# The Dust-free and Digital Future of Surface Finishing

*Veli-Pekka Västi, Mirka Power Tools R&D 27.1.2022*

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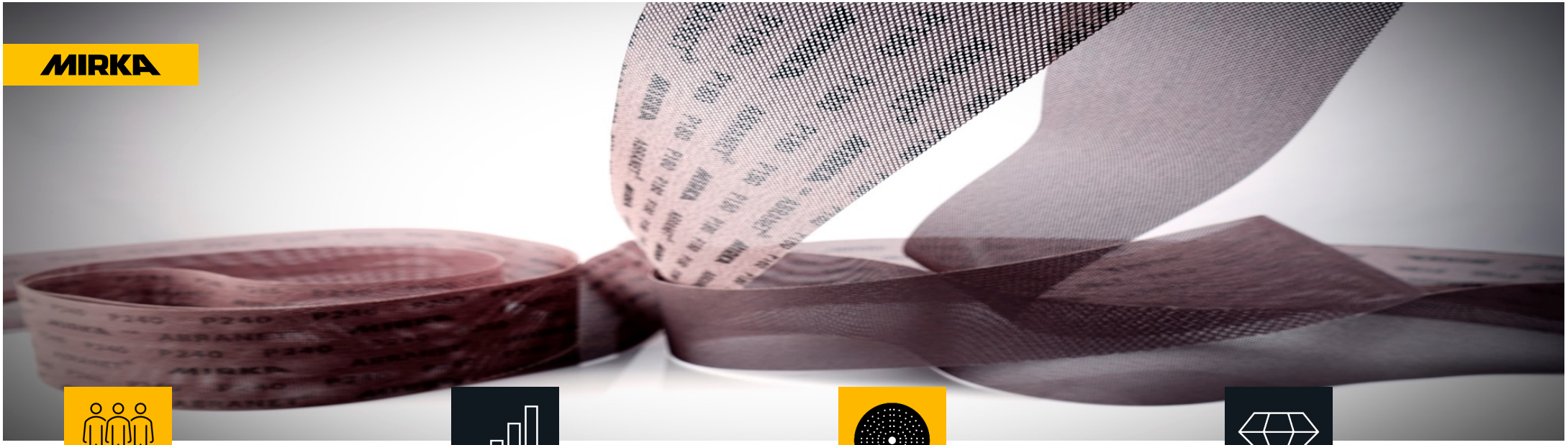
Mirka

Project introduction

WP4.1 Predictive maintenance PoC




## People

We are almost 1600 people working globally for Mirka. Our dedicated experts work in sales, production, R&D, customer service etc.

## Finance

Our turnover has been continuously growing, nearly reaching 370M€ in 2021. Mirka is a part of the KWH Group.

## Sectors

Our products and solutions are used in collision repair, transport, construction & decoration, wood, industry and precision industry sectors.

## Values

We are responsible, committed, innovative and respectful. We create sustainable solutions that are at the forefront of innovation.


# Mirka Magic

- Mirka is a family-owned Finnish company and a part of the KWH Group.
- We have been dedicated to the finish since 1943. With constant improvement and innovation, Mirka has become a world leader in abrasives technology.
- We are the only company that develops and produces abrasives, tools and polishing compounds under the same roof.

# At the forefront of innovation

- Mirka is a world leader in surface finishing technology and offers a broad range of groundbreaking sanding solutions for the surface finishing and precision industry.
- Mirka products are problem solvers brought to you by friendly people. Our know-how combines hands-on experience and fearless innovation to produce the best in abrasives, tools and sanding solutions. That’s why Mirka has become the natural choice in a wide variety of industry sectors.

# Vision of Digital Services and Connectivity at Mirka

Product

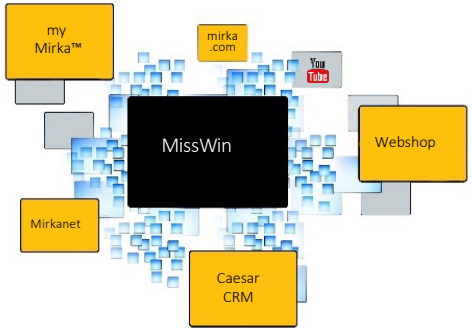
Smart Product

Smart Connected Product

Smart Connected Product System

System of Systems




AISA PROJECT

# 2. Project: The Dust-free and Digital Future of Surface Finishing

*Part of the AISA consortium*

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# The Future is Dust-free and Digital

