

THERMAL EXPO 2025



Designing Electric Powertrains For High Performance and Reduced Costs

Jigar Mistry, Thermal Expo 2025

Schaeffler facts and figures – One of the world's largest family-owned companies

~120,000
employees worldwide

>250 locations in
~55 countries

~100 plants and
34 R&D centers

~€18.2 billion
of sales in 2024

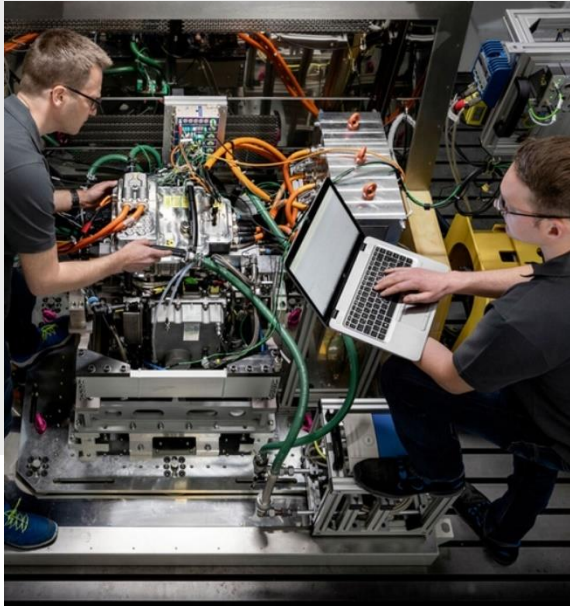
4.5%
EBIT margin in 2024¹

>1,000
patents registered in 2024

¹ Before special items

The Motion Technology Company – Our Four Divisions

E-Mobility



Modular and scalable solutions for all types of electric drives.

Powertrain & Chassis



Innovative solutions for powertrain and chassis systems.

Vehicle Lifetime Solutions




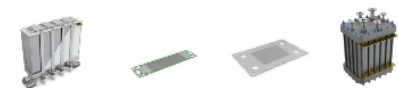






Tailored solutions for the mobility ecosystem.

Bearings & Industrial Solutions



Products and solutions for the industry of the future.

Our Product & Service Offering – Motion as the connecting element

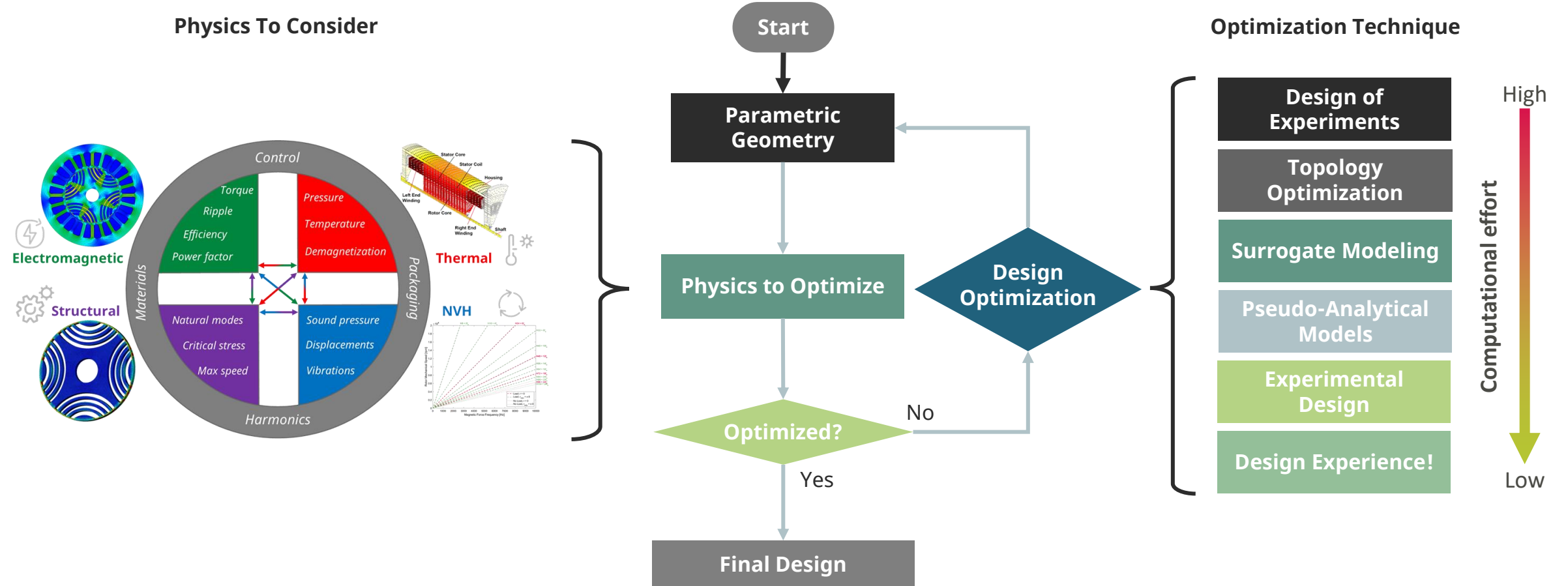
8 AREAS	8 PRODUCT FAMILIES	PRODUCT & SERVICE OFFERING
Sustain motion	8 Repair & Monitoring Services	
Energize motion	7 Hydrogen Stacks & Plates	
Drive motion	6 E-Motors & E-Drives	
Power motion	5 Power Electronic Units	
Generate motion	4 Actuators	
Control motion	3 Electric Control Units & Sensors	
Transmit motion	2 Transmission & Engine Components	
Guide motion	1 Bearings & Linear Guides	

