



High Speed Motors & Drives

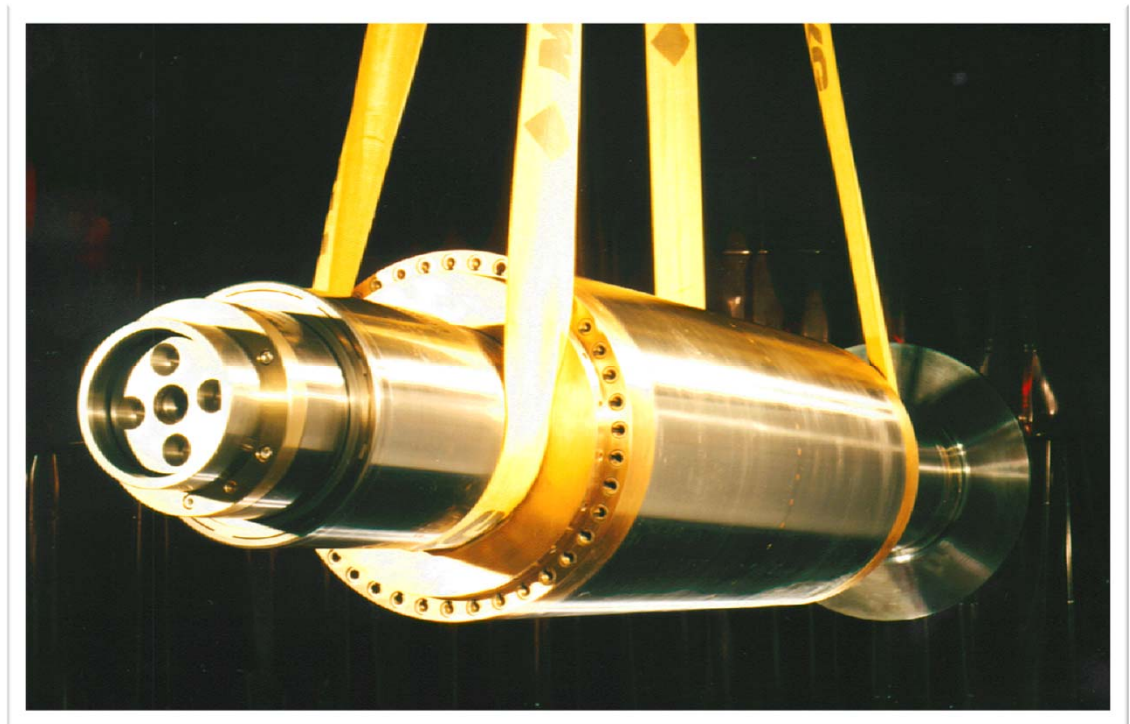
2011 Gas/Electric Partnership

CONVERTTEAM
THE POWER CONVERSION COMPANY

Induction or Synchronous

Power 4,000 to 133,000HP

- Rated speed 3,600RPM and higher
