

Mulighed for reel cirkularitet af WindowMaster aktuatorer

- Take-back: Hvordan vi arbejder med at blive 100% cirkulære



Fresh Air. Fresh people.



Vision

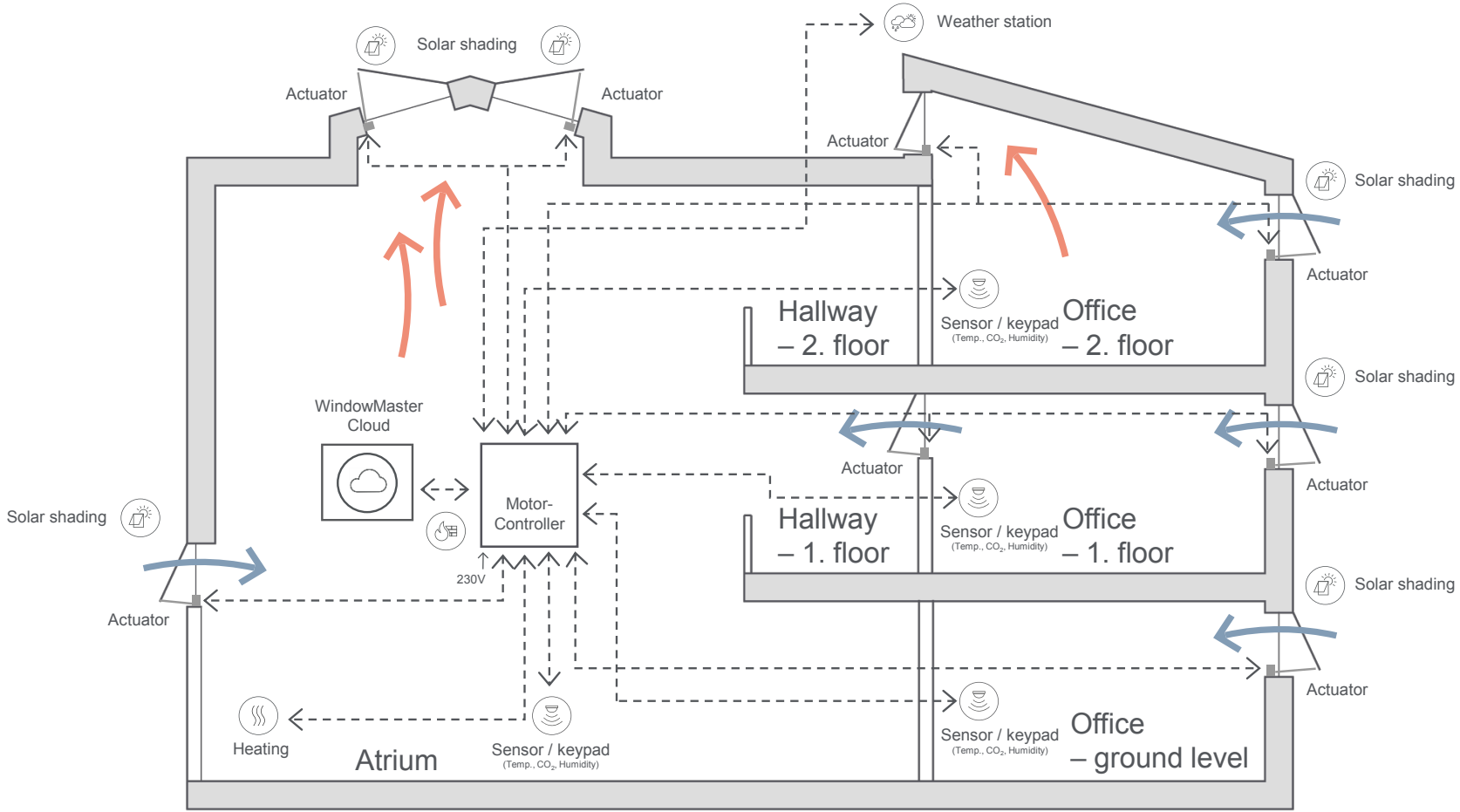
To provide people with the best & safest indoor climate in the world in the most intelligent & sustainable way possible.



Mission

To create well-designed natural & smoke ventilation products and solutions that improve the indoor climate for the benefit of people, productivity, and the environment

Ventilation principles & standalone solution

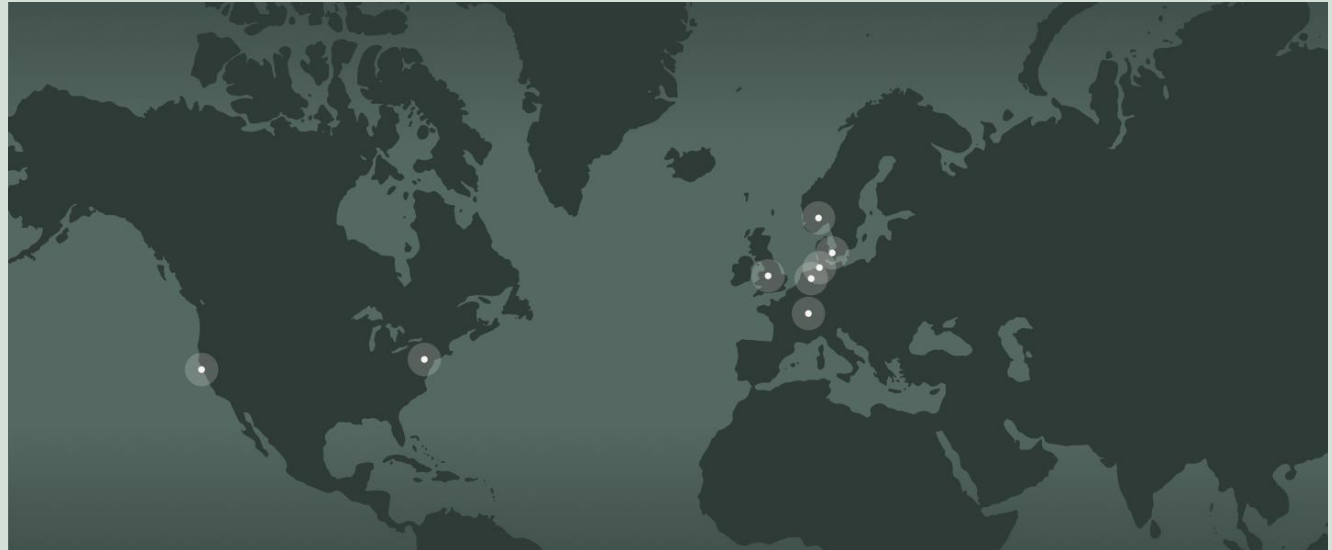


We are all over the world



Our presence in the world

- Established in 1990
- Sales offices in 6 countries
- 130 employees
- Produced more than 1.500.000 actuators
- Customers in more than 20 countries
- Network of certified partners
- Experience from more than 1000 projects
- Listing on Nasdaq Firth North Growth market in 2020

