

Magnequench[®]

A Division of Neo Material Technologies Inc.

Leading Magnet Innovation[™]

Motor Design – HVAC Blower Motor

2009

HVAC Blower Motor

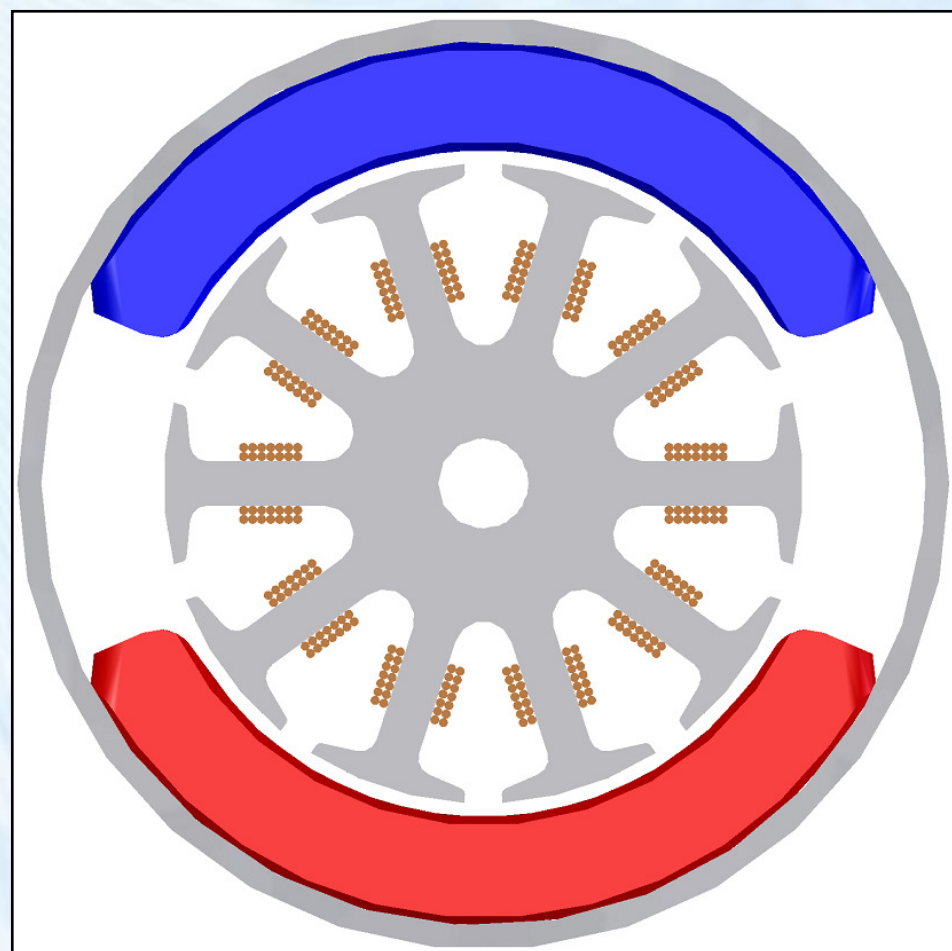
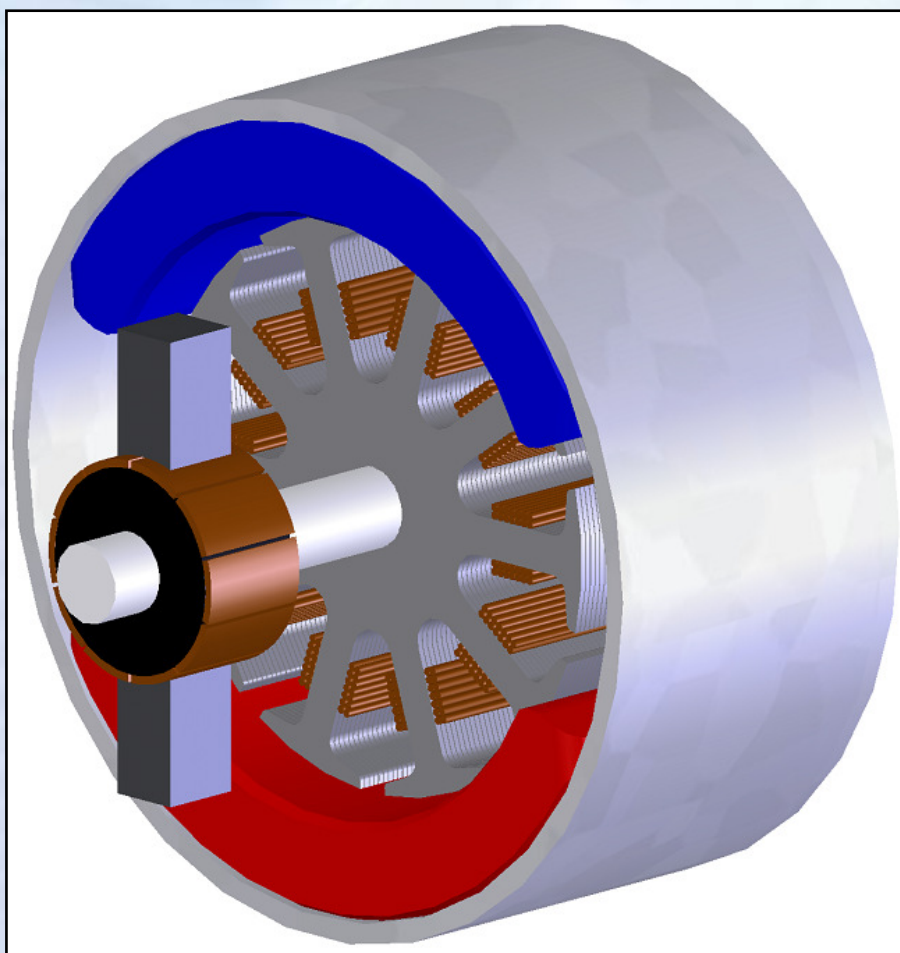
- Rationale

