Digitalised Value Management for Unlocking the potential of the Circular Manufacturing Systems with integrated digital solutions



DiCiM

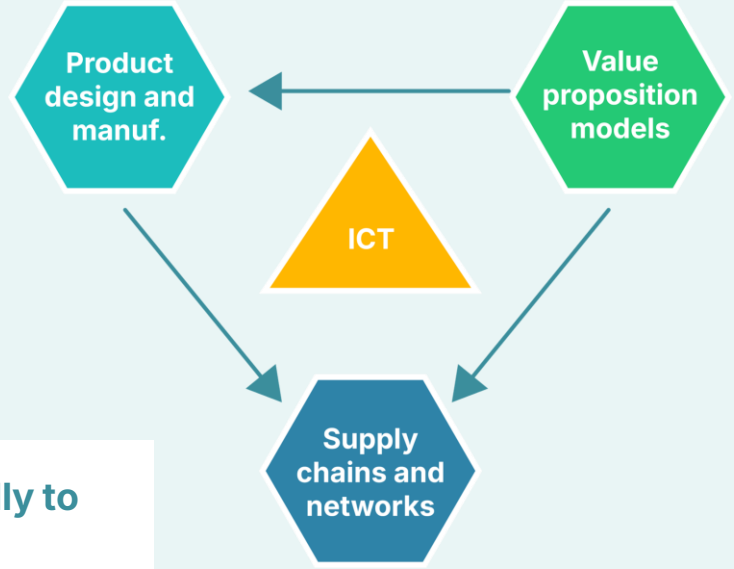
Digital Solutions for Implementing Circular Manufacturing Systems

EU Funding Call: CLIMATE NEUTRAL, CIRCULAR AND DIGITISED PRODUCTION 2022 (HORIZON-CL4-2022-TWIN-TRANSITION-01)

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Our focus

We scaled the ICT component in CMS



Source: adapted from Rashid et al., 2020

CMS are systems that are **designed intentionally to close the loop of components or products preferably in their original form, through multiple use & and lifecycles** (Asif, 2017)

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DiCiM's Integrated Digital Solutions



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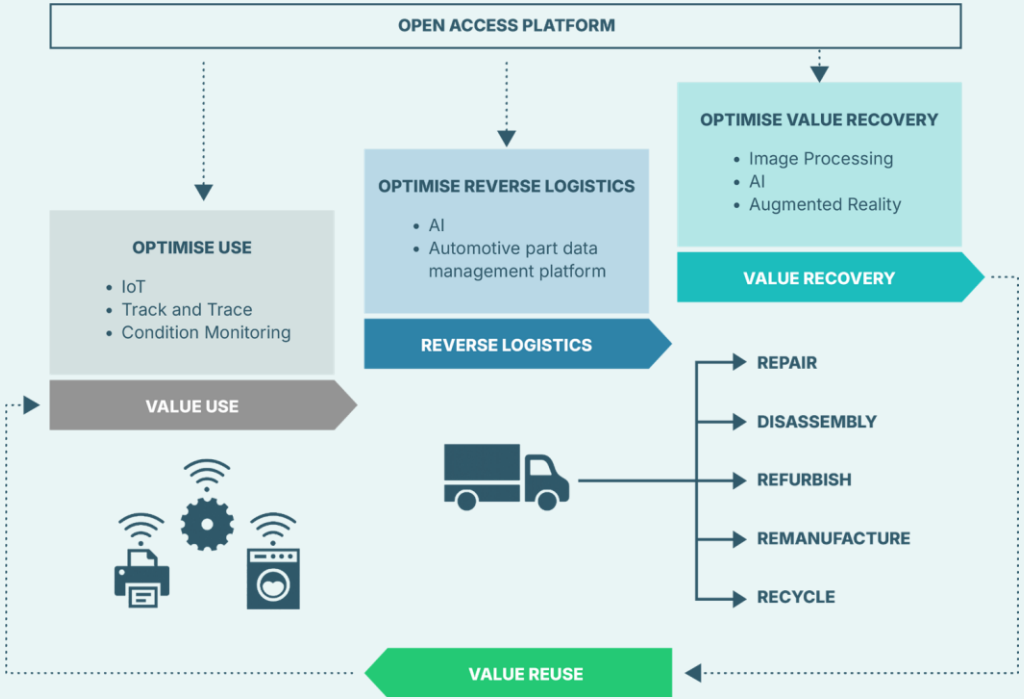
Lexmark



gorenje



CECO



Technologies:

- AI for decision support in product collection
- IoT-based tracking, tracing and condition monitoring
- Image processing and AI for part sorting
- AR for disassembly and part sorting
- Open-access digital platform

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Project Impacts



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Cost Avoidance & Economic Gains

- Refurbishment avoids ~€3M annually in warranty costs for refrigerators
- Component harvesting saves ~€116.5k/quarter in spare part costs for whitegoods

Quality & Throughput Improvements:

- Refrigerator cooling test time cut from 30 to 20 minutes
- Automotive core sorting mismatch errors reduced from 7.4% down to 2.0%.

Resource Preservation

- Increased washing machine spare part recovery productivity by 50%
- Prevented unnecessary downcycling of thousands of electronic control boards and printer cartridges

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IoT Telemetry, Anomaly Detection & AR Disassembly

Develop condition monitoring capability of washing machines



gorenje
Life Simplified

HW redesign

Being able to track 100+ operational parameters (motor current, water pressure, temperature) via Wi-Fi

Anomaly Detection

Moved from sparse failure logs to baseline anomaly detection models estimating technical health for pumps, heaters, and electric motors.

AR-Guided Disassembly

Built an ergonomic workstation with lift/tilt mechanics to harvest reusable components from B-grade and logistically damaged appliances.

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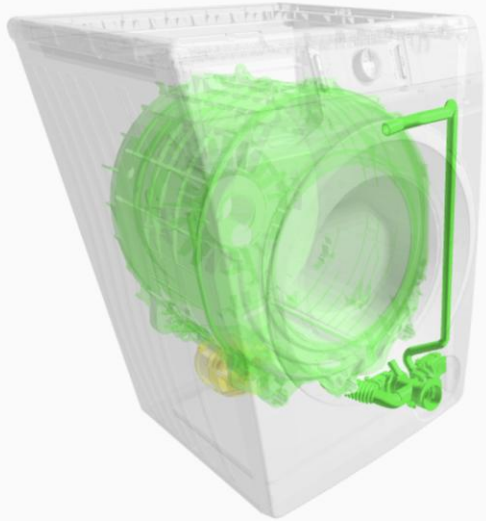
Analyse Status of Machine

Enter component ID

Get status

▼ **Machine Details**

Id:	453453
Total Number Of Cycles:	20
Total Number Of Working Hours:	100
Date Of Last Finished Washing Cycle:	15.5.2025
Number Of Service Interventions:	2
Further Actions:	Refurbish
Machine Wear:	30



Components

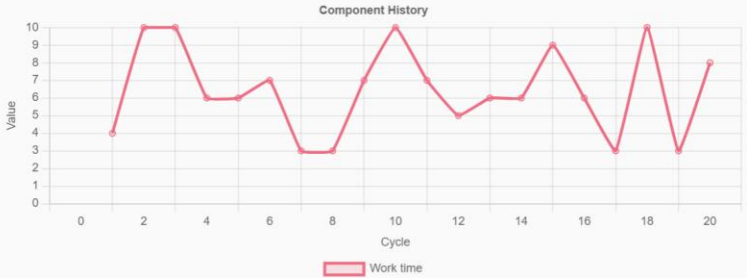
- Motor - ✗
- **Pump -** ✓
- tub - ✓

Component Details

Full Name:	Pump
No Of Cycles:	15
No Of Errors:	0
Type:	Drain
Work Time:	10

Component Image





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Machine Vision & Automated Thermal Testing

AI & image processing in inspection



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Optical PCB Inspection

Developed an automated computer-vision prototype using deep learning to detect missing, tilted, or burned components on electronic control boards.