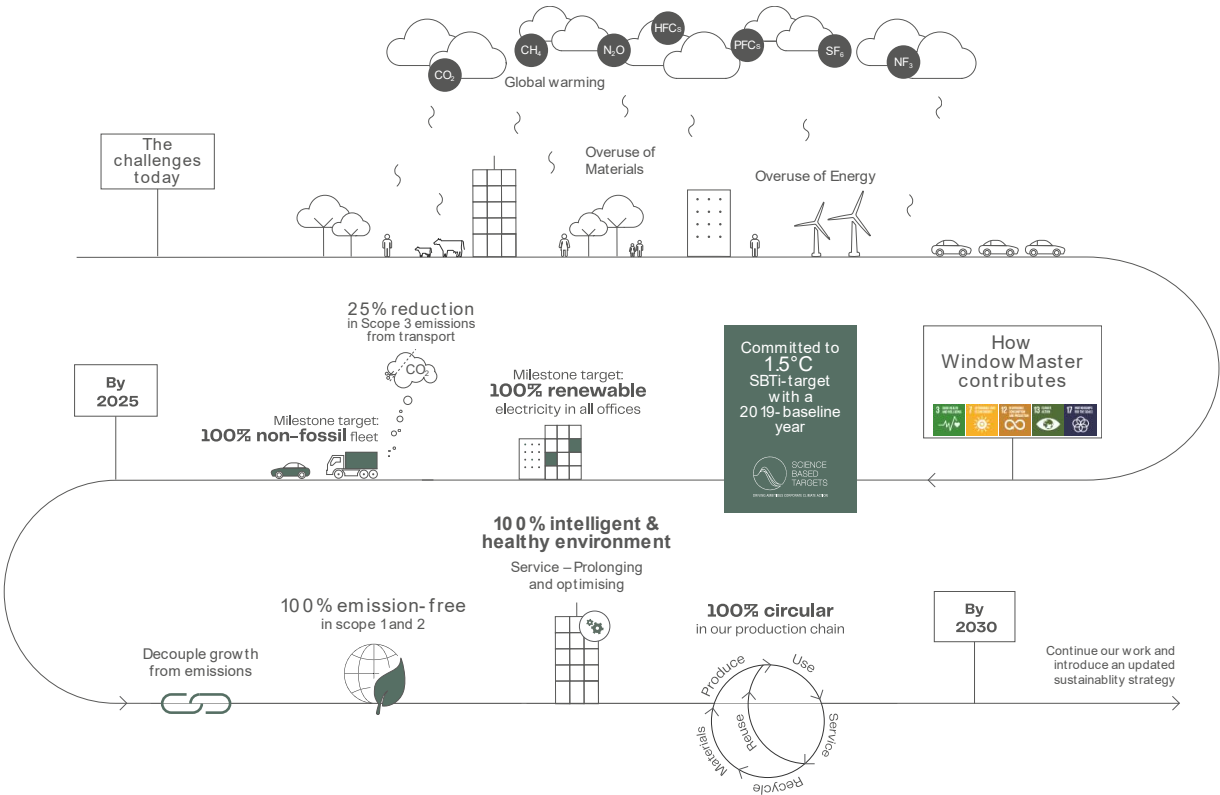


We are...

**...an electro-
mechanical
manufacturer
delivering to the
construction sector**



What we face today and our future ambitions



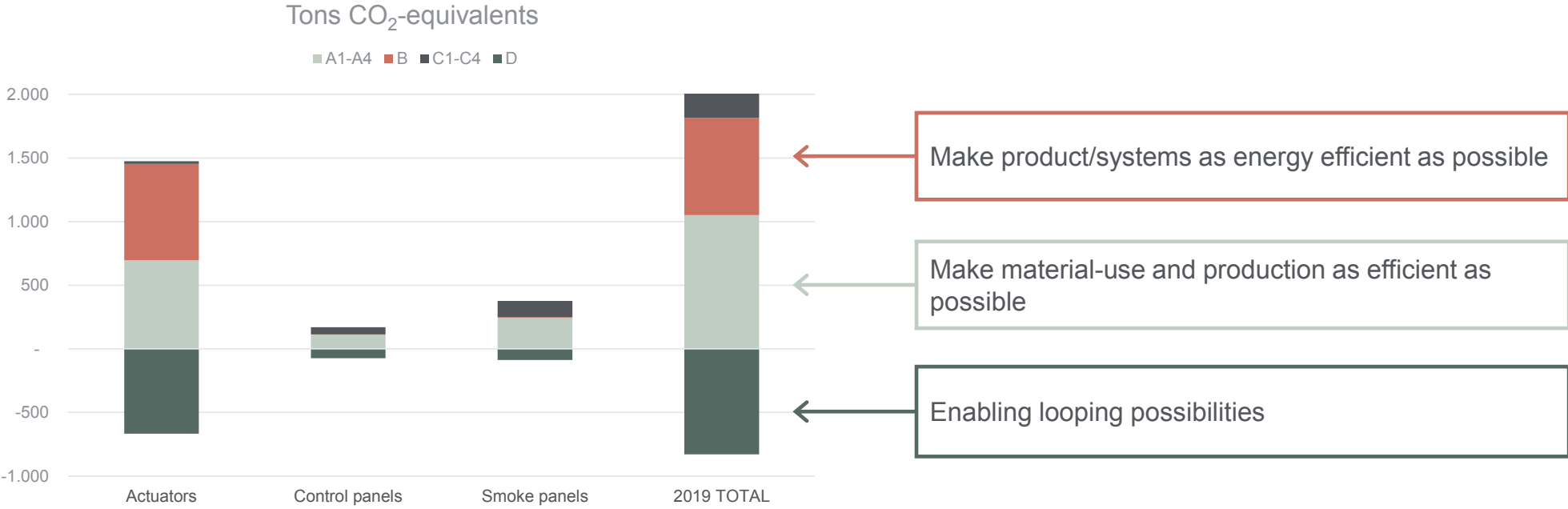
"Every company, no matter their size, has an impact on the environment and so should strive to be a good global citizen. For WindowMaster, it's an aim that impacts every aspect of business, from our employee interactions and ways of working to our products and the benefits they bring to the market."



Erik Boyter
CEO at WindowMaster

Minimizing embedded carbon in our products

Scope 3 initiative



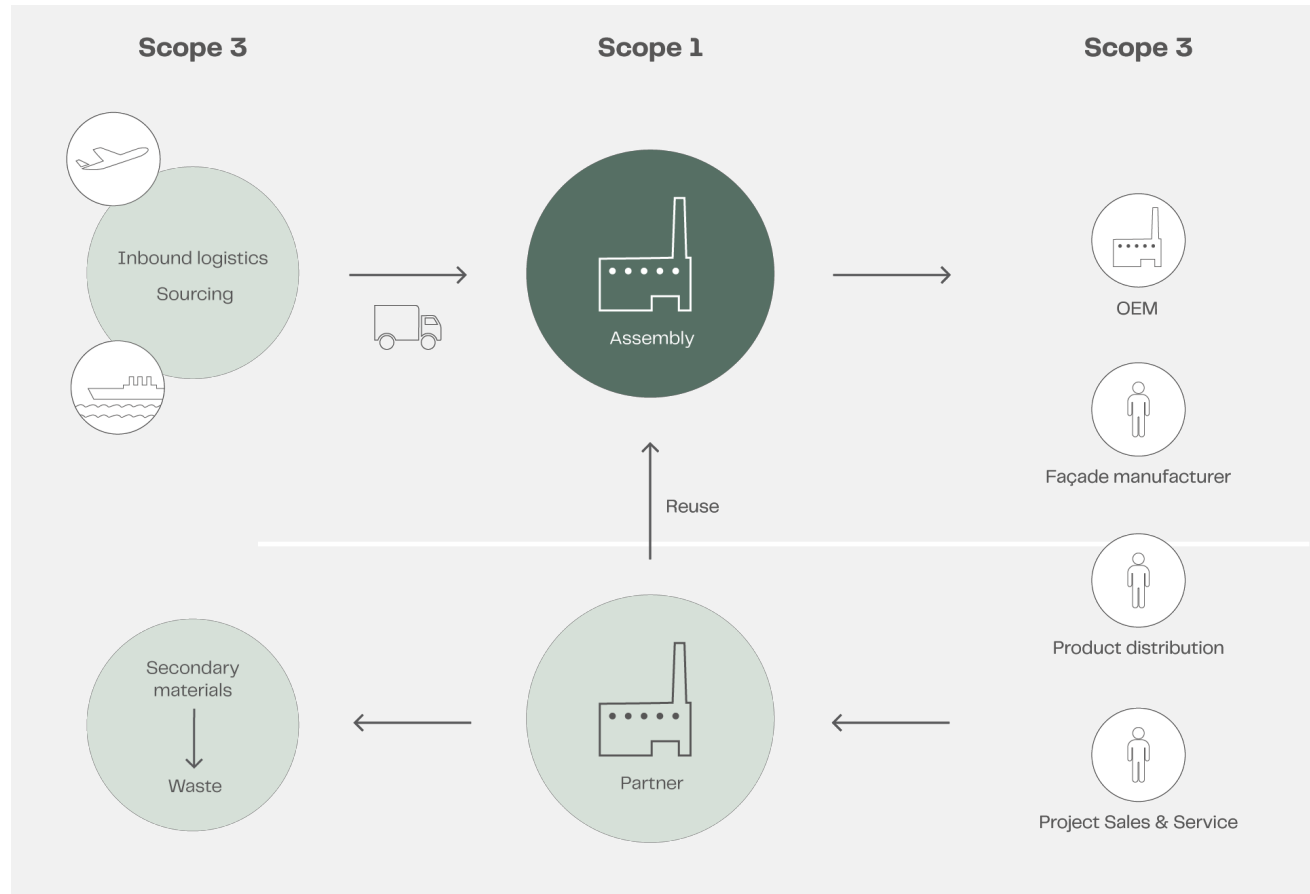
Enabling looping possibilities

PROs

- B-to-B project sales
- Intelligent systems and products
- High value in materials

CONS

- Complex supply chain and value chain
- Very different market conditions for take back schemes



Enabling looping possibilities

- Our products have value also at end-of-life
- Our products are intelligent
- Do we use components that can be directly reused?
- How do we change products to enable 100% circularity?

