



Technical challenges for automotive / (new) aerospace suppliers and Battery Competence Center

Workshop leaders:

- Rutger van Poppel (Battery Competence Centre)
- Maarten Klomp, Founder & CEO at Saluqi Motors B.V.

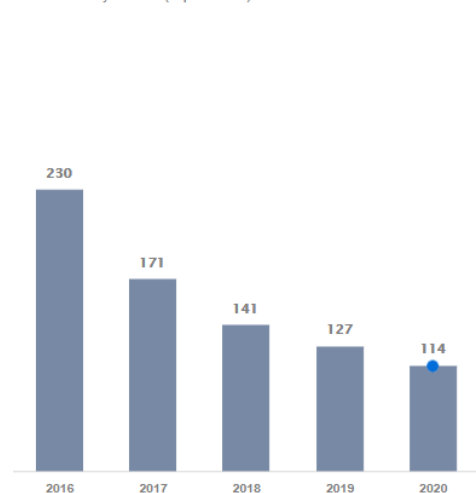
06-04-2022
15:15-15:50 Session I
16:00-15:35 Session II

Agenda

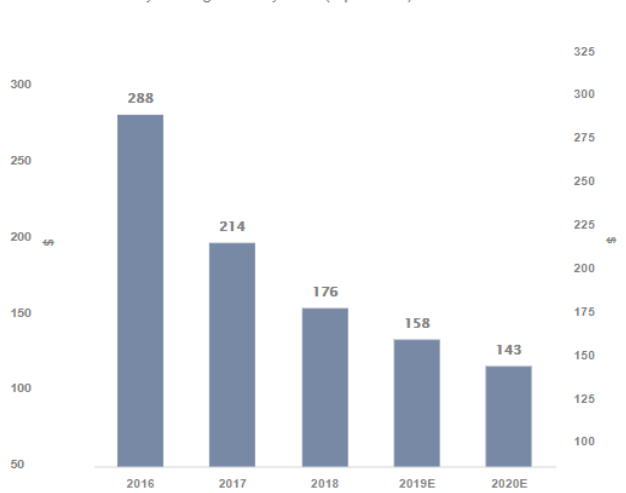
- Introduction and goal of the workshop – Rutger
- Short introductions – Organization, name and function
- Context and developments – Maarten
- Discussion on key challenges, priorities, current status of the technology and next steps on the following themes:
 - Electric drive
 - Electric motors
 - Power electronics
 - Battery developments
 - Propellers

Battery developments

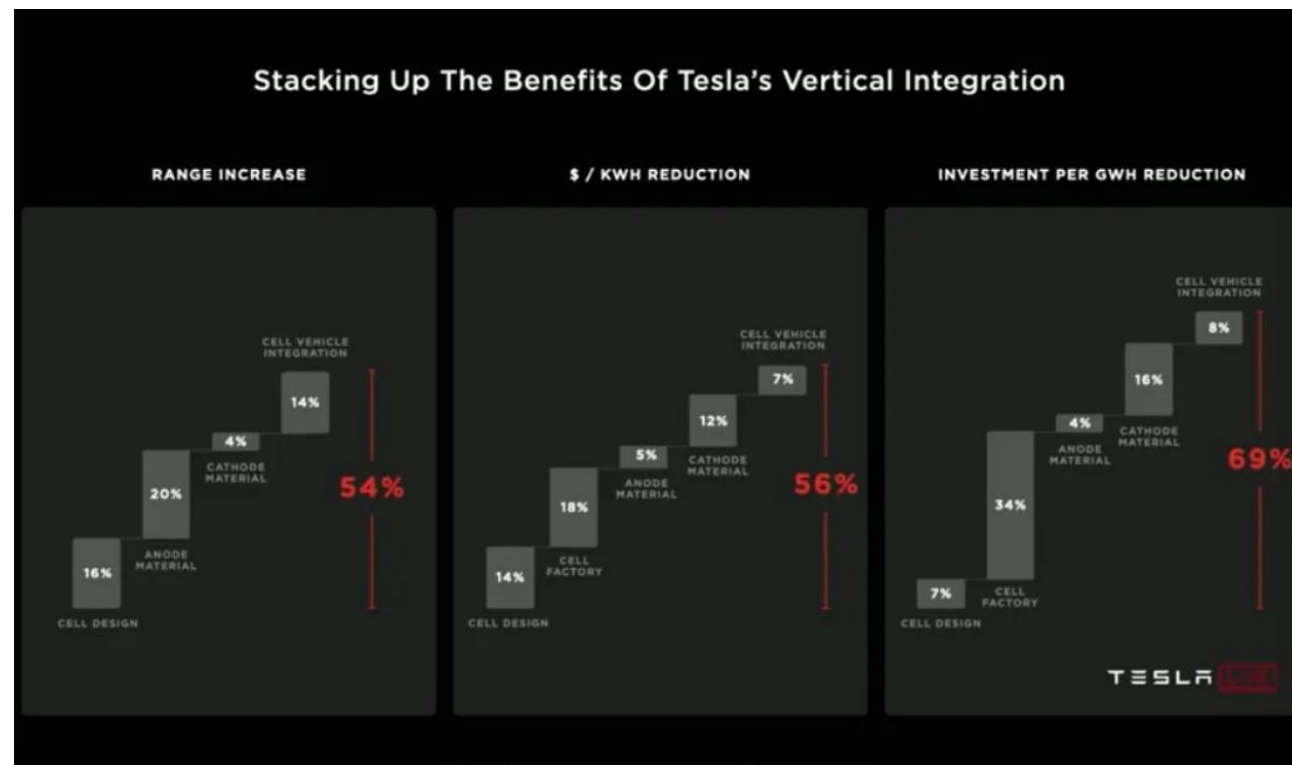
Tesla Battery Costs (\$ per kWh)



