MATTER@SCALE

Maintenance of battery production at industrial scale

FFI Circularity
Chalmers, KTH, AB Volvo, Volvo Cars, Scania, Northvolt

Jon Bokrantz (project leader)
Research Specialist, PhD
Department of Industrial and Materials Science
Chalmers University of Technology

Med stöd från programmet Fordonsstrategisk Forskning och Innovation, FFI

FFI Cirkularitet

Maintenance of battery production...

Why?

CHALMERS

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MAINTENANCE OF BATTERY PRODUCTION AT INDUSTRIAL SCALE

northvolt

VOLVO

SCANIA

VOLVO

CHALMERS UNIVERSITY OF TECHNOLOGY

KTH VETENSKAP OCH KONST

2024-05-14

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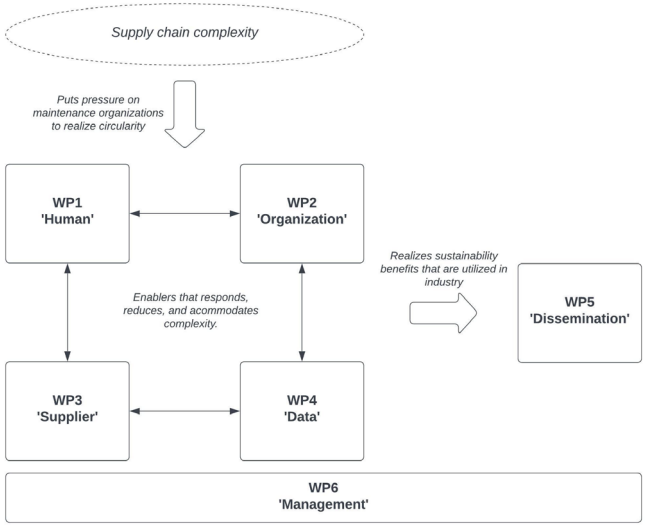
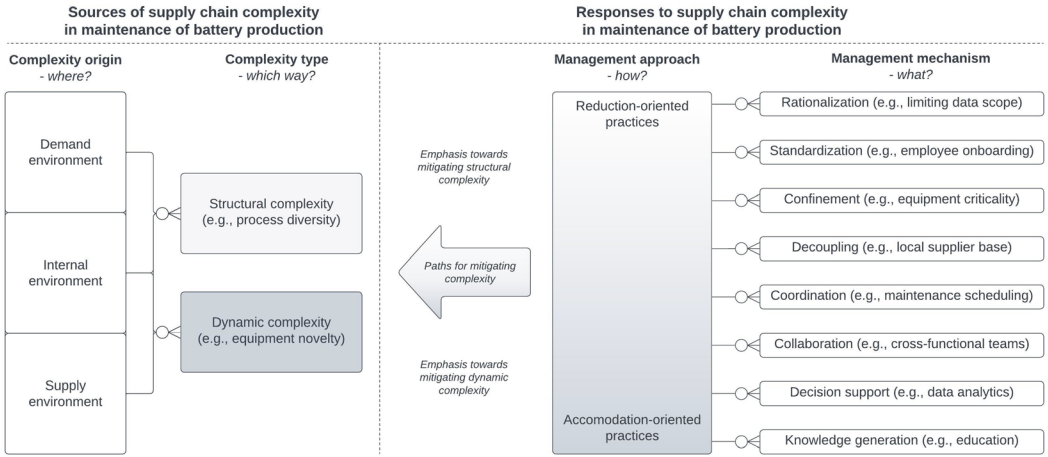
- Develop and scale four categories of key enablers that allow maintenance organizations to meet the ambitious targets set for the Swedish battery industry.