We engaged in



Long live products and materials



Danmarks produktionsklynge



Production network: Take-back systems

Circularity promise - What will we do?

Cleaning up the past.....

WindowMaster Take-back scheme

Our scope

- All products from refurbishment projects/service
 - We offer a dedicated WMa take-back solution from 1-1-2023 in DK.

How?

- Engaging with a partner that will take all benefits and costs
- Make our take-back solution part of all refurbishment offers and offered in general?
- Work with a partner that will help us enable reuse
- We need valid data regarding materials and amounts

How should it be documented?

- We need to track pr project
- Will be documented in our annual reporting
- Documentation will reduce our cost in general WEEE treatment

Looking forward.....

WindowMaster Circularity promise

Our scope

- All products sold in Europe with a WindowMaster logo

How should it be done - 10 years from now?

- Based on learnings from our other activities, we must ensure a setup for reuse and recycling

How should it be documented?

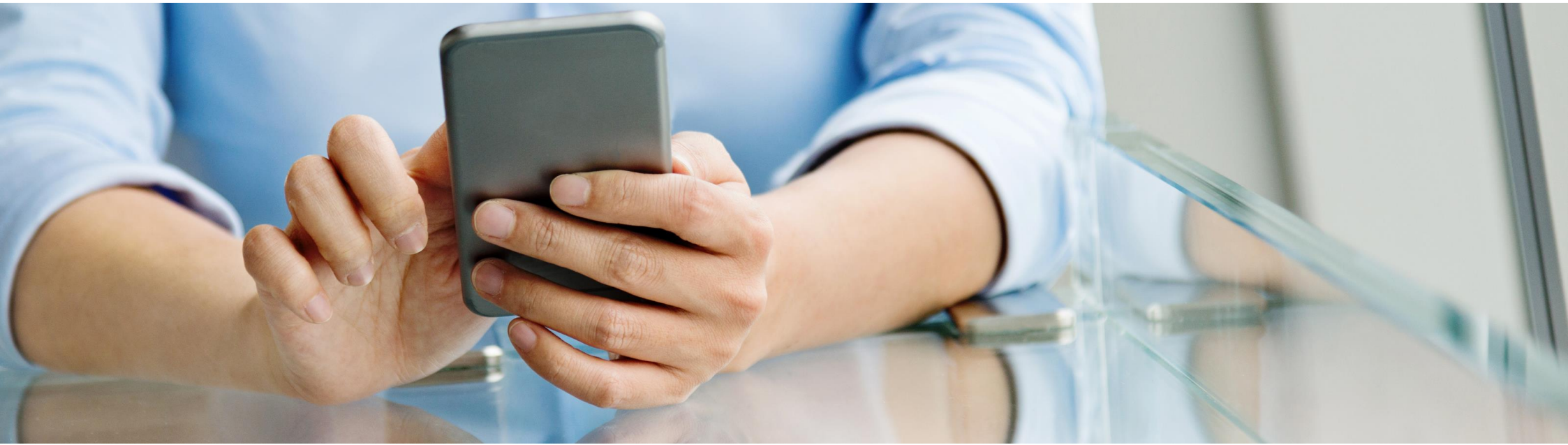
- We need to track pr production batch or pr ordre
- We must be able to document reuse and remanufacturing

Q&A

16-11-2022 13



Please join us



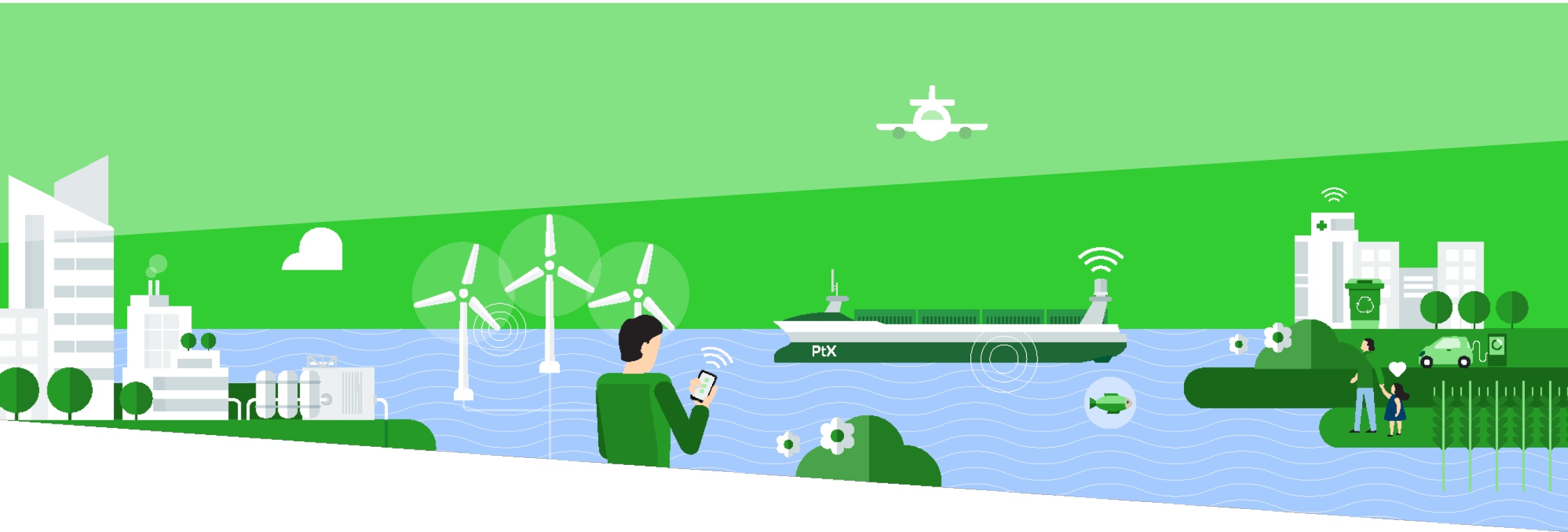
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Windowmaster Motor

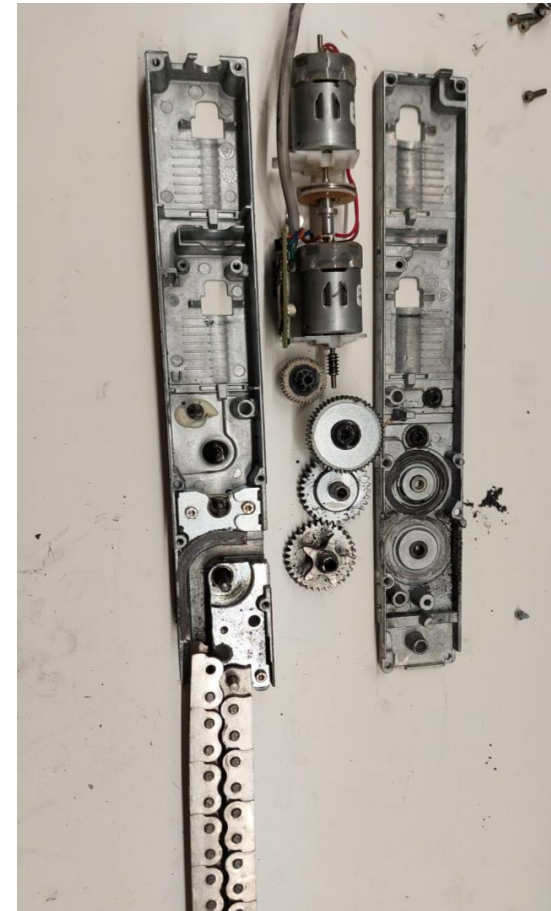
Investigation into used Windowmaster products

