



**SIEMENS**

**Corporate Technology**

# **High Performance Electric Machines and Power electronics**

**Joint Strategy and Networking Event**

10.09.2010

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## Content

**Introduction to Corporate Technology (CT)**

**Electromobility is integrated  
in an Overall Traffic concept**

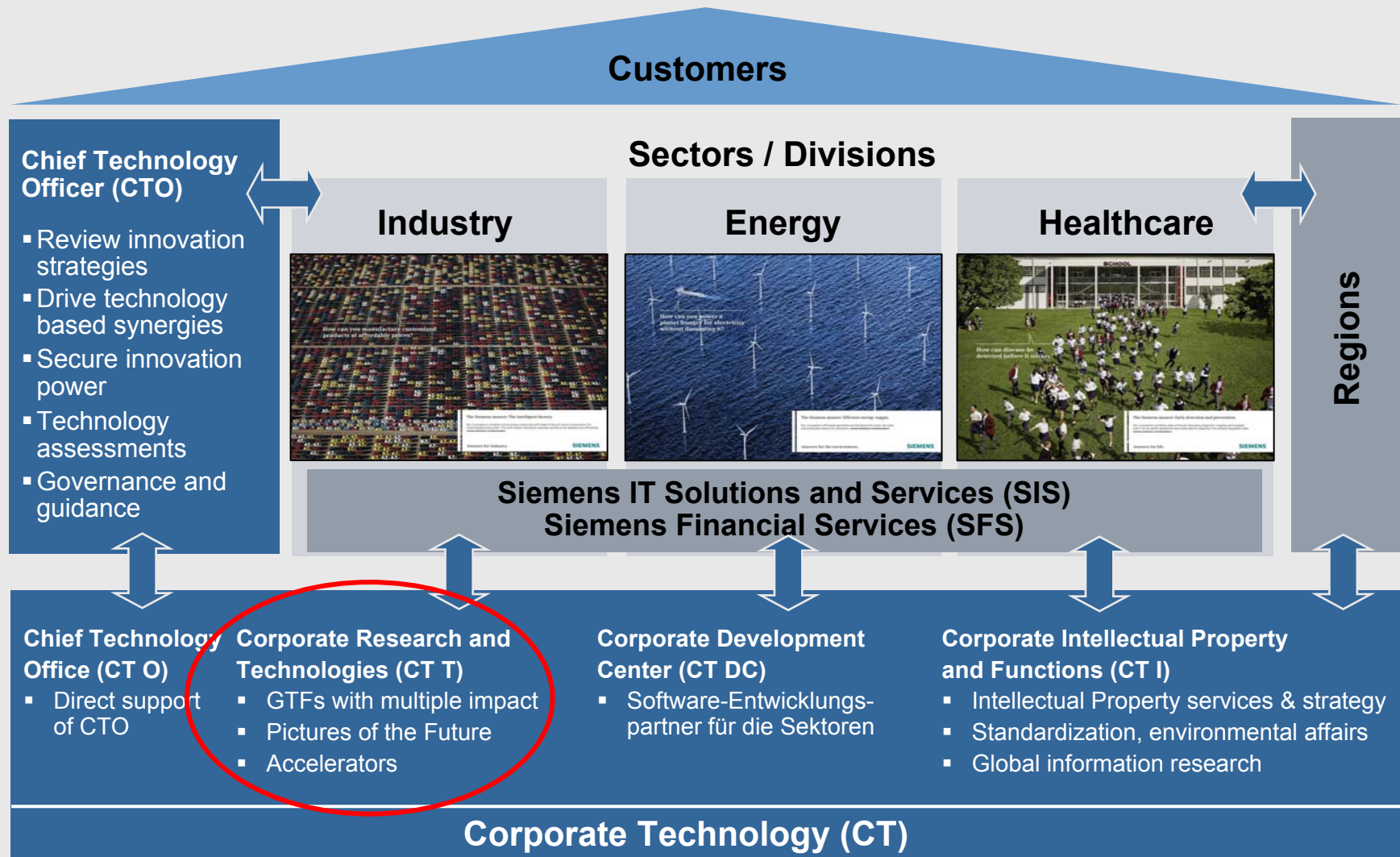
**The Drive Train**

**The Electric Machine**

**Aspects of assembling and production of E-machines**

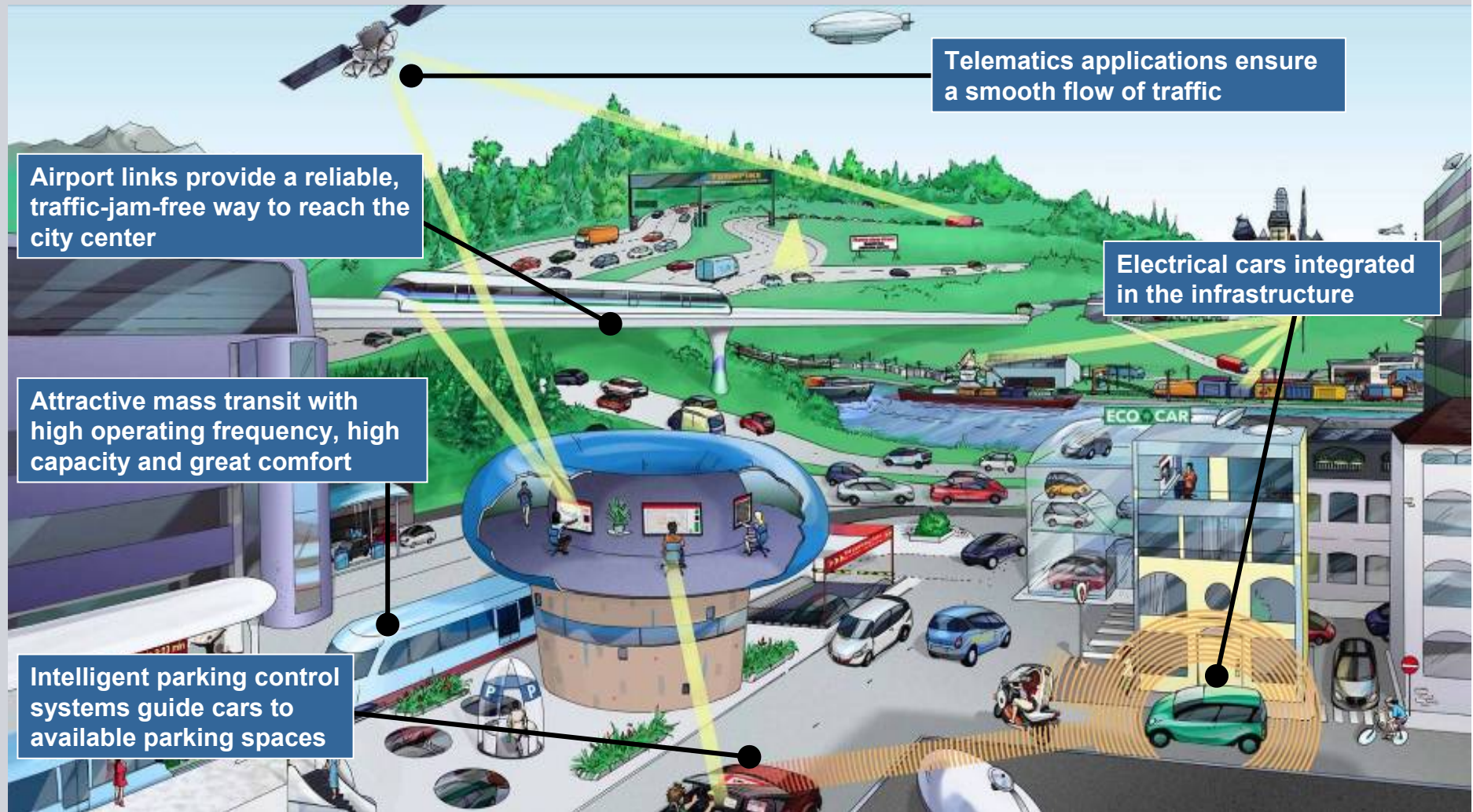
# Corporate Technology

Networking the integrated technology company

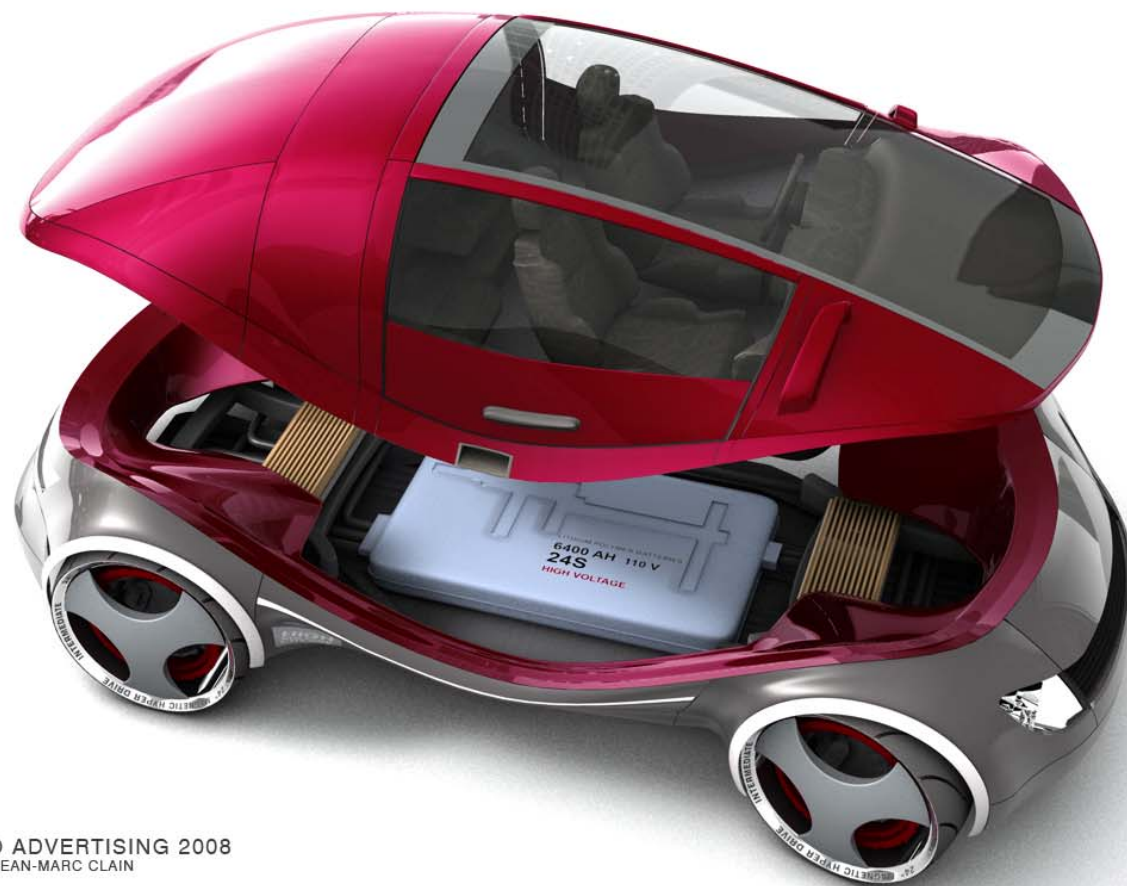


