



**Fraunhofer**

**EZRT**

Development Center X-ray Technology  
at Fraunhofer Institute for  
Integrated Circuits IIS

# Quality Control Systems for the Tire Building Process

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[www.iis.fraunhofer.de/ezrt](http://www.iis.fraunhofer.de/ezrt)

# Principle of Operation

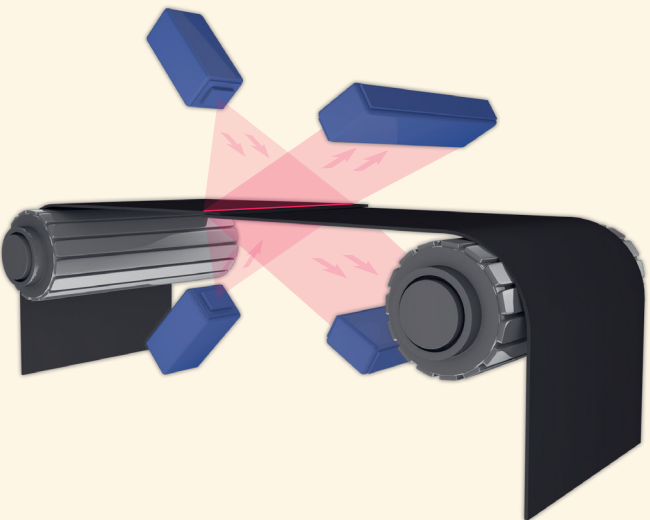
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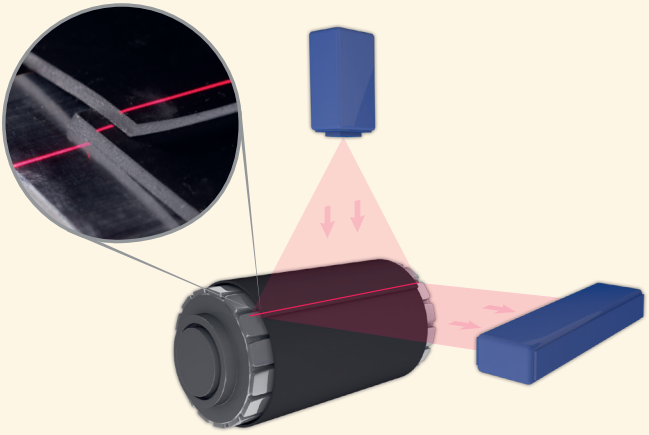
## Motivation

Monitoring of critical parameters during the tire building process is a vital measure to ensure tires of consistently high quality.

The SpliceChecker and Preparation Splice Monitor measurement systems were developed by Fraunhofer IIS in close cooperation with key tire manufacturers, providing measurement of a variety of important parameters with high accuracy.

The laser-based systems measure the splice over the entire width of the material. Due to the complete coverage of the material, additionally to the splice overlap the transversal position of the side edges can be measured and defects like dog ears or misalignment can be detected automatically.





## Splicechecker

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The SpliceChecker system measures the splice of material on the building drum along with a number of additional process relevant parameters like material centricity, offset, etc. The system can be used on material layers from innerliner to tread.

## Preparation Splice Monitor

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The preparation splice monitoring system PSM was designed to measure the splice of preparation material inline over the entire material width. Using two sheet-of-light measurement systems capturing both surfaces simultaneously, this system accurately measures the preparation splice with high resolution and is also capable of detecting other manufacturing flaws like dog ears, etc.

## Technical Data

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### Typical splice measurement sensors at the tire building drum

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Drum rotation speed	2000 mm/s
Measurement frequency	6.6 kHz
Tangential measurement accuracy	0.1 mm

#### Measurement range

Measurement width (axial)	300 mm - 1000 mm
Measurement height (radial)	20 mm
Measurement distance (radial)	50 mm - 1000 mm

#### Measurement resolution

Height resolution (radial)	70 $\mu$ m
Axial resolution	0.2 mm - 0.7 mm
Tangential resolution	0.3 mm

### Typical inline preparation splice measurement sensors

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#### Measurement range

Measurement width (transversal)	700 mm
Measurement height	40 mm
Measurement distance	50 mm

#### Measurement resolution

Transversal	0.5 mm
Longitudinal	0.3 mm

The measurement is synchronized with the drum rotation speed via rotary encoder signal.

All technical data including the housing dimensions and the measurement distance can be adapted within a wide range to the specific customer's requirements.

# Benefits

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Detecting flaws at these early stages during the building process allows correction of the problems and decreases the amount of defects in finished tires thus increasing output.

The compact SpliceChecker and Preparation Splice Monitor systems can be added to existing machinery as well as designed into new tire building machines.

The systems are customizable to fit different mechanical situations as well as capable of being integrated into a number of PLC architectures.



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