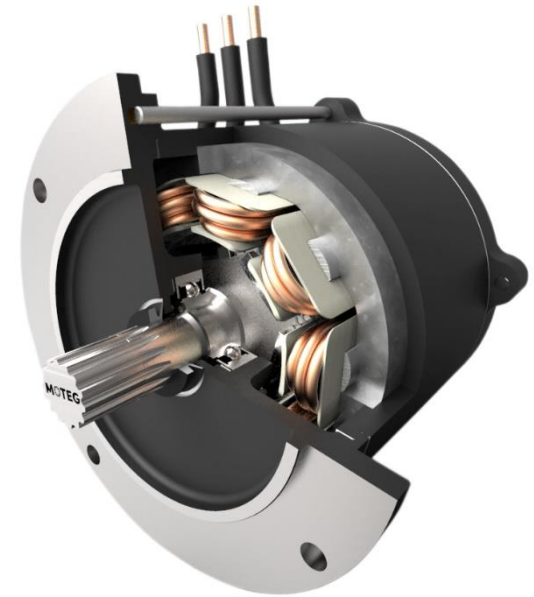


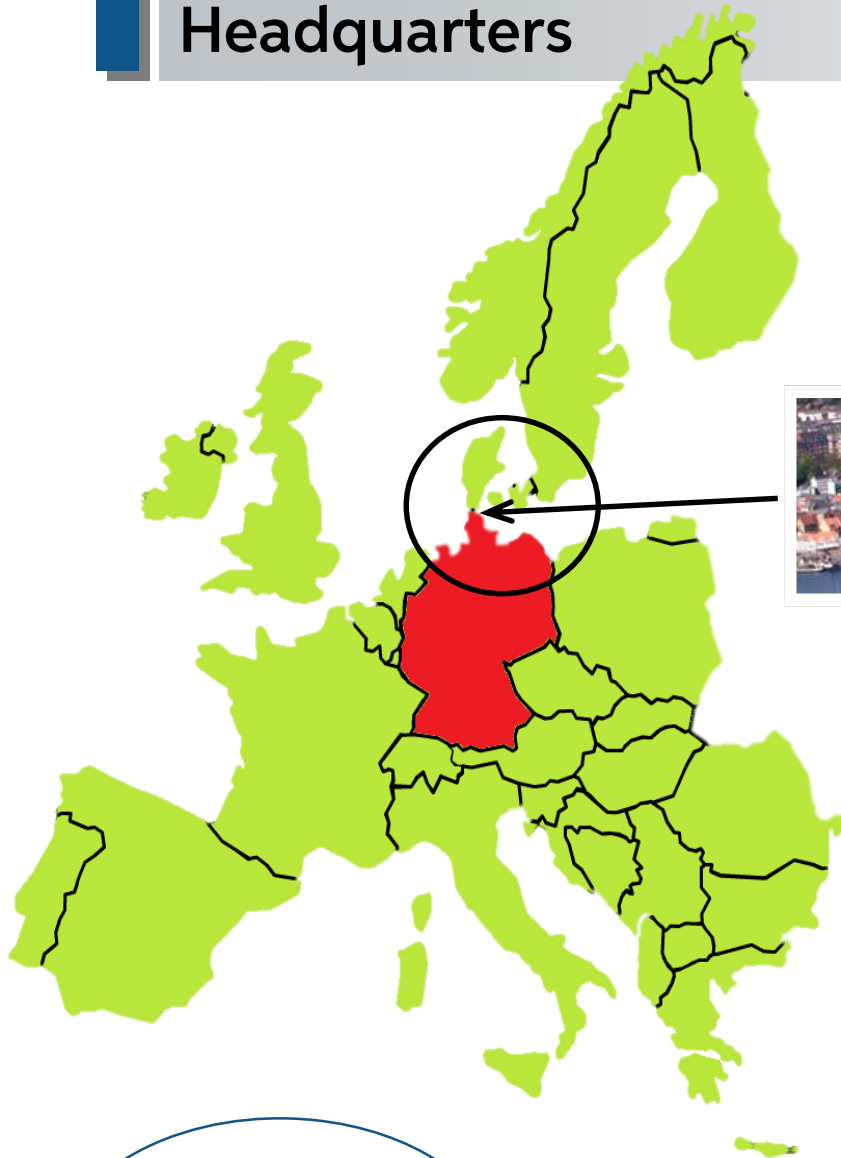
MOTEG



“Automotive application: Modern auxiliary motors in electric utility vehicles”

