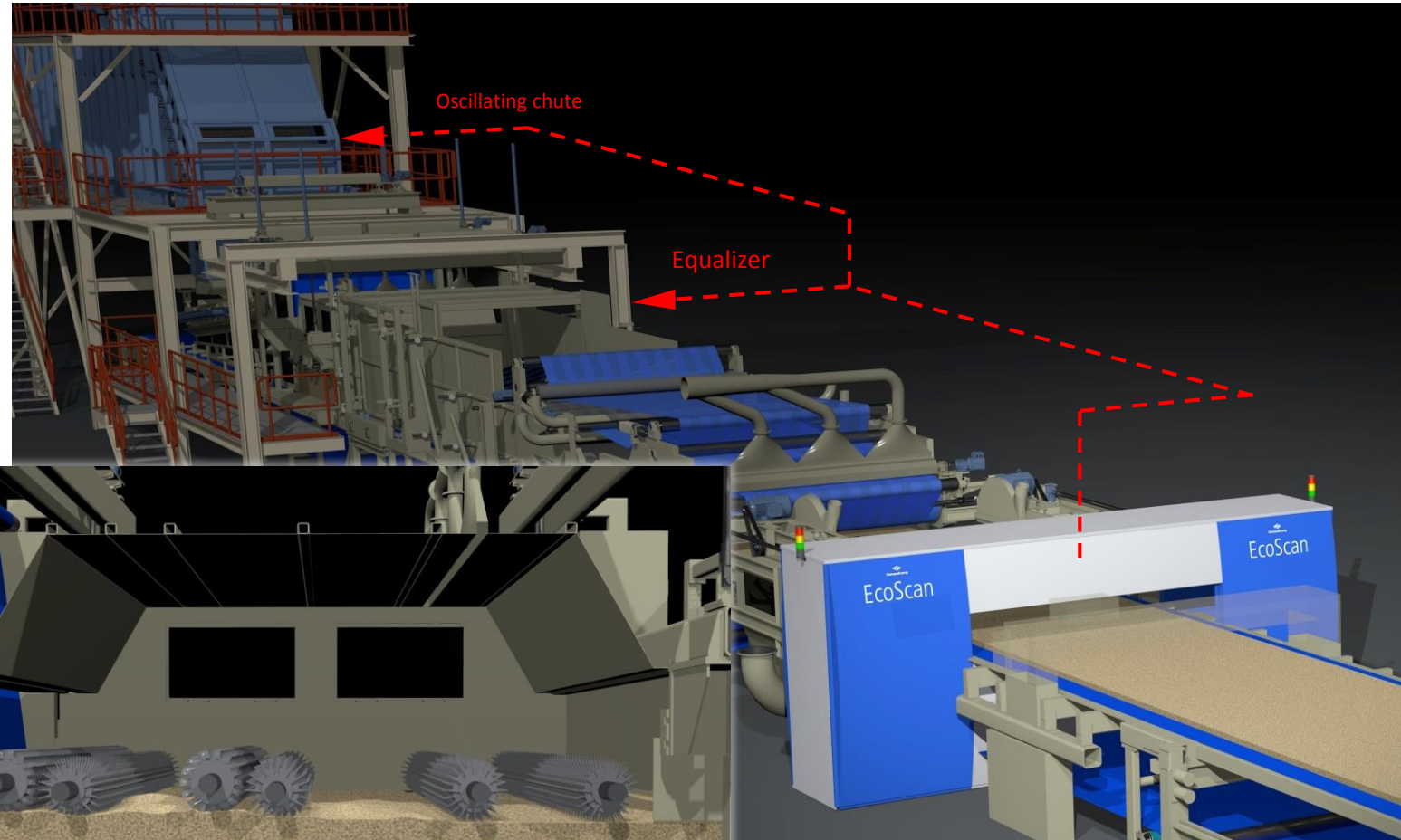
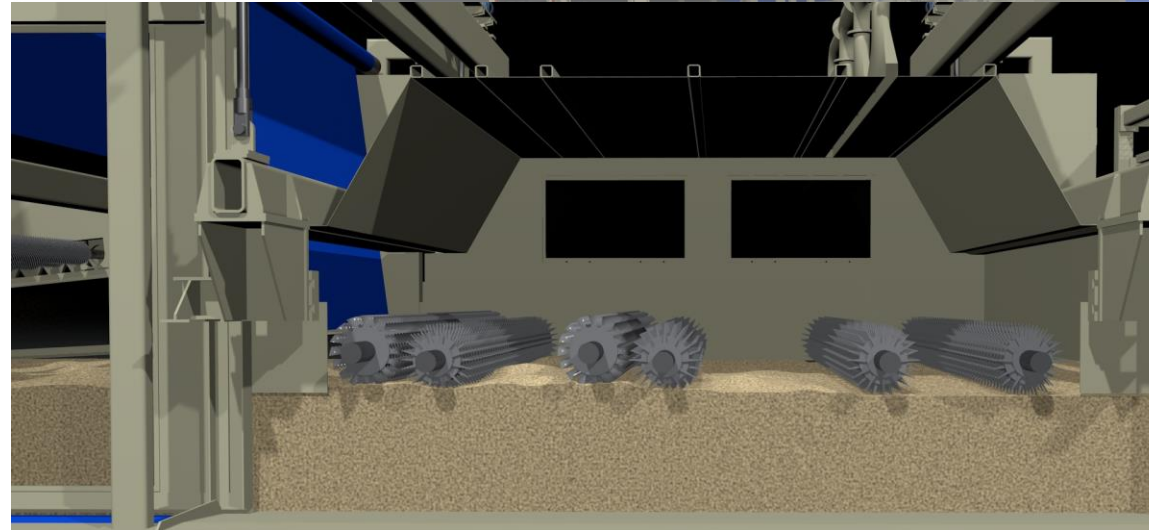


Fig. by courtesy
of Siempelkamp

The 4th Industrial (R)Evolution...

... ALREADY SLIGHTLY IN PROGRESS AND SUPPORTED BY RELIABLE MEASURING SYSTEMS

- enhance total efficiency
- avoid overmetering
- keep constant product quality
- stay competitive
- achieve overall savings



Thank you for your attention

VISIT OUR BOOTH #208

