MICRO-EPSILON

reflectCONTROL
The Innovation in Automated Paint Inspection
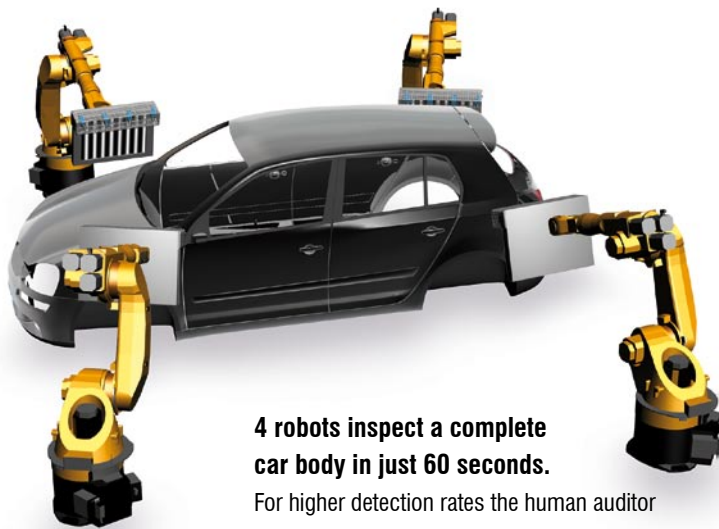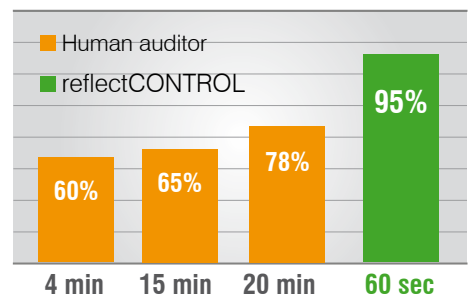
Four cameras per robot

REFLECT CONTROL

Large LCD screen

Key features:

- Fast inspection in less than 1s for each robot position
- Detection rate >95% for all relevant defect types
- Consistent performance levels unaffected by personal taste and fatigue
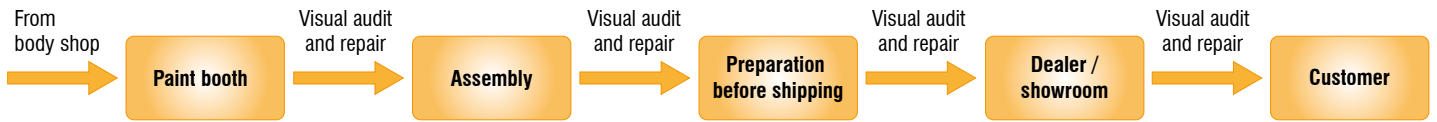- Marking unit as an option

