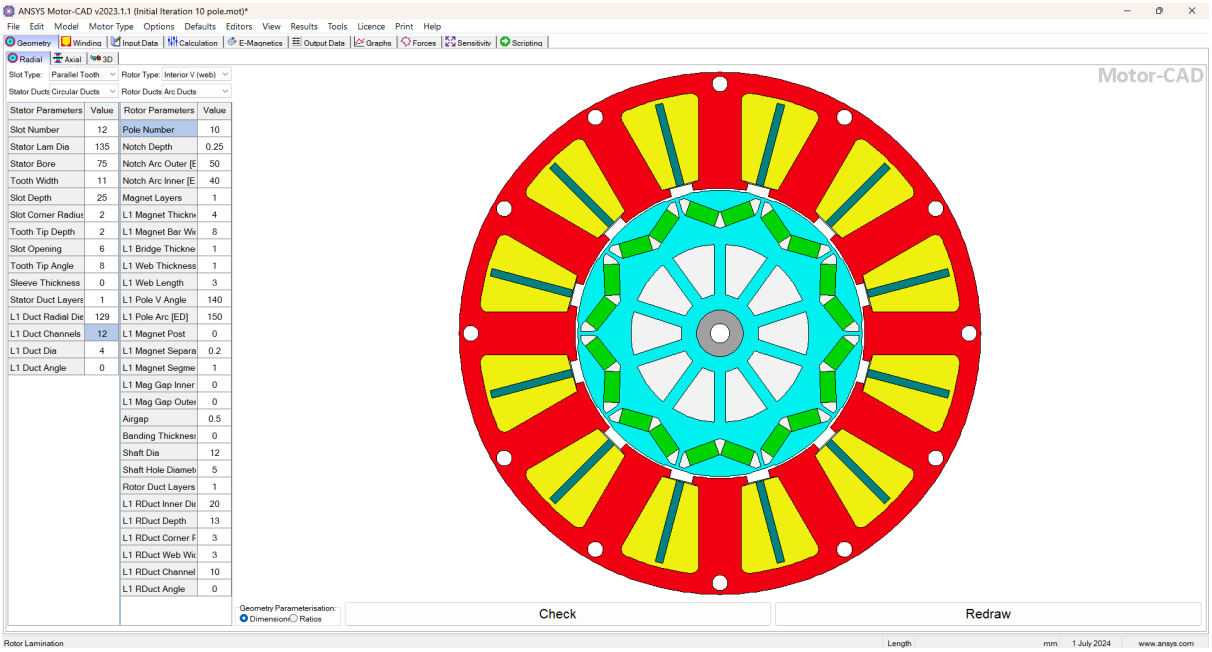
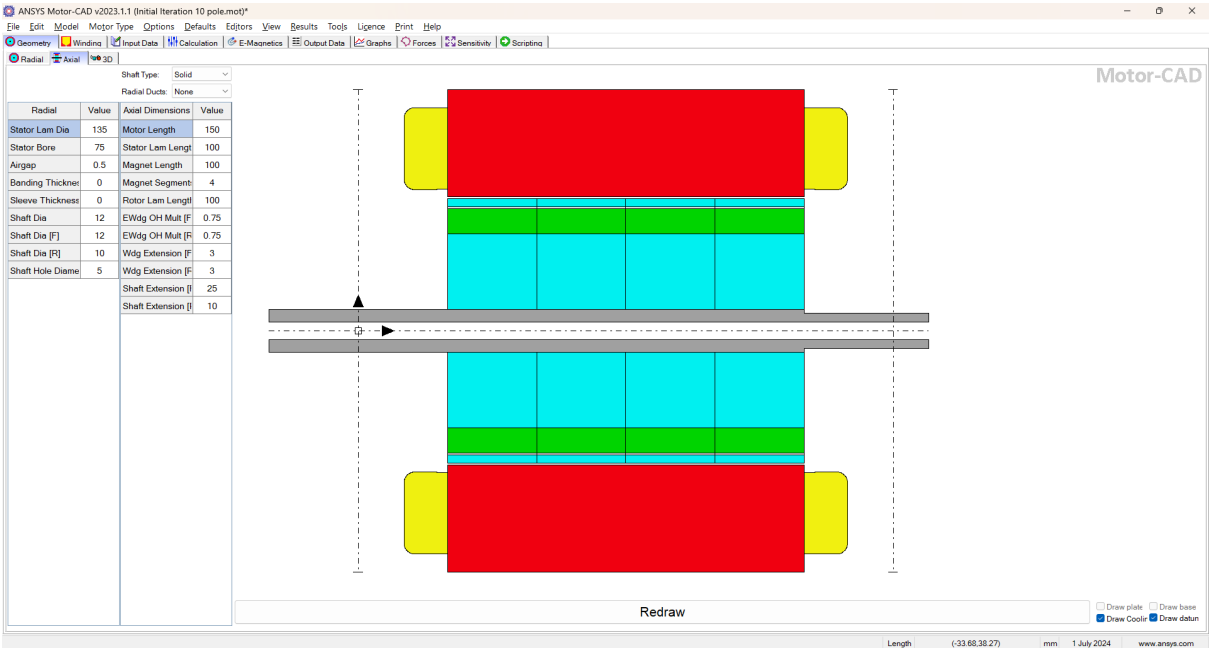
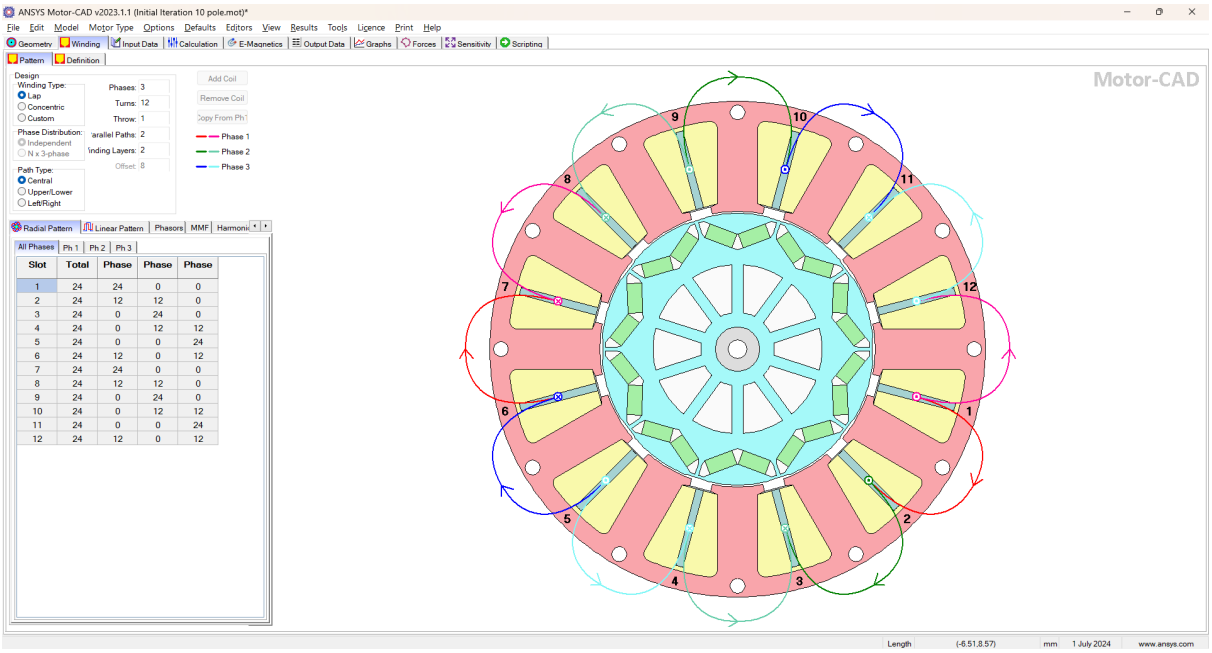
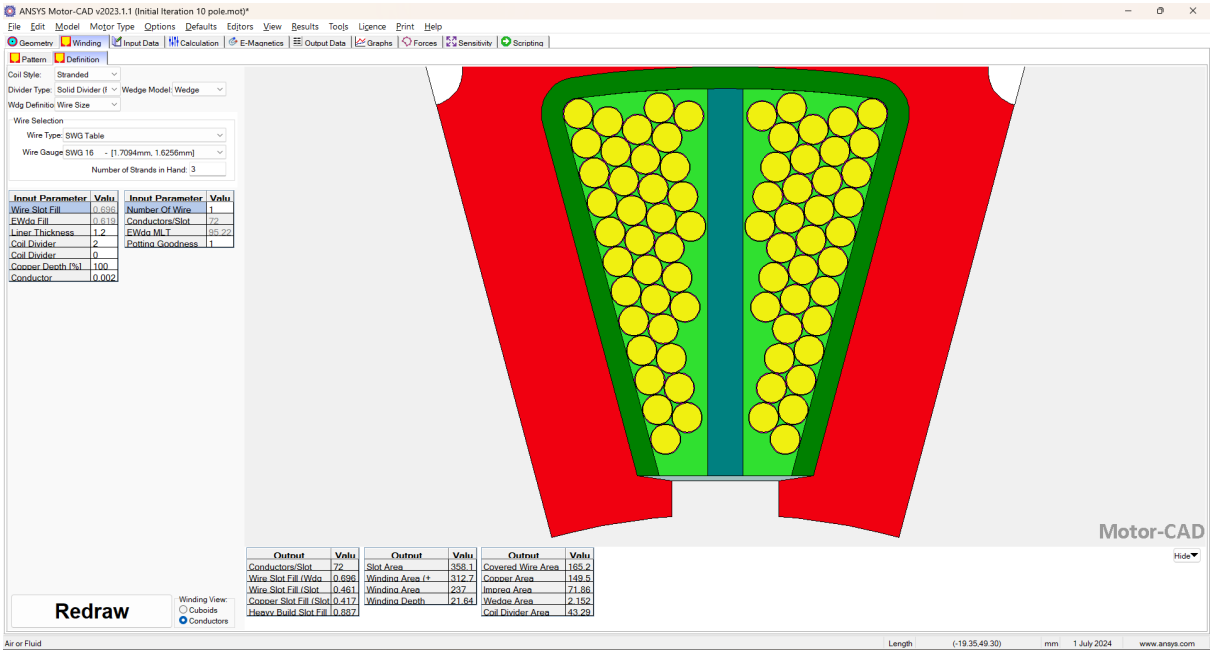
10 Pole


ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Radial Axial 3D
Slot Type: Parallel Tooth
Rotor Type: Interior V (web)
Stator Ducts Circular Ducts
Rotor Ducts Arc Ducts
Stator Parameters Value
Slot Number 12
Stator Lam Dia 135
Stator Bore 75
Tooth Width 11
Slot Depth 25
Slot Corner Radius 2
Tooth Tip Depth 2
Slot Opening 6
Tooth Tip Angle 8
Sleeve Thickness 0
Stator Duct Layers 1
L1 Duct Radial Dia 129
L1 Duct Channels 12
L1 Duct Dia 4
L1 Duct Angle 0
Rotor Parameters Value
Pole Number 10
Notch Depth 0.25
Notch Arc Outer [E 50
Notch Arc Inner [E 40
Magnet Layers 1
L1 Magnet Thickne 4
L1 Magnet Bar Wi 8
L1 Bridge Thickne 1
L1 Web Thickness 1
L1 Web Length 3
L1 Pole V Angle 140
L1 Pole Arc [ED] 150
L1 Magnet Post 0
L1 Magnet Separa 0.2
L1 Magnet Segme 1
L1 Mag Gap Inner 0
L1 Mag Gap Outer 0
Airgap 0.5
Banding Thickness 0
Shaft Dia 12
Shaft Hole Diamete 5
Rotor Duct Layers 1
L1 RDuct Inner Dia 20
L1 RDuct Depth 13
L1 RDuct Corner F 3
L1 RDuct Web Wic 3
L1 RDuct Channel 10
L1 RDuct Angle 0
Motor-CAD
Geometry Parameterisation: Dimensions Ratios
Check
Redraw
Rotor Lamination
Length
mm
1 July 2024
www.ansys.com


ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Radial Axial 3D
Shaft Type: Solid
Radial Ducts: None
Radial Value
Stator Lam Dia 135
Stator Bore 75
Airgap 0.5
Banding Thickne 0
Sleeve Thickness 0
Shaft Dia 12
Shaft Dia [F] 12
Shaft Dia [R] 10
Shaft Hole Diame 5
Axial Dimensions Value
Motor Length 150
Stator Lam Lengt 100
Magnet Length 100
Magnet Segment 4
Rotor Lam Length 100
EWdg OH Mult [F 0.75
EWdg OH Mult [R 0.75
Wdg Extension [F 3
Wdg Extension [F 3
Shaft Extension [I 25
Shaft Extension [I 10
Motor-CAD
Redraw
Draw plate
Draw base
Draw Coolir
Draw datun
Length
(-33.68,38.27)
mm
1 July 2024
www.ansys.com


ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
Motor-CAD
Phase 1
Phase 2
Phase 3
Slot | Total | Phase | Phase | Phase
1 | 24 | 24 | 0 | 0
2 | 24 | 12 | 12 | 0
3 | 24 | 0 | 24 | 0
4 | 24 | 0 | 12 | 12
5 | 24 | 0 | 0 | 24
6 | 24 | 12 | 0 | 12
7 | 24 | 24 | 0 | 0
8 | 24 | 12 | 12 | 0
9 | 24 | 0 | 24 | 0
10 | 24 | 0 | 12 | 12
11 | 24 | 0 | 0 | 24
12 | 24 | 12 | 0 | 12


ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
Motor-CAD
Redraw
Output | Valu
Conductors/Slot | 72
Wire Slot Fill (Wdg | 0.696
Wire Slot Fill (Slot | 0.461
Copper Slot Fill (Slot | 0.417
Heavy Build Slot Fill | 0.887
Slot Area | 358.1
Winding Area (+ | 312.7
Winding Area | 237...
Winding Depth | 21.64
Covered Wire Area | 165.2
Copper Area | 149.5
Impreg Area | 71.86
Wedge Area | 2.152
Coil Divider Area | 43.29

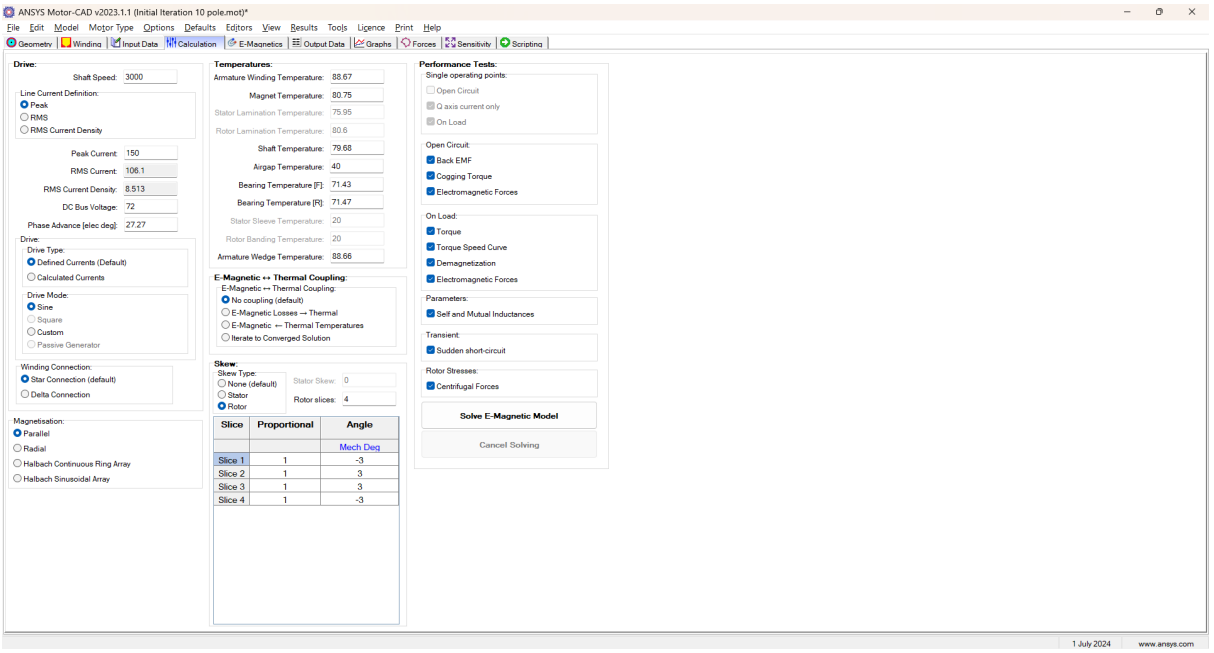
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*

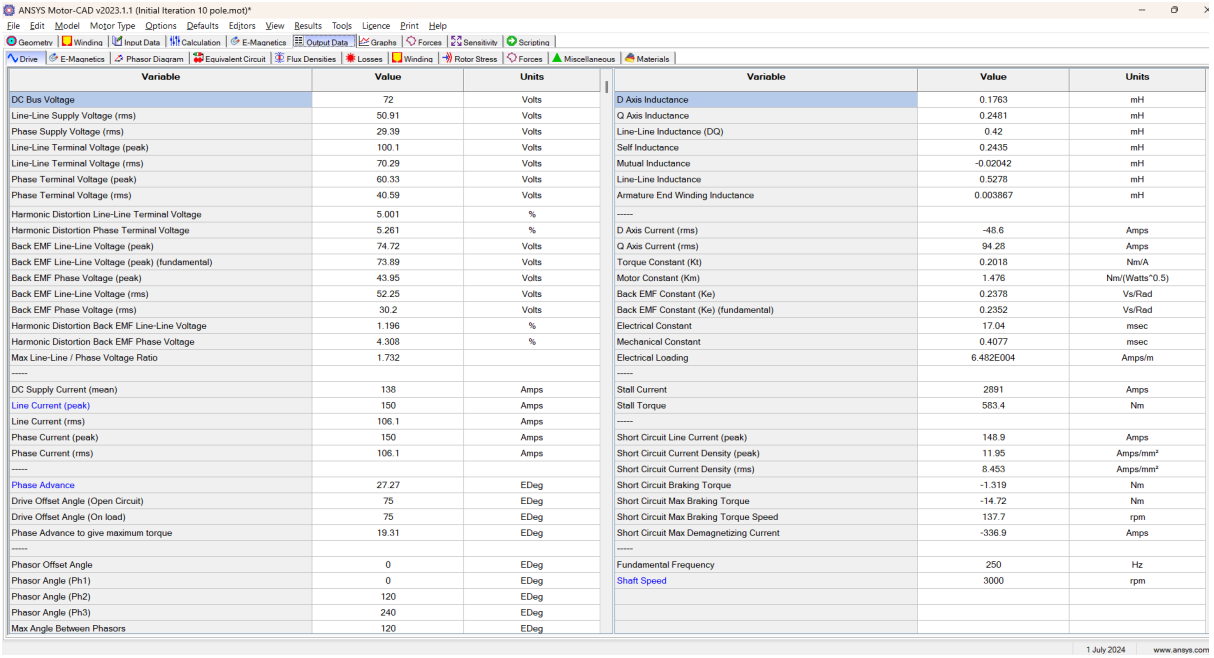
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help

Geometry | Winding | Input Data | Calculation | E-Magnetics | Output Data | Graphs | Forces | Sensitivity | Scripting

Materials | Settings | Material database

Component	Material from Database	Electrical Resistivit	Temp Coef	Magnet Br at	Magnet Relative	Temp Coef	Density	Weight	
Units		Ohm.m		Tesla		%/°C	kg/m³	kg	
Stator Lam (Back Iron)	M250-35A	5.9E-07	0				7650	1.403	
Stator Lam (Tooth)	M250-35A	5.9E-07	0				7650	2.536	
Stator Lamination								3.983	
Armature Winding	Copper (Annealed)	1.724E-08	0.00393				8933	1.603	
Armature EWdg [Front]	Copper (Annealed)	1.724E-08	0.00393				8933	0.3815	
Armature EWdg [Rear]	Copper (Annealed)	1.724E-08	0.00393				8933	0.3815	
Armature Winding								2.366	
Slot Wedge	Nomex 410	1E12	0				1400	0.00361	
Rotor Lam (Back Iron)	M250-35A	5.9E-07	0				7650	0.5236	
Rotor Lam (IPM Magnet	M250-35A	5.9E-07	0				7650	1.11	
Rotor Lam (Inter Magnet	M250-35A	5.9E-07	0				7650	0.1233	
Rotor Lamination [Total]								1.757	
Mag Magnet	N35UH	1.8E-06	0	1.21	1.05	-0.12	7500	0.48	
Shaft [Active]	Stainless Steel 302	7.2E-07	0				8055	0.07528	
Shaft [Front]	Stainless Steel 302	7.2E-07	0				8055	0.03764	
Shaft [Rear]	Stainless Steel 302	7.2E-07	0				8055	0.01661	
Shaft [Total]								0.1295	
Total								8.719	Weight [Total]