- WP1: Human
- WP2: Organization
- WP3: Supplier
- WP4: Data
- WP5: Dissemination
- WP6: Management



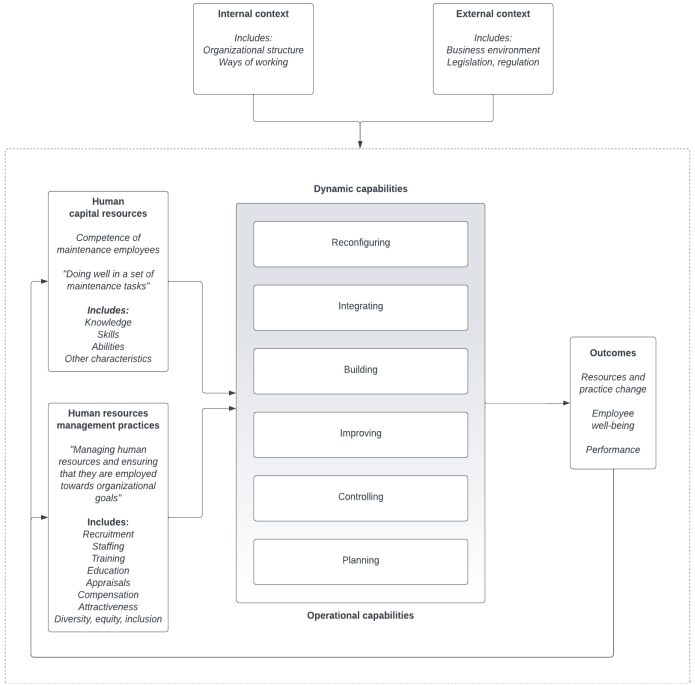
Supply chain complexity

- Identified sources of complexity and responses to complexity in maintenance of battery production.
- Developed a practical framework for maintenance managers, engineers, and technicians.
- Anticipate complexity and agree on actions for responding to complexity.



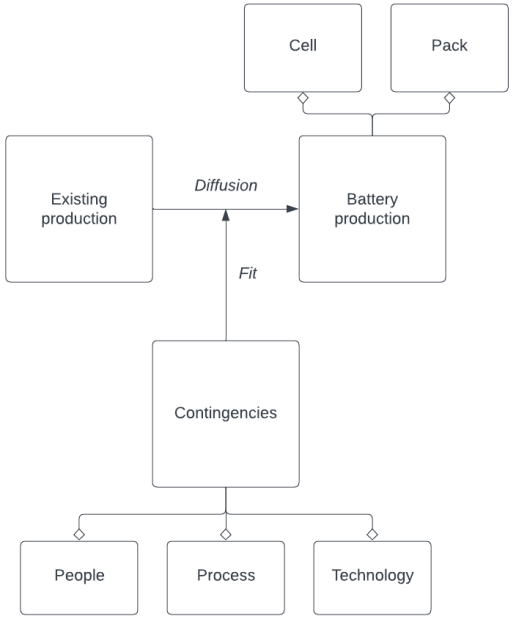
Human resource architecture

- Developing a framework for human resource management of maintenance teams in battery factories.
- Capabilities right here and now (operational) as well as capabilities for the future (dynamic).
- Holistic perspective on competence in maintenance of battery production.



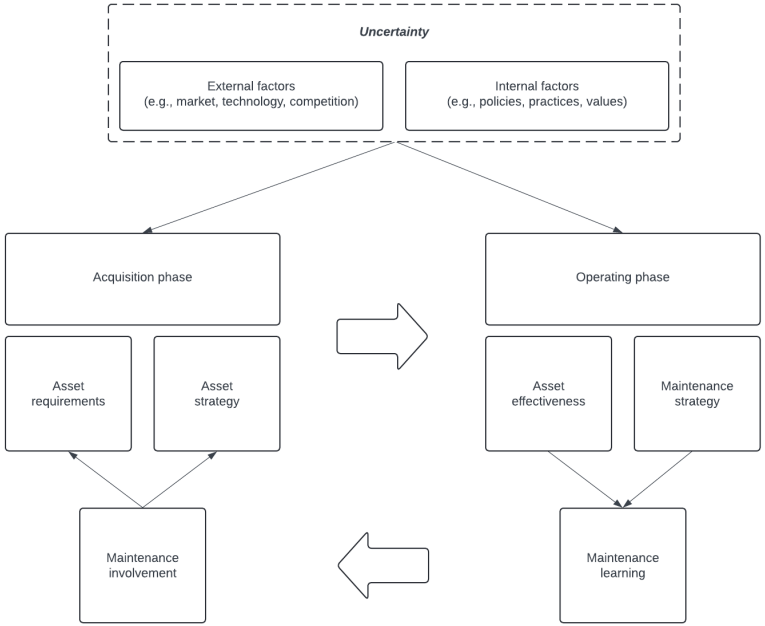
Maintenance best practices

- Systematic way of working for identifying and filtering maintenance best practices.
- Adopting, adapting, or rejecting maintenance best practices from automotive to battery production.
- Extending to adopt best practices from other sectors such as semiconductor, paper & pulp.



