TFG_Z01_TRa   [Magnetostatic]

The following proceedure might be one method to use in determining a usable mixture of design objectives between the pole material, pole windings, current and voltage. This is static only, however a feel for a starting point may be gained. AEDT Student can be used.

Parameters | Assign | Matrix

Matrix - "Name: Matrix1" - select Winding1 & Winding2

Winding1 & 2 | Winding Type | - Select "Resistance Voltage Drop"

Winding1:

Name	Value	Unit	Evaluated Value
Name	Winding1		
Type	Winding Group		
Winding Type	Resistance Voltage Drop		
IsSolid	Stranded		
Resistance	27	ohm	27ohm
Voltage	3.2	V	3.2V
Number of Parallel Branches	1		1

Name	Value	Unit	Evaluated Value
Name	CoilTerminal_N		
Type	Coil Terminal		
Number of Conductors	18		18
Direction	Point into terminal		

Winding2:

Name	Value	Unit	Evaluated Value
Name	Winding2		
Type	Winding Group		
Winding Type	Resistance Voltage Drop		
IsSolid	Stranded		
Resistance	27	ohm	27ohm
Voltage	3.2	V	3.2V
Number of Parallel Branches	1		1

Name	Value	Unit	Evaluated Value
Name	CoilTerminal_S		
Type	Coil Terminal		
Number of Conductors	18		18
Direction	Point into terminal		

Results | Solution Data | - move along the ribbon:

Winding Name	Flux Linkage[Wb]	Input Current[A]	Input Voltage[V]	Current[A]
Winding1	0.0046701	N/A	3.2	0.11852
Winding2	0.0046701	N/A	3.2	0.11852