Variable	Value	Units
DC Bus Voltage	72	Volts
Line-Line Supply Voltage (rms)	50.91	Volts
Phase Supply Voltage (rms)	29.39	Volts
Line-Line Terminal Voltage (peak)	100.1	Volts
Line-Line Terminal Voltage (rms)	70.29	Volts
Phase Terminal Voltage (peak)	60.33	Volts
Phase Terminal Voltage (rms)	40.59	Volts
Harmonic Distortion Line-Line Terminal Voltage	5.001	%
Harmonic Distortion Phase Terminal Voltage	5.261	%
Back EMF Line-Line Voltage (peak)	74.72	Volts
Back EMF Line-Line Voltage (peak) (fundamental)	73.89	Volts
Back EMF Phase Voltage (peak)	43.95	Volts
Back EMF Line-Line Voltage (rms)	52.25	Volts
Back EMF Phase Voltage (rms)	30.2	Volts
Harmonic Distortion Back EMF Line-Line Voltage	1.196	%
Harmonic Distortion Back EMF Phase Voltage	4.308	%
Max Line-Line / Phase Voltage Ratio	1.732	

DC Supply Current (mean)	138	Amps
Line Current (peak)	150	Amps
Line Current (rms)	106.1	Amps
Phase Current (peak)	150	Amps
Phase Current (rms)	106.1	Amps

Phase Advance	27.27	EDeg
Drive Offset Angle (Open Circuit)	75	EDeg
Drive Offset Angle (On load)	75	EDeg
Phase Advance to give maximum torque	19.31	EDeg

Phasor Offset Angle	0	EDeg
Phasor Angle (Ph1)	0	EDeg
Phasor Angle (Ph2)	120	EDeg
Phasor Angle (Ph3)	240	EDeg
Max Angle Between Phasors	120	EDeg

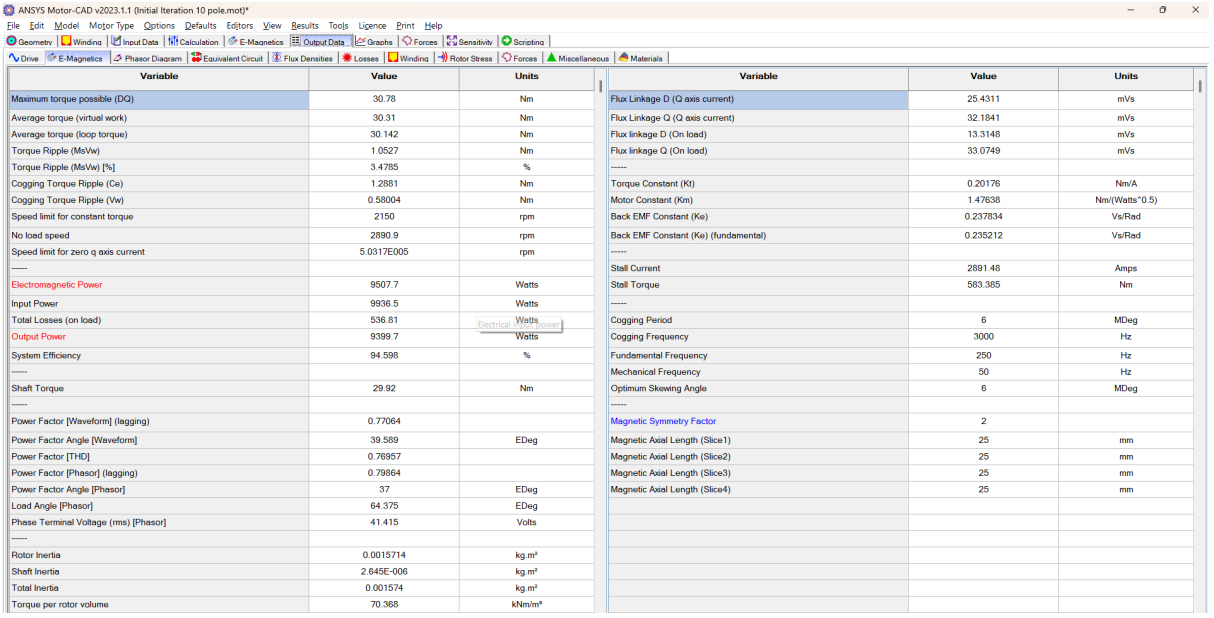
Variable	Value	Units
D Axis Inductance	0.1763	mH
Q Axis Inductance	0.2481	mH
Line-Line Inductance (DQ)	0.42	mH
Self Inductance	0.2435	mH
Mutual Inductance	-0.02042	mH
Line-Line Inductance	0.5278	mH
Armature End Winding Inductance	0.003867	mH

D Axis Current (rms)	-48.6	Amps
Q Axis Current (rms)	94.28	Amps
Torque Constant (Kt)	0.2018	Nm/A
Motor Constant (Km)	1.476	Nm/(Watts^0.5)
Back EMF Constant (Ke)	0.2378	Vs/Rad
Back EMF Constant (Ke) (fundamental)	0.2352	Vs/Rad
Electrical Constant	17.04	msec
Mechanical Constant	0.4077	msec
Electrical Loading	6.482E004	Amps/m

Stall Current	2891	Amps
Stall Torque	583.4	Nm

Short Circuit Line Current (peak)	148.9	Amps
Short Circuit Current Density (peak)	11.95	Amps/mm²
Short Circuit Current Density (rms)	8.453	Amps/mm²
Short Circuit Braking Torque	-1.319	Nm
Short Circuit Max Braking Torque	-14.72	Nm
Short Circuit Max Braking Torque Speed	137.7	rpm
Short Circuit Max Demagnetizing Current	-336.9	Amps

Fundamental Frequency	250	Hz
Shaft Speed	3000	rpm



Variable	Value	Units
Maximum torque possible (DQ)	30.78	Nm
Average torque (virtual work)	30.31	Nm
Average torque (loop torque)	30.142	Nm
Torque Ripple (MsVw)	1.0527	Nm
Torque Ripple (MsVw) [%]	3.4785	%
Cogging Torque Ripple (Ce)	1.2881	Nm
Cogging Torque Ripple (Vw)	0.58004	Nm
Speed limit for constant torque	2150	rpm
No load speed	2890.9	rpm
Speed limit for zero q axis current	5.0317E005	rpm

Electromagnetic Power	9507.7	Watts
Input Power	9936.5	Watts
Total Losses (on load)	536.81	Watts
Output Power	9399.7	Watts
System Efficiency	94.598	%

Shaft Torque	29.92	Nm

Power Factor [Waveform] (lagging)	0.77064	
Power Factor Angle [Waveform]	39.589	EDeg
Power Factor [THD]	0.76957	
Power Factor [Phasor] (lagging)	0.79864	
Power Factor Angle [Phasor]	37	EDeg
Load Angle [Phasor]	64.375	EDeg
Phase Terminal Voltage (rms) [Phasor]	41.415	Volts

Rotor Inertia	0.0015714	kg.m²
Shaft Inertia	2.645E-006	kg.m²
Total Inertia	0.001574	kg.m²
Torque per rotor volume	70.368	kNm/m³

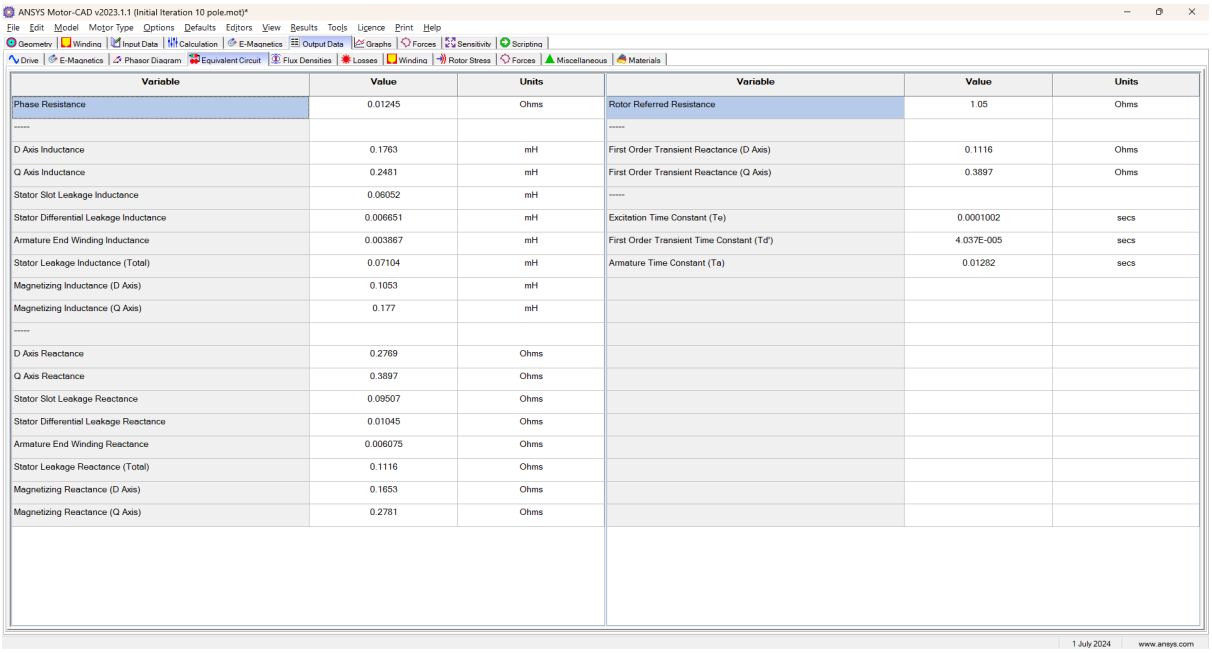
Variable	Value	Units
Flux Linkage D (Q axis current)	25.4311	mVs
Flux Linkage Q (Q axis current)	32.1841	mVs
Flux linkage D (On load)	13.3148	mVs
Flux linkage Q (On load)	33.0749	mVs

Torque Constant (Kt)	0.20176	Nm/A
Motor Constant (Km)	1.47638	Nm/(Watts^0.5)
Back EMF Constant (Ke)	0.237834	Vs/Rad
Back EMF Constant (Ke) (fundamental)	0.235212	Vs/Rad