Thermal Cooling Inspection

Deployed an infrared thermal camera setup measuring surface heat patterns across thresholds to evaluate cooling system health

Operational Impact

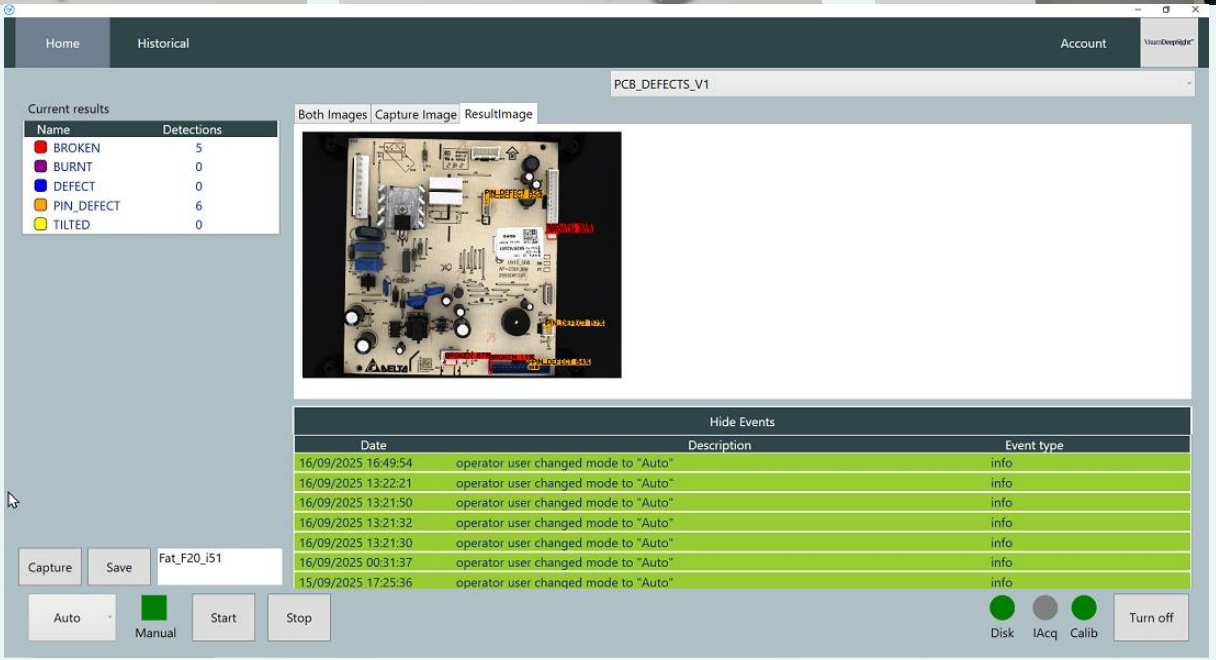
Reduced cooling test cycle duration from 30 minutes to 20 minutes and dropped downstream PCB simulator test rejections from 25% down to 2–5%.

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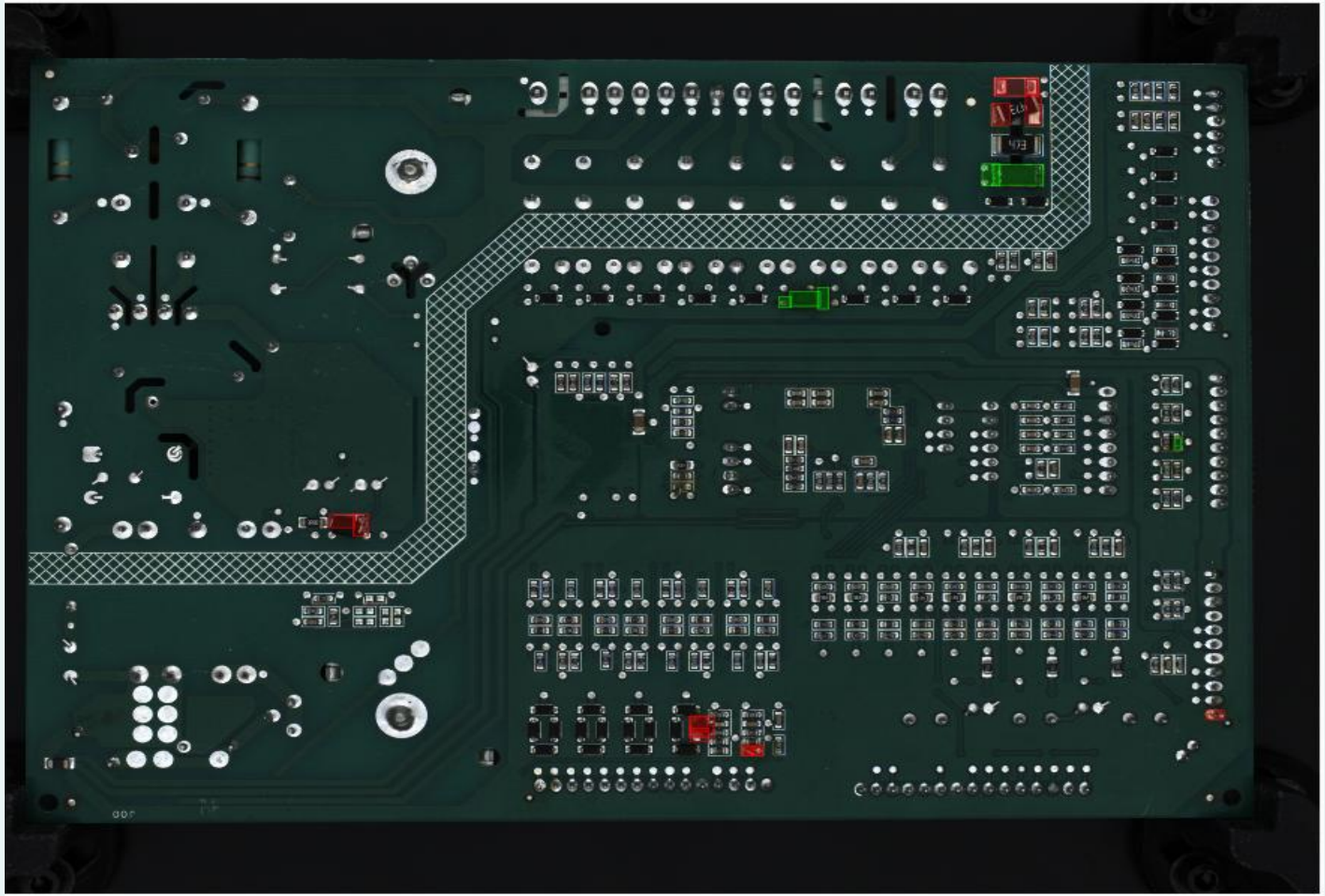