Detection rate over all relevant defects

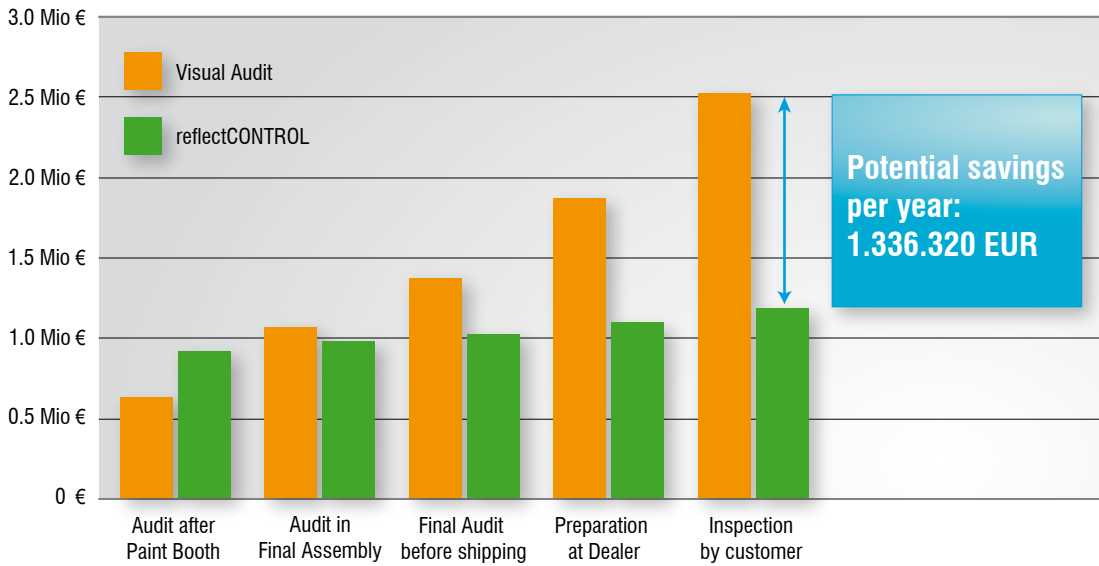|	Human auditor			reflectCONTROL
	60%	65%	78%	95%
	4 min	15 min	20 min	60 sec

4 robots inspect a complete car body in just 60 seconds.

For higher detection rates the human auditor needs significantly more time than available at normal production rates.

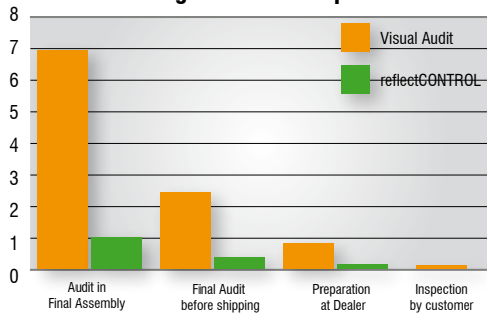RC robotic achieves highest detection rates within typical cycle times.

From body shop → **Paint booth** → Visual audit and repair → **Assembly** → Visual audit and repair → **Preparation before shipping** → Visual audit and repair → **Dealer / showroom** → Visual audit and repair → **Customer**

Cumulated repair cost from production to customer

Legend:
- Visual Audit (orange)
- reflectCONTROL (green)

Y-axis: 0 €, 0.5 Mio €, 1.0 Mio €, 1.5 Mio €, 2.0 Mio €, 2.5 Mio €, 3.0 Mio €

X-axis categories: Audit after Paint Booth, Audit in Final Assembly, Final Audit before shipping, Preparation at Dealer, Inspection by customer
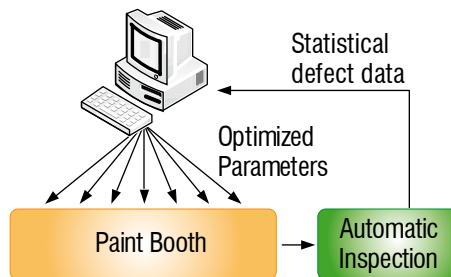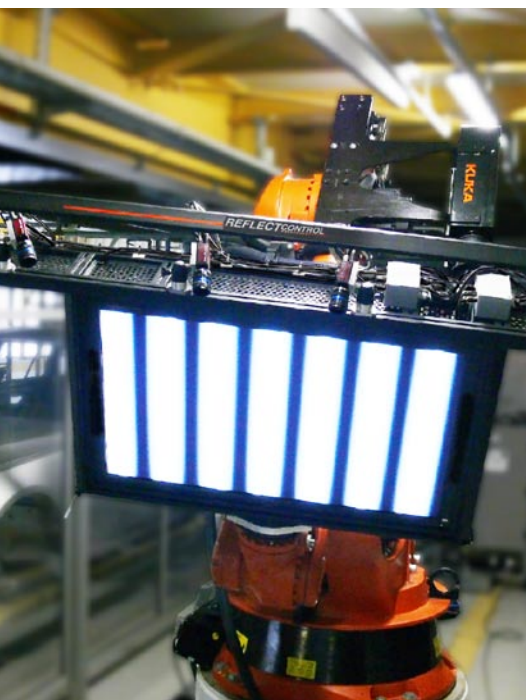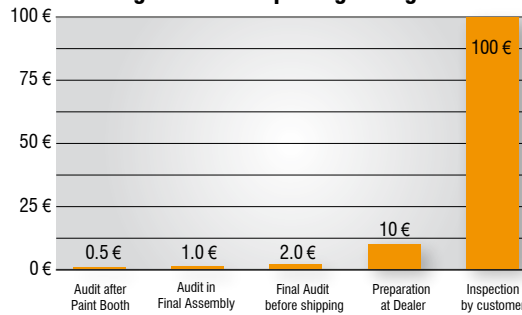
Potential savings per year: 1.336.320 EUR