Stall Current	2891.48	Amps
Stall Torque	583.385	Nm

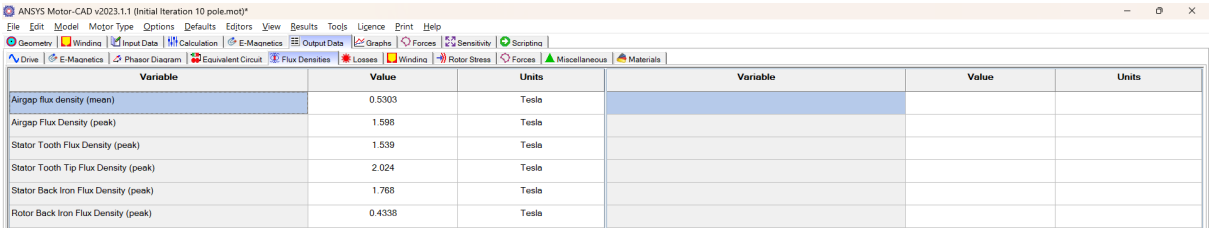
Cogging Period	6	MDeg
Cogging Frequency	3000	Hz
Fundamental Frequency	250	Hz
Mechanical Frequency	50	Hz
Optimum Skewing Angle	6	MDeg

Magnetic Symmetry Factor	2	
Magnetic Axial Length (Slice1)	25	mm
Magnetic Axial Length (Slice2)	25	mm
Magnetic Axial Length (Slice3)	25	mm
Magnetic Axial Length (Slice4)	25	mm

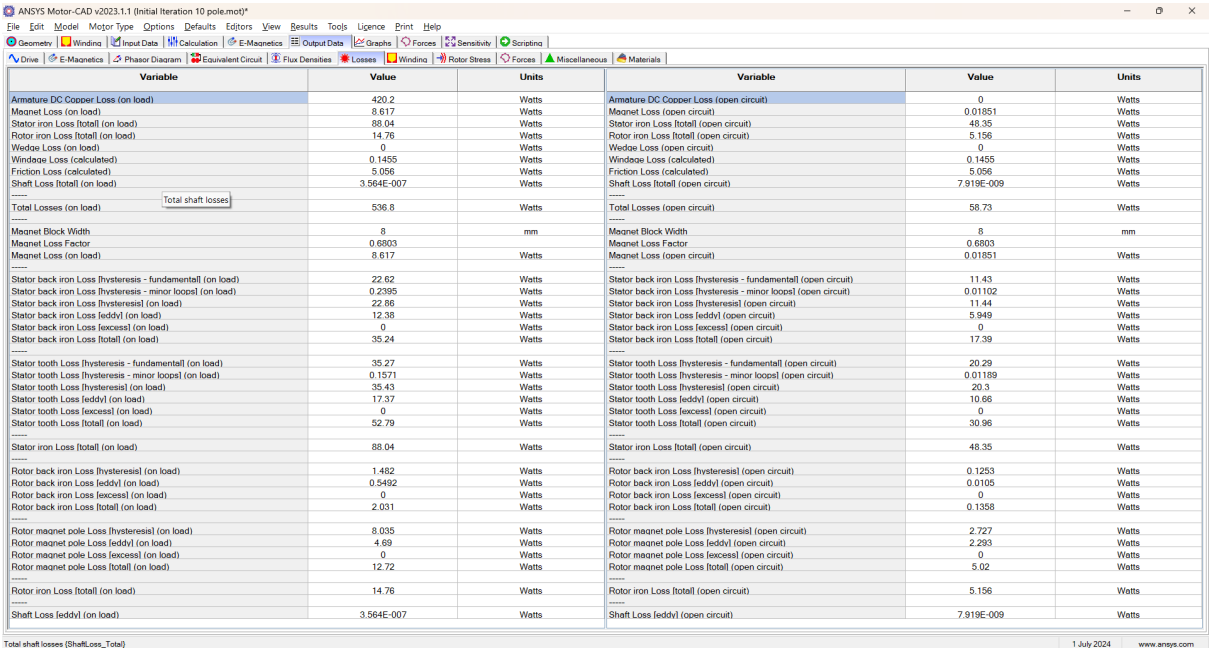


Variable	Value	Units	Variable	Value	Units
Phase Resistance	0.01245	Ohms	Rotor Referred Resistance	1.05	Ohms
-----			-----		
D Axis Inductance	0.1763	mH	First Order Transient Reactance (D Axis)	0.1116	Ohms
Q Axis Inductance	0.2481	mH	First Order Transient Reactance (Q Axis)	0.3897	Ohms
Stator Slot Leakage Inductance	0.06052	mH	-----		
Stator Differential Leakage Inductance	0.006651	mH	Excitation Time Constant (Te)	0.0001002	secs
Armature End Winding Inductance	0.003867	mH	First Order Transient Time Constant (Td')	4.037E-005	secs
Stator Leakage Inductance (Total)	0.07104	mH	Armature Time Constant (Ta)	0.01282	secs
Magnetizing Inductance (D Axis)	0.1053	mH			
Magnetizing Inductance (Q Axis)	0.177	mH			

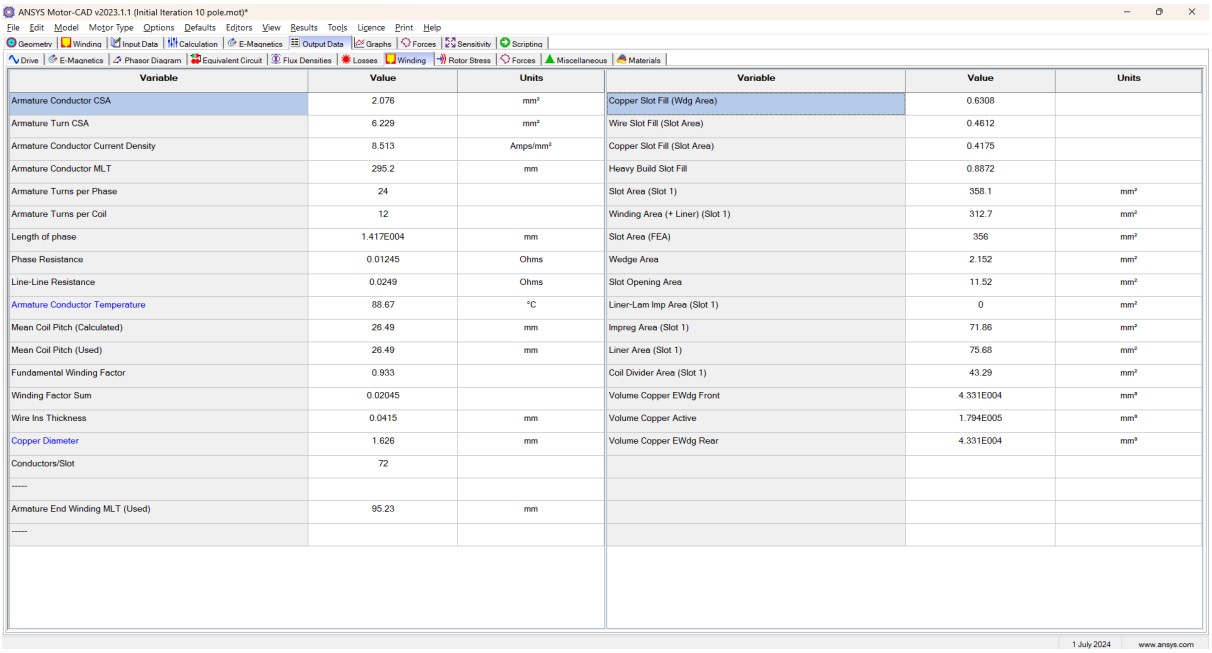
D Axis Reactance	0.2769	Ohms			
Q Axis Reactance	0.3897	Ohms			
Stator Slot Leakage Reactance	0.09507	Ohms			
Stator Differential Leakage Reactance	0.01045	Ohms			
Armature End Winding Reactance	0.006075	Ohms			
Stator Leakage Reactance (Total)	0.1116	Ohms			
Magnetizing Reactance (D Axis)	0.1653	Ohms			
Magnetizing Reactance (Q Axis)	0.2781	Ohms			



Variable	Value	Units	Variable	Value	Units
Airgap flux density (mean)	0.5303	Tesla			
Airgap Flux Density (peak)	1.598	Tesla			
Stator Tooth Flux Density (peak)	1.539	Tesla			
Stator Tooth Tip Flux Density (peak)	2.024	Tesla			
Stator Back Iron Flux Density (peak)	1.768	Tesla			
Rotor Back Iron Flux Density (peak)	0.4338	Tesla			