From selling abrasives and tools to selling solutions and services

*New solutions, services and business models through creative exploration and utilization of the potential of combining the opportunities of digitalization with our extensive expertise in surface finishing*

Future Offering

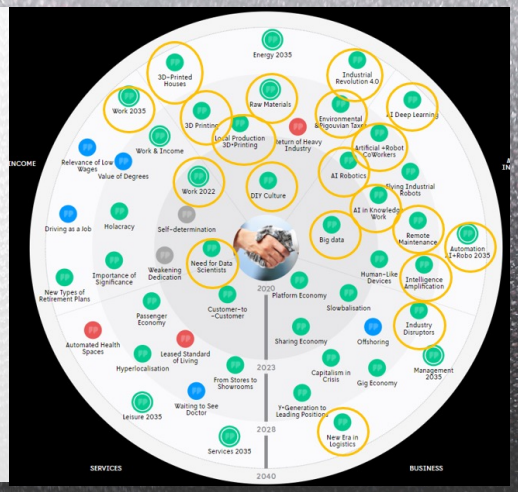
Future Capabilties

- WP 1 The roadmap to a dustless and digital future
- WP 2 Helping our customers perform better
- WP 3 AI, ML , visual and acoustic analytics in Robot sanding solutions
- WP 4 Intelligent products
- WP 5 On-line QC utilizing visual and acoustic analytics, AI, ML securing consistent abrasive quality

MIRKA

# WP 1

*The roadmap to a dustless and digital future*

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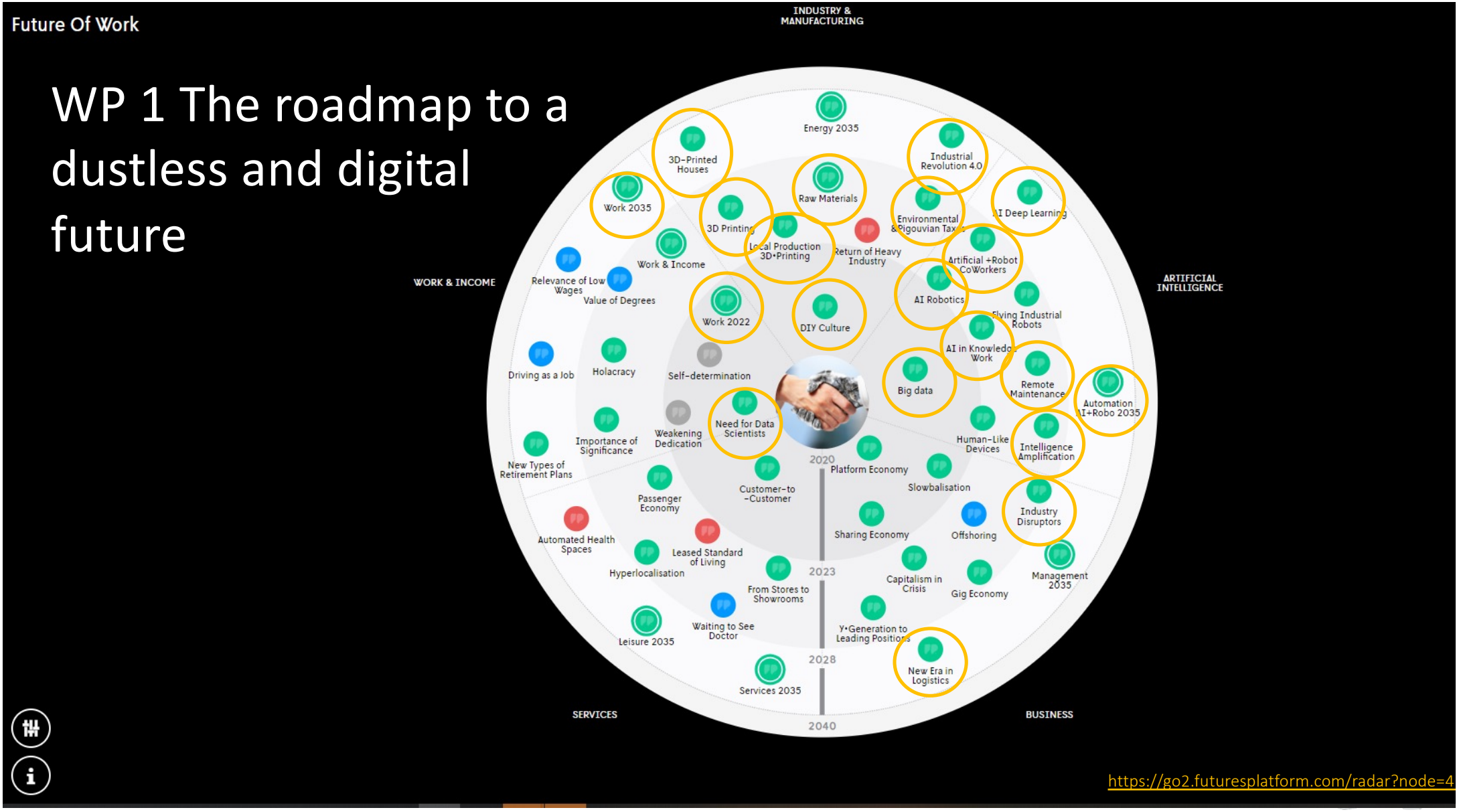
# WP 1 The roadmap to a dustless and digital future




