

Quality control



! The challenge

Manufacturers face tighter quality standards while production lines keep accelerating, making in-line automatic optical inspection (AOI) increasingly important. Modern AOI must inspect continuously without reducing throughput. Key optical limitations are:

- Varying part heights and curvatures -> frequent refocusing is required.
- Large inspection areas -> wider FOV can reduce spatial resolution.
- Mechanical Z-focus -> motion adds speed, vibration and lifetime constraints.

For example, battery, automotive or lens inspection can combine large or curved surfaces with varying feature heights, forcing conventional optics to trade speed, focus coverage and resolution.



Optotune's solution

Optotune combines liquid lenses with fast steering mirrors to enable high-speed, high-precision AOI. The mirror scans multiple areas of interest across a large FOV while preserving spatial resolution, while the liquid lens refocuses within milliseconds to keep surfaces at different heights or curvatures sharp.

Focus tunable lenses offer >1 billion cycles and high repeatability, while the MR-15-30 provides 2D beam deflection in one compact element. The result is faster, scalable in-line inspection without mechanical Z-focus bottlenecks.

Advantages

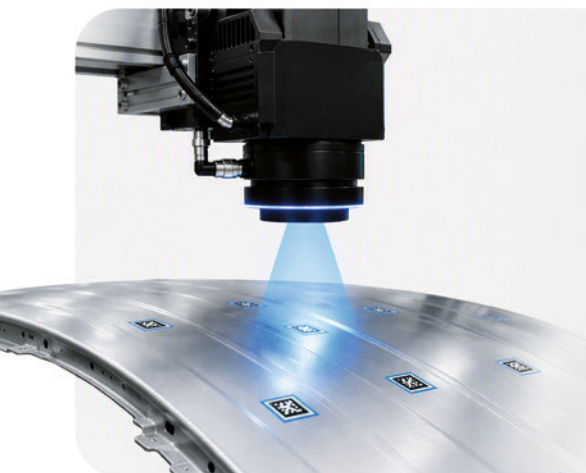
- ✦ **Millisecond-fast, precise focus** across varying working distances
- ✦ **Large-FOV inspection** without sacrificing spatial resolution
- ✦ **Compact, vibration-free focusing** with no motorized Z-axis
- ✦ **>1 billion lens cycles** for high-volume industrial use



Electronics inspection

Varying component heights

Shift focus electronically between focal planes, extending usable depth of field and avoiding vibration from motorized Z-focus.



Large/curved-surface inspection

Large FOV + varying height/curvature

Use MR-15-30 to scan AOIs at high resolution while a liquid lens refocuses within milliseconds.



Camera lens inspection

High magnification, shallow DOF

ELM-T modules shift the focal plane and capture image stacks within milliseconds for multi-surface inspection.



Customer success story

A customer is using our mirrors for field of view expansion in a pharma and food inspection line. This enables a significant reduction of inspection time and increase in the production throughput.

<10 ms

Fast focus settling
with liquid lenses

<10 ms

High-speed beam steering
with large-angle mirrors



IR imaging compatible
seeing through complex
material stacks

Scan for
more info:

