2026-05-20

Creating Digital Value in Manufacturing: Insights from the STRIDE Collaboration –

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Topics to Be covered

- STRIDE Project – Background
- Skultuna Induflex Journey in Quality Inspection
- Methodology & Outcomes
- Value Creation and Business Impact
- Results and outcome
- Summary and Next Steps

STRIDE - Project

- **STRIDE –** Secure and Resilient Infrastructure for Digital Enterprises
- **Reference number:** 2024-03263
- **Project Duration:** November 2024 - December 2025

Financed By:

VINNOVA
Sveriges innovationsmyndighet

Partners and Co-Financed:

RI. SE

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MITSUBISHI ELECTRIC

Hitachi Energy

Project Background

Purpose:

- Support the industry in understanding long-term digital infrastructure needs.
- Bridge the gap between current capabilities and future demands.

Objectives:

- Develop a guiding framework for digital infrastructure.
- Establish a service model based on real industrial use cases.
- Translate industry use cases into clear infrastructure requirements.
- Provide a foundation for future digital development and investments.

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Background – Why This Matters

Increasing Demand in Manufacturing:

- Net Zero targets
- Higher quality expectations
- Cost competitiveness

Laminate Technology:

- Complex multilayer systems
- Tight tolerances

Challenge:

- Traditional inspection methods are no longer sufficient

SKULTUNA Induflex

About Us

We combine and coat materials – including plastic films, metal foils, paper and cardboard to create an almost infinite number of laminates to meet every possible need.

Operations in three countries:

Sweden, Belgium, and China

Sales >200 MSEK

Production capacity:
>50 million m²/year

ISO 9001 and 14001 certified

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Our Processes

Laminates produced from roll to roll: Wide variety of one or two-component high-performance adhesives: PUR, Epoxy, Polyester, Acrylic, etc.

- Metal foils 6–200 µm
- Polymer films 4–300 µm
- Papers and cardboard 40-500 g/m²
- Other thin materials on reels
- 2–5-layer laminates

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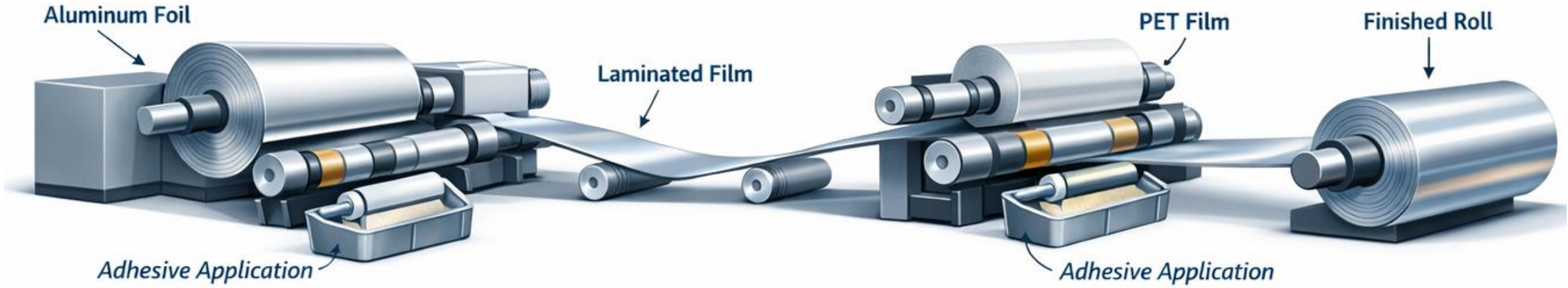
Manufacturing Line

1 meter wide web, running with a speed of 200 m/min, and a finished product up to 5000 meters in length in roll form, could be a challenging process to find Micro defects.



In R2R lamination, quality is not controlled by one parameter — it is the interaction of tension on the rolls, production speed, nip pressure, and adhesive chemistry.

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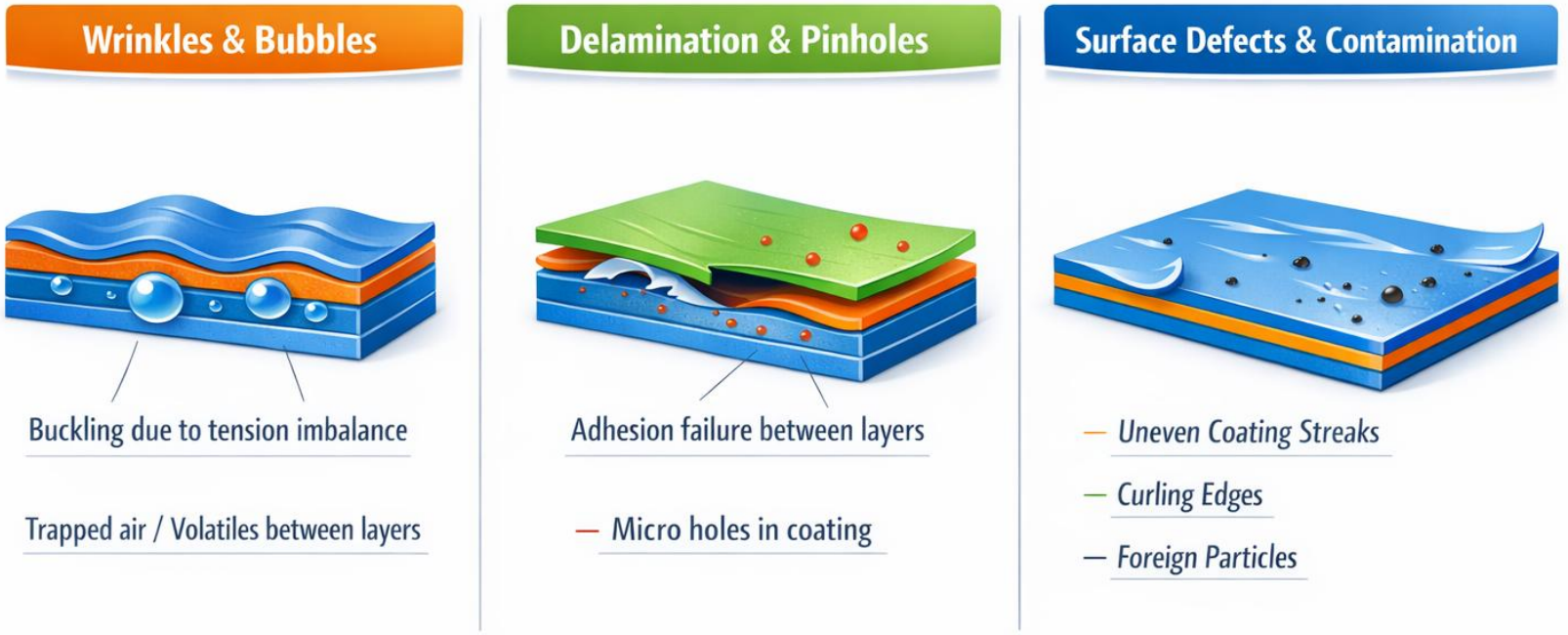
Common Lamination Defects



Previous vision system at Skultuna Induflex exhibited constrained detection accuracy due to non-tuned threshold algorithms and inadequate flexibility in identifying process-specific defect patterns.

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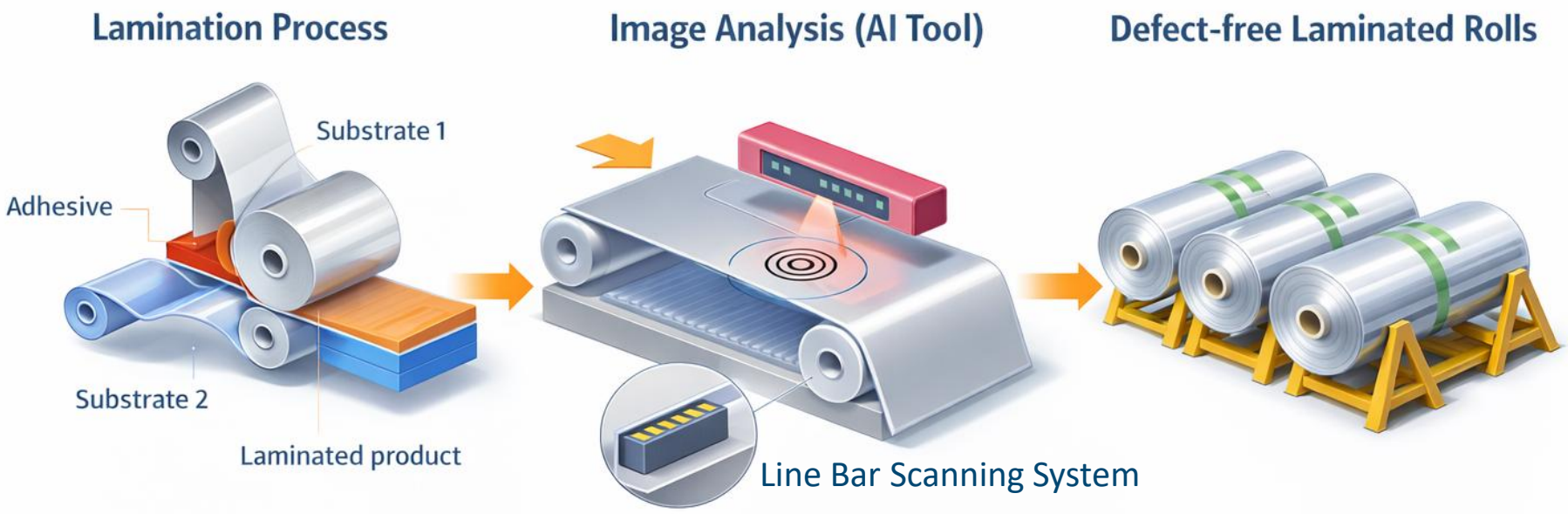
Proof-of-Concept (PoC)