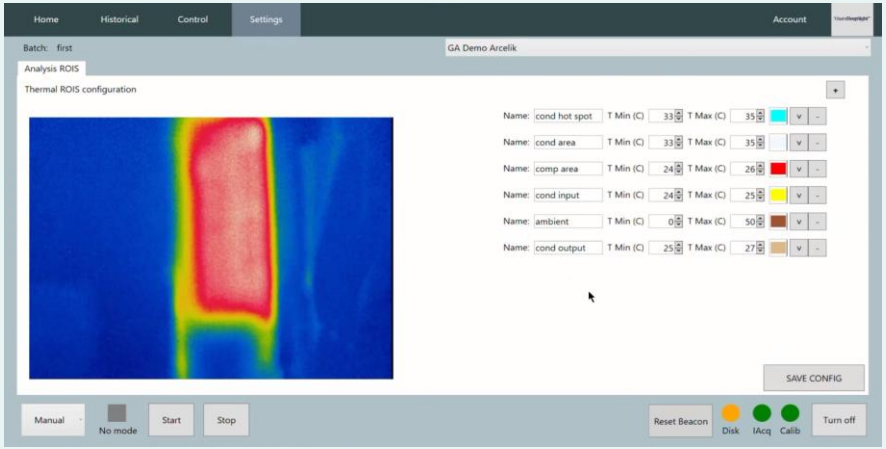


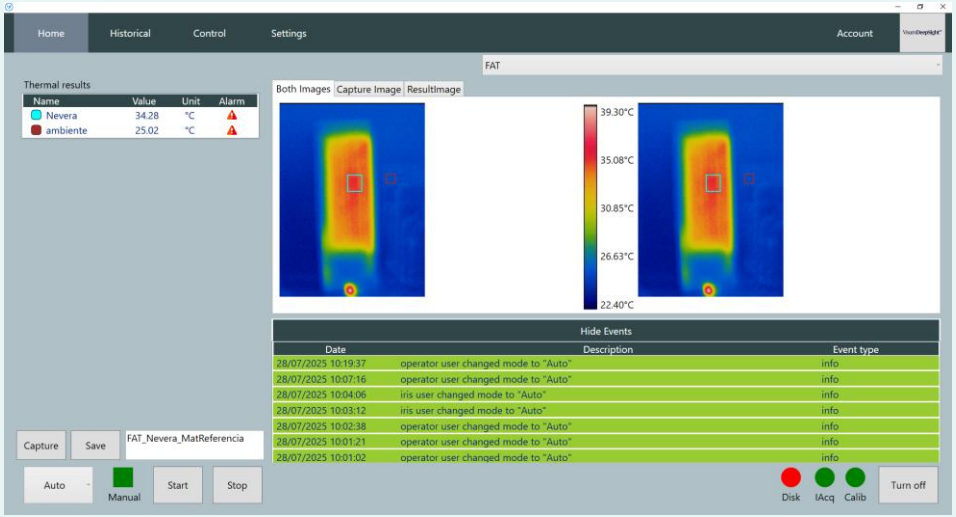
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Cloud Connectivity & AI Decision Making