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- Many smaller motors in automobiles are switched from ferrite to bonded Neo magnets years ago
- Emerging trend to replace larger motors to improve environmental performance of cars
- Improved efficiency and performance
 - Higher torque and smaller size
 - Reduced energy consumption

Benchmark Ferrite HVAC Blower Motor

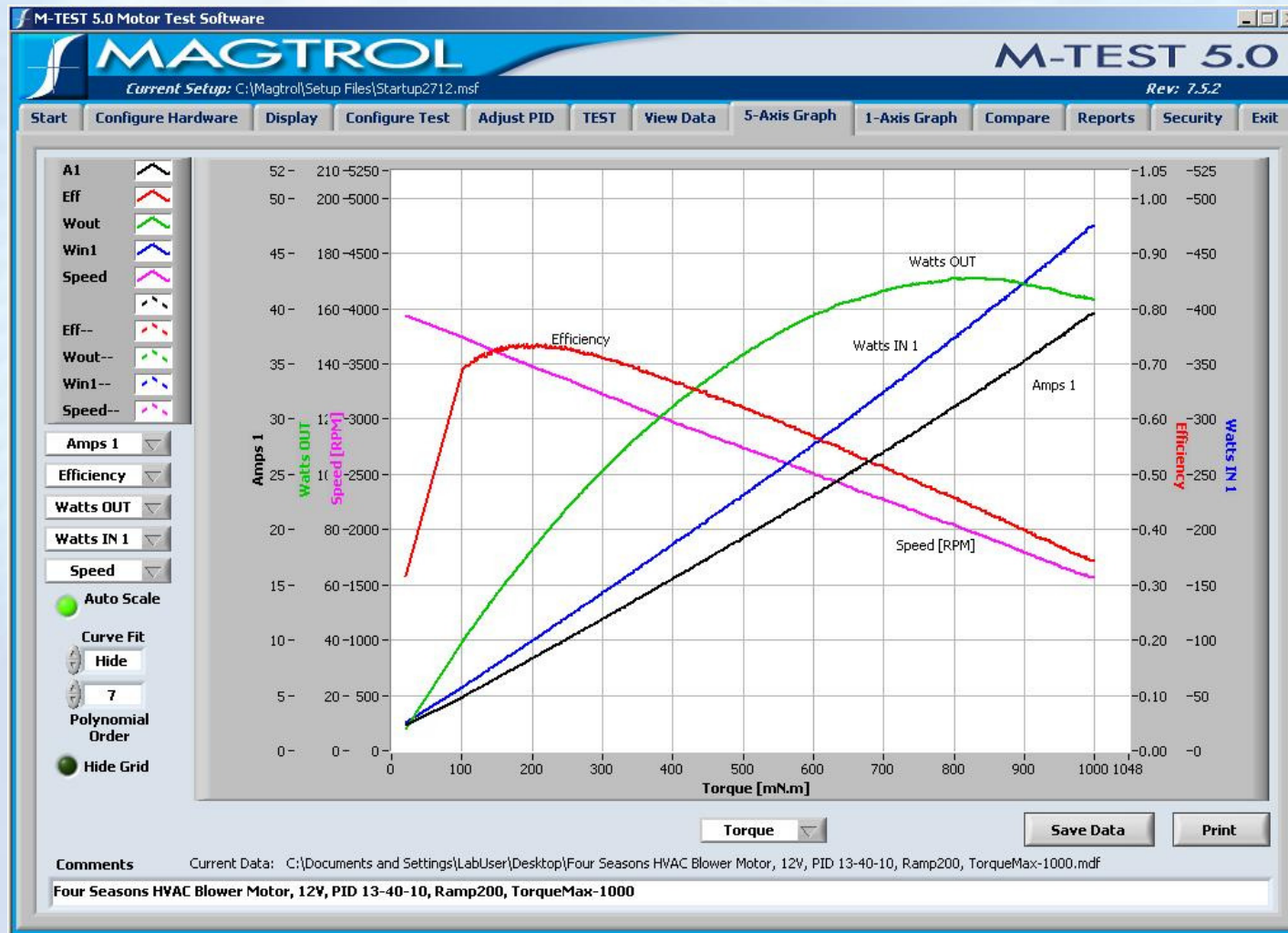
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Benchmark Ferrite HVAC Blower Motor