Key Aspects

- Schaeffler product & service portfolio categorized into 8 Product families
- All product families associated with their respective notion of motion
- Product families address customer requirements along all 4 market and 10 sector clusters
- Use all the Schaeffler know-how in our core technologies to create maximum customer value and a unique selling proposition

Motion as the connecting element

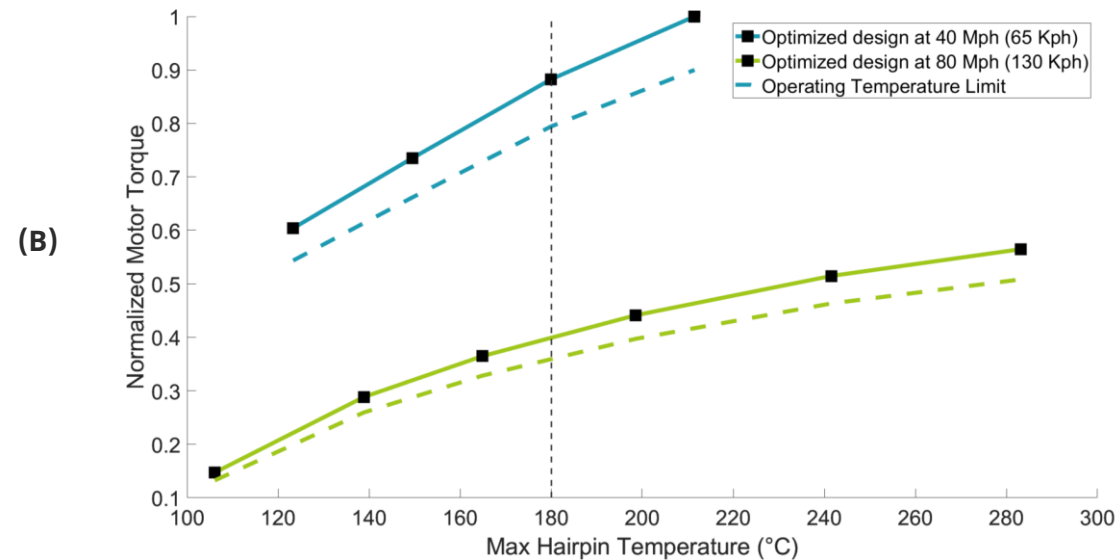
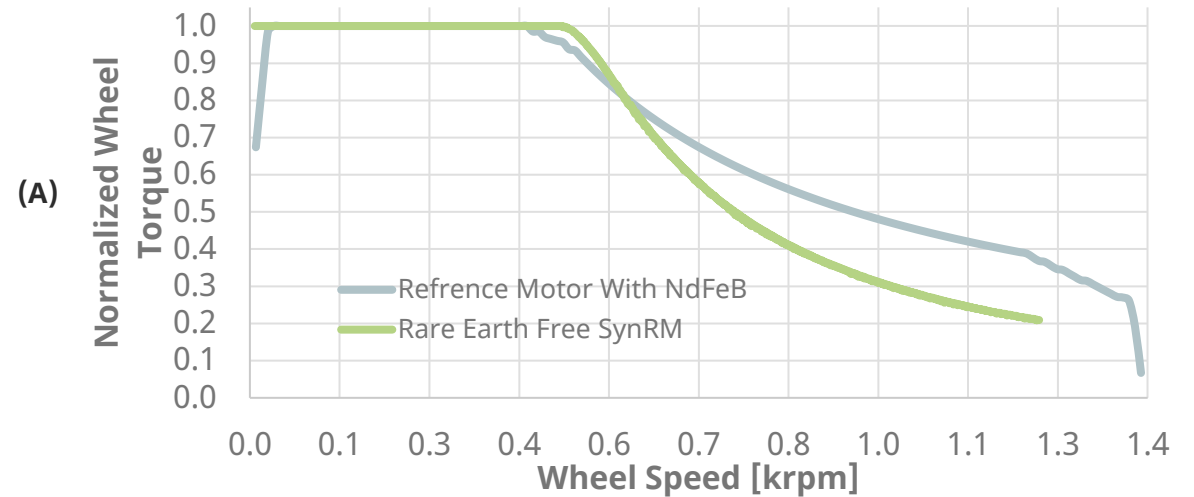
System level design considerations