NOTE:
All figures and calculations are taken from a Micro-Epsilon survey based on 64000 cars per year, detection rate 65% (visual audit), detection rate 95% (reflectCONTROL). Feel free to ask for the complete survey.

Remaining defects after paint booth

Legend:
- Visual Audit (orange)
- reflectCONTROL (green)

Y-axis: 0 to 8

X-axis categories: Audit in Final Assembly, Final Audit before shipping, Preparation at Dealer, Inspection by customer

Average cost for repairing a single defect

Y-axis: 0 €, 25 €, 50 €, 75 €, 100 €

- Audit after Paint Booth: 0.5 €
- Audit in Final Assembly: 1.0 €
- Final Audit before shipping: 2.0 €
- Preparation at Dealer: 10 €
- Inspection by customer: 100 €

Statistical defect data

Optimized Parameters

Paint Booth → Automatic Inspection

Reduced overall defect count through optimized process control
reflectCONTROL delivers reliable statistical data for long term optimization: This allows to detect and overcome process issues more quickly. Generally, this results in fewer defects and lower total cost for paint repair.
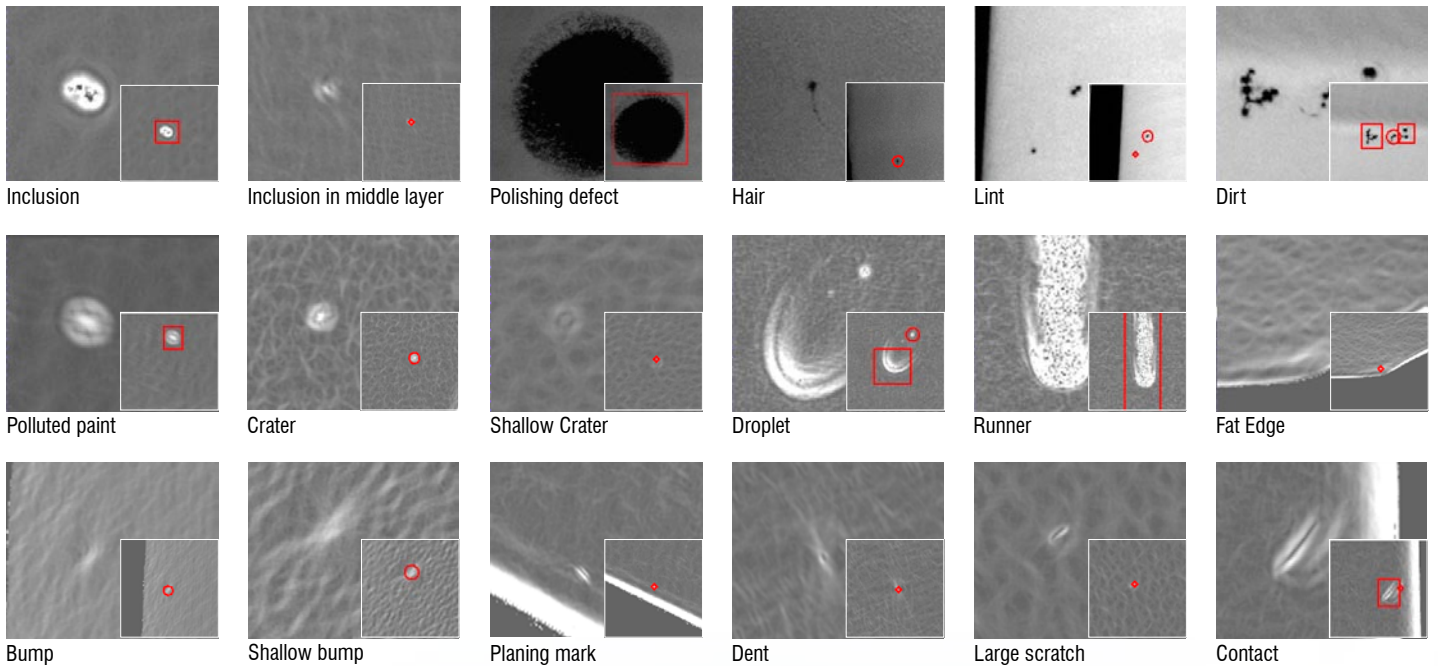
