

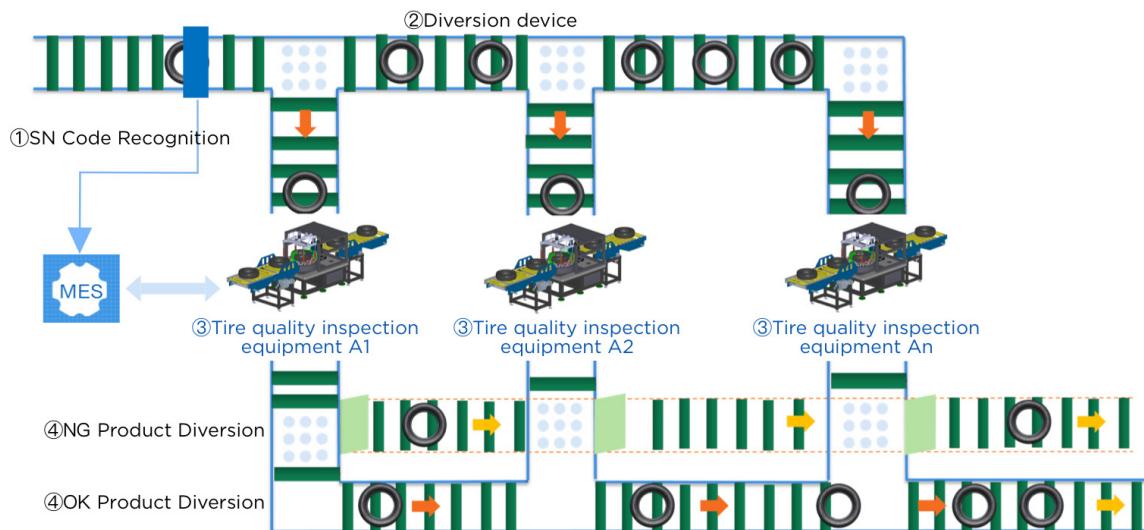
Tire Surface Defect Full-inspection Equipment

The innovated full-inspection equipment for tire appearance defects in the tire industry.



Lenovo's tire surface defect full-inspection equipment leverages advanced mechanical and optical designs along with high-definition industrial cameras to capture comprehensive image data of the tire crown, sidewall, shoulder, bead, and cavity surface. Powered by Lenovo's few-shot lifelong learning technology, the system enables rapid modeling of tire surface defects. In addition to providing thorough detection, it also supports precise classification and measurement of defects. This cutting-edge equipment replaces manual inspections, enhancing efficiency and accuracy while significantly reducing costs.

Solution architecture



SN Code Recognition:

Obtain tire information through the MES (Manufacturing Execution System) and synchronize it to the diversion device.

Diversion device:

The device distributes the tires to the corresponding quality inspection equipment.

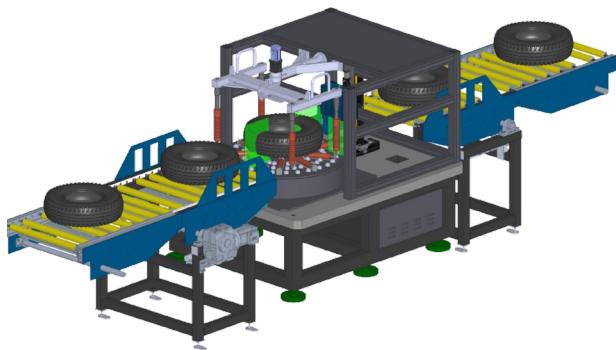
Inspection:

The inspection equipment conducts image collection and defect inspection on the tires.

Product Diversion:

Divert the inspected tires into OK products and NG products.

Quality inspection equipment



✓ Powerful generalized AI engine

Based on Lenovo's fully self-developed pre-trained Foundation model for quality inspection and few-shot lifelong learning technology, it achieves pixel-level precise recognition and generalized adaptation to multiple tire models.

✓ End-to-end solution

With an integrated design of optics, mechanics, electricity, computing, and software, multiple light sources and cameras work in coordination to cover the comprehensive defect inspection of tires.

✓ Switching SKUs in seconds

It supports the second-level switching of models for multiple tire types, meets the requirements of mixed inspection on complex production lines, and significantly reduces labor and time costs.

✓ Pioneering breakthrough in full inspection

The full-inspection equipment for tire appearance defects fills the gap in the industry.

✓ System Integration and Management

It supports connection to the factory's MES system, optimizes the production process, and reduces the management cost.

Types of detectable defects

Crown	Rubber shortage, Blister, Pattern misplaced, Exposed cords, Vagrant cords, Cracks at the tire crown joint, Rounded corners of the pattern, Crown deformation etc.
Sidewall	Rubber shortage, Cracks, Scratches, Blister, Wrinkling of the sidewall, Exposed cords, Exposed steel wires, Abnormal movable blocks, Wrinkling on the sidewall, Trademark & year and week code etc.
Shoulder	Rubber shortage, Cracks, Scratches, Blister, Non-uniform etc.
Tire Cavity	Rubber shortage, Cracks, Scratches, Blister, Exposed cords, Barcode defects, Scaling at the bead etc.
Bead	Rubber shortage, Cracks, Scratches, Blister, Non-uniform etc.