Industry Average Battery Cost (\$ per kWh)



-> 2020 -2023



@ cell level:

-> 2020: 250 Wh/kg, 120 \$/kWh

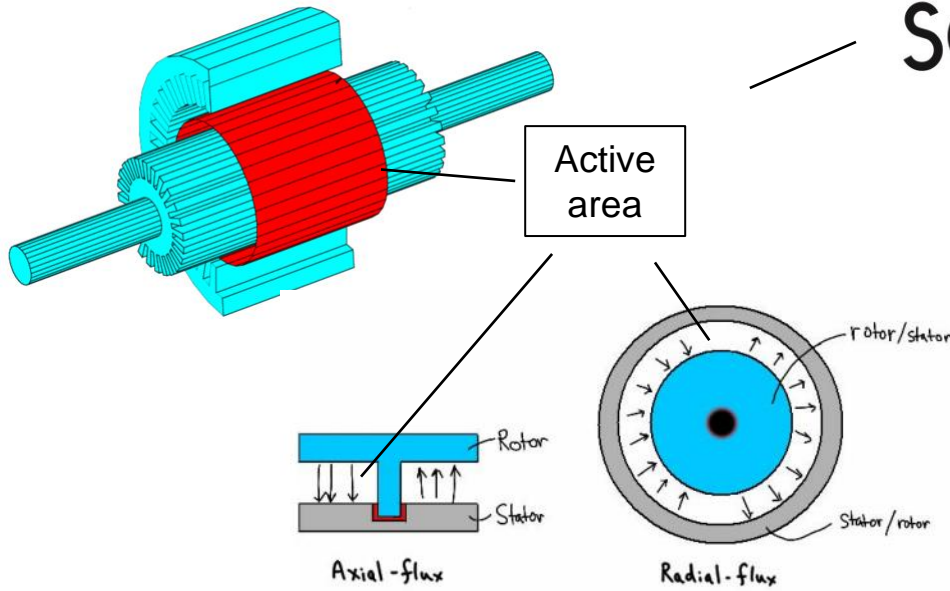
-> 2025 -2030: 350-400 Wh/kg, 50 \$ kWh

Electric drive

**Combined power density > 8 kW/kg
Combined efficiency > 95 %
in direct drive propellor and fan
applications**

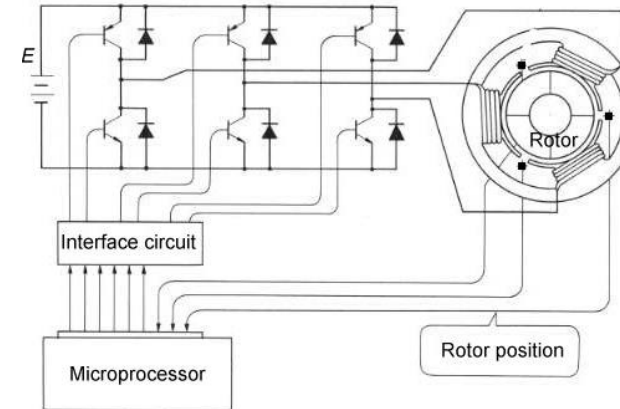
Electric motor

- Maximizing force state of the art force: approx. 1kg (~ 10N)/cm² active airgap*
- Maximizing flux density in airgap, stronger magnets, improved performance while extending operational temperture range and lifetime of key materials and components*
- Minimizing coil, magnetic and iron losses, improve effectiveness of cooling*



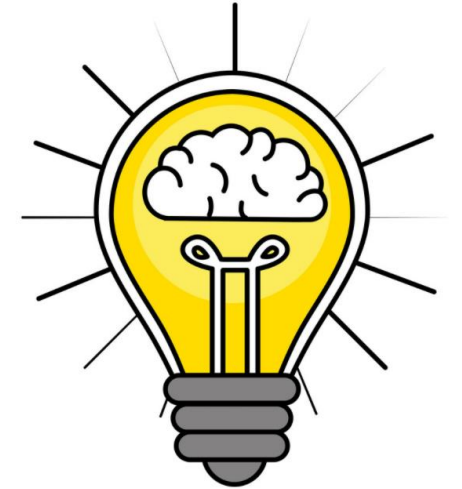
Power electronics

- Fast and loss free switching*
- Faster on/off transition, improve bandwidth, improve performance while extending operational temperture range*
- Improve thermal conduction between semiconductor die and cooling system while improving electric isolation properties*



Propellers, propulsive rotors

- Rotor noise reduction (electric motor is silent)
- Developments needed?
- Running project: EU EFRO Smart Rotor project, TU Delft, Koninklijke NLR, KVE, Airborne en RHIA with financial support from InnovationQuarter/Kansen voor west



Discussion

- On what development level is the most need for further R&D to meet the requirements for electric aviation?
- What is the Dutch position on this topic and do we have a strong 'right to play'?
- What are current initiatives already taking place to take on these topics?
- What are the next developments / steps that need to be achieved in the technology?
- How to proceed?