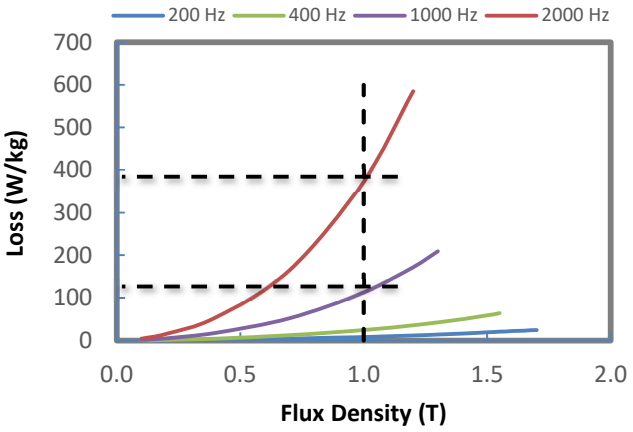
SALIENT FEATURES FOR HIGH SPEED MOTOR DESIGN – PART 1

High Speed Motor

- Number of Poles
- Magnet Material
- Soft Iron Material
- Sleeve Material

Number of Poles



Number of poles		4	2
Switching frequency	(Hz)	2f	f
Stator iron loss	(W)	15.8	6.72
Copper loss	(W)	2.57	5.79
Efficiency	(%)	70.19	76.26

- Increase number of poles
  - Better utilization of magnet
  - Shorter copper overhang length will reduce copper loss
  - Increased fundamental frequency and switching frequency, increased core loss
  - Complex and costly motor control

Magnet Material

No segmentation

7 segmentations

Magnet material		Sintered NdFeB	MQ1™
Resistivity	(Ω-m)	$1.4X10^{-6}$	140
Magnet loss with no magnet segmentation	(W)	0.94	$5.1x10^{-9}$
Magnet loss with 3 axial magnet segments	(W)	0.89	-
Magnet loss with 7 axial magnet segments	(W)	0.69	-

- Epoxy in MQ1™ magnet will lead to higher magnet resistivity and lower eddy current loss
- The use of fully dense sintered NdFeB magnet leads to lower resistivity and higher eddy current loss.
  - Need of magnet segmentation which increase the cost due to complex assembly
- Sintered neo ring is relatively more expensive than MQ1™ .

61 Science Park Road #01-19 The Galen
Singapore Science Park II Singapore 117525
research@magnequench.com
www.mqitechnology.com

Magnequench