- Peripheral speed up to 260 m/sec



1992



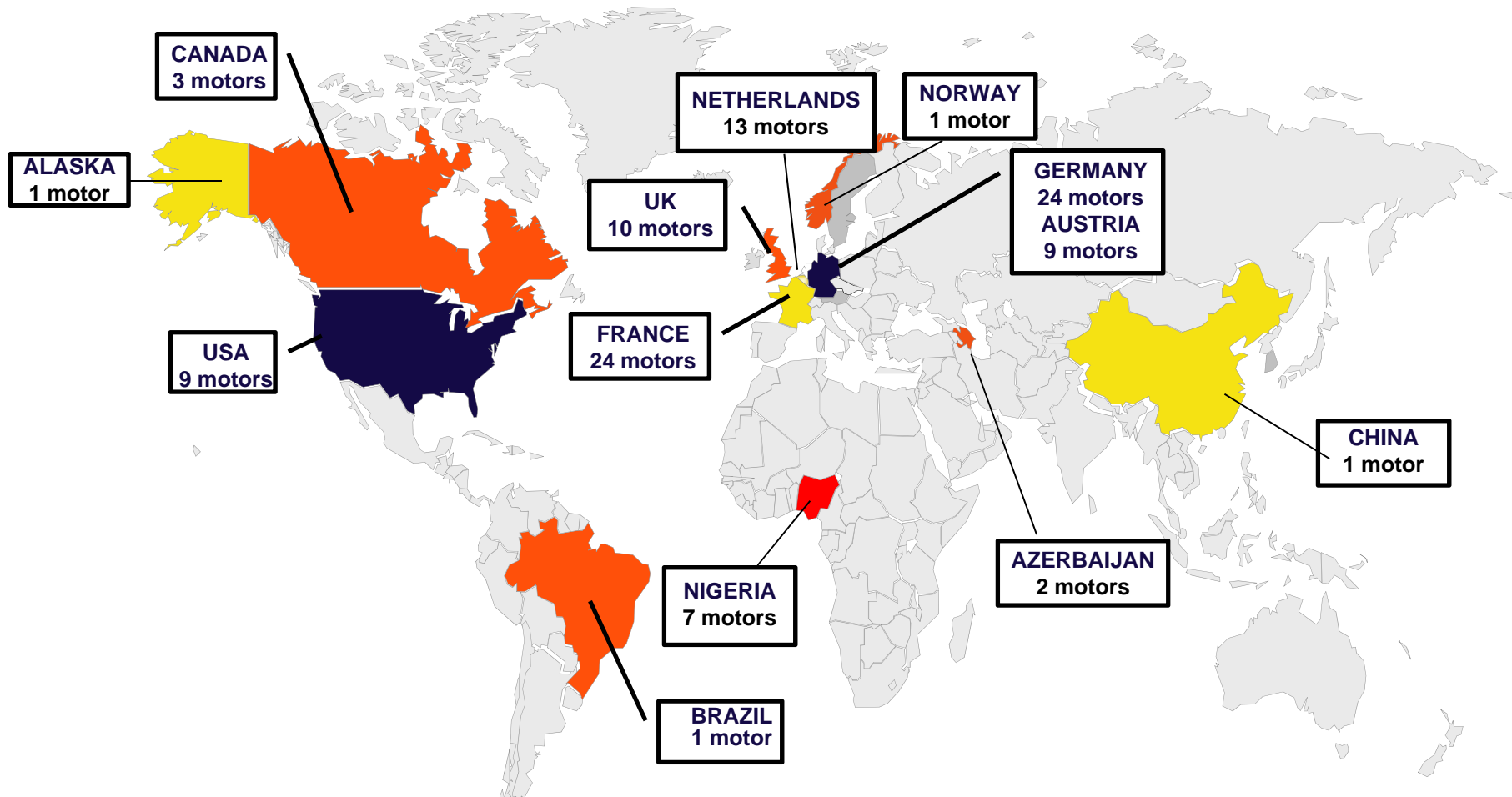
USA

4 x 3.4MW – 10,000RPM

Gas Transmission

18+ Years Operating Experience!

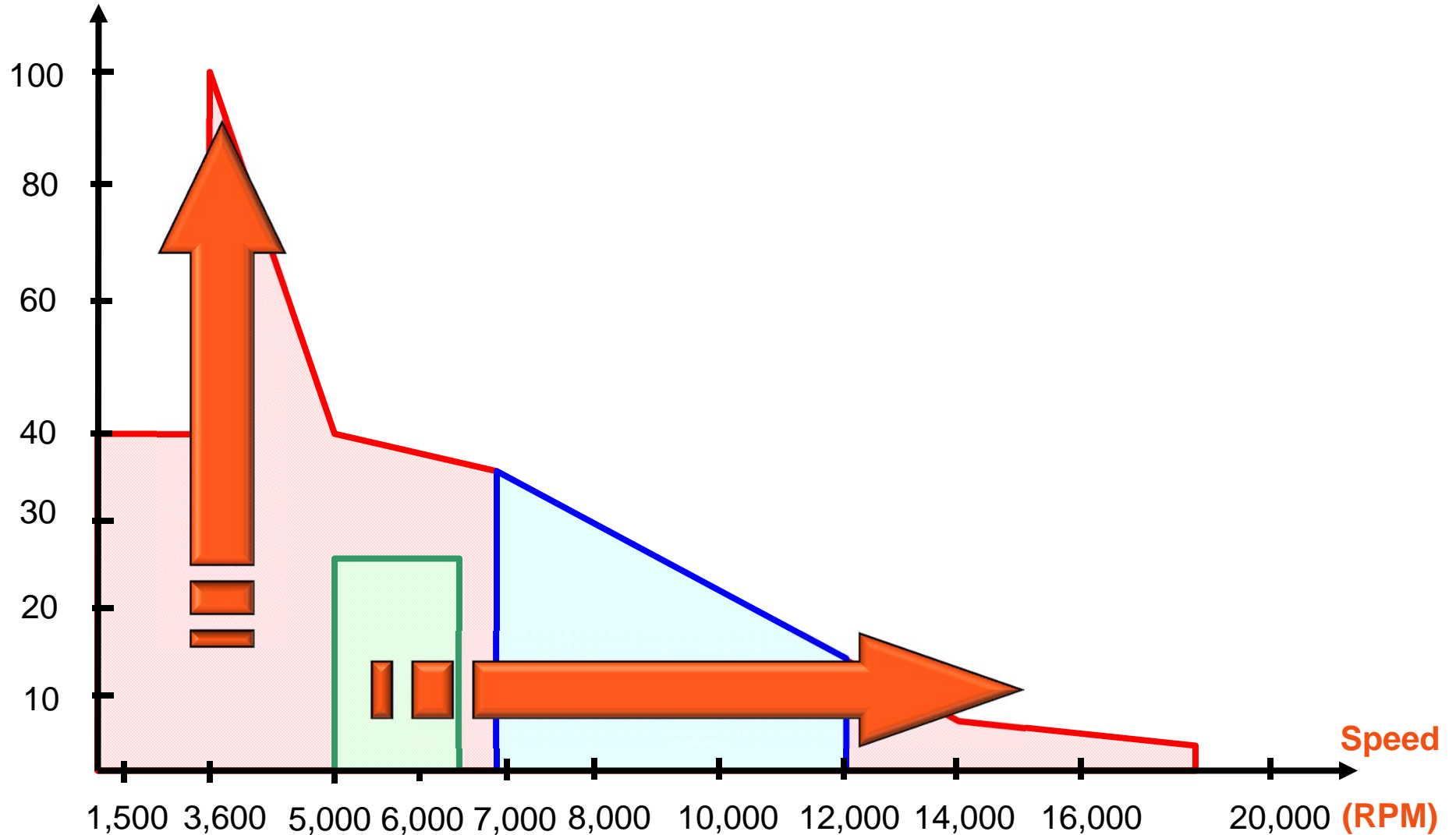
Today: 110 HSM ordered ... including 93 MGV