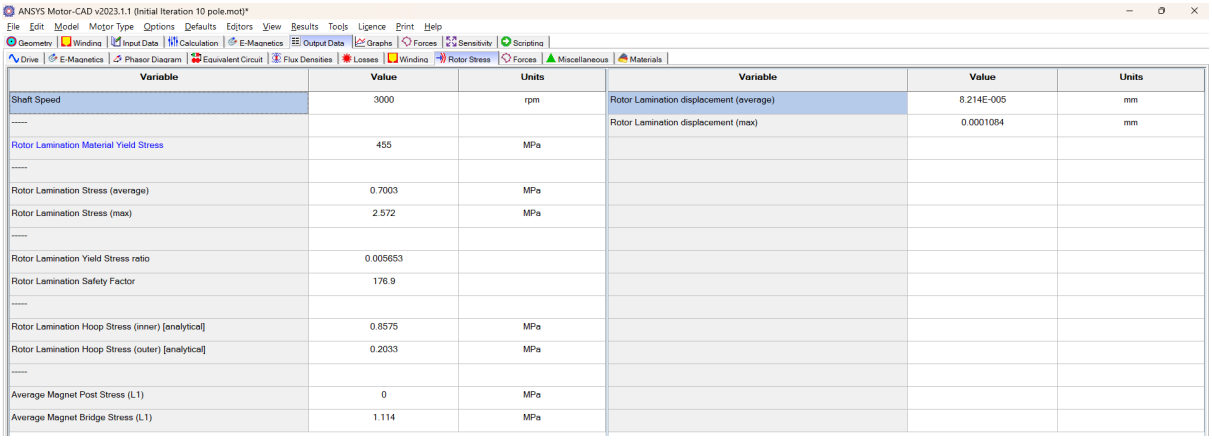


Variable	Value	Units	Variable	Value	Units
Armature DC Copper Loss (on load)	420.2	Watts	Armature DC Copper Loss (open circuit)	0	Watts
Magnet Loss (on load)	8.617	Watts	Magnet Loss (open circuit)	0.01851	Watts
Stator iron Loss [total] (on load)	88.04	Watts	Stator iron Loss [total] (open circuit)	48.35	Watts
Rotor iron Loss [total] (on load)	14.76	Watts	Rotor iron Loss [total] (open circuit)	5.156	Watts
Wedge Loss (on load)	0	Watts	Wedge Loss (open circuit)	0	Watts
Windage Loss (calculated)	0.1455	Watts	Windage Loss (calculated)	0.1455	Watts
Friction Loss (calculated)	5.056	Watts	Friction Loss (calculated)	5.056	Watts
Shaft Loss [total] (on load)	3.564E-007	Watts	Shaft Loss [total] (open circuit)	7.919E-009	Watts
-----			-----		
Total Losses (on load)	536.8	Watts	Total Losses (open circuit)	58.73	Watts
-----			-----		
Magnet Block Width	8	mm	Magnet Block Width	8	mm
Magnet Loss Factor	0.6803		Magnet Loss Factor	0.6803	
Magnet Loss (on load)	8.617	Watts	Magnet Loss (open circuit)	0.01851	Watts
-----			-----		
Stator back iron Loss [hysteresis - fundamental] (on load)	22.62	Watts	Stator back iron Loss [hysteresis - fundamental] (open circuit)	11.43	Watts
Stator back iron Loss [hysteresis - minor loops] (on load)	0.2395	Watts	Stator back iron Loss [hysteresis - minor loops] (open circuit)	0.01102	Watts
Stator back iron Loss [hysteresis] (on load)	22.86	Watts	Stator back iron Loss [hysteresis] (open circuit)	11.44	Watts
Stator back iron Loss [eddy] (on load)	12.38	Watts	Stator back iron Loss [eddy] (open circuit)	5.949	Watts
Stator back iron Loss [excess] (on load)	0	Watts	Stator back iron Loss [excess] (open circuit)	0	Watts
Stator back iron Loss [total] (on load)	35.24	Watts	Stator back iron Loss [total] (open circuit)	17.39	Watts
-----			-----		
Stator tooth Loss [hysteresis - fundamental] (on load)	35.27	Watts	Stator tooth Loss [hysteresis - fundamental] (open circuit)	20.29	Watts
Stator tooth Loss [hysteresis - minor loops] (on load)	0.1571	Watts	Stator tooth Loss [hysteresis - minor loops] (open circuit)	0.01189	Watts
Stator tooth Loss [hysteresis] (on load)	35.43	Watts	Stator tooth Loss [hysteresis] (open circuit)	20.3	Watts
Stator tooth Loss [eddy] (on load)	17.37	Watts	Stator tooth Loss [eddy] (open circuit)	10.66	Watts
Stator tooth Loss [excess] (on load)	0	Watts	Stator tooth Loss [excess] (open circuit)	0	Watts
Stator tooth Loss [total] (on load)	52.79	Watts	Stator tooth Loss [total] (open circuit)	30.96	Watts
-----			-----		
Stator iron Loss [total] (on load)	88.04	Watts	Stator iron Loss [total] (open circuit)	48.35	Watts
-----			-----		
Rotor back iron Loss [hysteresis] (on load)	1.482	Watts	Rotor back iron Loss [hysteresis] (open circuit)	0.1253	Watts
Rotor back iron Loss [eddy] (on load)	0.5492	Watts	Rotor back iron Loss [eddy] (open circuit)	0.0105	Watts
Rotor back iron Loss [excess] (on load)	0	Watts	Rotor back iron Loss [excess] (open circuit)	0	Watts
Rotor back iron Loss [total] (on load)	2.031	Watts	Rotor back iron Loss [total] (open circuit)	0.1358	Watts
-----			-----		
Rotor magnet pole Loss [hysteresis] (on load)	8.035	Watts	Rotor magnet pole Loss [hysteresis] (open circuit)	2.727	Watts
Rotor magnet pole Loss [eddy] (on load)	4.69	Watts	Rotor magnet pole Loss [eddy] (open circuit)	2.293	Watts
Rotor magnet pole Loss [excess] (on load)	0	Watts	Rotor magnet pole Loss [excess] (open circuit)	0	Watts
Rotor magnet pole Loss [total] (on load)	12.72	Watts	Rotor magnet pole Loss [total] (open circuit)	5.02	Watts
-----			-----		
Rotor iron Loss [total] (on load)	14.76	Watts	Rotor iron Loss [total] (open circuit)	5.156	Watts
-----			-----		
Shaft Loss [eddy] (on load)	3.564E-007	Watts	Shaft Loss [eddy] (open circuit)	7.919E-009	Watts



Variable	Value	Units	Variable	Value	Units
Armature Conductor CSA	2.076	mm²	Copper Slot Fill (Wdg Area)	0.6308	
Armature Turn CSA	6.229	mm²	Wire Slot Fill (Slot Area)	0.4612	
Armature Conductor Current Density	8.513	Amps/mm²	Copper Slot Fill (Slot Area)	0.4175	
Armature Conductor MLT	295.2	mm	Heavy Build Slot Fill	0.8872	
Armature Turns per Phase	24		Slot Area (Slot 1)	358.1	mm²
Armature Turns per Coil	12		Winding Area (+ Liner) (Slot 1)	312.7	mm²
Length of phase	1.417E004	mm	Slot Area (FEA)	356	mm²
Phase Resistance	0.01245	Ohms	Wedge Area	2.152	mm²
Line-Line Resistance	0.0249	Ohms	Slot Opening Area	11.52	mm²
Armature Conductor Temperature	88.67	°C	Liner-Lam Imp Area (Slot 1)	0	mm²
Mean Coil Pitch (Calculated)	26.49	mm	Impreg Area (Slot 1)	71.86	mm²
Mean Coil Pitch (Used)	26.49	mm	Liner Area (Slot 1)	75.68	mm²
Fundamental Winding Factor	0.933		Coil Divider Area (Slot 1)	43.29	mm²
Winding Factor Sum	0.02045		Volume Copper EWdg Front	4.331E004	mm³
Wire Ins Thickness	0.0415	mm	Volume Copper Active	1.794E005	mm³
Copper Diameter	1.626	mm	Volume Copper EWdg Rear	4.331E004	mm³
Conductors/Slot	72				

Armature End Winding MLT (Used)	95.23	mm			



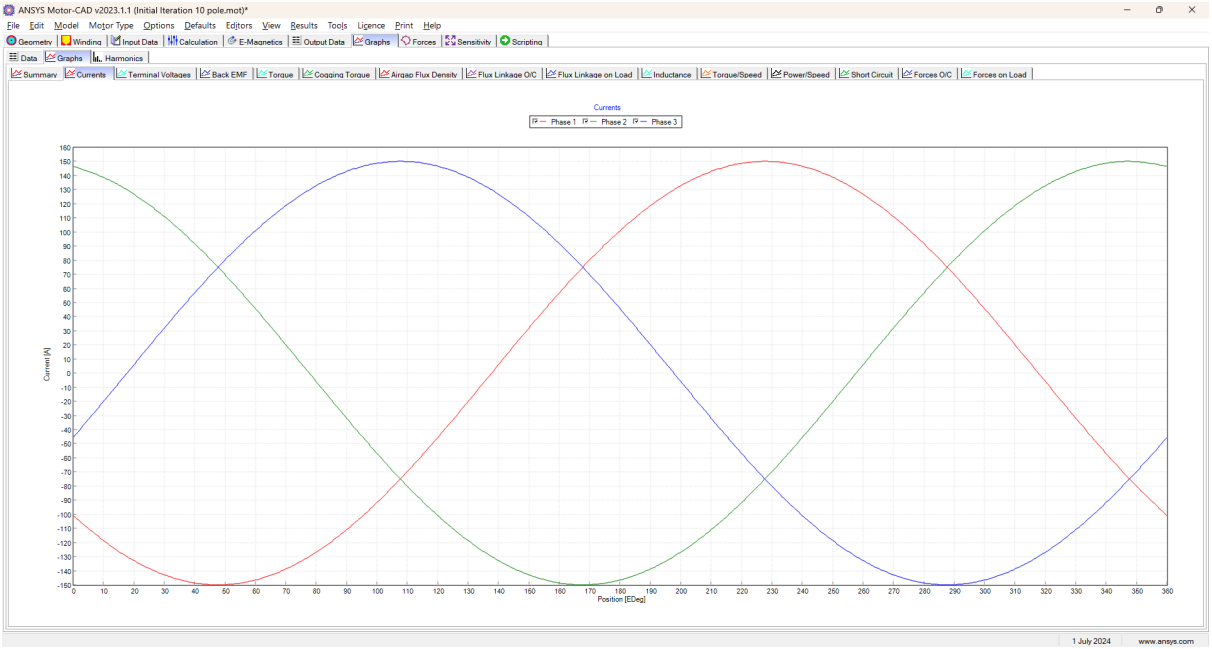
Variable	Value	Units	Variable	Value	Units
Shaft Speed	3000	rpm	Rotor Lamination displacement (average)	8.214E-005	mm
-----			Rotor Lamination displacement (max)	0.0001084	mm
Rotor Lamination Material Yield Stress	455	MPa			

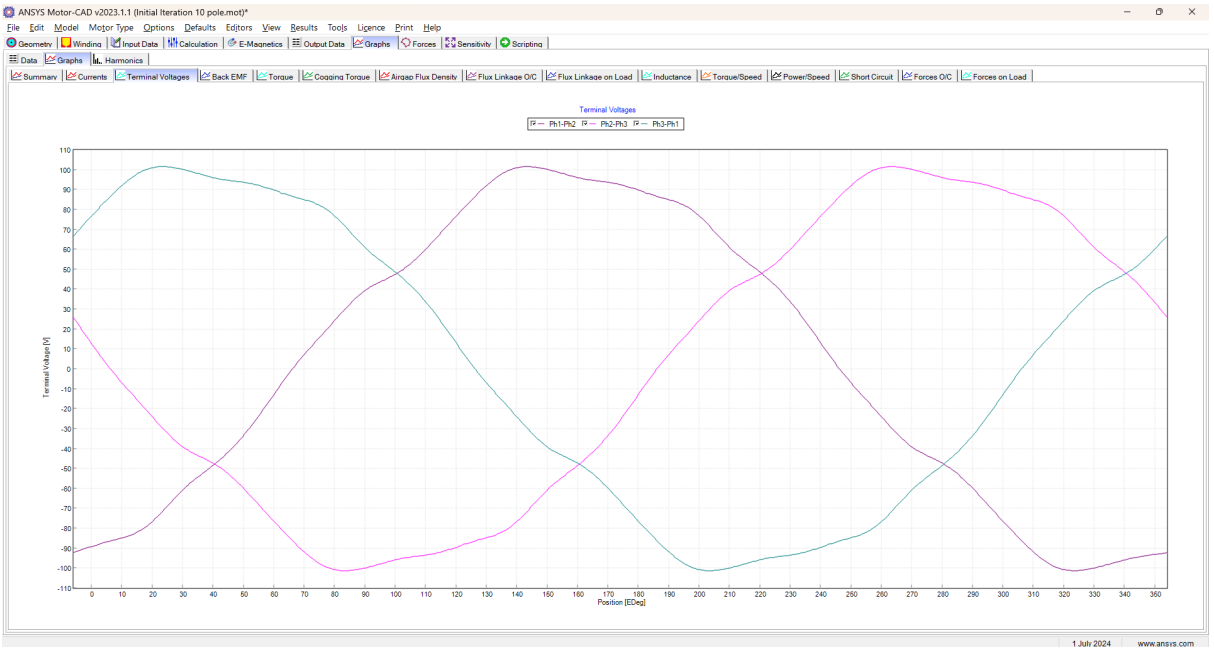
Rotor Lamination Stress (average)	0.7003	MPa			
Rotor Lamination Stress (max)	2.572	MPa			

