

# Prototyping of a Claw Pole Machine Using 3D Modeling

F. Mannerhagen

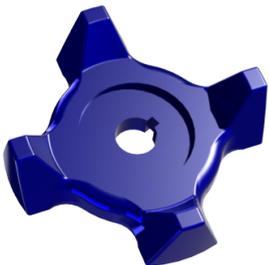
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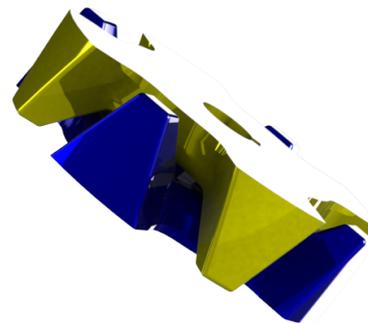
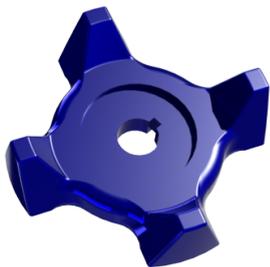
# Outline

- 1 What is a claw pole machine?
- 2 3D modeling
- 3 Results
- 4 Questions

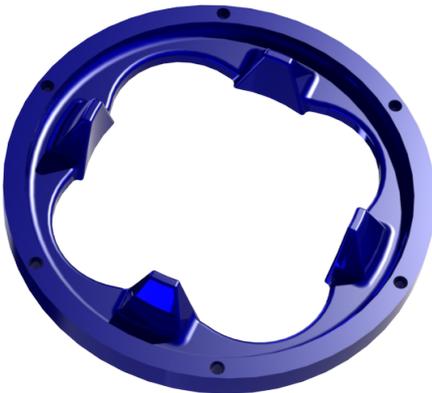
# The rotor of a claw pole machine



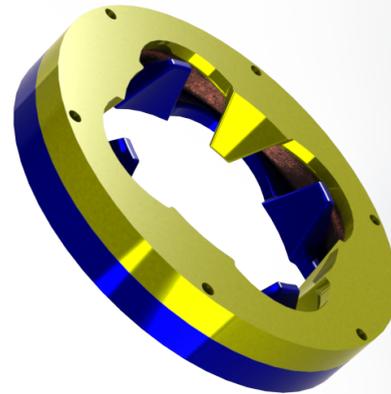
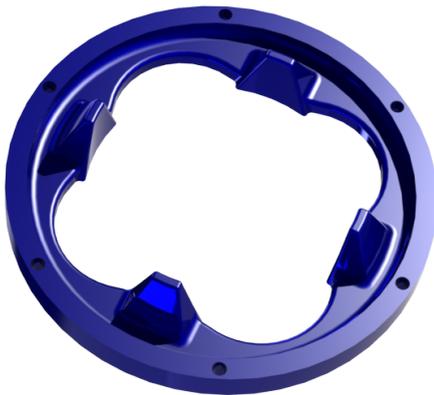
# The rotor of a claw pole machine



# The stator of a claw pole machine



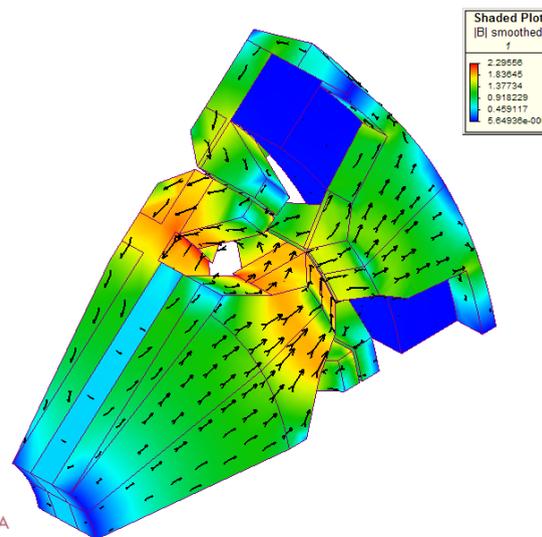
# The stator of a claw pole machine



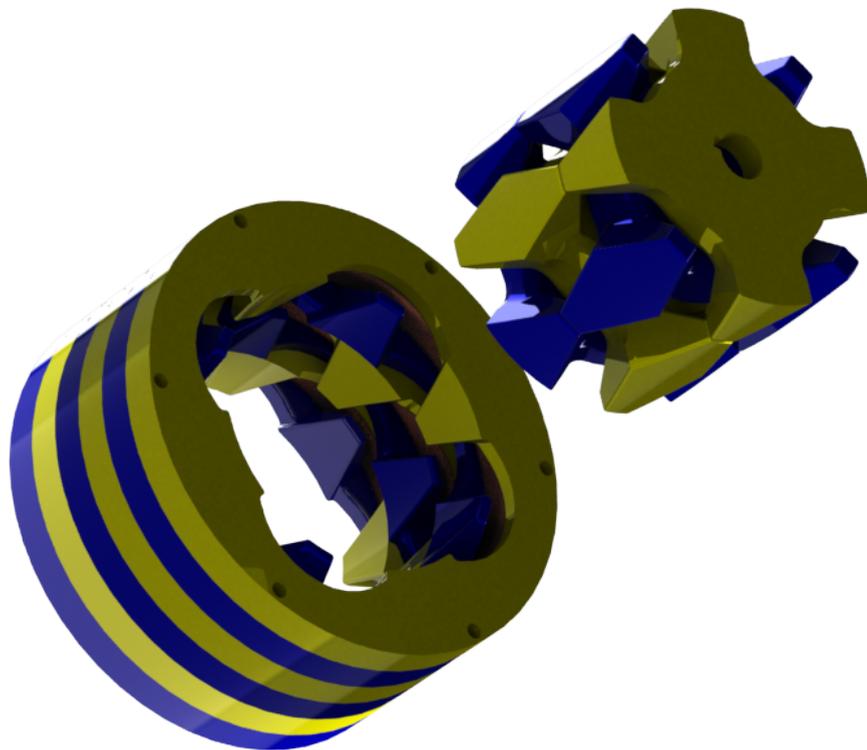
# The claw pole machine



# The claw pole machine



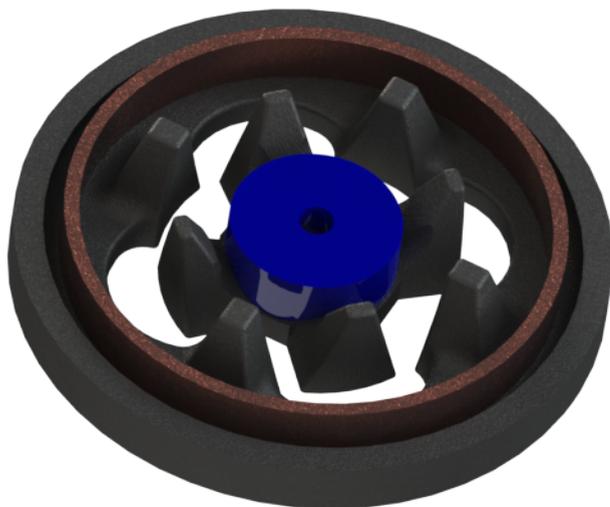
# 3 Phases



# Geometry A

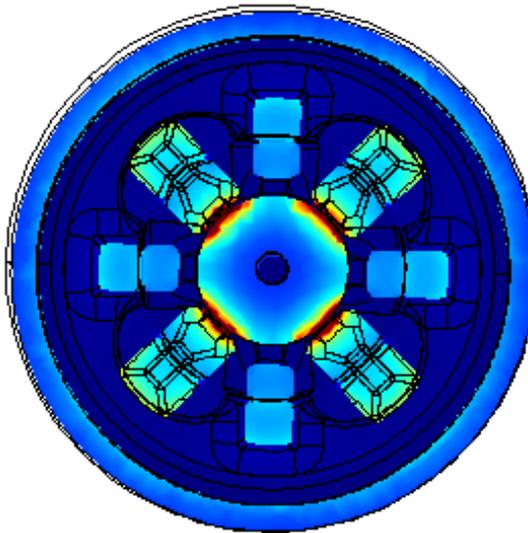


# Geometry B



- Large cutout

# Geometry B, Magnetic flux Density

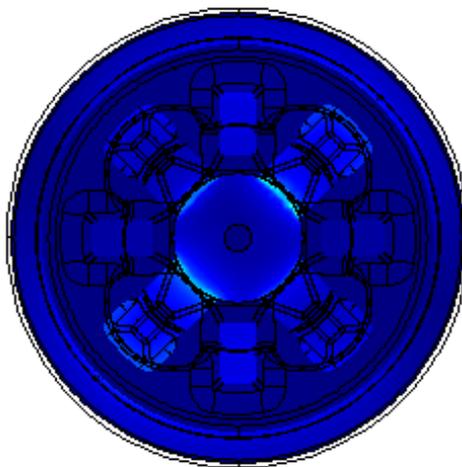


# Geometry C

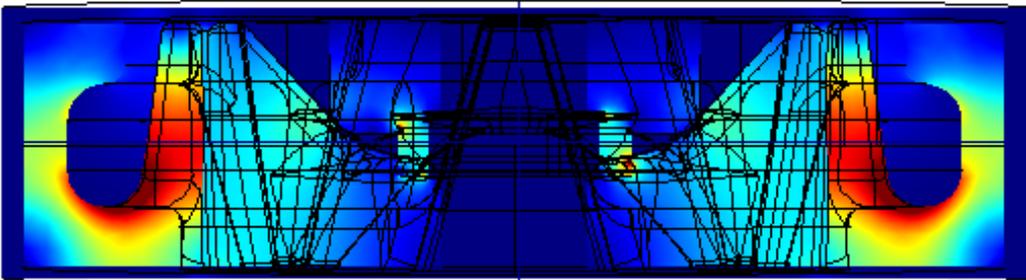


- Smaller teeth in stator.
- Smaller magnet.
- Lowering the magnet into the rotor material.

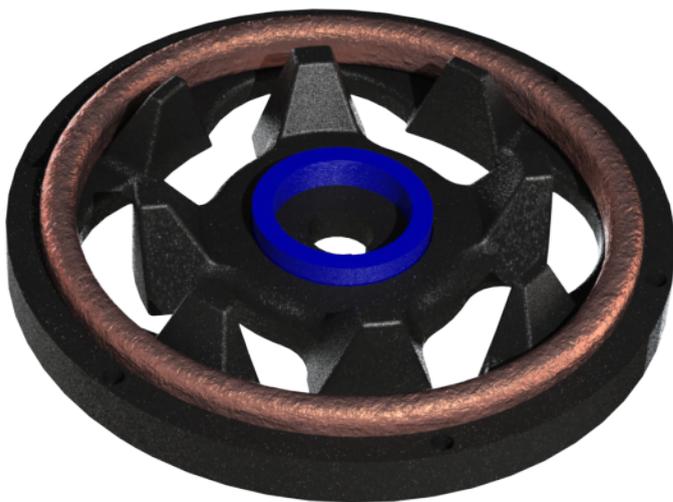
# Geometry C, Magnetic flux Density



# Geometry C, Magnetic flux Density

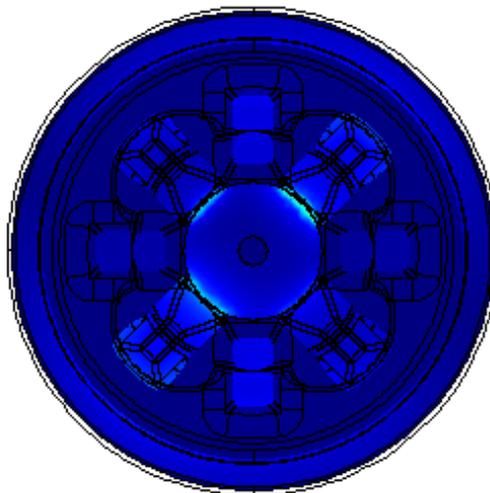


# Geometry final

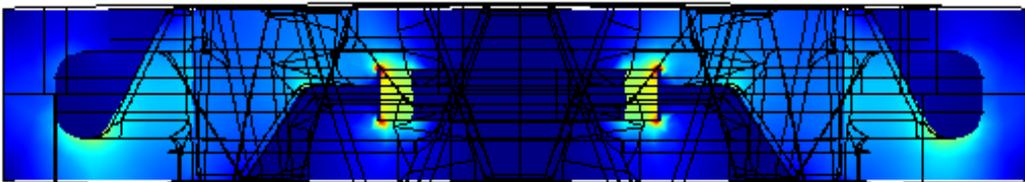


- Rotor diameter shortend.
- More material added to the stator.