https://go2.futuresplatform.com/radar?node=4

# WP 1 The roadmap to a dustless and digital future

- Where are we now, where should we be in 2024. Which things to consider, regulations, laws, standards, IPR landscape – *What are the customer challenges to be solved in 2024?*
  - Identify, explore and analyze trends, weak signals, future materials , production technologies, surface finishing methods, standards, laws, ROHS, REACH
- *State of the art in surface finishing business study*
  - *Threats, opportunities, competitors, customer jobs*
- Tech trends
  - *Artificial intelligence, 3D printing and advanced materials are still in their early stages of use, but the pace of change will be fast*
- Outcome : Roadmap 2021-2026 and identified potential in market and business sectors
- IPR

# WP 2

*Helping our customers perform better*

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# Future of production

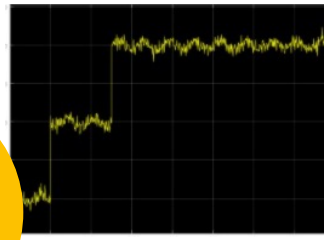
AI

Robotics and agile production

Resource-efficincy

Machine Learning

Visual and acoustic analytics



Optimized logisitics

Industria lIoT

Intelligent Tools

Edge solutions

AI

Industria lIoT

Intelligent packaging

Imaging and sensors

Advanced robotics and tools in the line

Positioning elaborate 5g opportunities

Real time data accuracy, speed

Analytics for process adjustment

Analytics for predictive maintenance

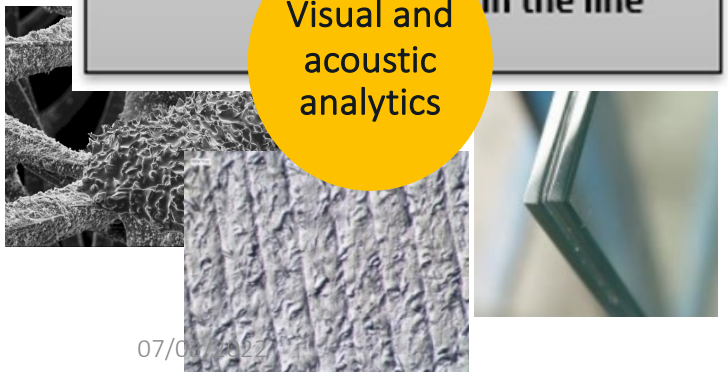
New packa methods

Visual and acoustic analytics

Flexibility

Data science

Sustainabilit y



# WP 2 Helping our customers perform better

- The objective is to increase the intelligence and automation of surface finishing processes to achieve a higher and verifiable quality level, optimal process and high resource efficiency
- Design thinking – customer centric solutions
- Identify the customer pain
  - By understanding the customer challenges, interpreting these into surface finishing solutions and making sure our offering comprises opportunities to optimize processes
- Re-evaluate our offering and business model
  - From selling abrasives and tools to selling solutions and services
  - Big data has turned into a challenge in many traditional industries as just data without an application might turn out to be more pain than gain. For us this can be turned into a huge opportunity.
  - Combining our extensive competence in surface finishing through data algoritms, AI and ML, robotics with our machines, abrasives, polish, services (WP2, WP3, WP4) into complete digitalized surface finishing solutions (WP1)