Cato Nørrung Poulsen

22.11.2022

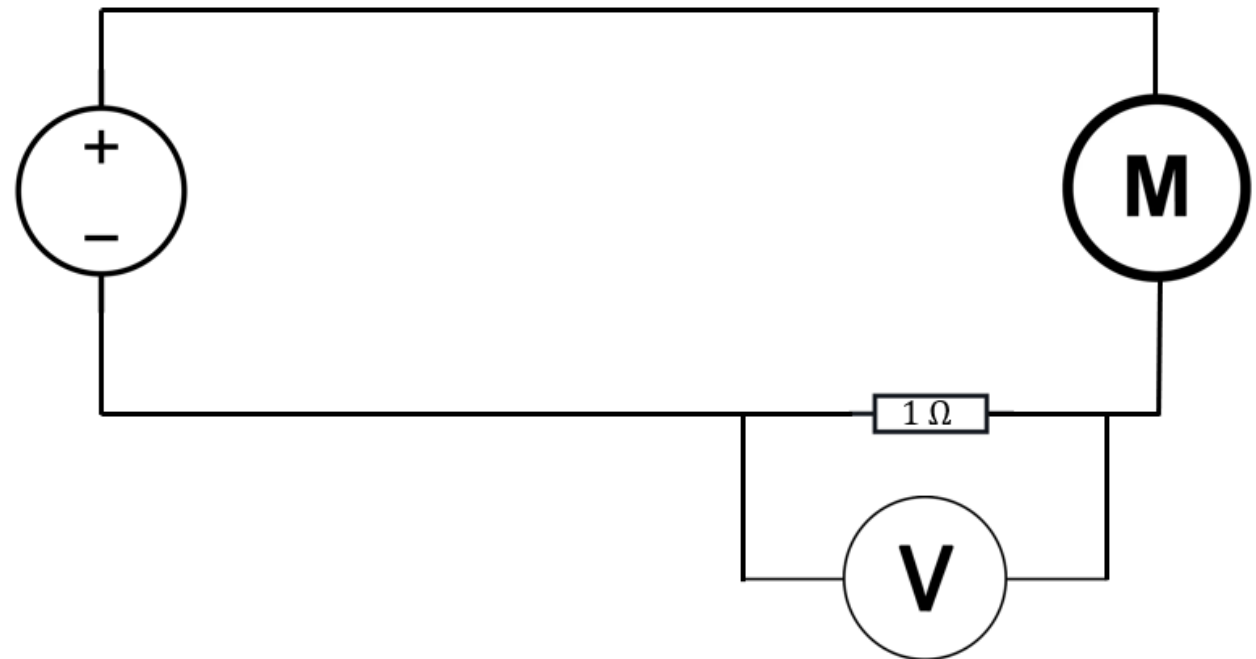
What has been done?

- Electric measurements
 - Circuit
 - Data
- Mechanical Analysis
 - Gears
 - Chain
 - Print
 - DC motor
- Data Analysis and Results



Electronic Measurements

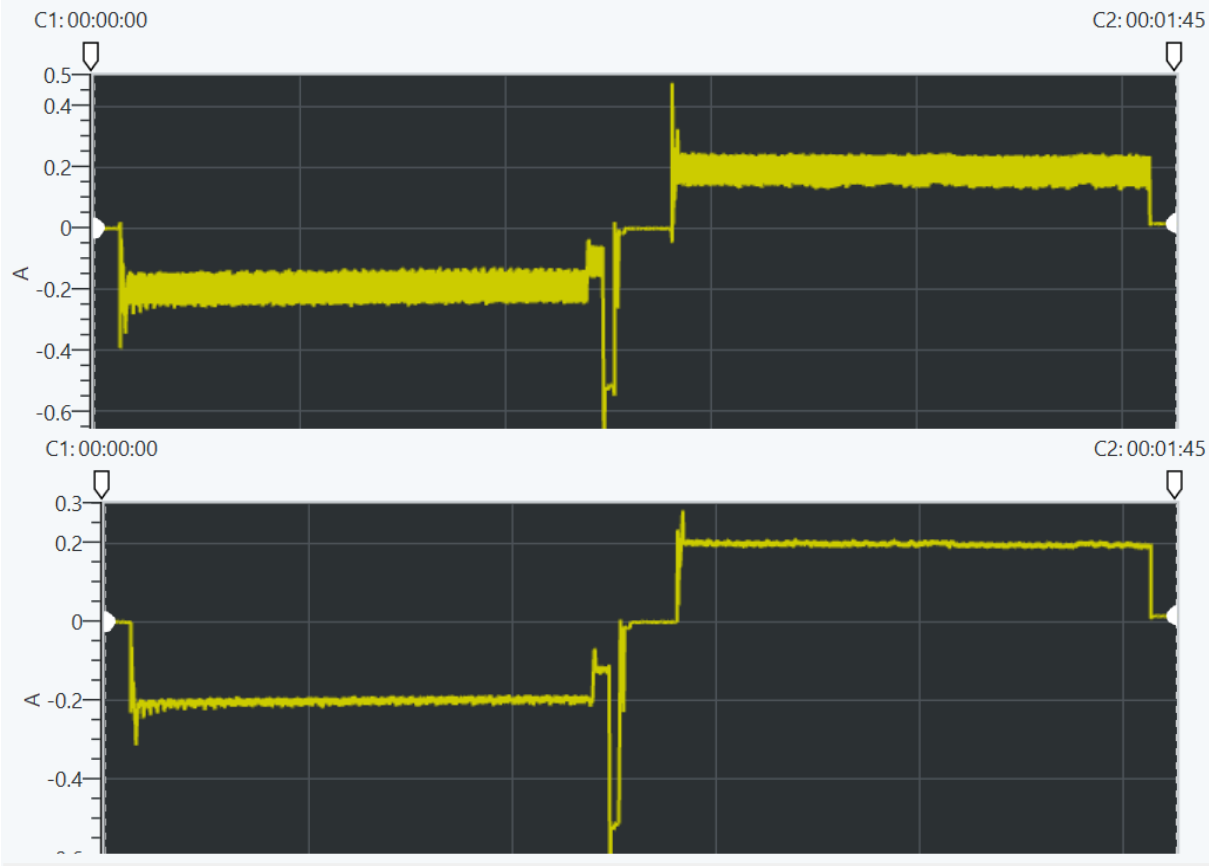
- DC Power Supply
- Probe into Computer



Electronic Measurements

- Current measurements in:
NI DAQExpress

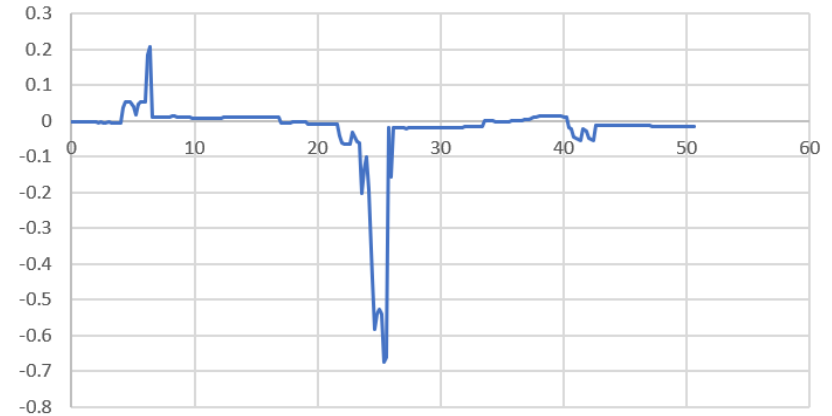
- Low Pass filtering



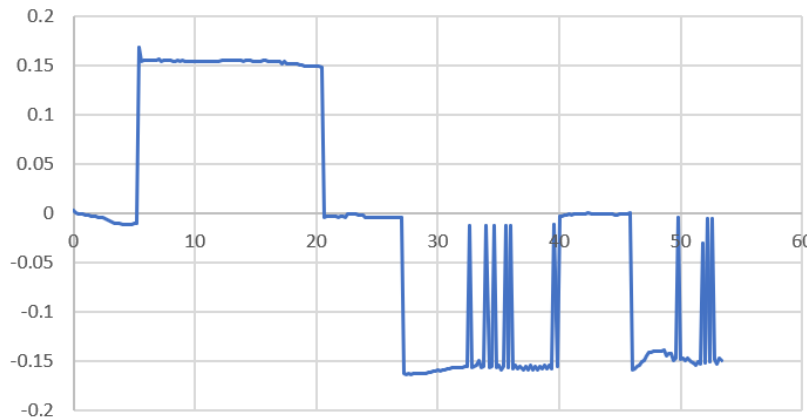
Electronic Measurements

- 3 distinct electronic responses
 - 1. High spikes, but no physical movement
 - 2. Short duration movement
 - 3. Long duration movement