Cumulated operation of hours = over 3,500,000 hours

High Speed Motor Trends

Power Rate (MW)



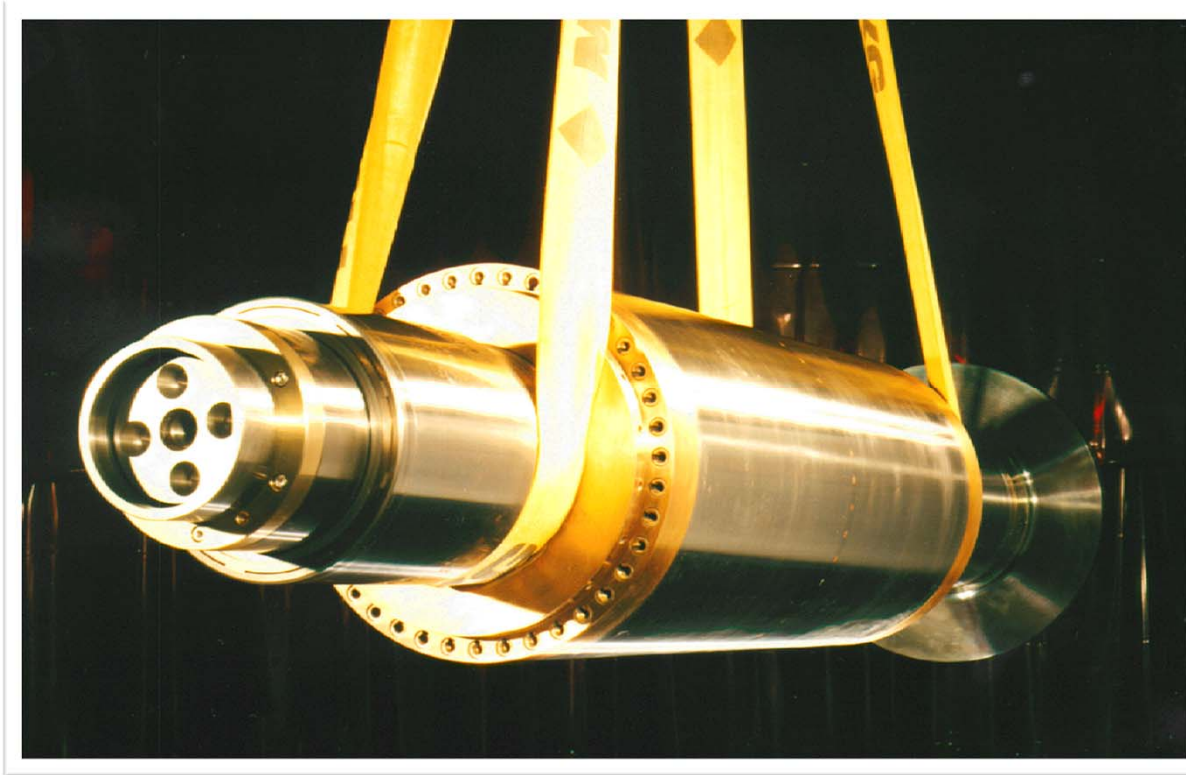


MGV Induction Motors

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8MW / 10,000RPM



MGV Applications

- Speed >6,000RPM = Variable Speed (Converter Based)
- Power >4,000HP = Direct Drive (No Speed Increaser)