The PoC was scoped to two core questions:

1. Can imaging technology reliably capture defect characteristics?
2. Can an AI model detect these defects with sufficient accuracy to justify further development?



IN AI-BASED QUALITY INSPECTION, THE CHALLENGE IS RARELY LACK OF COMPETENCE

- Production systems are already optimized over many years
- Processes, materials, machines, and systems are tightly integrated
- Local adaptations and workarounds are part of daily operation
- Production experts master their specific context and constraints

- New solutions must fit into existing systems, not sit “on top”

Critical operational context is often:

- - implicit
- - distributed
- - difficult to transfer between organisations

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UNRAVELING THE IMPLICIT

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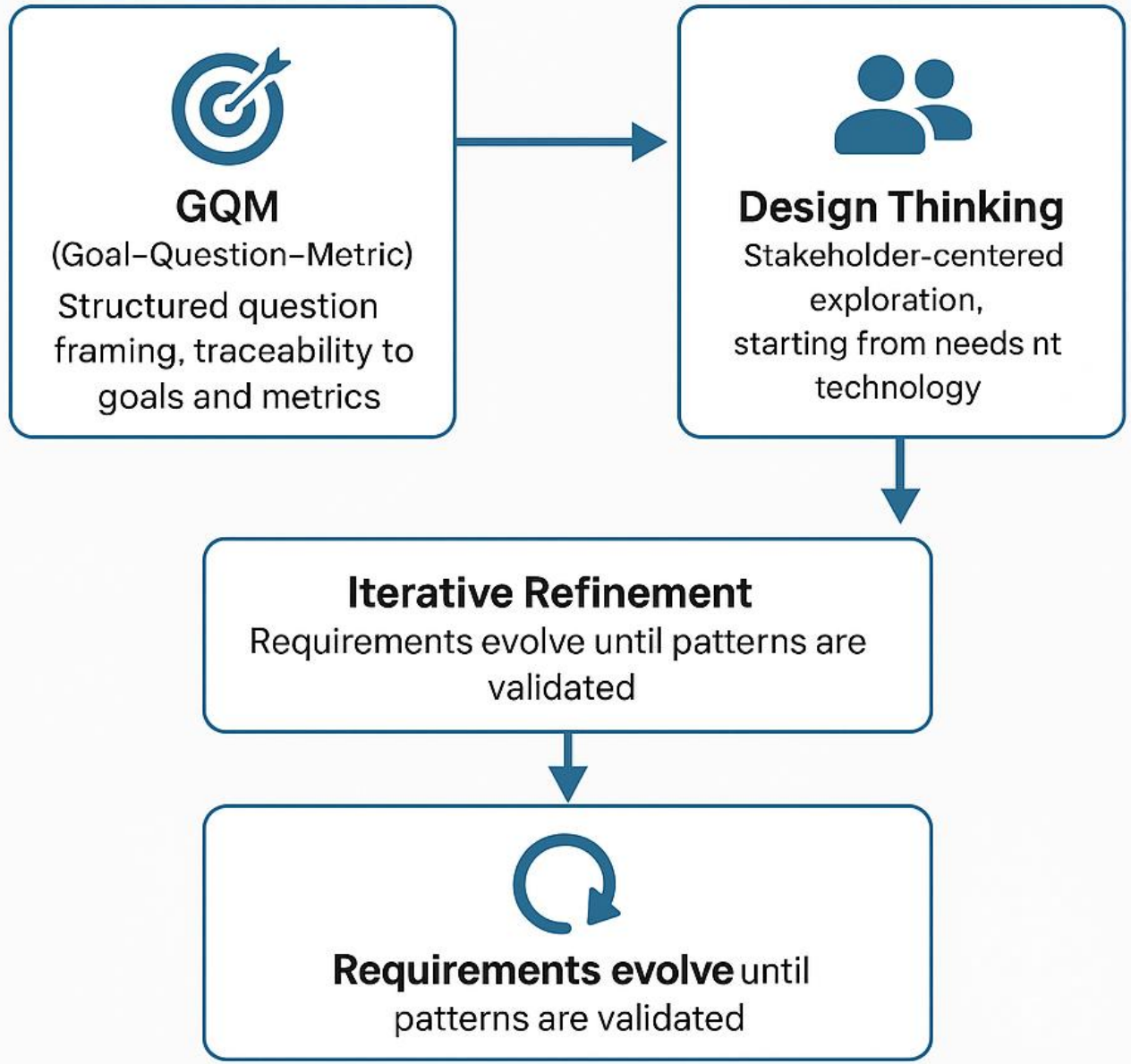
Methodology