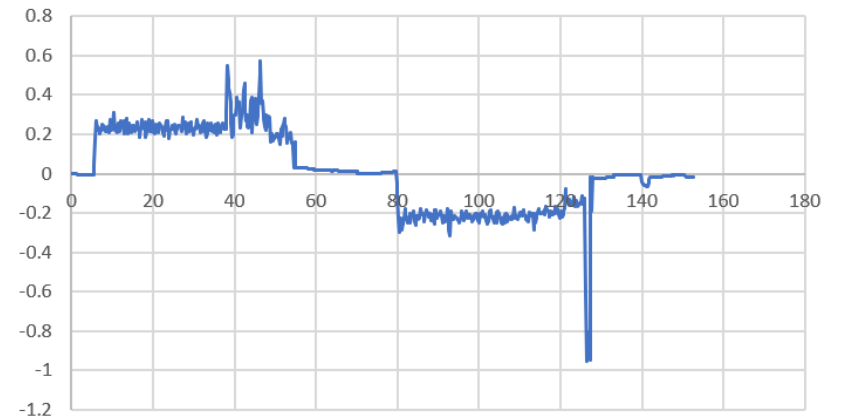
Current [A]



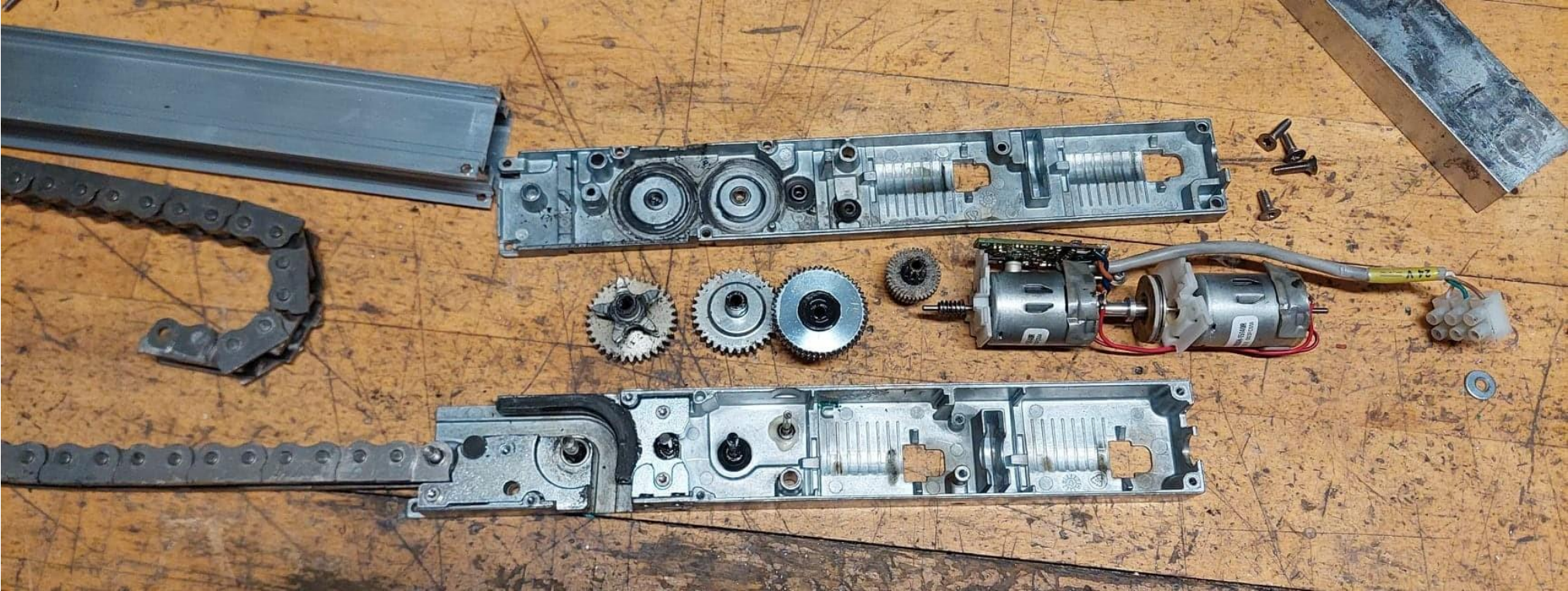
Current [A]



Current [A]

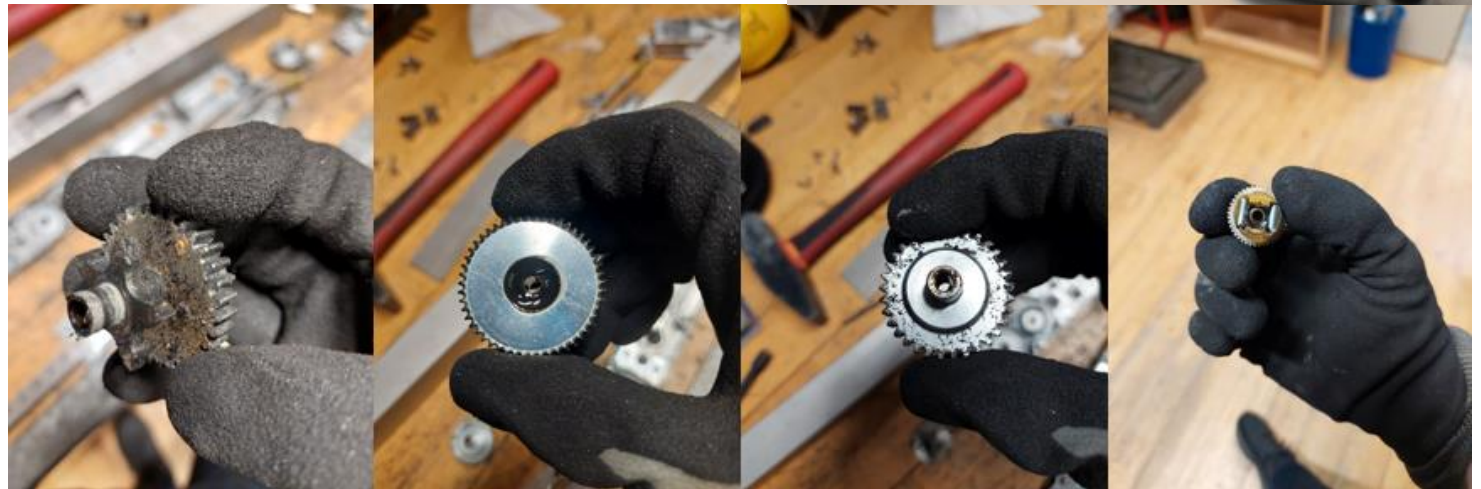
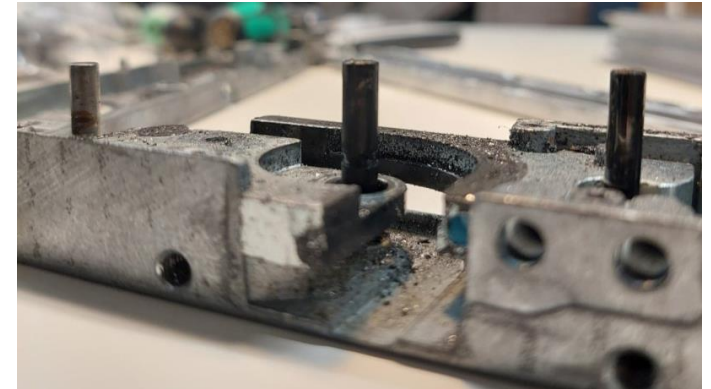