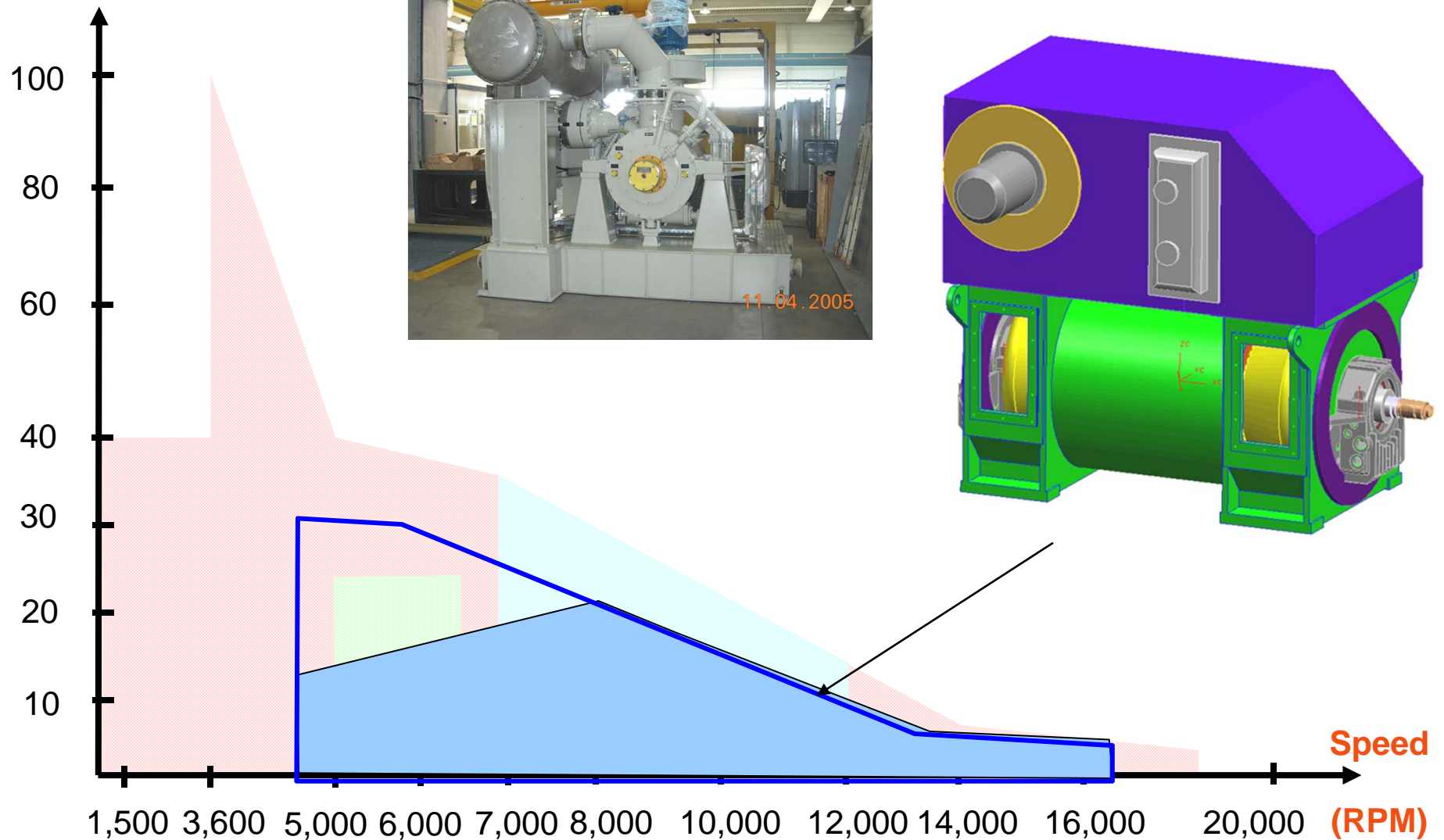
1999



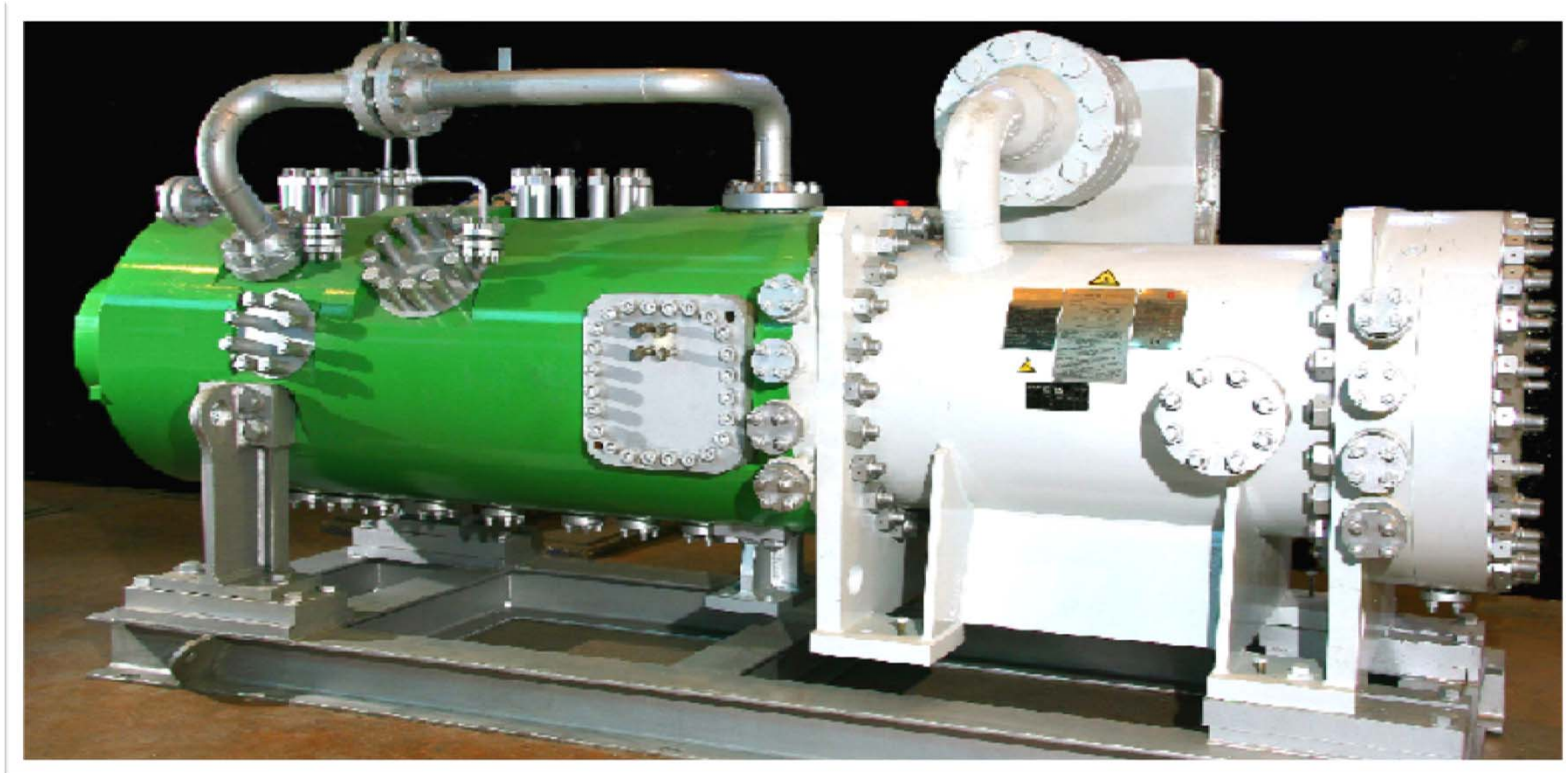
Thyssen Gas - Germany
8,000HP / 12,128RPM
Gas Transmission