Presentation for PE:Region seminar on electric drives on 28 August 2018 at Danfoss Drives, Ulsnæs 1, DK-6400 Gråsten”

Headquarters



Flensburg, Germany



Source: WIREG

Other Locations



Production facility

- **MOTEG GmbH**
- Lecker Str. 7
- 25917 Enge-Sande
- E-Mail info@moteg.de



Field Office China

- **Moteg Electrical Engineering (Nanjing) Co., Ltd.**
- Jinma Lu 3
- Nanjing 210049
- E-Mail info@moteg.de

Portfolio of Services

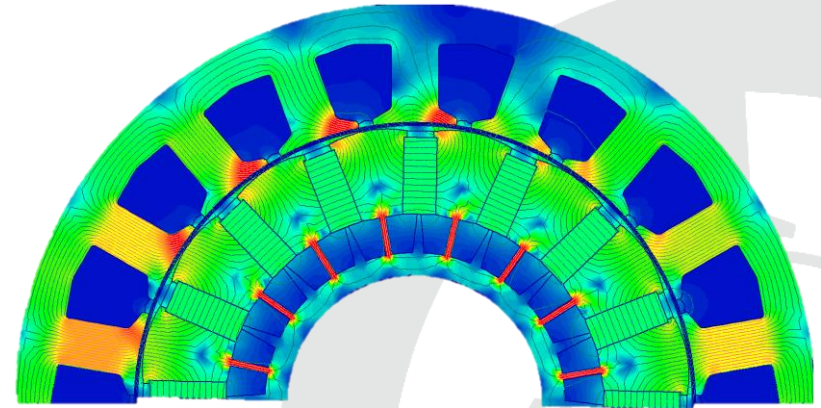
■ Customized electric machine services

- Feasibility studies
- Electromagnetic Machine Design
- Mechanical Design
- Machine Measurements
- Prototype construction

■ Customized electric machines

■ Own Products

■ MOTEG eMobility Services



Milestones of company history

2014

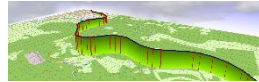
Foundation of MOTEG through Dr. Siegfried Götz

First order from aviation business segment



2016

Nationwide study for the introduction of electric buses in the province of Vorarlberg, Austria



15 individual studies on the introduction of electric buses and commercial vehicles worldwide (including Nanjing / China)

2018

Start of production for auxiliary units for electric utility vehicles



Successful certification according to ISO 9001 and EN 9100.

2014-2016

2017-today

Future

Aviation/ eMobility/
Automotive

Development and sample production of e-Motor for Mercedes MAGIC BODY CONTROL System



Build up of special e-Mobility team and dedicated simulation tools for usage of electric utility vehicles

2015

Framework contract with the EURABUS consortium about supply of auxiliary units for more than 1000 buses over the next 3 years

Establishment of manufacturing site on Green TEC Campus in Enge-Sande

2017

Ramp-up of production for auxiliary units for electric utility vehicles

Certification according to TS 16949

Build-up of second large customer in aviation segment

2019

Customized electric machines



Example of Customer Projects

■ Electric motor for helicopter rescue hoist



- $U_{nom} = 28 \text{ V DC}$
- $N_{nom} = 7500 \text{ min}^{-1}$
- $P_{nom} = 4 \text{ kW}$
- $N_{max.} = 12000 \text{ min}^{-1}$
- $\varnothing\text{-Housing} = 135 \text{ mm}$
- Length = 119 mm
- Operating Mode = S2
- Polpairs = 5
- Start of production: 2018
- Numbers/Year: 20-300
- Prototypes delivered
- Serial production by MOTEG
- Production period >10 years

Own Products



compAUX-Auxiliaries for utility vehicles and busses

■ Why electrify auxiliaries in utility EV's?

No combustion engine, but still the need to drive Air-compressor, Servo-Steering, Fluid-Pumps etc..

■ Problem!

No one was focussing on the e-Motors for auxiliaries, the focus is on the main traction motor!

■ Result

The industry used standard asynchronous motors to drive the auxiliaries.

= BLACK, HEAVY, SIEMENS !