Mechanical Analysis



Mechanical Analysis

- Generally good lubrication
- No cracks
- No wear
- Varying cleanliness



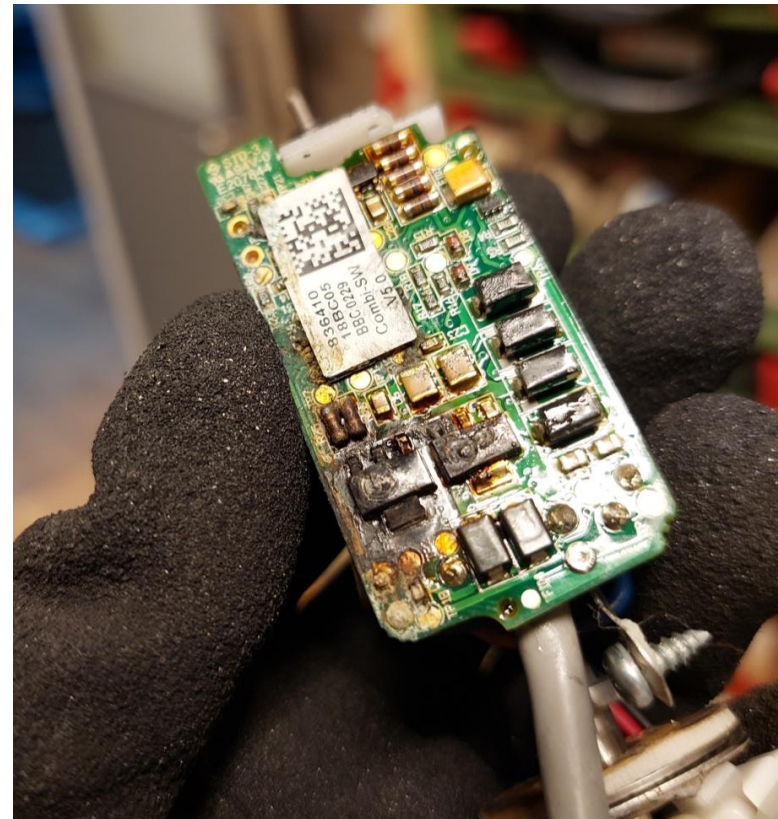
Mechanical Analysis

- Major point of failure
- Difficulties Quantifying Measurements



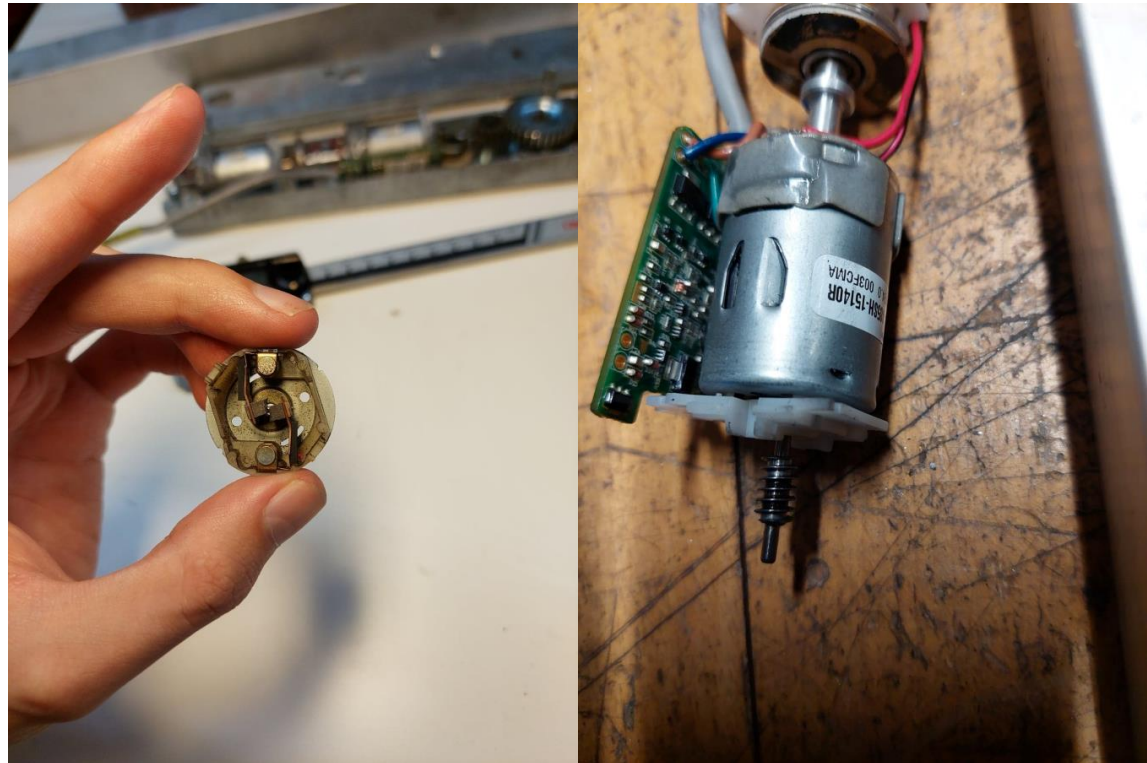
Mechanical Analysis

- Burnt Print
 - Corrosion related
 - One case
 - Anomaly or Failure Point?



Mechanical Analysis

- No visible DC motor issues
 - ~10% wear of coal
 - Relatively clean
- Possibility for reuse

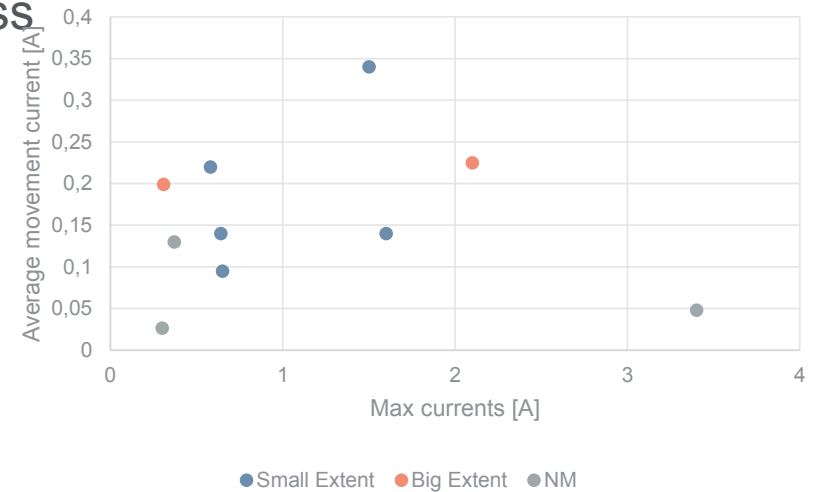


Data Analysis and Results

# Objekt	Ja	Nej	
1 Kæde			Qualitative levels:
a Er kæden frit bevægelig i alle led?	X		
b Fremstår kæden uden rust - specielt i overlap?	X		
2 Kædetrækkerhjulet			Chain house levels:
a Er tændernes flader og kanter uden væsentligt slid?	X		0. Holes from wear have been formed 1. Protrusions on outside, 2. Visual wear inside, clean outside, 3. Very slight wear inside, 4. No wear
b Er hjulet uden revner, brud eller andre mekaniske skader?	X		
c Fremstår hjul og tænder uden korrosion på alle flader?	X		
d Er der stadig "virksomt fedt" på aksel/bøsning og ml. hjul og alukasse?	X		Chain movement:
e Er tandhjulet uden snavs og/eller metalspåner af funktionel betydning?	X		0. Stuck links 1. Strong Resistance to movement 2. Resistance to movement 3. Free movement
3 Mellemhjul			Dirt and particle quantity:
a Er tændernes flader og kanter uden væsentligt slid?	X		0. Filled with particles 1. Small amounts of particles 2. Clean
b Er hjulet uden revner, brud eller andre mekaniske skader?	X		
c Fremstår hjul og tænder uden korrosion på alle flader?	X		
d Er der stadig "virksomt fedt" på aksel/bøsning og ml. hjul og alukasse?	X		
e Er tandhjulet uden snavs og/eller metalspåner af funktionel betydning?	X		
4 Udvekslingshjul			
a Er tændernes flader og kanter uden væsentligt slid?	X		
b Er hjulet uden revner, brud eller andre mekaniske skader?	X		