MGV Stand Alone Platform

Power Rate (MW)



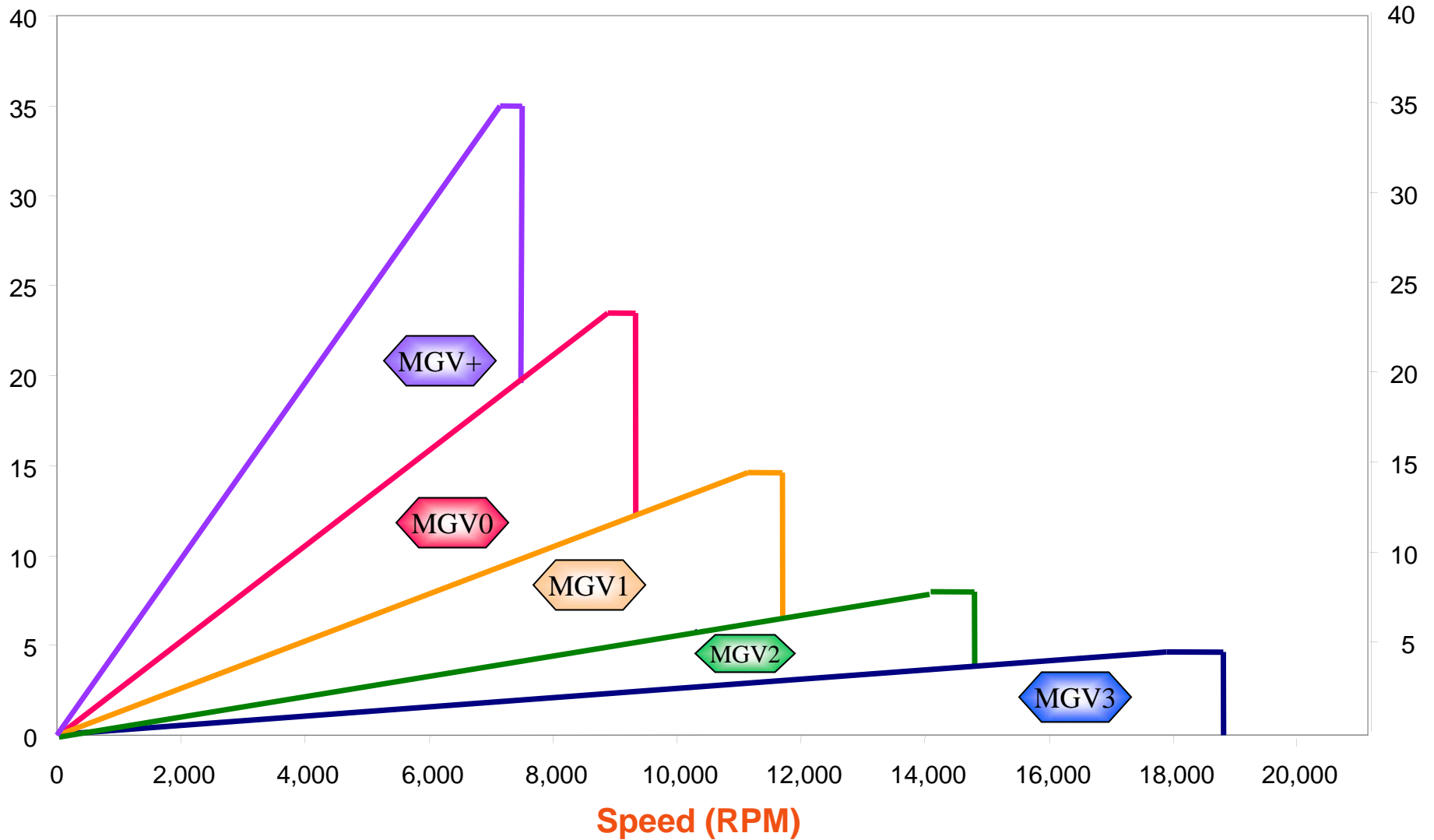
2006



**High Speed Motor
–MGV–
8,000HP / 11,500RPM**

MGV Range of Manufacture

Power (MW)