The detectable range of tire sizes

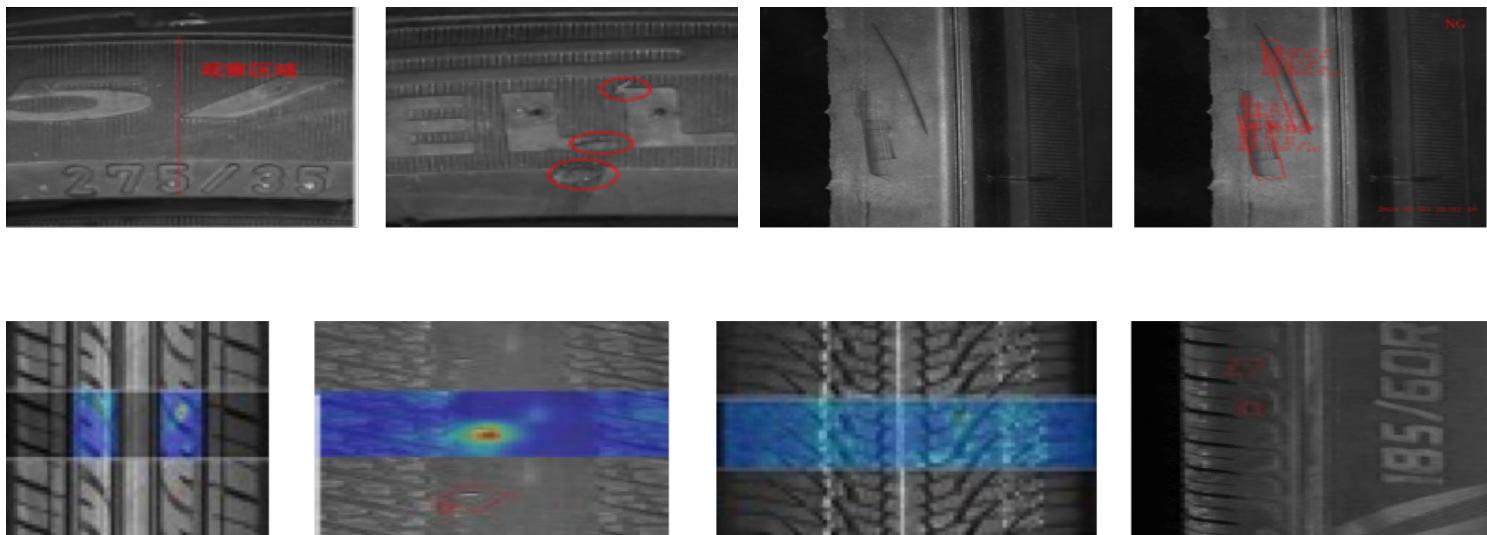
PCR (Passenger Car Radial)

Name	Minimum size	Maximum size
Section width	110 (mm)	355 (mm)
Section height	70 (mm)	210 (mm)
Rim diameter	12 inches (304 mm)	24 inches (610 mm)
The outer diameter of the tire	400 (mm)	1000 (mm)
The distance between tire toes	70 (mm)	325 (mm)

TBR (Truck and Bus Radial)

Name	Minimum size	Maximum size
Section width	135 (mm)	510 (mm)
Section height	150 (mm)	320 (mm)
Rim diameter	15 inches (381 mm)	25 inches (635 mm)
The outer diameter of the tire	700 (mm)	1400 (mm)
The distance between tire toes	80 (mm)	400 (mm)

Detection effect



Customer value



Suppose a tire manufacturing enterprise produces **20,000** semi-steel tires per day, and there are **150** SKUs.

AI drives solid business outcome



1.5x

increase in productivity



50%

omission ratio decreased

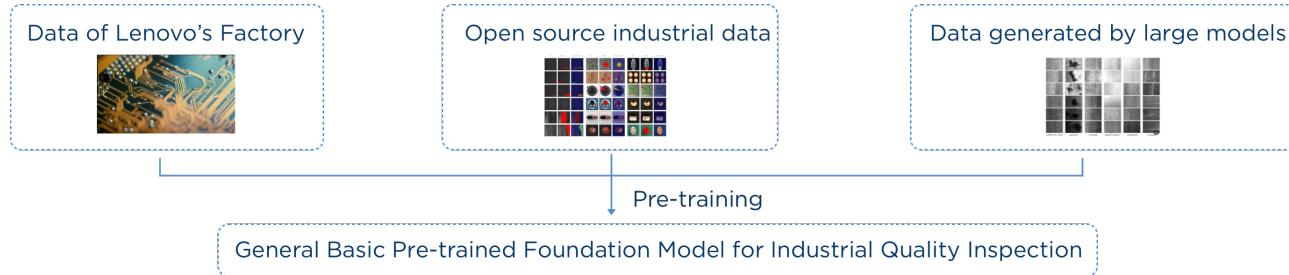


60%

inspection labor costs saved

Core technology

Lenovo Industrial Quality Inspection - Foundation Model



Unsupervised algorithm training and inference system based on few-shot



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Contact us today to discover how Lenovo Manufacturing Solutions can bring the future of manufacturing to you.
Learn more on: <http://lenovo.com/manufacturing>

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