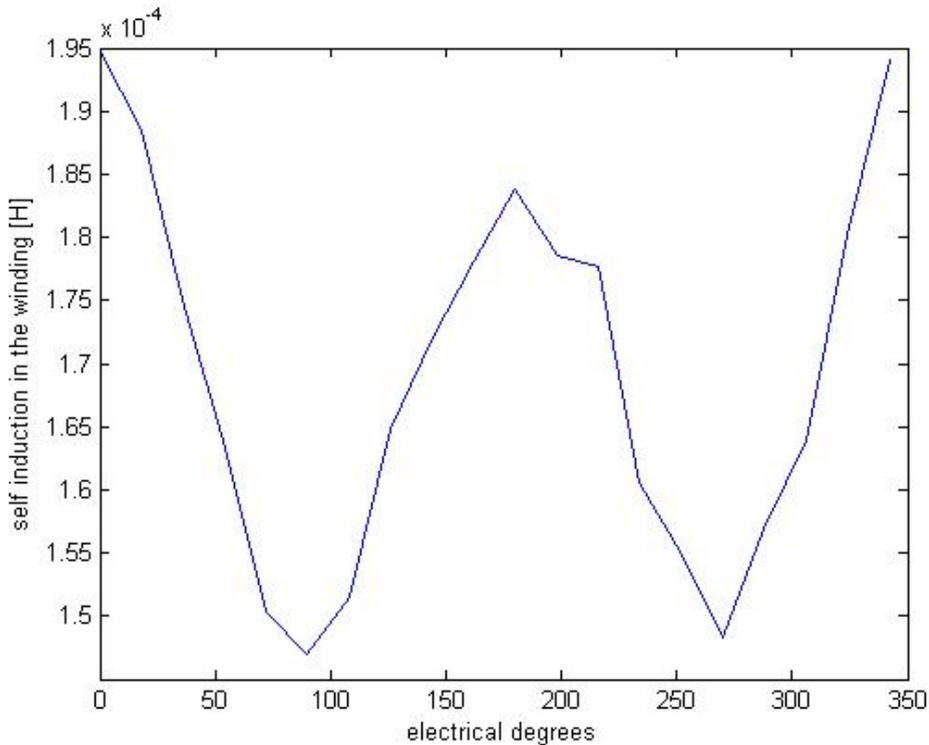
# Geometry final, Magnetic flux Density



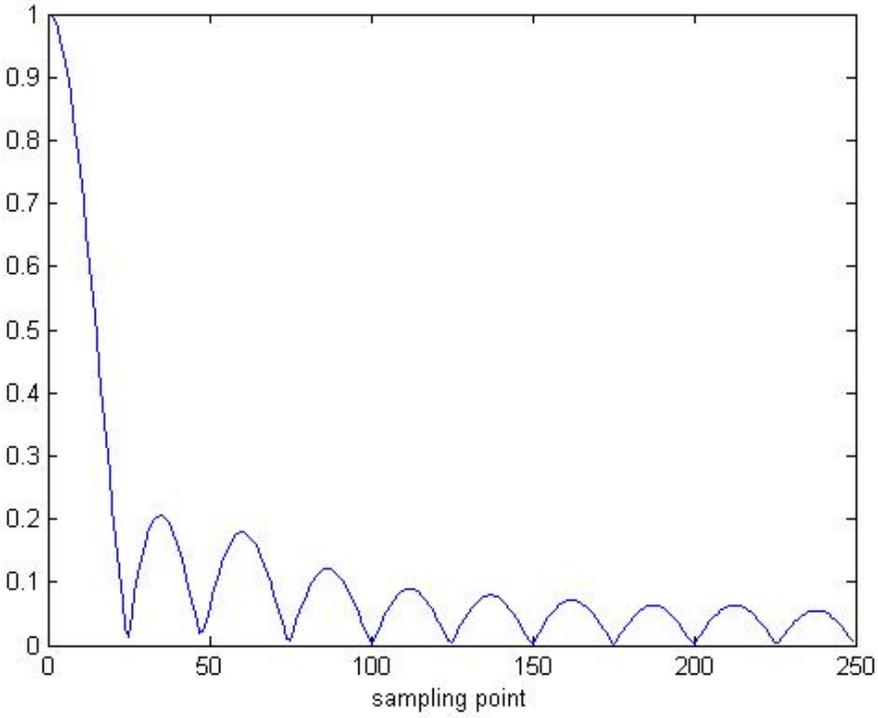
# Geometry final, Magnetic flux Density



# Waveform of the selfinductance depending on electrical angle



# Normalices FFT



# Results

- Stator Diameter =  $120 \text{ mm}$
- Rotor Diameter =  $75 \text{ mm}$
- Machine Length =  $60 \text{ mm}$
- Machine Weight  $\approx 3.7 \text{ kg}$

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- Torque per volume ratio  $\approx$  15.6 *Nm/dm<sup>3</sup>*

Thank you for your time

Questions?

Reference: S. Lundmark (2005). Application of 3-D Computation of Magnetic Fields to the Design of claw pole motors. Göteborg: Chalmers University of Technology.