General benefits:
- Inspects 100% of all vehicles produced
- Allows workers to concentrate on fixing defects, not finding them
- Finds defects reliably directly after the paint booth when they are still easy to fix
- Effectively reduces cost of defects slipping through your Quality Control
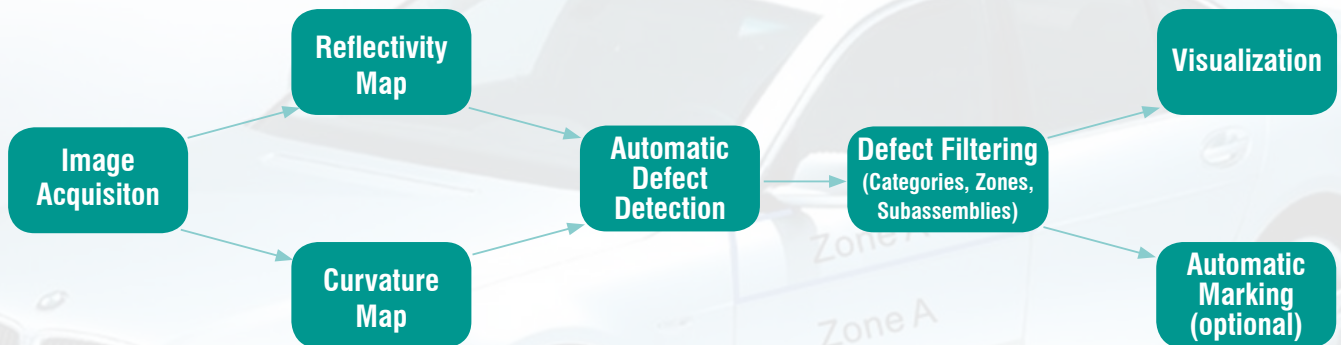- Reduced number of repair lines

Defect Types

reflectCONTROL offers detection of all relevant defect types. Found defects are categorized and matched against customer specific standards.

Inclusion	Inclusion in middle layer	Polishing defect
Hair	Lint	Dirt
Polluted paint	Crater	Shallow Crater
Droplet	Runner	Fat Edge
Bump	Shallow bump	Planing mark
Dent	Large scratch	Contact

RC-Robotic: Flow

Image Acquisiton → Reflectivity Map → Automatic Defect Detection
Image Acquisiton → Curvature Map → Automatic Defect Detection
Automatic Defect Detection → Defect Filtering (Categories, Zones, Subassemblies)
Defect Filtering → Visualization
Defect Filtering → Automatic Marking (optional)

Projektpartner

Bayerische Forschungsstiftung

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