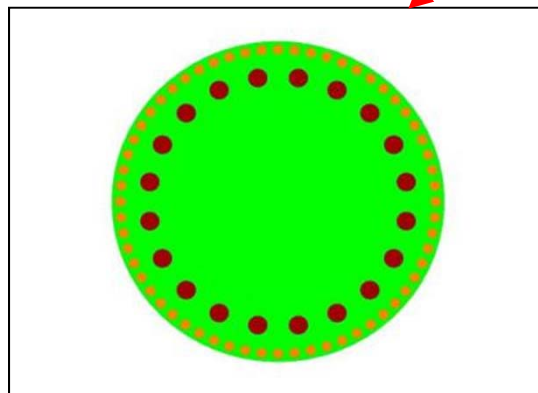
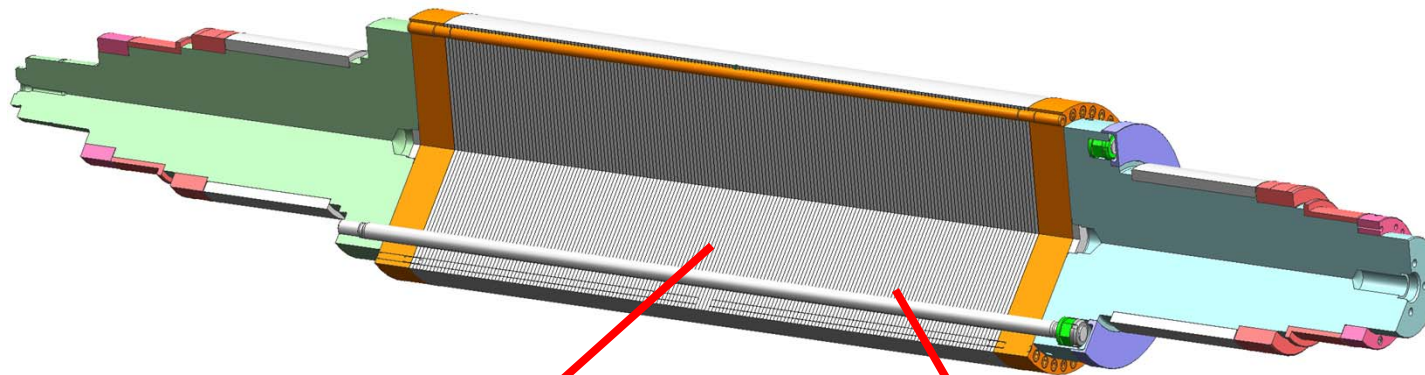
Rotor Technology

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Rotor Construction: lamination and tie rod system