Maintenance in procurement

- Adapting and improving procurement processes to new machine suppliers.
- Requirement specifications for battery equipment from a maintenance (e.g., life span) and digitalization perspective (e.g., sensors).
- Identifying and overcoming barriers to success (e.g., culture, language, routines).



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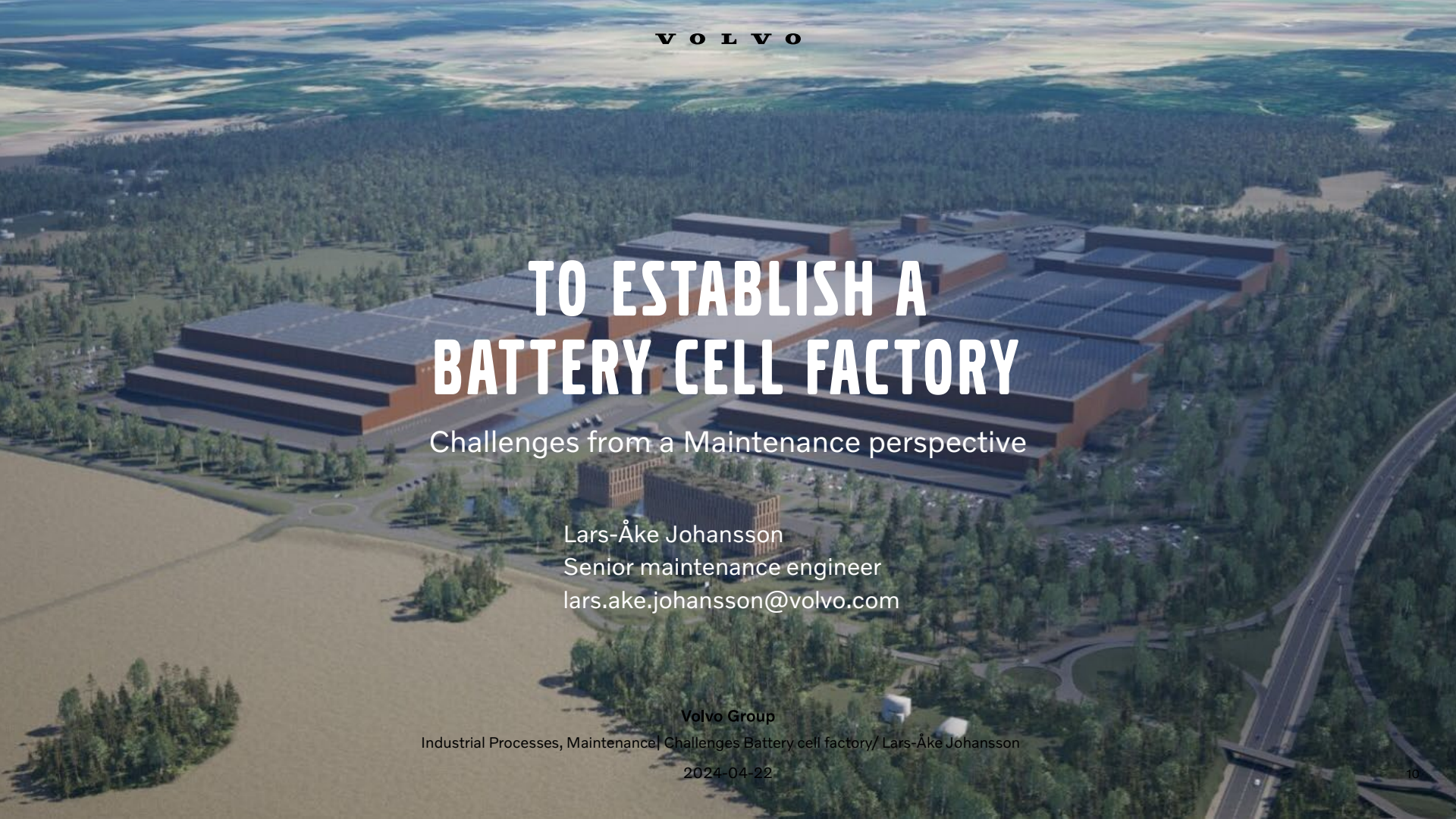
Setting the agenda for research on maintenance of battery production