*Helping our customers perform better…*

# WP 3

*Implement AI, ML , visual and acoustic analytics in robot sanding  solutions*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# WP 3 Investigate AI, ML , visual and acoustic analytics in Robot sanding process development

Task Utilizing  visual and acoustic analytics and sensor data in defining the surface finishing requirements of a specific case and matching this using AI and ML into an optimal process utilizing intelligent products and optimized abrasives or polishing compounds

By being able to set the sanding or polishing parameters optimal will increase the  performance of products – more resource efficiency

- Increasing sustainability of processes through optimal energy consumption, wear and less waste (sand paper is single use, disposable material) This has a significant direct impact on resource use

Goal:

The aim is to find the right type analytical methods, sensors providing the right data needed and then applying machine learning and AI for setting and improving the right sanding or polishing parameters automatically. Data inputs will be analyzed by Six Sigma tools to prove their accuracy.

# WP 4

*Intelligent products*

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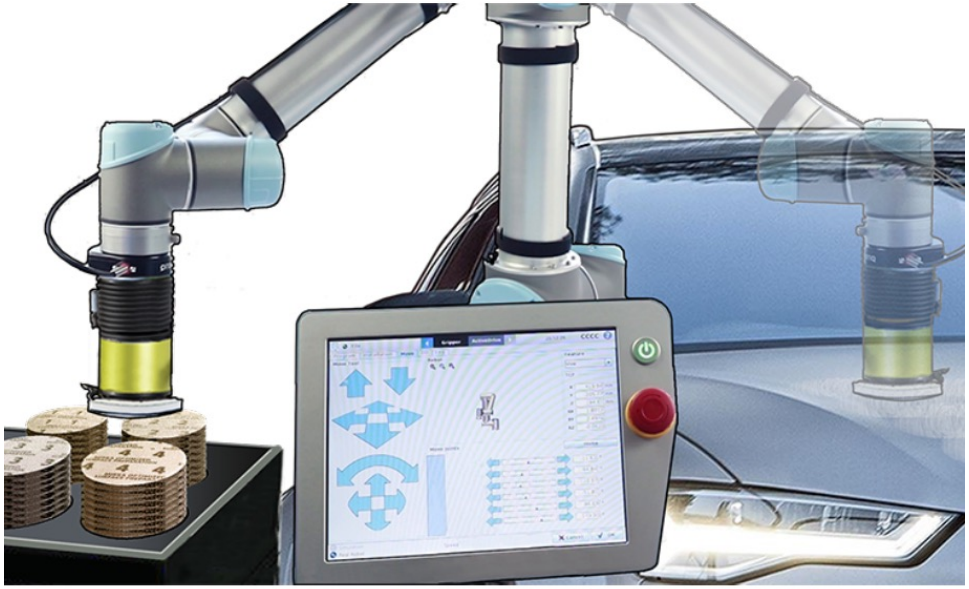
# WP 4 Intelligent products

Aim is to develop new intelligent features and products to be used as enablers of Mirka's intelligent solutions for different use cases and sectors. Investigate and validate new ways of showing the data to the end user. Surface finishing automation needs sensing of various things and for that purpose, different sensors to be tested and data improved by applying machine learning and artificial intelligence technologies.



# WP 4 Intelligent products

- Predictive maintenance.
- Healthy working environment
- Predict optimal lifetime of consumable
- Surface temperature measurement
- Force sensing
- Consumable detection
- Data sharing to user
- Combination of moving platform, cobot, camera, surface finishing tools, control surface
- Surface fault detection

Temp

3D Scanner

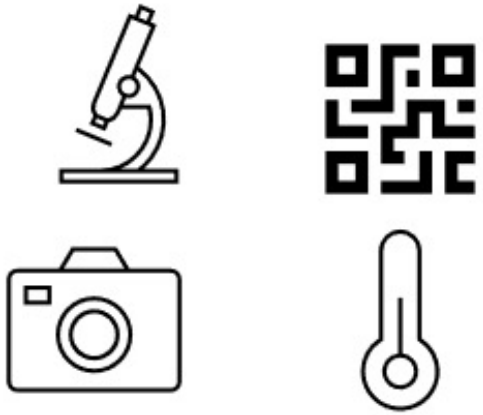
Force

Vision

Dust

# WP 5

*On-line QC utilizing visual and acoustic analytics, AI, ML securing consistent abrasive quality*