High Performance: no eddy currents, efficiency, power factor

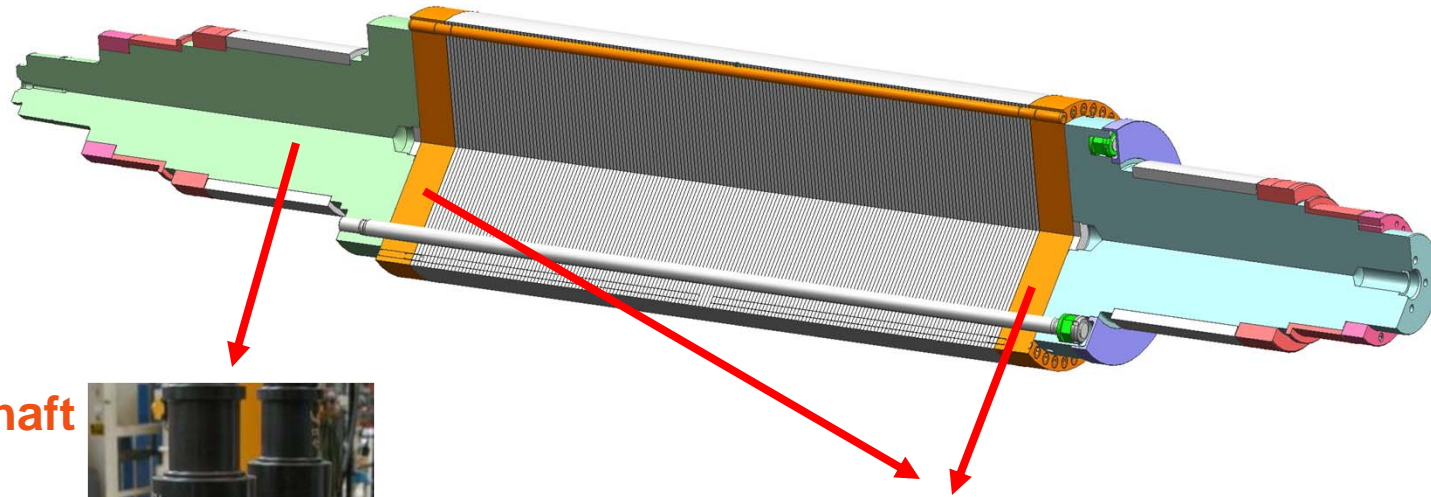


Laminations



Tie rods

End-shafts are fixed to the end-rings by tie rods



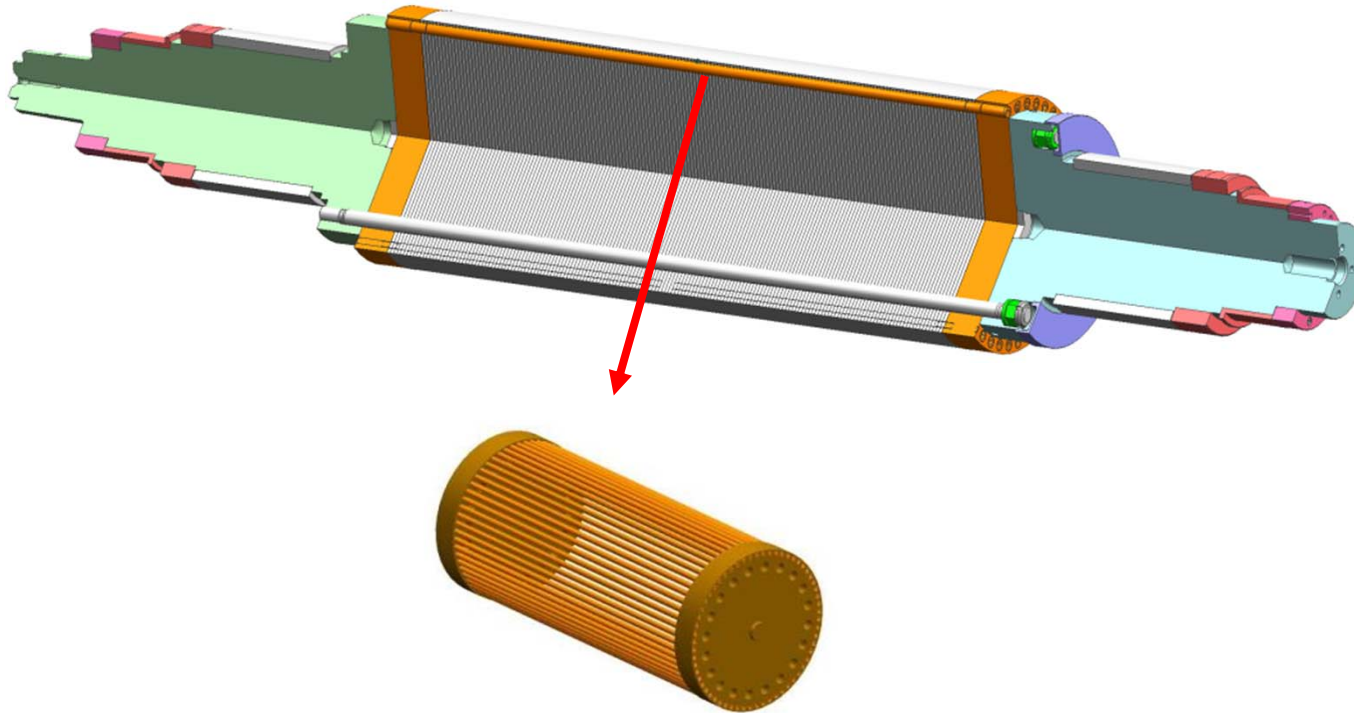
End-shaft



End-rings

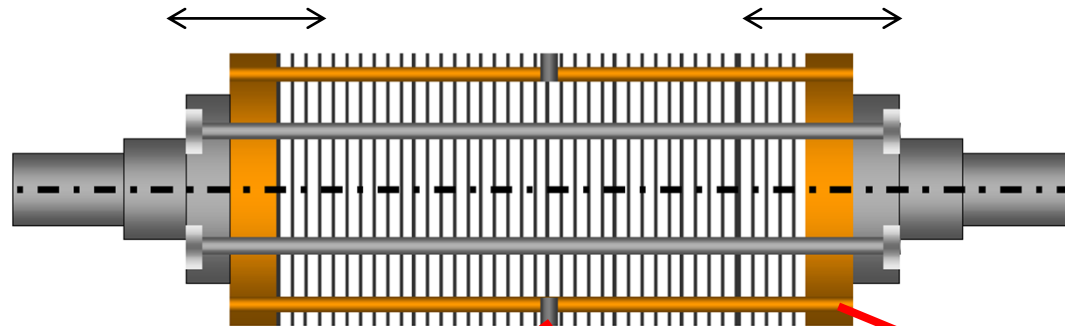


Squirrel cage bars are embedded in the laminated core

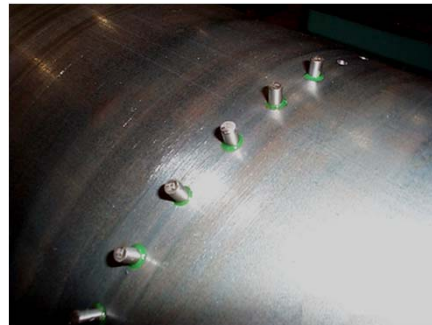


**A conventional induction
motor squirrel cage**

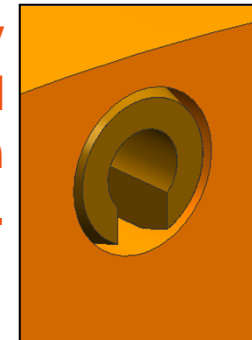
Patented Design: rotor cage expands/contracts freely w/o stress