Case Study: Rare Earth Free PMa SynRM Design Optimization

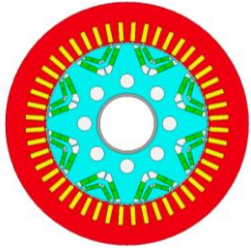
Design Features

- Scalable platform for torque & power
 - Design can be adapted to specific requirements from OEMs
- Free of NdFeB magnets
 - Significant reduction in material costs
 - No demagnetization at -40°C
- Mostly reluctance torque (>66%)
 - High peak power, like NdFeB design
 - Low torque ripple with rotor step skewing
- Integrated stator cooling channels
 - High continuous-peak ratio

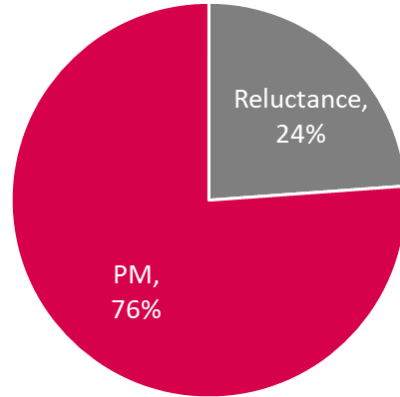


Case Study: Rare Earth Free PMa SynRM Cost Optimization

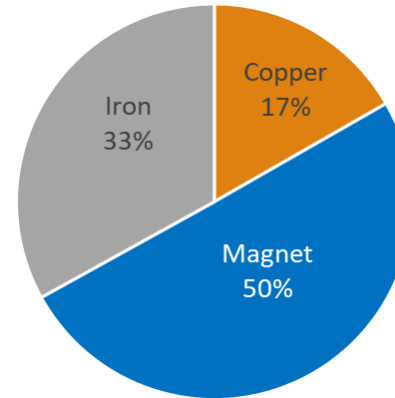
Reference Motor
With NdFeB



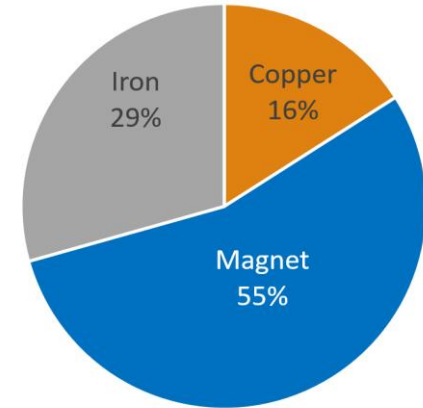
Peak
Torque



Material
Cost



Global Warming
Potential



Rare-Earth-Free
PMa SynRM



PM,
21%

Reluctance,
79%



Same Packaging Dimensions
Meets Driving Requirements

Iron
47%

Magnet
26%

Copper
27%



Similar Total Mass
>40% Cheaper Motor

Iron
56%

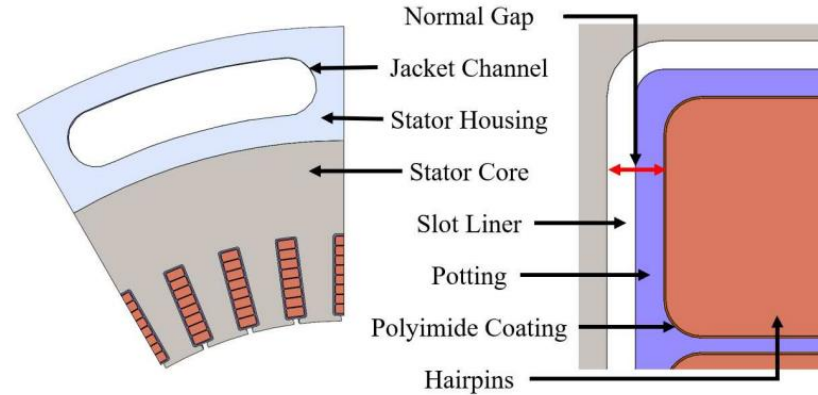
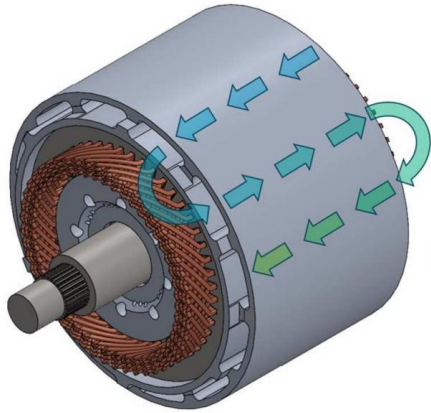
Copper
35%