Development aspects

- Weight reduction
 - More efficient machine topology
 - Higher No. of pole pairs
 - Innovative housing concept
 - Better cooling
- Size reduction
 - Higher integration of motor and aggregate
- Noise reduction
 - Different cooling
 - Optimized machine design

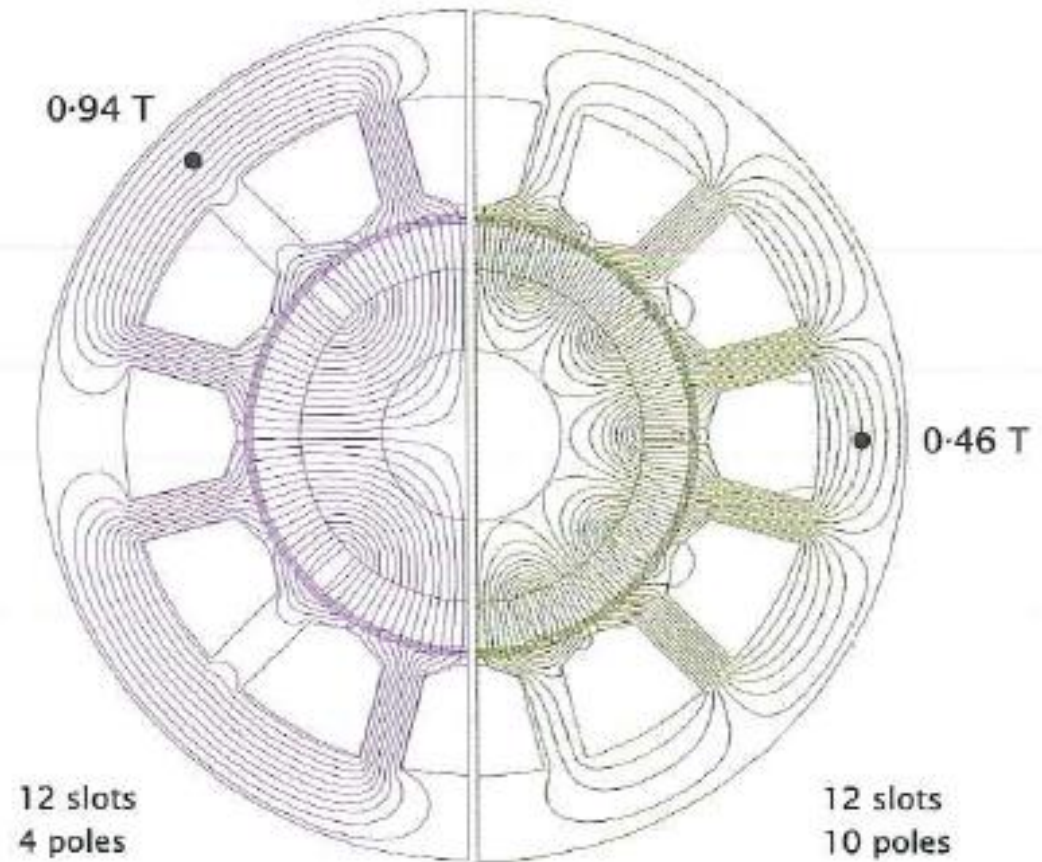
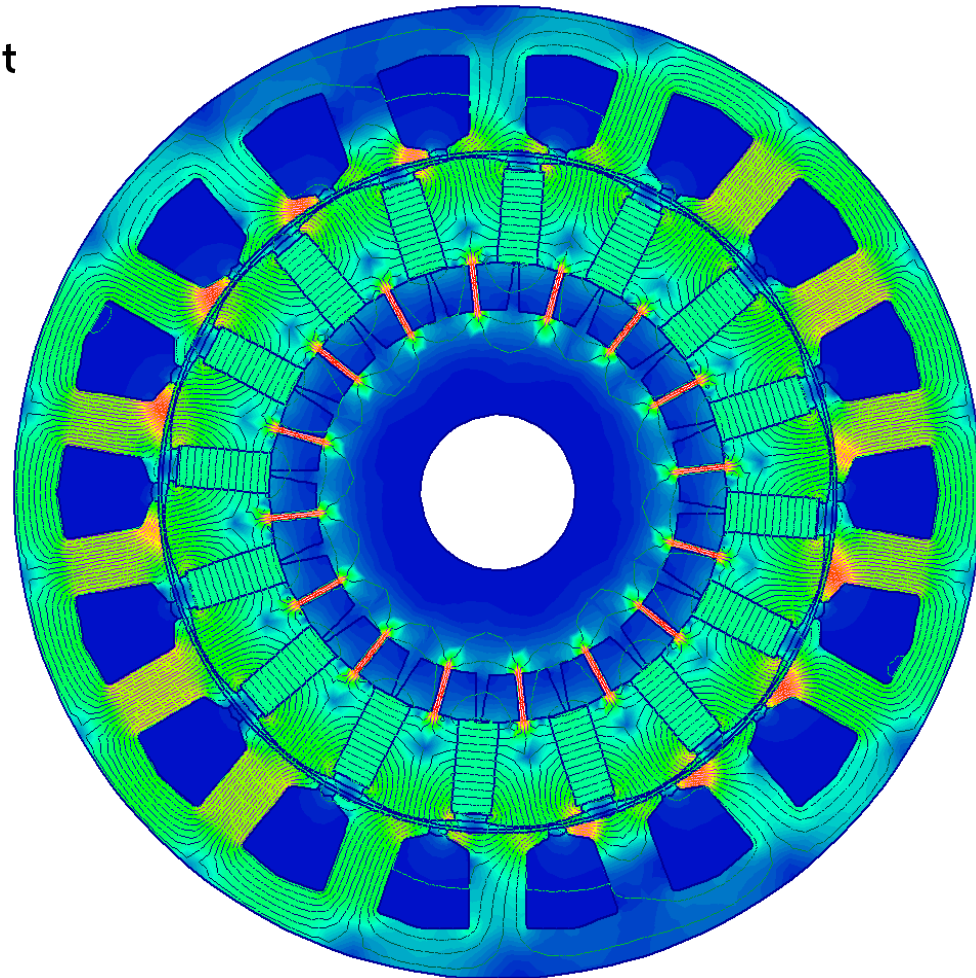