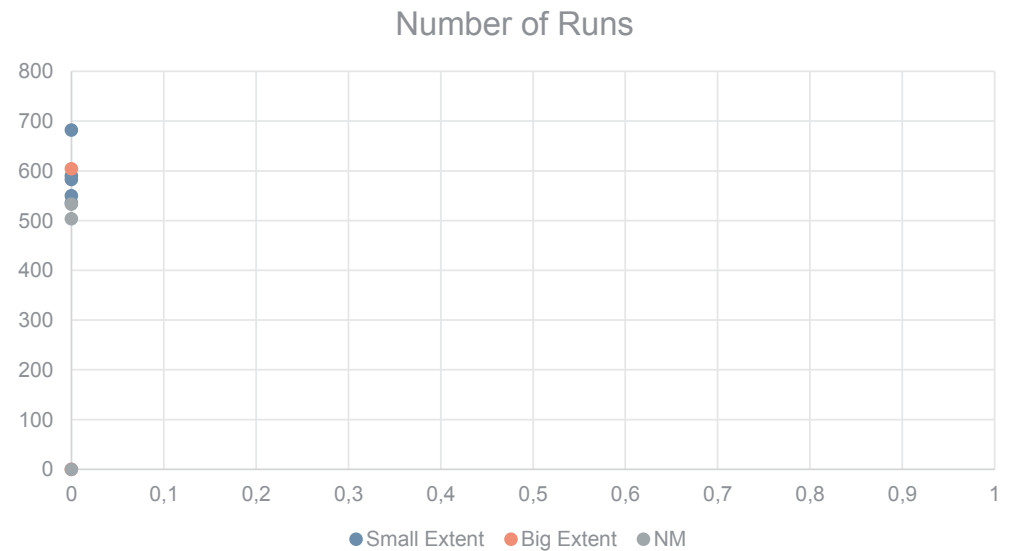
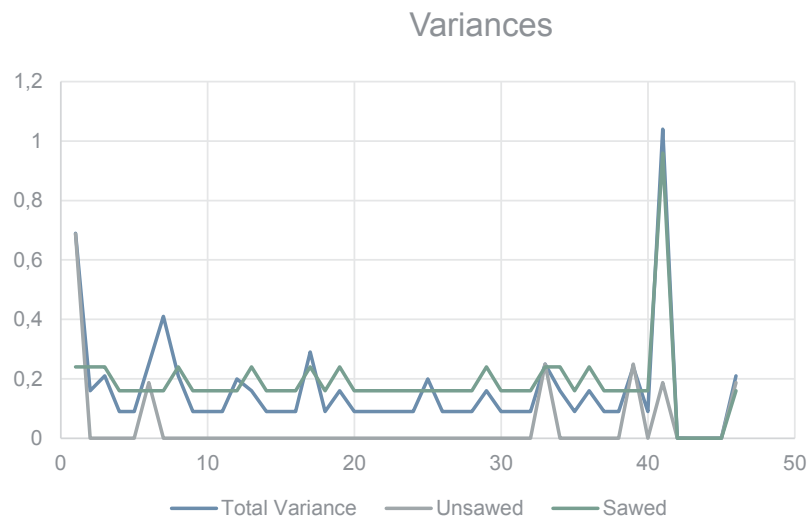
Data Analysis and Results

- Defining Classes:
 - 1. No response
 - 2. Minor extension (either due to sync mode or stuck chain)
 - 3. Major extension
- Correlation between maximum currents and class



Data Analysis and Results

- Failures happen early
- Possibility for statistical model
 - More data
 - Better quantitative measurements



Conclusions

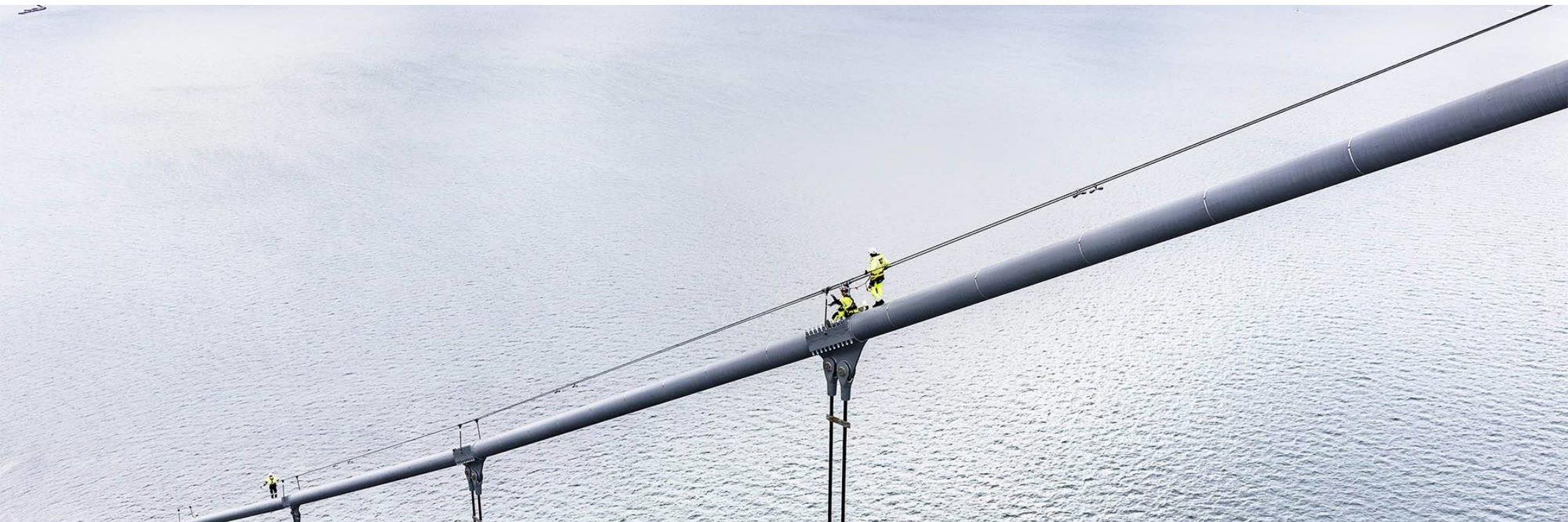
- Chain and Print are main points of failure
- Insignificant wear of motors observed
- Better quantification needed
- No correlation established between run time and failures
- Conclusions limited by number of samples

Keep in touch

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Follow us on:





Window Master – miljøpotentiale

Af Charlotte B. Merlin



Holistisk miljøvurdering i form af LCA



Grundlæggende metode:

- ISO 14040/44
- EN 15804 - miljøvaredeklarationer (EPD)

Påvirkningskategorier



Tilgang

- LCA baseline for hver enkelt komponent, delkomponent og det samlede produkt
- Beregne scenarier for levetidsforlængende initiativer. e.g.:
 - Take-back
 - Bruge hele produktet en gang mere (måske efter en softwareopdatering)
 - Udskifte en enkelt slidt del (måske som resultat af øget modulopbygning)
 - Reparere produkterne (hvilke processer medfører dette?)
 - Forskellige transport scenarier afh. af hvor produkterne indsamles, hvor de behandles og forhandles igen...
 - ...
- Dokumentere en eventuel ny forretningsmodel