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# WP 5 On-line QC utilizing visual and acoustic analytics, AI, ML securing consistent abrasive quality

*Optimized surface finishing require consistent  abrasives quality and built-in traceability and intelligence*

Sustainable sourcing

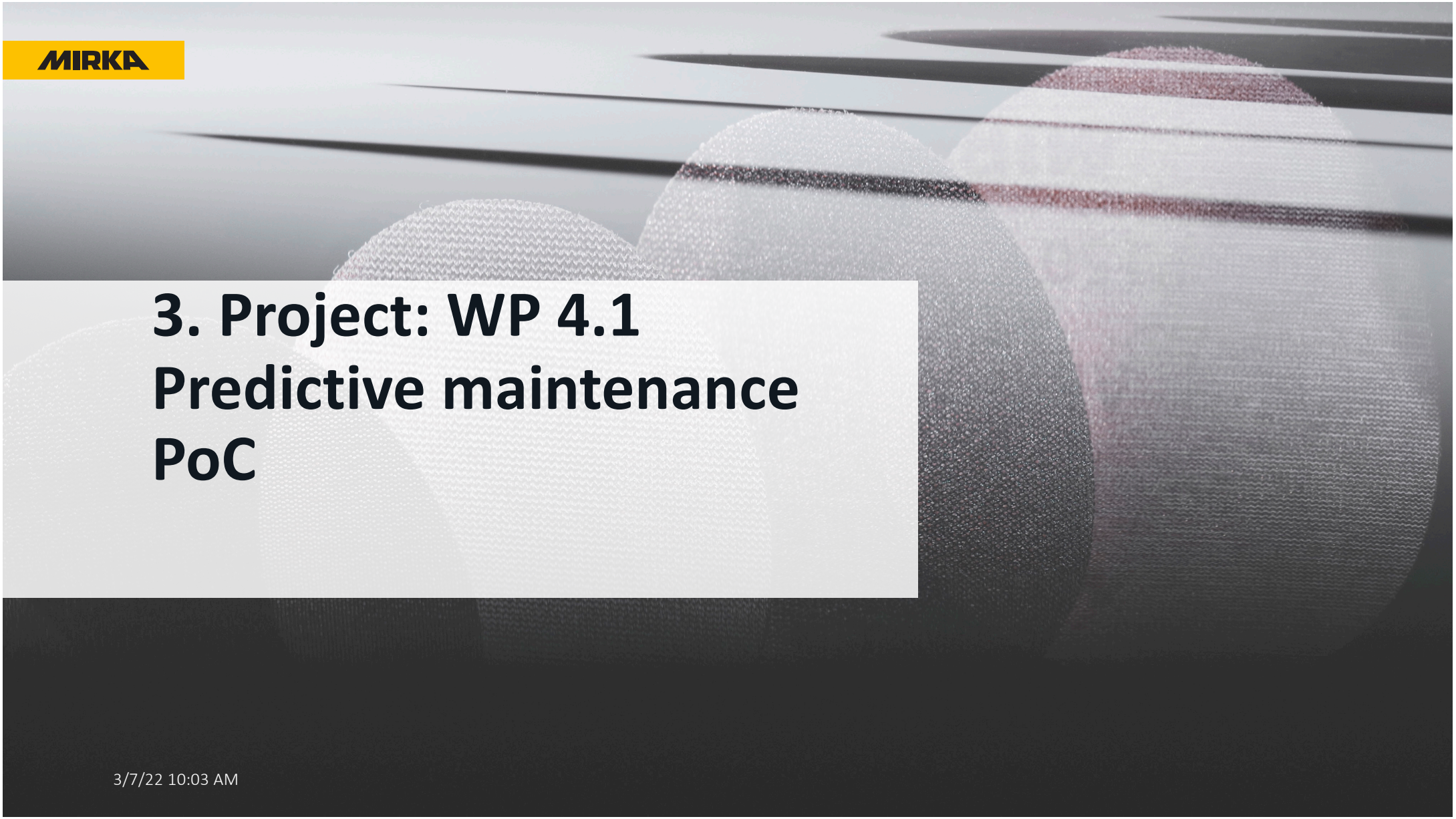
- Blockchain through the entire value chain to certify origin of components

Quality scoring

- On-line QC utilizing visual and acoustic analytics, AI, ML, more efficiently detecting and tracing quality defects and variation.
- A quality scoring system enabling product classification adapted to the demands of different applications