AI for decision support in product collection



Lexmark™

Non-MPS Cloud Connectivity

Unlocked the telemetry from non-MPS printers without firmware modifications by Cloud Bridge

AI Health Models & Buy-Back Engine

Trained ML models on single printed page on motor load/speed telemetry (fuser, transport, redrive) to generate automated desirability scores and buy-back pricing

Reverse Logistics & Cartridges

Optimized return routing and customer participation via QR packaging tags and regionalized European collection hubs.

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Analyse Status of Machine

Enter component ID

Get status

▼ Machine Details

Current Fuser Start Page:	26357
Current Toner Start Page:	126345
Current Imaging Unit Start Page:	26357
First Stored Page:	26357
Last Stored Page:	130704
First Stored Page Timestamp:	2020-01-01 04:02:30
Last Stored Page Timestamp:	2024-08-05 11:03:05
Number Of Source Trays:	5



Components

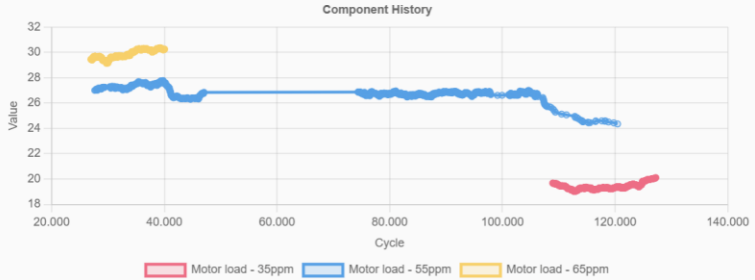
- autocomp_lift_tall_tray - ✗
- **fuser - ✗**
- imaging_unit - ✓
- toner - ✓

Component Details

Behavior:	fuser_belt_normal
Current SN:	817902630000
Current Page Count:	130704
Current Roller Revolutions:	1099499
Error Grade:	0

Component Image





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Status: Redshift

CUSTOMER INFORMATION

Customer Name	SC-01 - Ideal/Happy path
Customer Address	Lechner Odon fasor 8.
Postal Code	1095
City	Budapest
Country	Hungary
Contact Name	Jason Bourne
Contact Phone	36301450059
Contact Email	jason.bourne@fbi.com
Customer vendor code	☐
Customer bank details	
Customer bank details	Choose File No file chosen

ATTACHMENTS

PRODUCT INFORMATION

	MS826de
Product Model	 MS826de MS826de Product model MS826de Printer weight 26,00 Printer dimensions 600x600x750 Product type Documents to be attached Mono SFP
Product Name	MS826de
Product Part Number	
Product Type	

REDSHIFT INFORMATION

Attach Documents: Choose File No file chosen — Upload files

Save and close | Back to open | Ulfs

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Data Management of Cores & AR Sorting

Extend and enhance the automotive part Data management platform



Automotive Core Data Management Portal

Upgraded CoremanNet with 26 self-service reporting dashboards, consolidating logins and cutting support ticket burdens.

OADP Platform Integration

Connected CoremanNet to OADP to manage cross-sector part option lists and end-user WebShop return price incentives.

AR Scan-to-Sort Validation

Implemented hands-free sorting using RealWear Navigator 520 smart glasses and ring hand-scanners, dropping order content mismatch from 7.44% to 2.00%.

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WANT MORE DETAILS OR COOPERATE?

MEET US AT OUR BOOTH!

Contacts:
Project Coordinator: Alena Klapalová, alena.klapalova@econ.muni.cz
Scientific Lead: Farazee Asif, aasi@kth.se
Collaboration Lead: Michal Krčál, Michal.Krcal@econ.muni.cz

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