Parameter: Matrix1   Type: Inductance

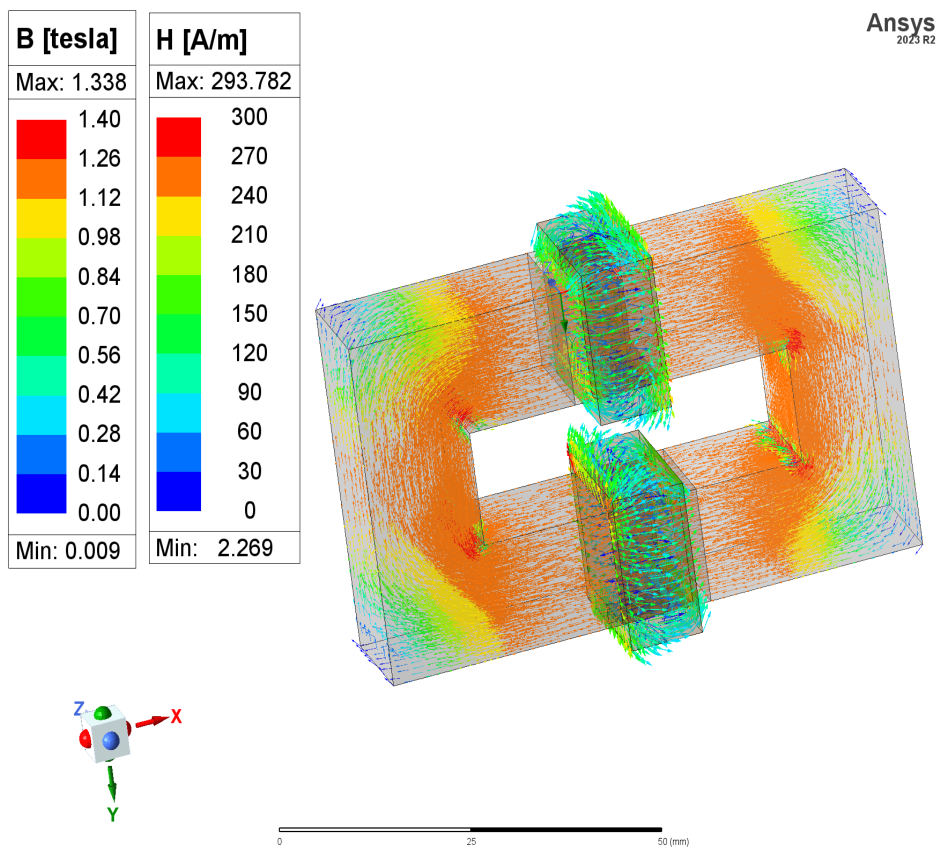
Pass: 10   Inductance Units: mH

View | Format | Export

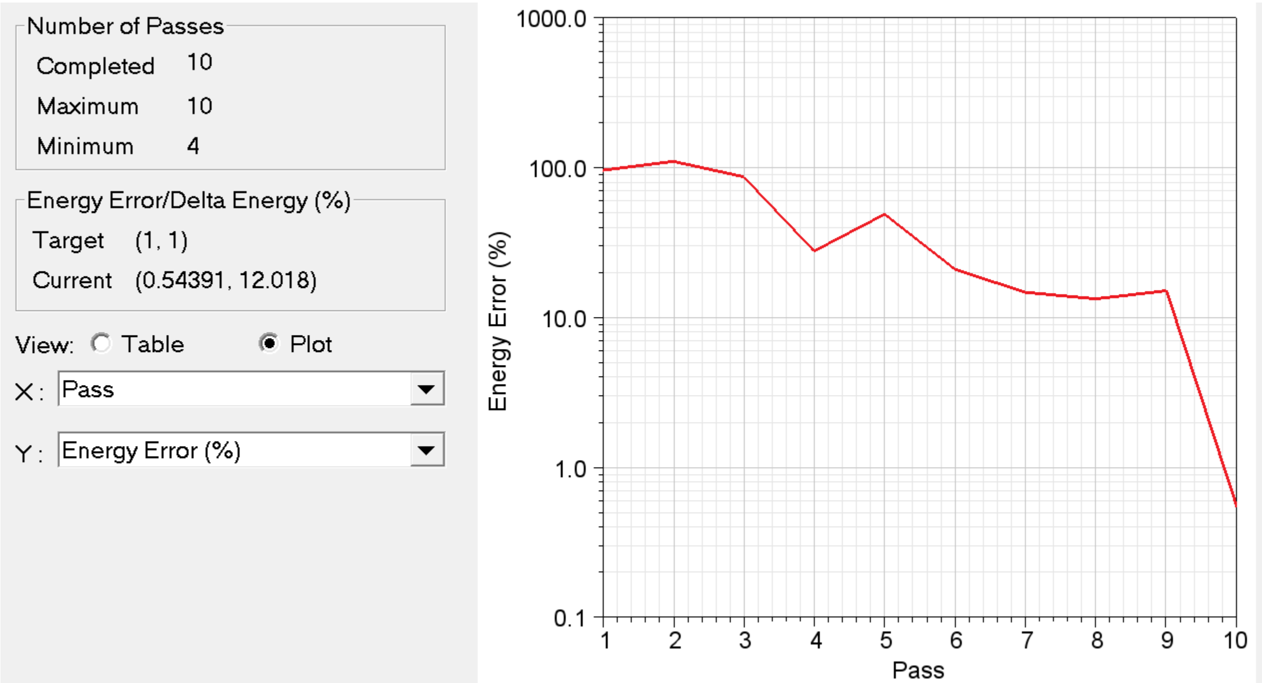
	Winding1	Winding2
Winding1	19.78	19.759
Winding2	19.759	19.78

Solid Loss[W]	Stranded Loss[W]
0	0.00042868

Field Overlays | B - B_Vector1, H - H_Vector1:



Convergence Check & Mesh Statistics:



Total number of elements: 52373

	Num Tets	Min edge length	Max edge length	RMS edge length	Min tet vol	Max tet vol	Mean tet vol	Std Devn (vol)
Coil_N	582	2.01005	6.59246	4.31205	0.324643	10.7214	3.00687	2.05697
Coil_S	581	2.3451	6.93921	4.30113	0.188426	10.4888	3.01205	2.03125
Region	28188	0.710406	39.8541	7.01532	0.0149761	1562.57	20.2568	56.4885
U_Lower	11056	0.698512	8.31638	3.15671	0.0169036	29.5337	1.83158	2.6894
U_Upper	11966	0.92308	9.22056	3.06946	0.0257783	46.1211	1.69229	2.73895

Proceedure:

This proceedure can be done using AEDT Student.

Enter the various data (Resistance, Voltage, Number of Conductors) and observe the results.
The goal is use the minimum Voltage, Current, and Windings to achieve near, or grater than,
1.2 Tesla (B) in the Poles. This value was taken from a variety of "Permanent Magnet Generator"
papers and information (NOTE: this is only a starting goal and is yet to be proven for this concept).

As different Pole Material are used, the results will change. This can be set by highlighting the "Pole"
in the Model, then double-click Material in the Properties. This brings up the available material
dialog. Check the B-H Curve (double click on the B-H chart and in - "X Scaling | Axis Scaling | select Log
and Apply"). Now you can view the lower end of the H (A_per_meter) VS B (tesla) expected results.

Trade-offs are Size of the Pole(s), Material, Number of Coil Turns, total Resistance, Current and Voltage.

If you balance these well, you should bet close to a working device; **but this is still "To Be Determined" by a "Proof-of-Concept" PROTOTYPE.**

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