Research on IPM motors at Uppsala University
Background and specifications

- Powerful enough to drive a Volvo V40
- Simple to mount for 1st year students
The outer cover (Ytterhölje) is non-magnetic
No need of epoxy to glue the magnets
The Uppsala concept

- No flux leakage through the bridges
Number of poles

2 poles and 10 poles motors

- More poles means less end windings
- More coils means thinner cables and more PVC
The rotor

Rotor with 2 and 8 poles
The rotor was mounted magnetized. The new version has a window in the side to insert the magnets.
The rotor

- Solid poles suffer from tooth ripple losses
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Tooth ripple calculation

Results in: Juan de Santiago, Hans Bernhoff Calculation of Tooth Ripple Losses in Solid Poles, Electric Power Components and Systems, 2015
The result 2016
The result 2017
The result 2018
Improvement potential

- EMC – End windings are not encapsulated
- Airgap of 4 mm
- Simple inverter control
- Battery limited to 96 V for safety in the lab