- Dyno Test

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Measurement of motor characteristics using the dynamometer

Comparison

Benchmark Ferrite HVAC Blower Motor Vs Bonded Neo

Parameter	Benchmark PMDC Motor	4-Pole PMDC motor with Bonded Neo Magnets	4-Pole BLDC motor with Bonded Neo Magnets
Type of Magnet	Ferrite	Compression Molded (B+-20056-070)	Compression Molded (B+-20056-070)
Total motor weight (gm)	697.51	422.23	446.5
Length of the motor* (mm)	37.2	23	25
Overall diameter**(mm)	81.8	65.5	62
Total copper weight (gm)	81.94	73.7	67.9
Total magnet weight (gm)	257.2	37.13	32.6
Length of Air gap (mm)	1.25	1.25	1.25
Current at 400 mN-m (A)	15.53	15.85	15.94
Current at 700 mN-m (A)	27	26.78	28
Efficiency at 400 mN-m (%)	66.84	66.7	73
Efficiency at 700 mN-m (%)	51.39	53.71	54

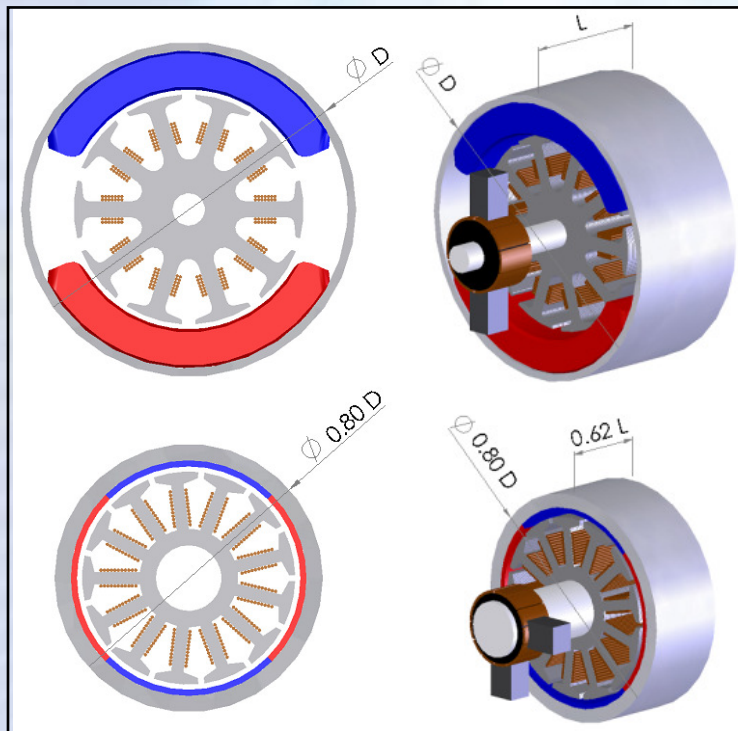
Comparison

Benchmark Ferrite HVAC Blower Motor Vs Bonded Neo

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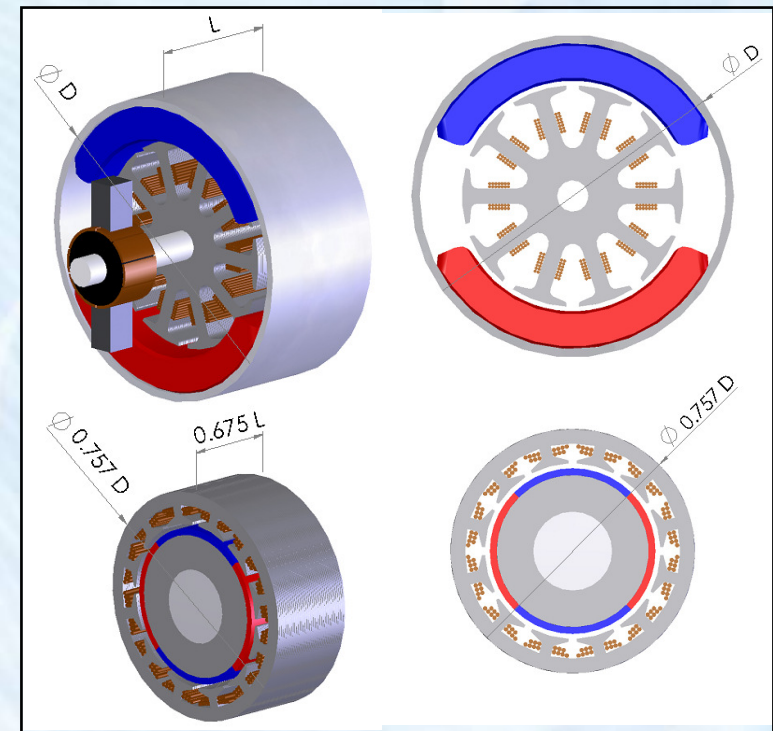
PMDC

PMBL DC



Benchmarked
Motor

Redesigned
Motor



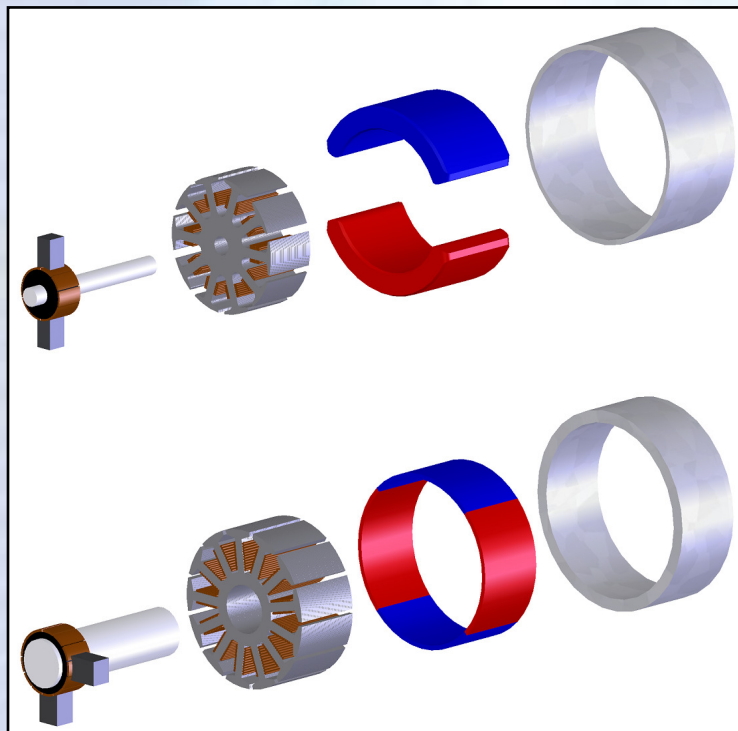
Comparison

Benchmark Ferrite HVAC Blower Motor Vs Bonded Neo

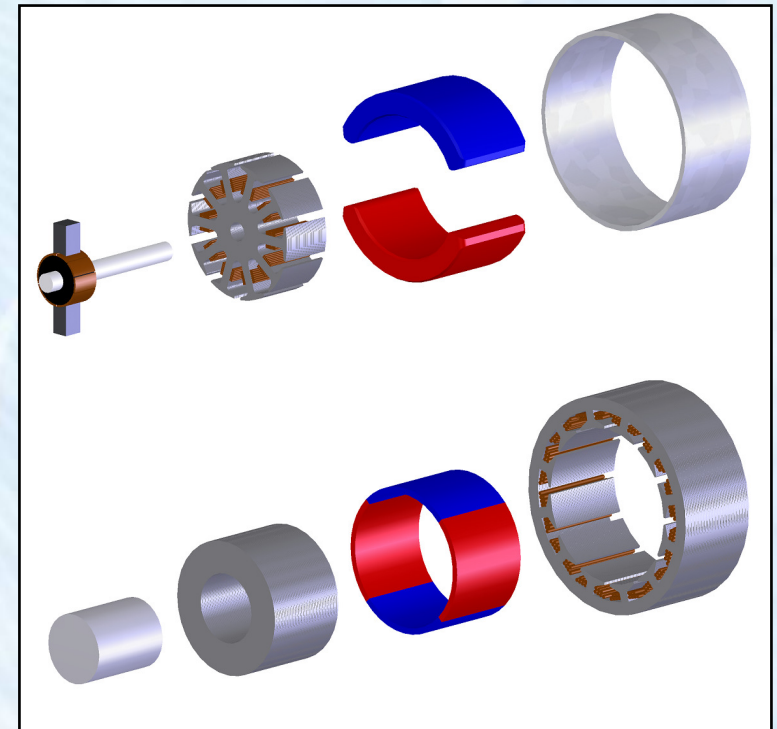
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PMDC