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From Method to Practice: Needs Discovery

Initiate

1. Define Use Case
2. Define Initial Stakeholders, Roles
3. Identify Initial Set of Interviewees

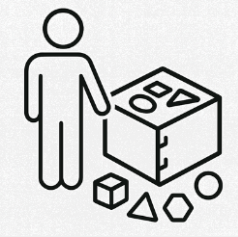
Interview

- Information needs?
- Interactions ?
- Used or Wanted Tools?
- New Stakeholders?

…

Derive

What, Who, Why….



Document

- Technical Aspects
- Organisational Aspects
- Cyber Security Aspects
- …

STRIDE Outcome On Digital Infrastructure

Recommendations and insights related to:
- Organization
- Infrastructure and platforms
- Communication flows
- Information workflows
- Digital resources
- Resilience & cybersecurity

This is not a system design. It's input to a roadmap.
And that's where the Skultuna case takes over.

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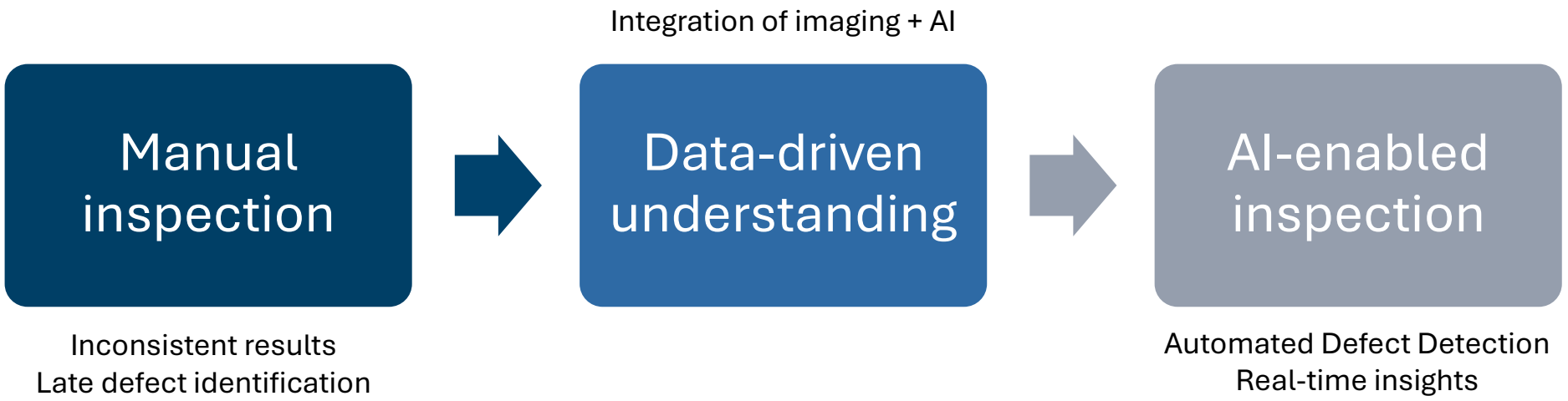
Value Creation – For us