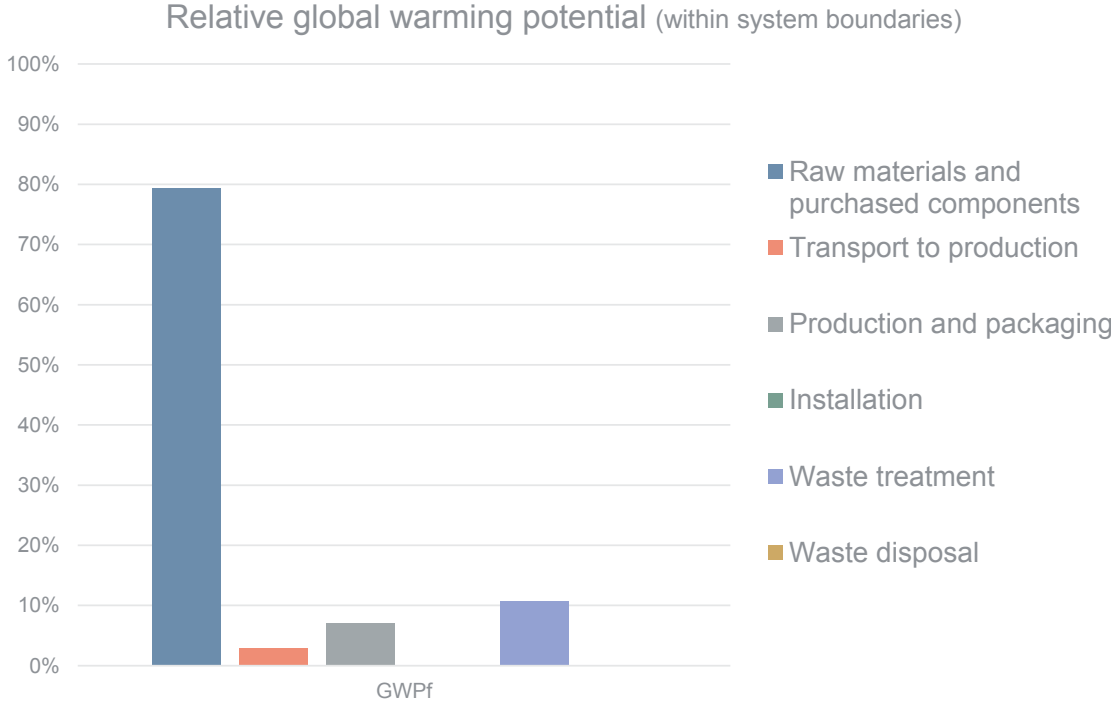
Kompleksitet

- > 500 linjer i en bill of materials. Hver linjer dækker over mange processer !
- Global leverandørkæde
- Produktvariationer (e.g. forskellige størrelser, kombinationer af dele...)
- Vægte er ikke i IT systemerne, der er indrettet på stk. eller kr.



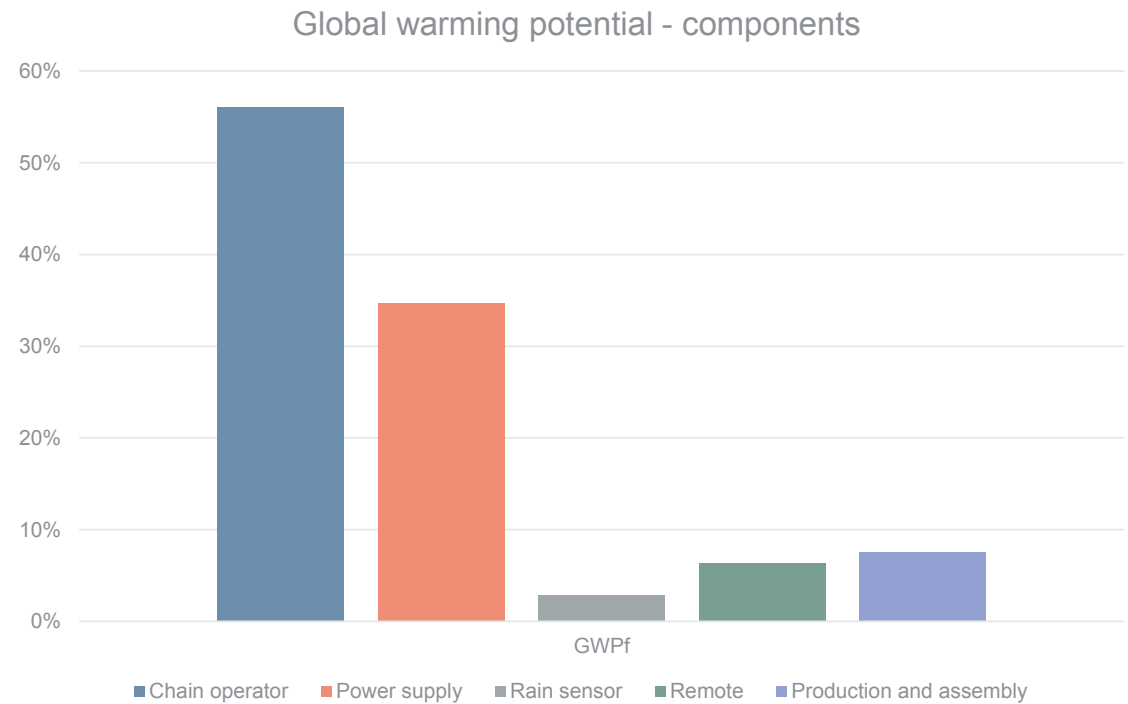
Findings from a similar product (global warming)

- Extraction of raw materials and production of purchased components account for most of the potential global warming impact !



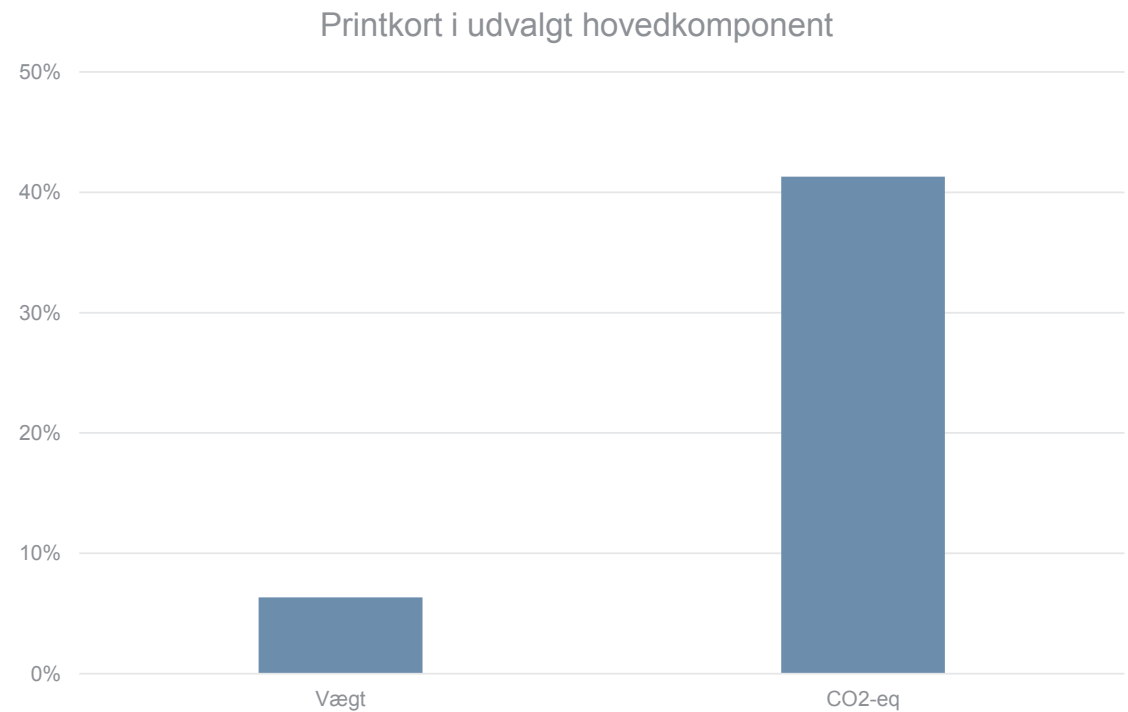
Findings from a similar product (global warming)

- How do the overall components compare w.r.t. global warming impact ?



Vægt vs. Klimaeffekt

- Eksempel baseret på printkort i en af hovedkomponenterne i et naturligt ventilations system
- Med elektronikprodukter kan man ikke antage en lineær sammenhæng imellem vægt og klimaeffekt !





Questions

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