PMBL DC



Benchmarked Motor



Redesigned Motor

Improved Efficiency and Performance **Magnequench**

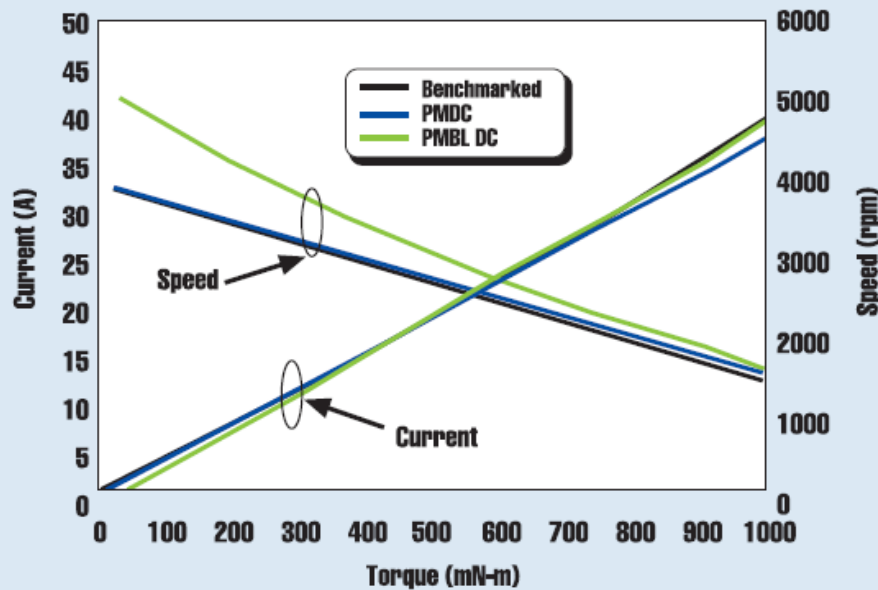
Benchmark Ferrite HVAC Blower Motor Vs Bonded Neo

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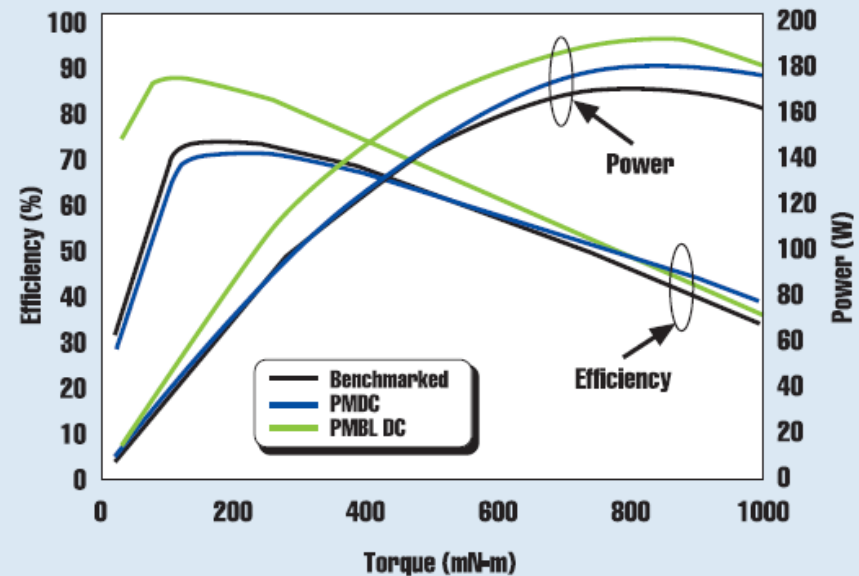
After Market Motor for Late Model Toyota & Honda Applications



Torque-Speed and Torque-Current Characteristics



Torque-Efficiency and Torque-Power Characteristics



Comparison

Benchmark Ferrite HVAC Blower Motor Vs Bonded Neo

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