- Reduced scrap → lower material consumption
- Reduced rework → energy savings
- Higher consistency → improved product reliability
- Faster decisions → improved productivity/yield

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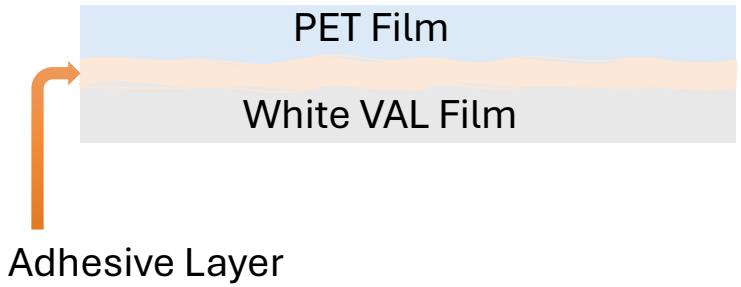
Results- Adhesive Variations

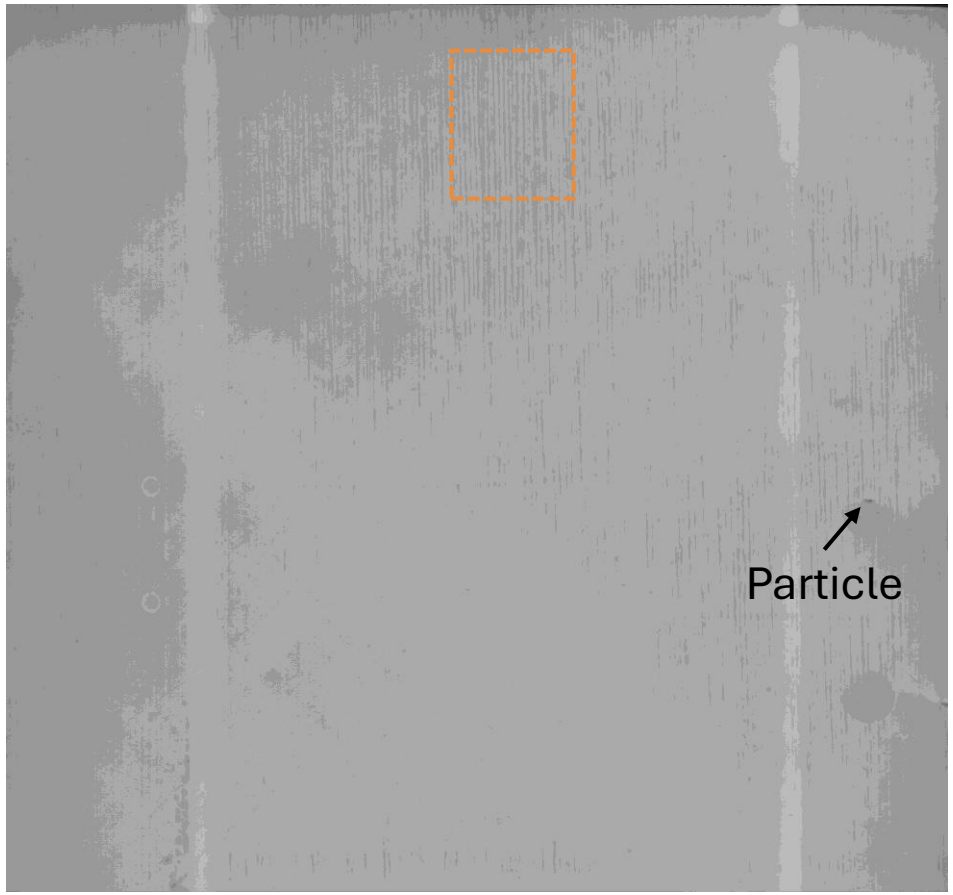
A4 sheets with defects were scanned with bench scale scanner and immages were analysed with AI model

Material Combination: PET film (19 µm) and White VAL film (75 µm)



Defect: Adhesive areas with small particles.

This microscale defect may cause delamination and bad quality in the end product.