# Integrated traffic concepts – Solutions to increase traffic efficiency

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## Changes in the automotive industry



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DESIGN: JEAN-MARC CLAIN

However, new entrants can only be successful if complexity of vehicle engineering and production is reduced

**Reduce complexity in drivetrain**



- Less material
- Less complexity
- Less faults



**Reduce battery cost**

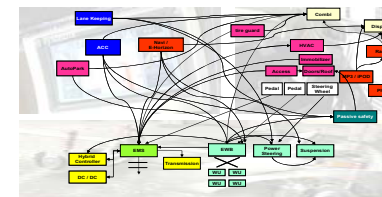
- Automated production
- High volumes



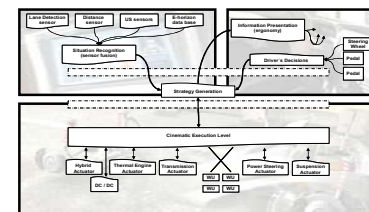
**New entrants**



**Reduce complexity in system architecture**



- Easier integration of new functions
- Less complex variant management
- Less development time
- Less integration cost



# Siemens will contribute to the breakthrough of eMobility in various business segments



## Electric Infrastructure

- Home Charging
- Public Charging
- Fast Charging
- Battery swapping
- Smart grid & energy automation & metering and billing
- Central energy storage & load flow management
- Grid consulting & infrastructure services



## Infrastructure Telematics

- Traffic Control
- Remote Services
- Fleet Management
- Billing and Roaming
- Infrastructure 2 Car Com.
- IT Services and Solutions

## Development of eCar components

- Drive train (inverter, electric motors)



## Automation solutions for eCar production

**For car manufacturers and automotive suppliers active in**

- Car development (e.g. eCAx)