2024-05-14



VOLVO

TO ESTABLISH A BATTERY CELL FACTORY

Challenges from a Maintenance perspective

Lars-Åke Johansson
Senior maintenance engineer
lars.ake.johansson@volvo.com

VOLVO

BATTERY CELL MANUFACTURING IN MARIESTAD

MARIESTAD

2020	2022	2023	2024	2025	2028	2029	2030	2035	2040	2050
The site selection process for Volvo's battery cell factory begins	Decision on the location in Mariestad	Zoning planning Korstorp	Environmental permit	Construction begins	Production starts	Number of employees in the factory increases	Series production	35% fossil-free vehicles from Volvo	100% fossil-free vehicles from Volvo	High proportion of fossil-free vehicles from Volvo on the roads

The Paris Agreement on goals for reduced carbon dioxide emissions

Challenges from a Maintenance perspective

To establish a Battery cell factory

Challenges compared to Volvo GTO (mainly Powertrain, Skövde)

1. Equipment procurement phase
2. Installation and Commissioning
3. Production

1. EQUIPMENT PROCUREMENT PHASE

Challenges from a Maintenance perspective

Equipment procurement phase

Background , experiences

- We know the importance of including maintenance competence in early phases during equipment procurement
- Maintenance is involved at an early stage in EEM
- We have an established way of working for proqurement of production equipment (EEM)
- Established specifications and standards

Equipment procurement phase

Background, experiences

- Most used to equipment for Machining, Assembling and Casting
- The majority of our machines are made in Europe and the machines are already CE marked
- When purchasing equipment from a supplier who is new to Volvo, we usually need to put more effort into the project compared to if we buy from a familiar supplier

Equipment procurement phase

Challenges

- New kind of production equipment
  - Unfamiliar technical solutions
  - Fast machines with short cycle times
  - Unfamiliar brands of components
- Unfamiliar equipment suppliers, probably from Asia
  - We probably need to put even more effort into the project compared to if we buy from a familiar European supplier
  - Language
  - Cultural differences

Equipment procurement phase

Challenges

- Is it possible to use our specifications and standards?
- Ensure that European and Swedish requirements are fulfilled

2. INSTALLATION AND COMMISSIONING

Challenges from a Maintenance perspective

Installation and Commissioning

Background , experiences

- Project managers and technicians from the supplier take responsibility themselves for installation and commissioning being carried out according to agreement
- Mostly the suppliers performs their job in a safe way
- During inspection and function tests, most things are according to agreement regarding design and function

Installation and Commissioning

Challenges

- Language
- Cultural differences
- Is there a risk of different view of safety etc.?
- Is there a risk of more deviating from agreements due to misunderstandings?
- We probably need to put more effort into this phase compared to if we buy from a familiar European supplier

3. PRODUCTION

Challenges from a Maintenance perspective

Production

Background , experiences

- An established organization that takes over the production equipment
- Established way of working
- Long experience and high competence in the actual production
- We are familiar with the products we make
- Improvement tools most based on improving an existing equipment or way of working
- Limited data collection and analysis of data. Often developed afterwards.

Production

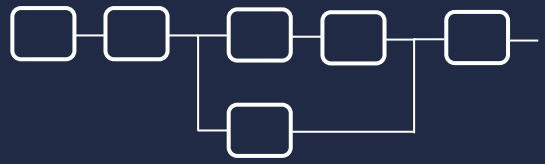
Challenges

- Establish the organization
- Establish way of working
- High speed production, short cycle times
- We are not familiar with the product
- New kind of production equipment
- Unfamiliar machine manufacturers
- Environment, clean and dry rooms
- Competence / Recourses

Production

Opportunities

- Standardised working processes from start
- Set the right mindset from start
- No old culture
- We can use our improvement tools but start on a higher level
- Industry 4.0/5.0. Establish Connectivity and analyzis from start



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QUESTIONS?