Fig. 3.25 Effect of pole-number on yoke flux-densities

Design choices

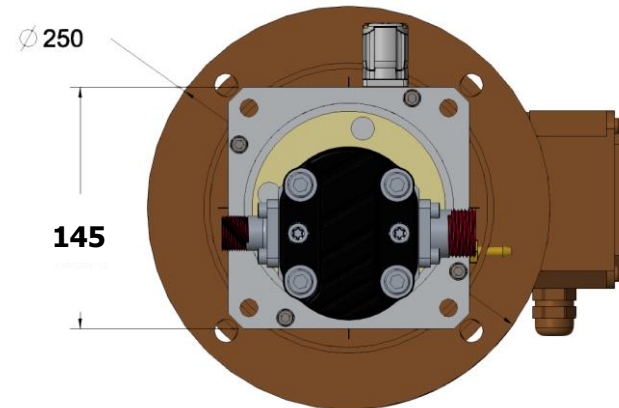
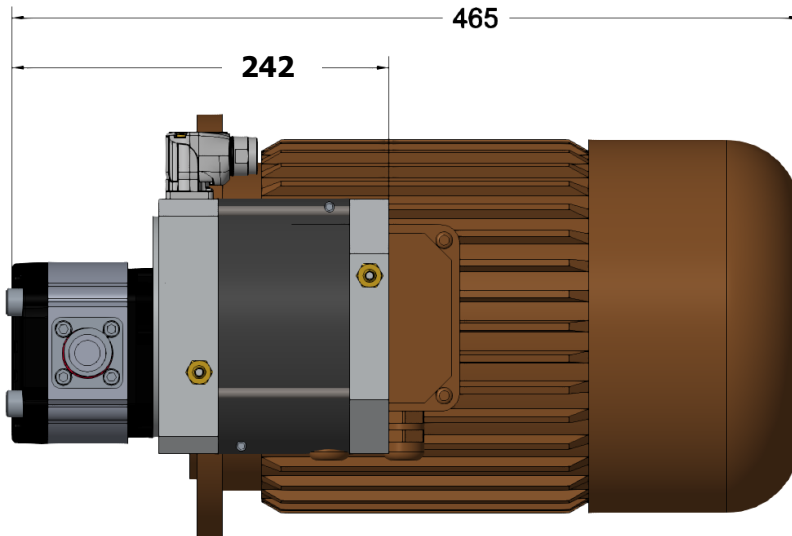
- Weight reduction
 - Change from induction to permanent magnet motor → lower rotor losses
 - Increase from 4 to 16 poles
 - Omission of housing tube → only flanges and potting
 - Change from Fan-cooling to water cooling
- Size reduction
 - Usage of modern coupling method
- Noise reduction
 - Change from Fan-cooling to water cooling
 - Usage of 18 slot/ 16 pole-design for low cogging torque



Size and weight comparison

- Type eServo = Power-Steering-Pump → „Silence Plus“ with water-cooled motor

eServo 3.0 (12 kg) vs.
Silence Plus Pump with ASM in size 112 (42 kg)



Final design