Traceability, intelligence

- Elaborate digital possibilities, printing patterns, codes, data-analysis, block-chain.
- Patterns offer uniqueness and material savings, codes traceability both inhouse (QA, feedback on product performance) and outside (communication with intelligent tools in digitalized processes , feedback from process)



# 3. Project: WP 4.1 Predictive maintenance PoC

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# Proof of Concept

- Target: Verify if Mirka's production test data can be used to predict the need of maintenance

## Step 1 Combine and clean data

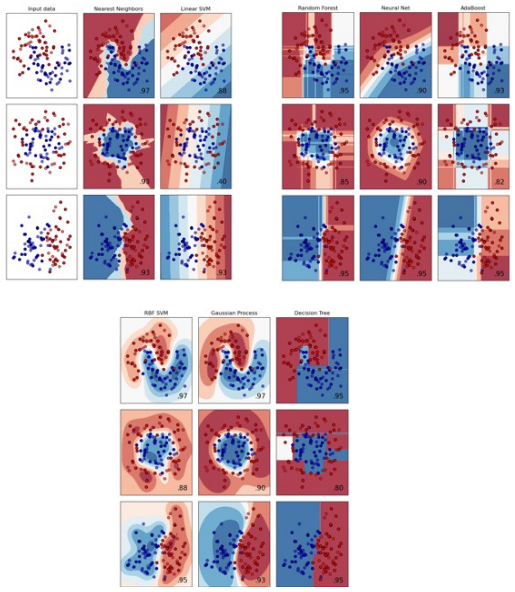
Supplier 1 Production test data

Supplier 2 Production test data

Mirka Production test data

Mirka Maintenance data

## Step 2 Analyze data by intelligent algorithms



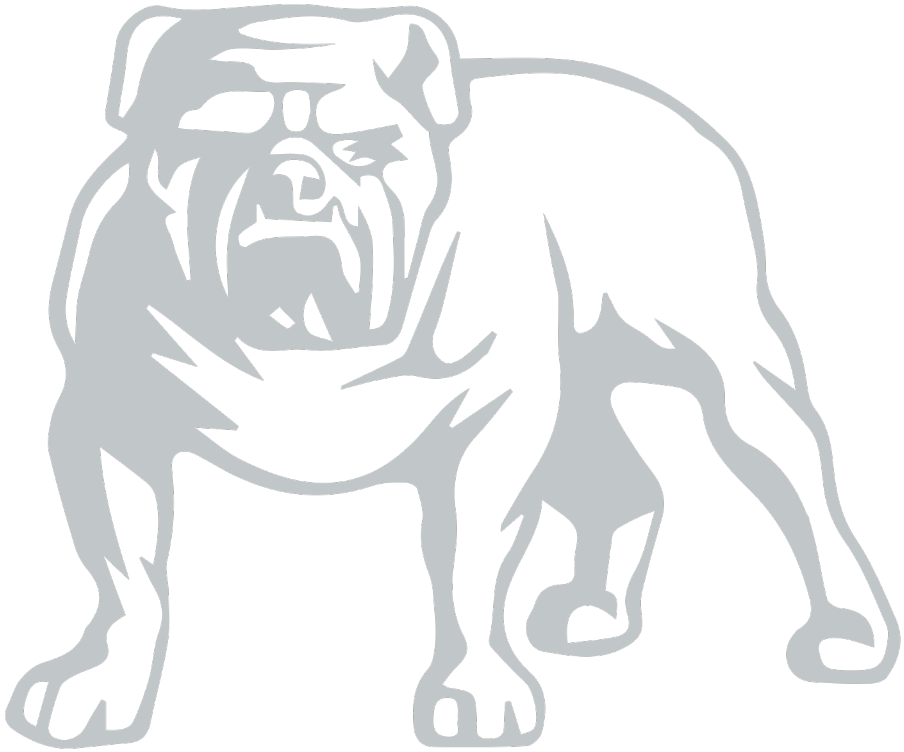
## Step 3 Report outcome

Conclusion:

- Current data is not usable to predict maintenance need

Possibly & speculation:

- Current test tolerances prevent faults.
- There are external reasons to cause maintenance need and that is not visible from data?
- Reasons that indicate maintenance are not tested?
- Inaccuracy in (maintenance) classification data?



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