Magnet
9%



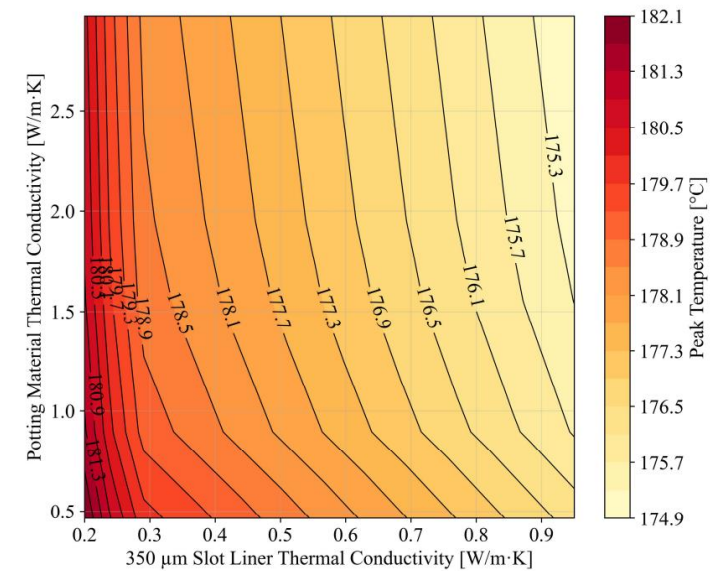
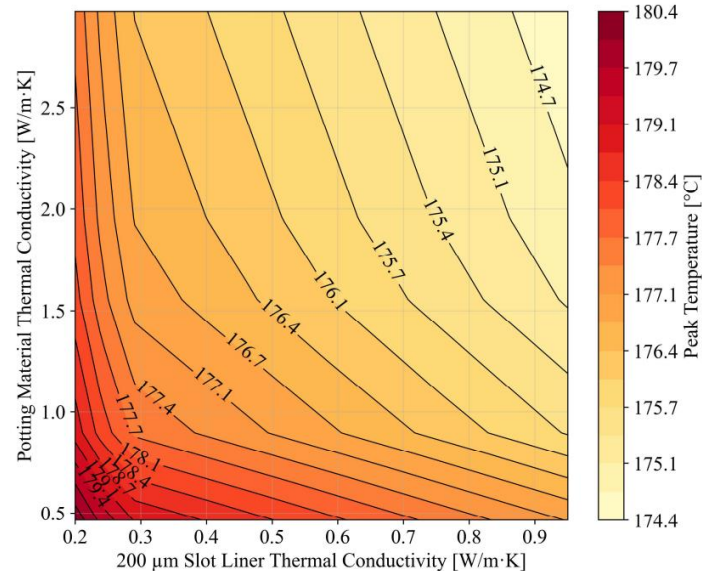
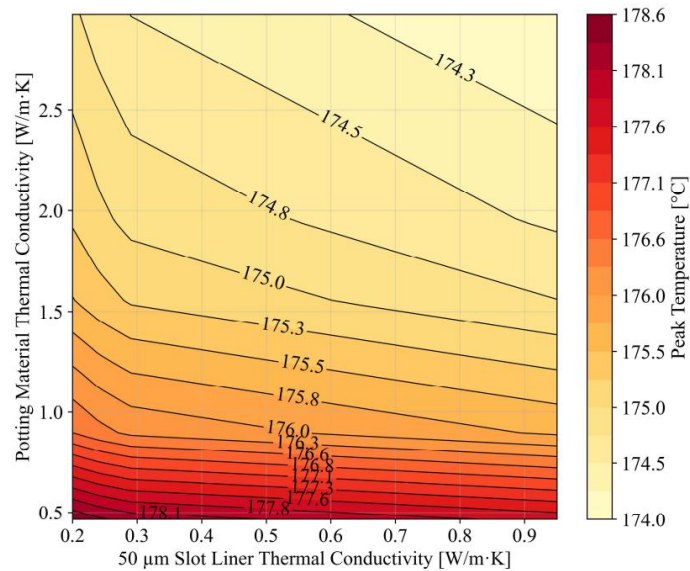
Similar Total Mass
>55% More Sustainable

Case Study: Effects of Potting and Slot Liner Material on Thermal Behavior



Factors to Consider

- Cost
- Ease of Assembly
- Performance Trade-offs
- Structural/NVH performance
- Sustainability



Higher Cost

Increasing Slot Liner Thickness

Lower Cost

Conclusion



Optimized **system level design** to minimize cost and maximize performance



Cost-effective rare-earth-free PMa SynRM prototype with **Advanced cooling**



Open to partnerships & collaboration on **R&D + advanced** projects



We offer **scalable & modular** drive units for various traction applications