- Motor manufacturing



- Battery manufacturing



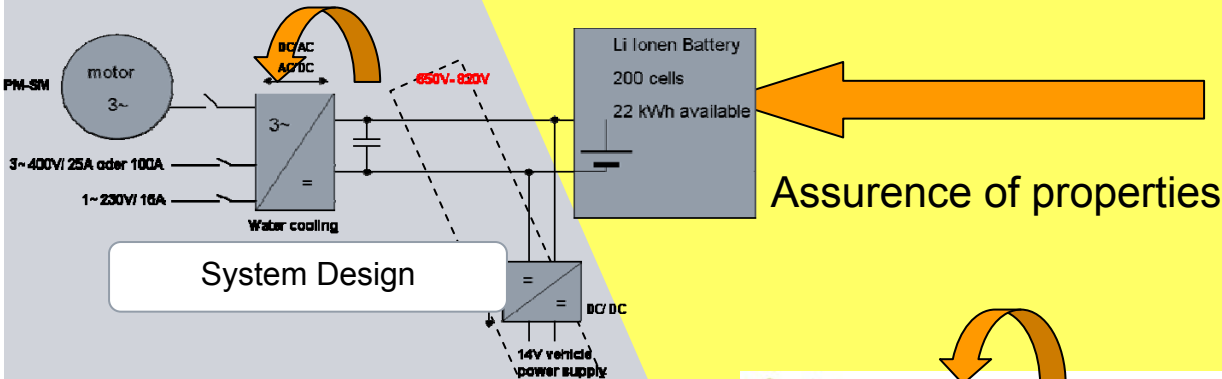
- Inverter manufacturing

- Assembly equipment

# Design Process to meet requirements for application and manufacturability

## Design process Electric machine

Requirement specification

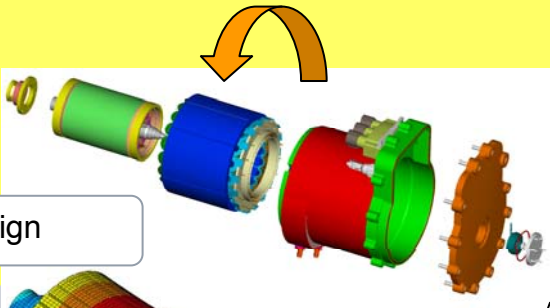


System Design

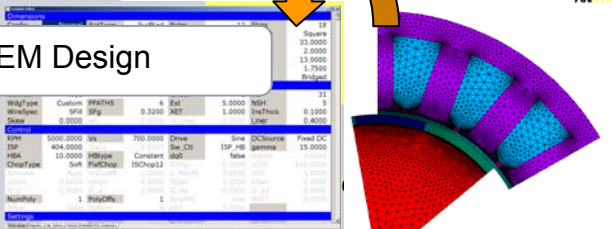


Build hardware  
Test hardware

Mech. Design



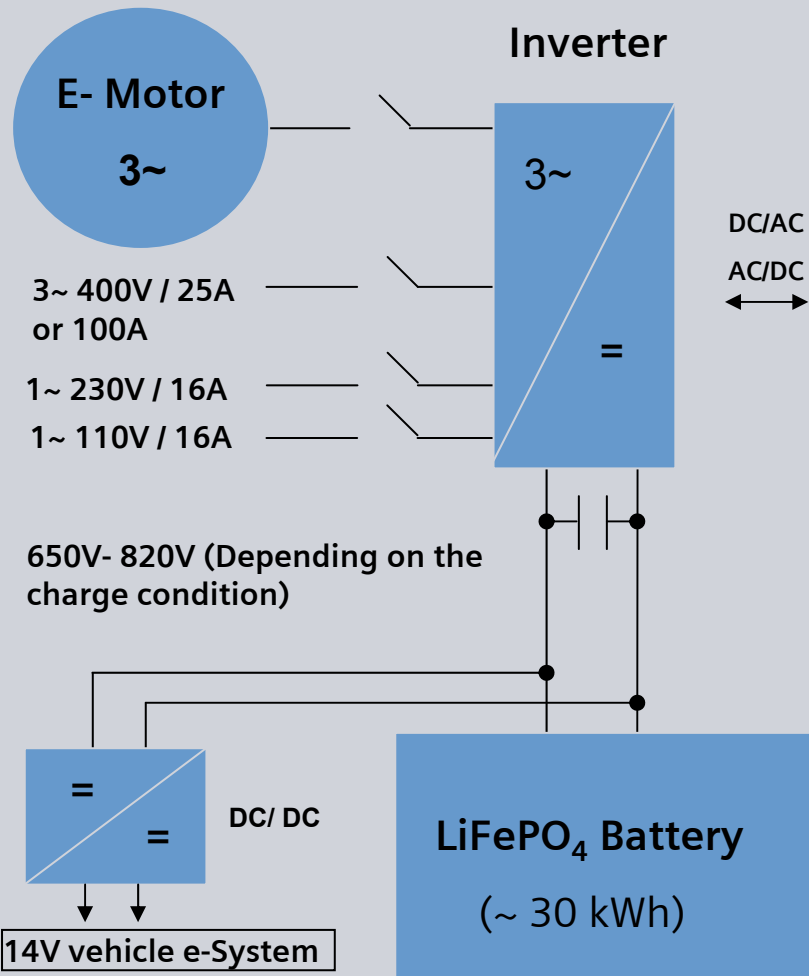
EM Design





# Siemens CT Powertrain Concept

to investigate advanced integration concepts



In 2010 the drive train will feature:

- A highly integrated power electronics with bidirectional interface to the power grid (efficient and light)
- A high voltage system (650V-820V) leading to sinusoidal mains currents
- An e-machine (PM-SM) which is a further development of the Siemens motor technology, i.e. high power density with excellent motor control for customizable driving dynamics

# Results of E-Motor and power electronic HW optimization of driving and charging performance

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## E-Motor for eCar\*



- High peak power (125kW)
- 50kW rated power
- High Power density (2,4kW/kg)
- Input voltage up to 850V

## Inverter for eCar\*



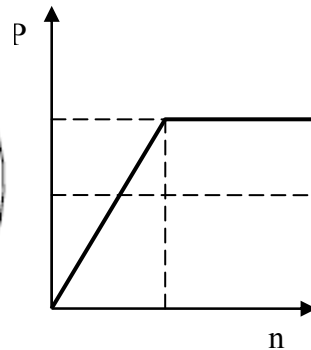
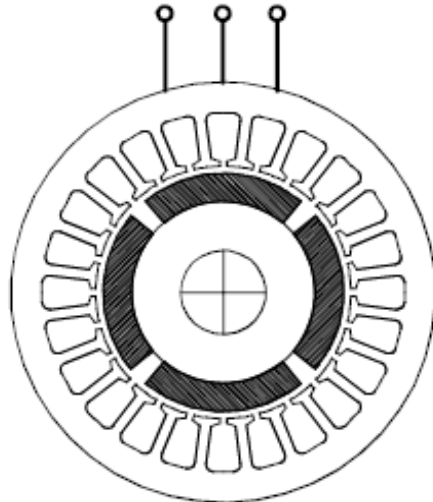
- Optimized for the corresponding E-Motor
- Developed for driving and charging function
- Integrated compact design
- Input voltage up to 850 V

\*Prototypes from CT T P

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## E- Machine

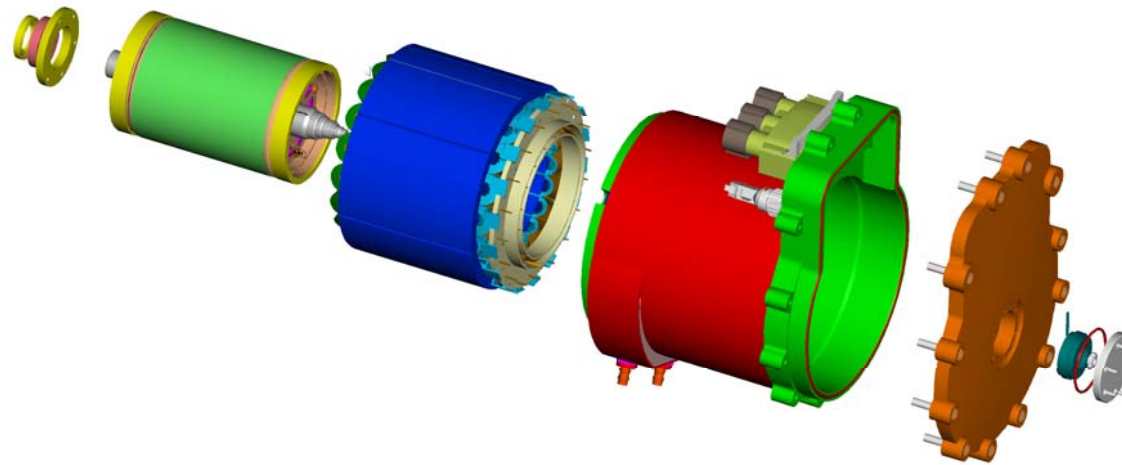
### Permanent Magnet Synchronous Machine (PM- SM)



#### *Advantages*

- Nearly zero rotor losses due to excitation by PM
- High power and torque density (lightweight motors)
- Robust mechanical design due to large air gap of PM - SM

[Speed's electric motors, TJE Miller]



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**Thank you for your attention!**



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