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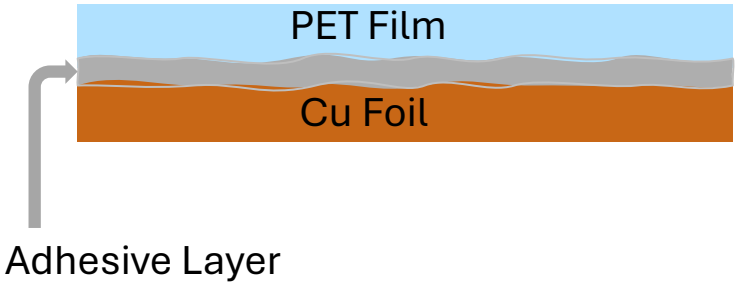
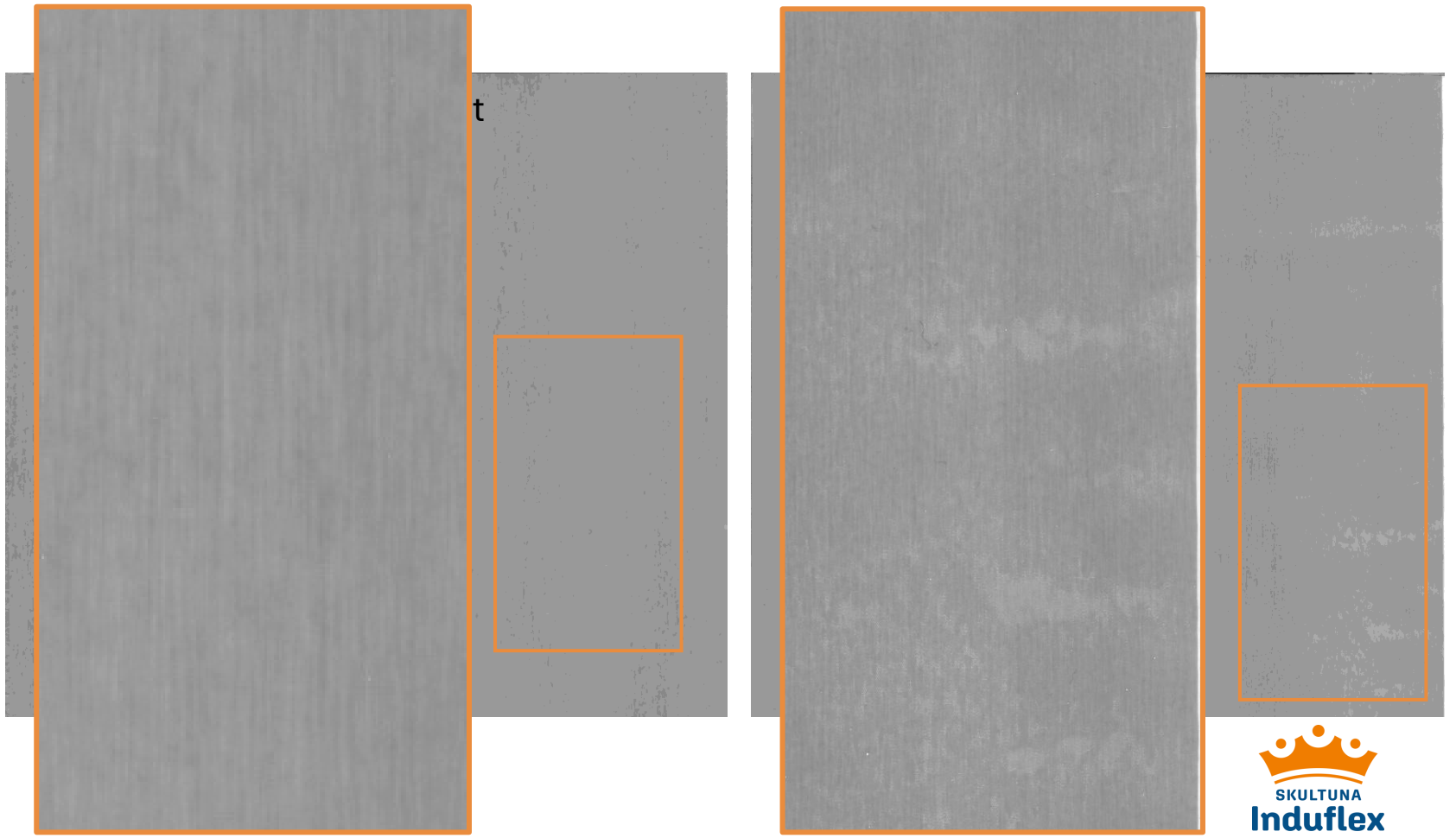
Results- Adhesive Variations