Rotor bars centrally fixed to the magnetic mass

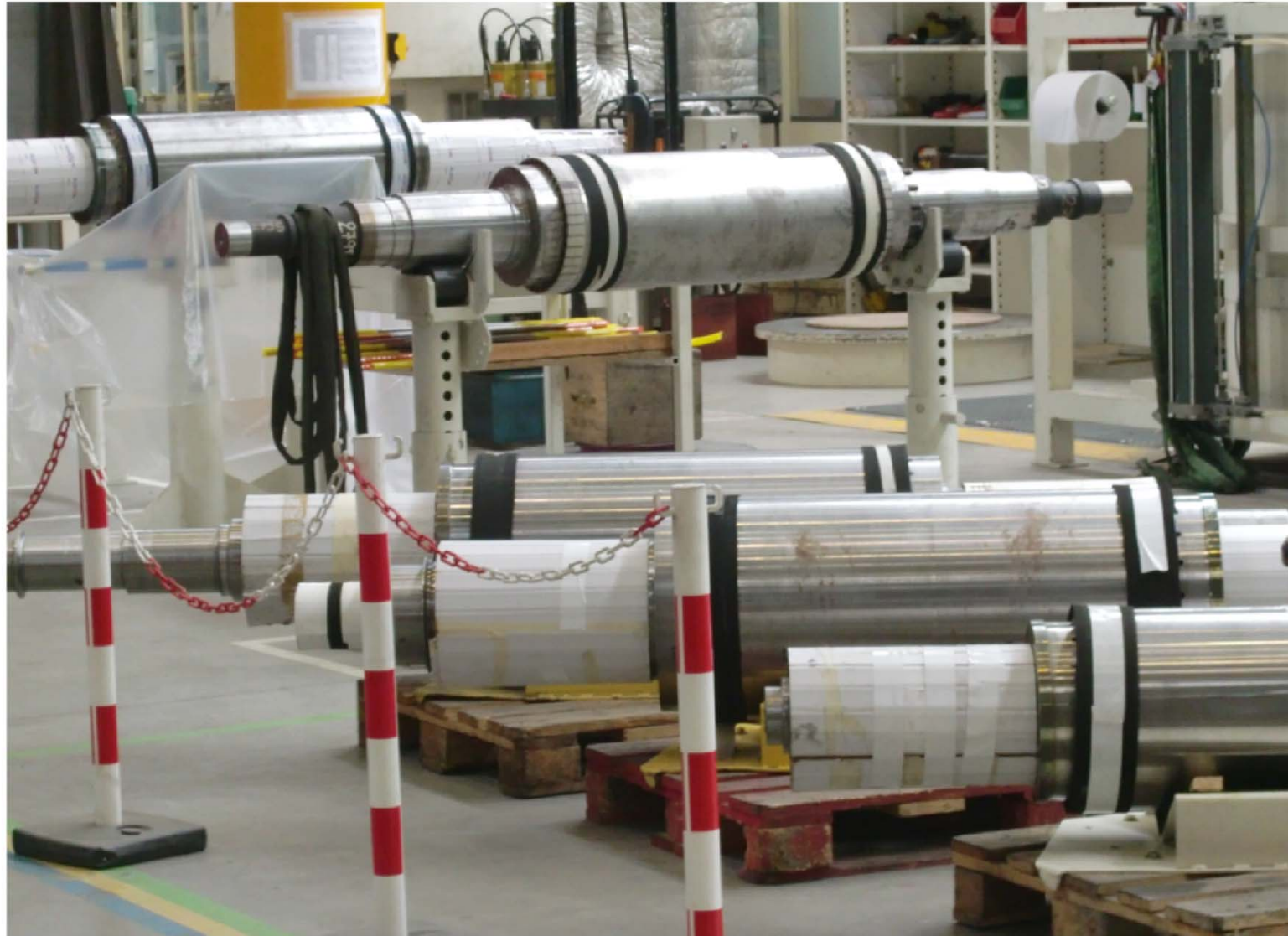


Rotor bars may freely expand and contract in the end ring.



- Rotor cage is not subject to thermal stress and unbalance as result of load or temperature excursions.

High Speed Rotor Development



Why a Laminated Rotor?

- Improved flux pattern enables improved rotor design
- Laminated core – very low eddy current losses
- Allows design with smaller air gap and improved electrical performance
- Uses low resistance copper cage materials
- Squirrel cage design – unimpaired thermal growth – no thermal stress
- Improved life - rotor bar to end ring connection
- Less project risk associated with major material imperfections
- Proven design
- *Patented technology*



Thank you for your attention

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