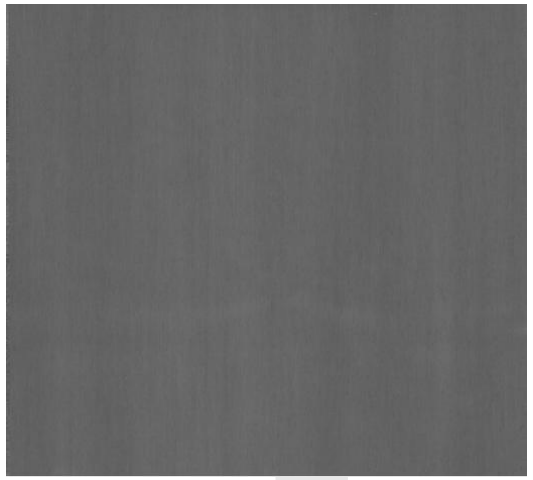
Material Combination: Cu foil (18) / Adhesive Layer / Pet 50



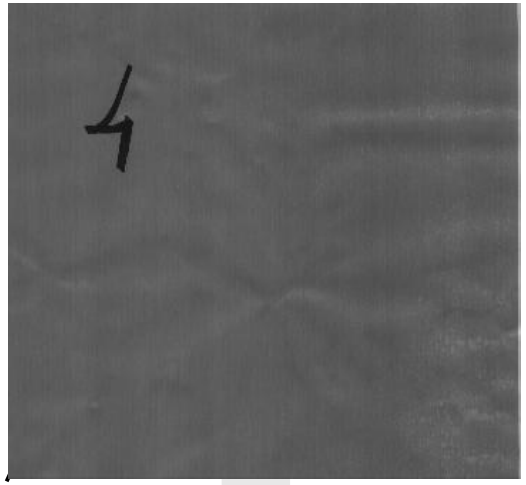


Model Training and Tuning (RISE)

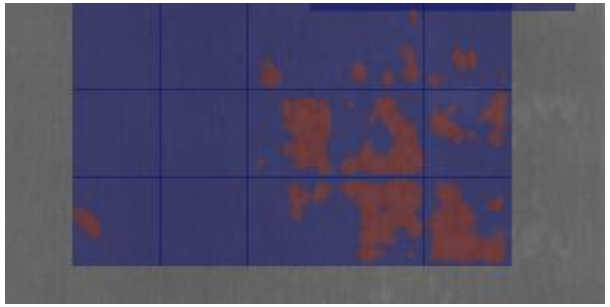
Laminate Defect Free



Laminate With Defects

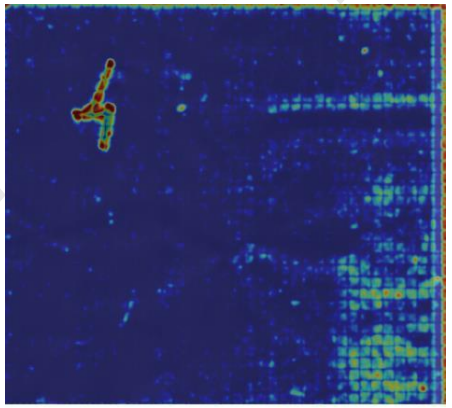


Detected Defect



Feedback in Quality Systems

AI Model-Trainer



Defects Classification

Threshold analysis

Summary

STRIDE successfully demonstrated;

- A user-centered method that clarified digital infrastructure needs for manufacturing.
- Early stakeholder input and PoC testing reduced risk before major investments.
- The Guidance Service provides a structured way to plan digitalization.
- AI and imaging are promising for quality inspection but need strong governance.
- Clear data security and governance are essential as industrial AI adoption grows.

Next Step;

- Scale the approach in machine level trials.
- Enable reuse of AI models across sites and production conditions.
- Further strengthen data governance and cybersecurity integration.

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Acknowledgements

- Saad Azhar (STRIDE project coordinator)
- Francisco Penayo from Hitachi, and Daniel Hansson from Mitsubishi Electric for their useful collaboration in the project work.
- Andreas Thore, Senior Researcher from RISE (AI model training and data analysis)
- Kateryna Mishchenko, Senior Researcher from RISE, (Cyber Security report)
- Ulrica Helsing, Quality Lab Controller from Skultuna Induflex, (samples for analysis)
- Shift Lab (Sponsor for the conference attendance)