Rotor Lamination Yield Stress ratio	0.005653				
Rotor Lamination Safety Factor	176.9				

Rotor Lamination Hoop Stress (inner) [analytical]	0.8575	MPa			
Rotor Lamination Hoop Stress (outer) [analytical]	0.2033	MPa			

Average Magnet Post Stress (L1)	0	MPa			
Average Magnet Bridge Stress (L1)	1.114	MPa			




ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Summary Currents Terminal Voltages Back EMF Torque Cogging Torque Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Inductance Torque/Speed Power/Speed Short Circuit Forces O/C Forces on Load
Terminal Voltages
Ph1-Ph2 Ph2-Ph3 Ph3-Ph1
Terminal Voltage [V]
Position [EDeg]
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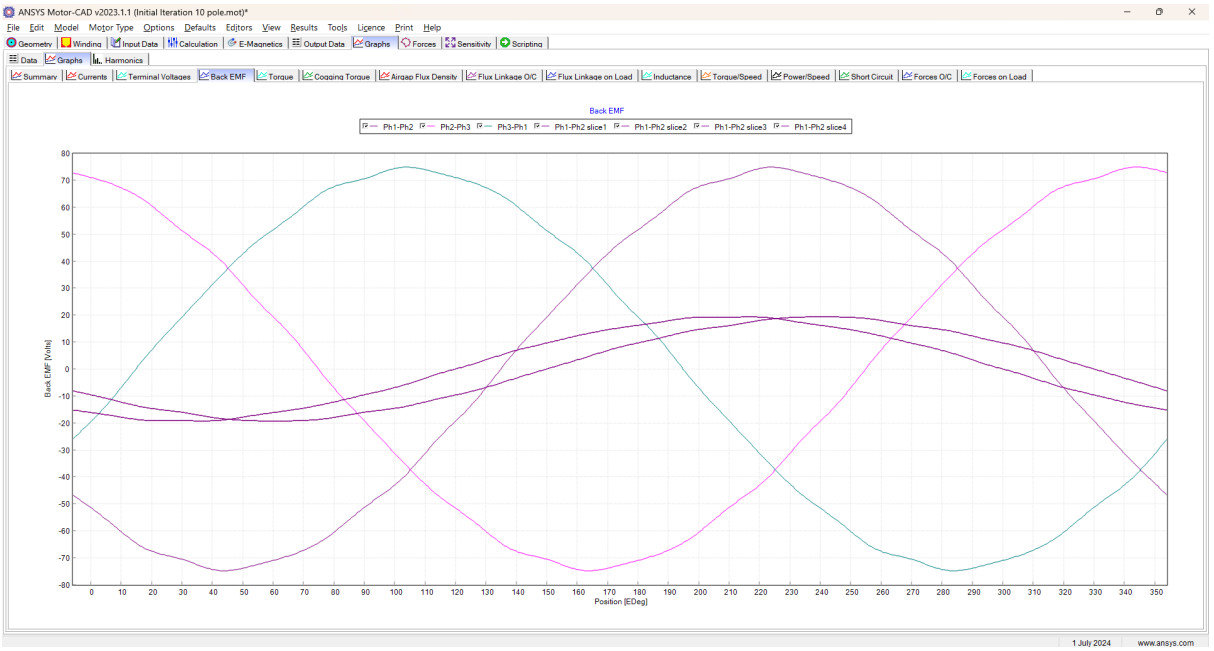
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
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Summary Currents Terminal Voltages Back EMF Torque Cogging Torque Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Inductance Torque/Speed Power/Speed Short Circuit Forces O/C Forces on Load
Back EMF
Ph1-Ph2 Ph2-Ph3 Ph3-Ph1 Ph1-Ph2 slice1 Ph1-Ph2 slice2 Ph1-Ph2 slice3 Ph1-Ph2 slice4
Back EMF [Volts]
Position [EDeg]
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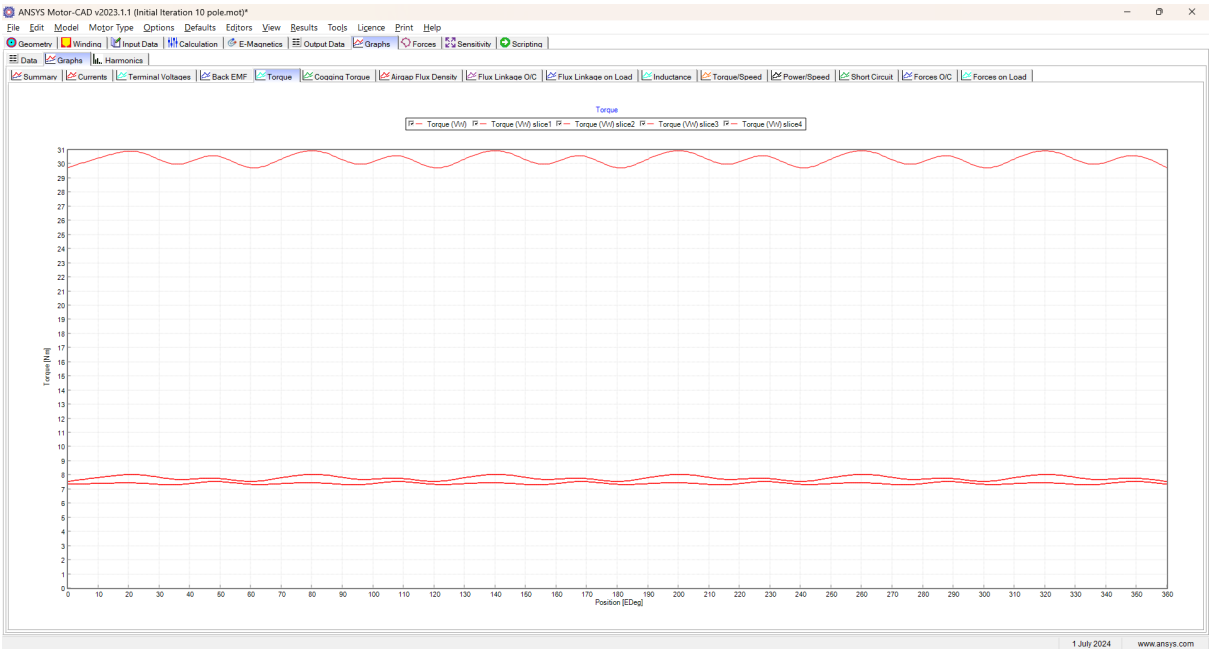
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Summary Currents Terminal Voltages Back EMF Torque Cogging Torque Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Inductance Torque/Speed Power/Speed Short Circuit Forces O/C Forces on Load
Torque
Torque (Vw) Torque (Vw) slice1 Torque (Vw) slice2 Torque (Vw) slice3 Torque (Vw) slice4
Torque [Nm]
Position [EDeg]
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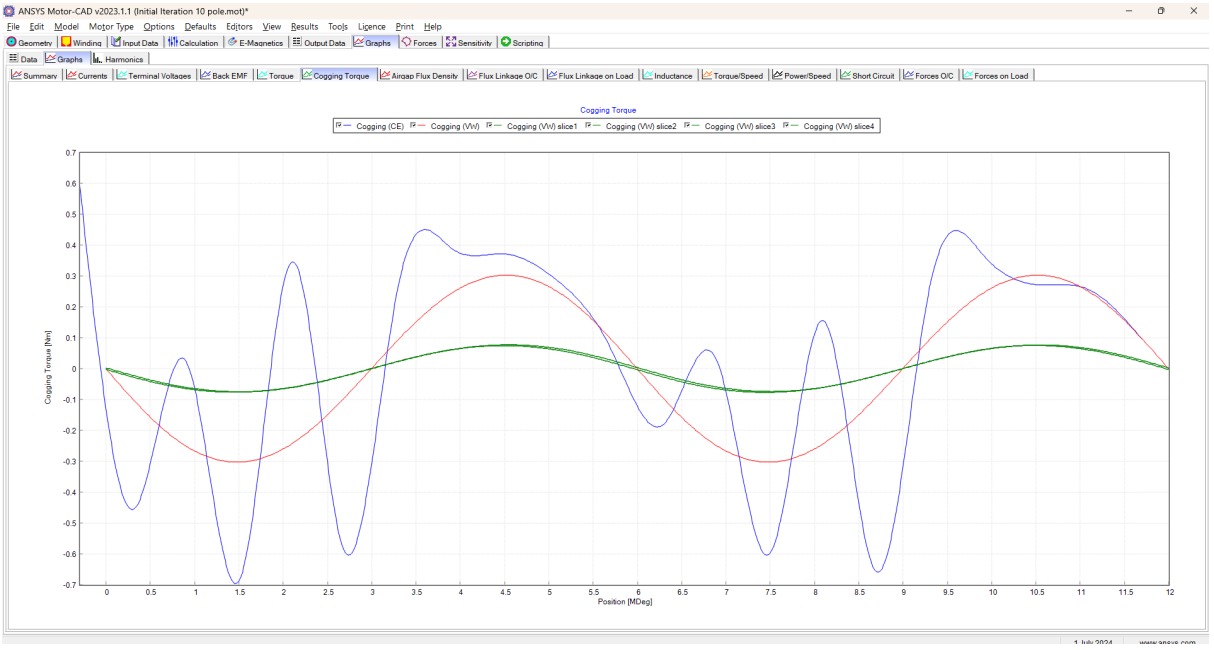
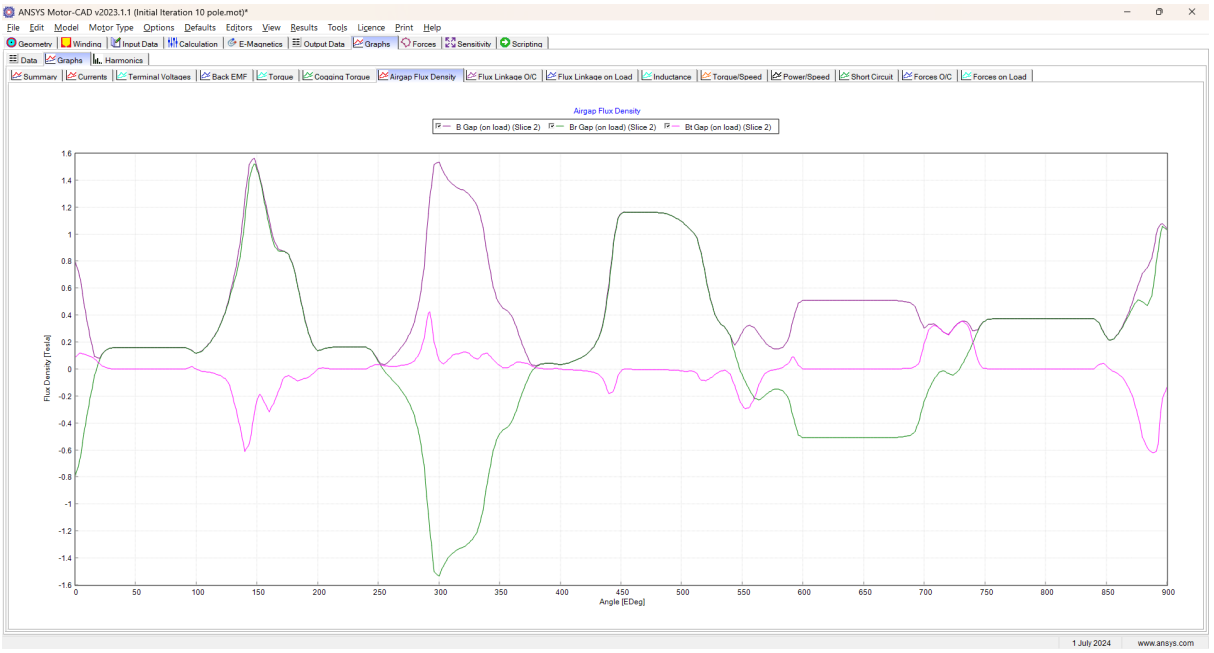

ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Summary Currents Terminal Voltages Back EMF Torque Cogging Torque Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Inductance Torque/Speed Power/Speed Short Circuit Forces O/C Forces on Load
Cogging Torque
Cogging (CE) Cogging (Vw) Cogging (Vw) slice1 Cogging (Vw) slice2 Cogging (Vw) slice3 Cogging (Vw) slice4
Cogging Torque [Nm]
Position [MDeg]


ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Summary Currents Terminal Voltages Back EMF Torque Cogging Torque Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Inductance Torque/Speed Power/Speed Short Circuit Forces O/C Forces on Load
Airgap Flux Density
B Gap (on load) (Slice 2)
Br Gap (on load) (Slice 2)
Bt Gap (on load) (Slice 2)
Flux Density [Tesla]
Angle [EDeg]
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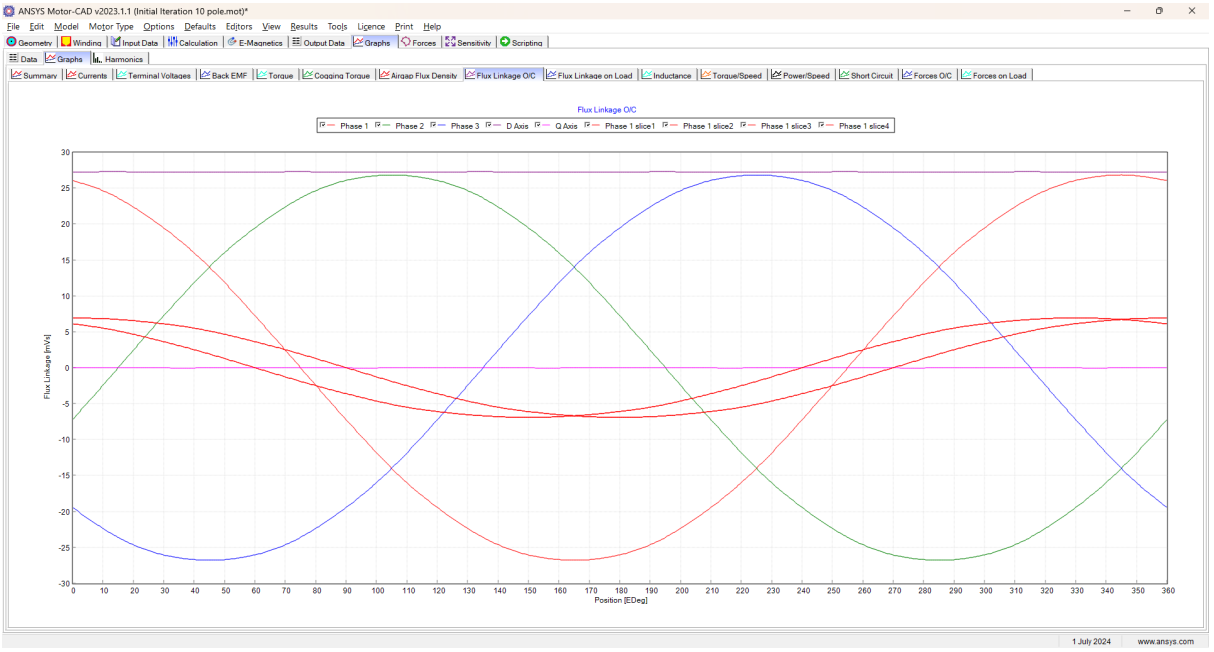
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Summary Currents Terminal Voltages Back EMF Torque Cogging Torque Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Inductance Torque/Speed Power/Speed Short Circuit Forces O/C Forces on Load
Flux Linkage O/C
Phase 1
Phase 2
Phase 3
D Axis
Q Axis
Phase 1 slice1
Phase 1 slice2
Phase 1 slice3
Phase 1 slice4
Flux Linkage [mVs]
Position [EDeg]
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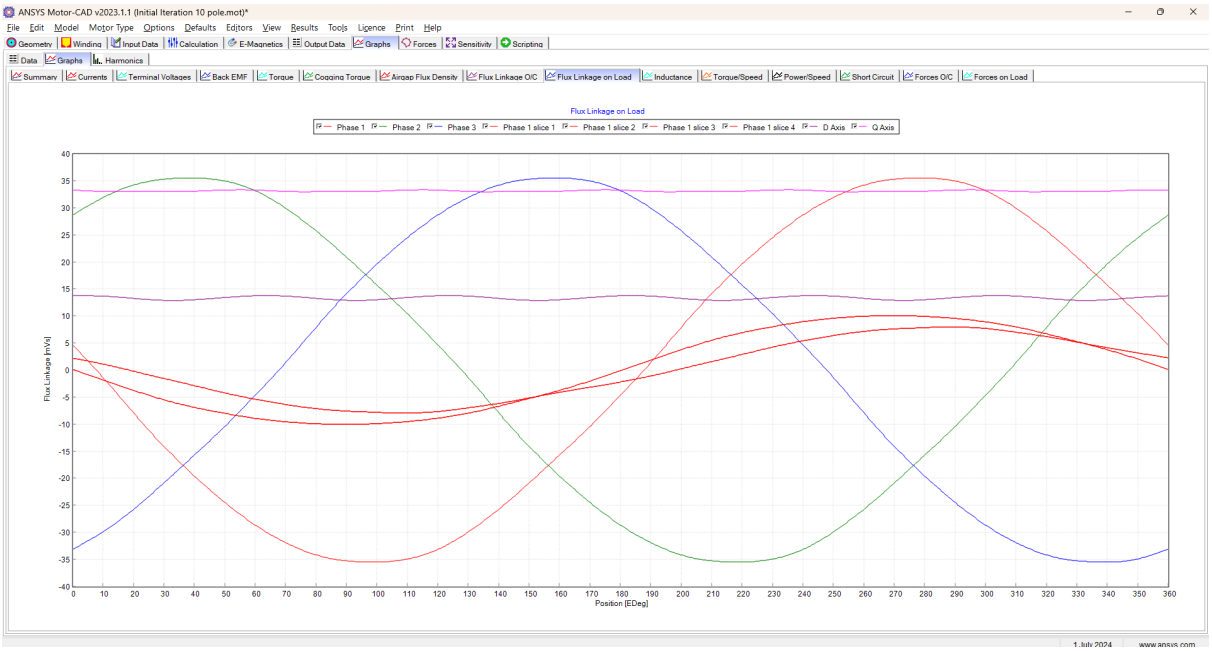
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Summary Currents Terminal Voltages Back EMF Torque Cogging Torque Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Inductance Torque/Speed Power/Speed Short Circuit Forces O/C Forces on Load
Flux Linkage on Load
Phase 1 Phase 2 Phase 3 Phase 1 slice 1 Phase 1 slice 2 Phase 1 slice 3 Phase 1 slice 4 D Axis Q Axis
Flux Linkage [mVs]
Position [EDeg]
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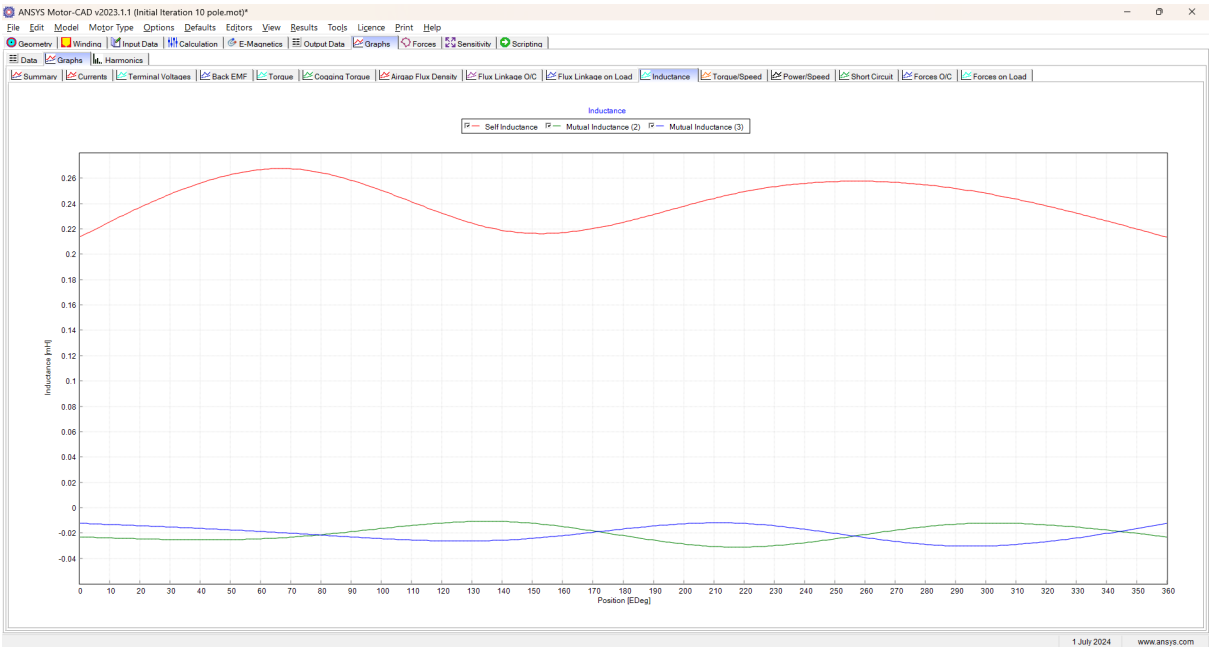
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Summary Currents Terminal Voltages Back EMF Torque Cogging Torque Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Inductance Torque/Speed Power/Speed Short Circuit Forces O/C Forces on Load
Inductance
Self Inductance Mutual Inductance (2) Mutual Inductance (3)
Inductance [mH]
Position [EDeg]
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Torque vs Time
Torque
Torque [Nm]
Time [secs]


ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
Electromagnetic Forces open circuit (stator)
Tangential Force
Radial Force
Force [kN]
Angle [MDeg]
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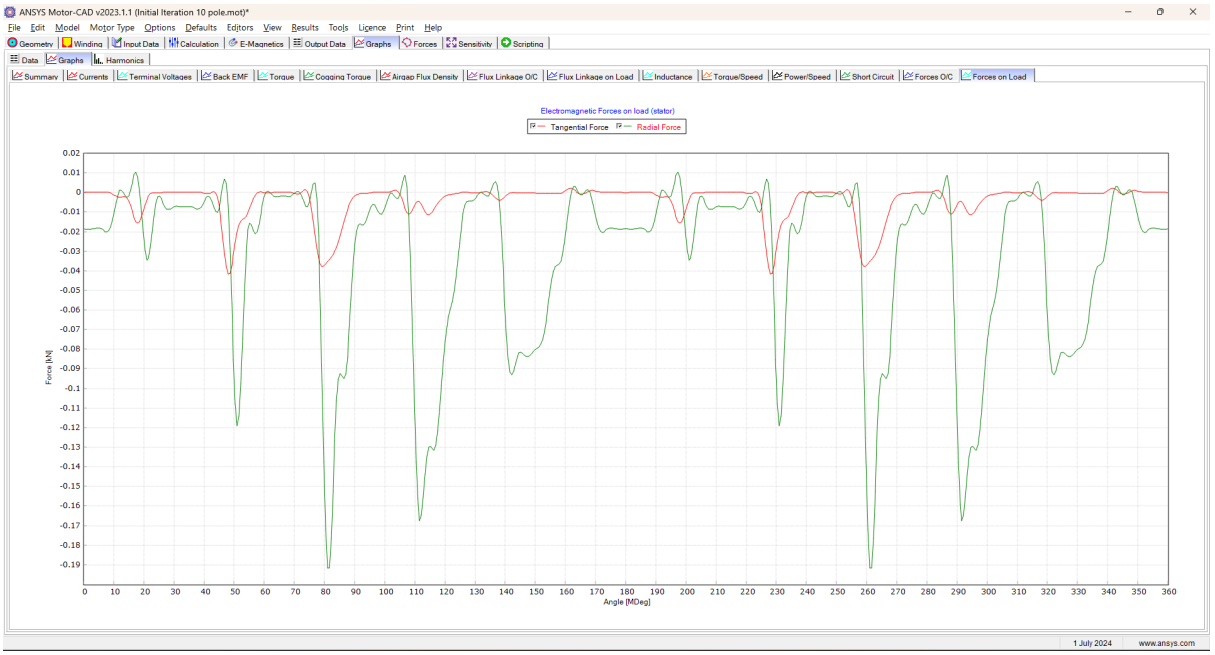
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Summary Currents Terminal Voltages Back EMF Torque Cogging Torque Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Inductance Torque/Speed Power/Speed Short Circuit Forces O/C Forces on Load
Electromagnetic Forces on load (stator)
Tangential Force
Radial Force
Force [kN]
Angle [MDeg]
1 July 2024
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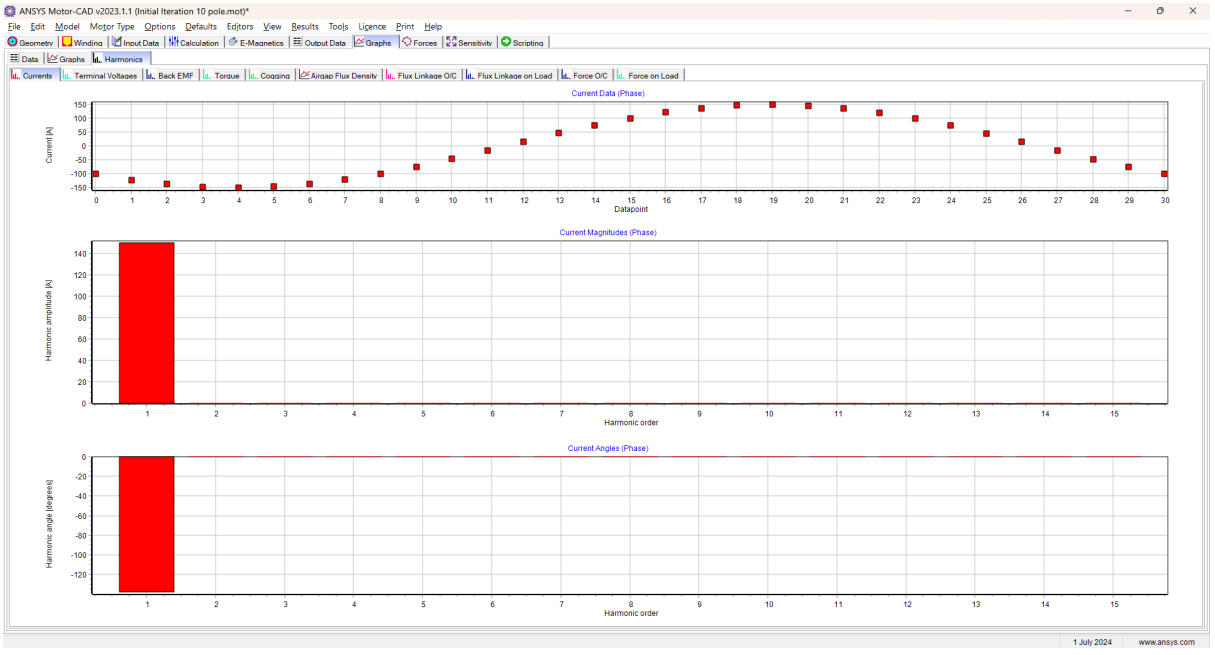
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Currents Terminal Voltages Back EMF Torque Cogging Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Force O/C Force on Load
Current Data (Phase)
Current [A]
Datapoint
Current Magnitudes (Phase)
Harmonic amplitude [A]
Harmonic order
Current Angles (Phase)
Harmonic angle [degrees]
Harmonic order
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ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Currents Terminal Voltages Back EMF Torque Cogging Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Force O/C Force on Load
Terminal Voltage Data (Line-Line)
Voltage [V]
Datapoint
Terminal Voltage Magnitudes (Line-Line)
Harmonic amplitude [V]
Harmonic order
Terminal Voltage Angles (Line-Line)
Harmonic angle [degrees]
Harmonic order
1 July 2024
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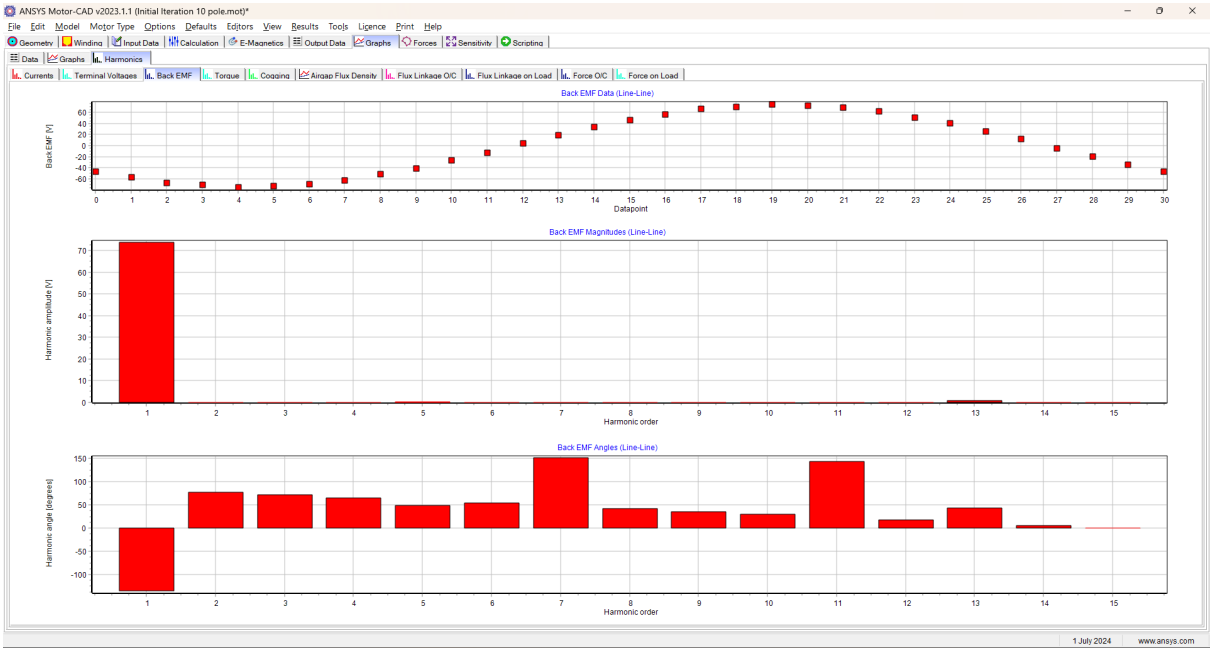
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Currents Terminal Voltages Back EMF Torque Cogging Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Force O/C Force on Load
Back EMF Data (Line-Line)
Back EMF [V]
Datapoint
Back EMF Magnitudes (Line-Line)
Harmonic amplitude [V]
Harmonic order
Back EMF Angles (Line-Line)
Harmonic angle [degrees]
Harmonic order
1 July 2024
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ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Currents Terminal Voltages Back EMF Torque Cogging Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Force O/C Force on Load
Torque (MsVw) Data
Torque (Nm)
Datapoint
Torque Magnitudes
Harmonic amplitude (Nm)
Harmonic order (Electrical)
Torque Angles
Harmonic angle (degrees)
Harmonic order (Electrical)
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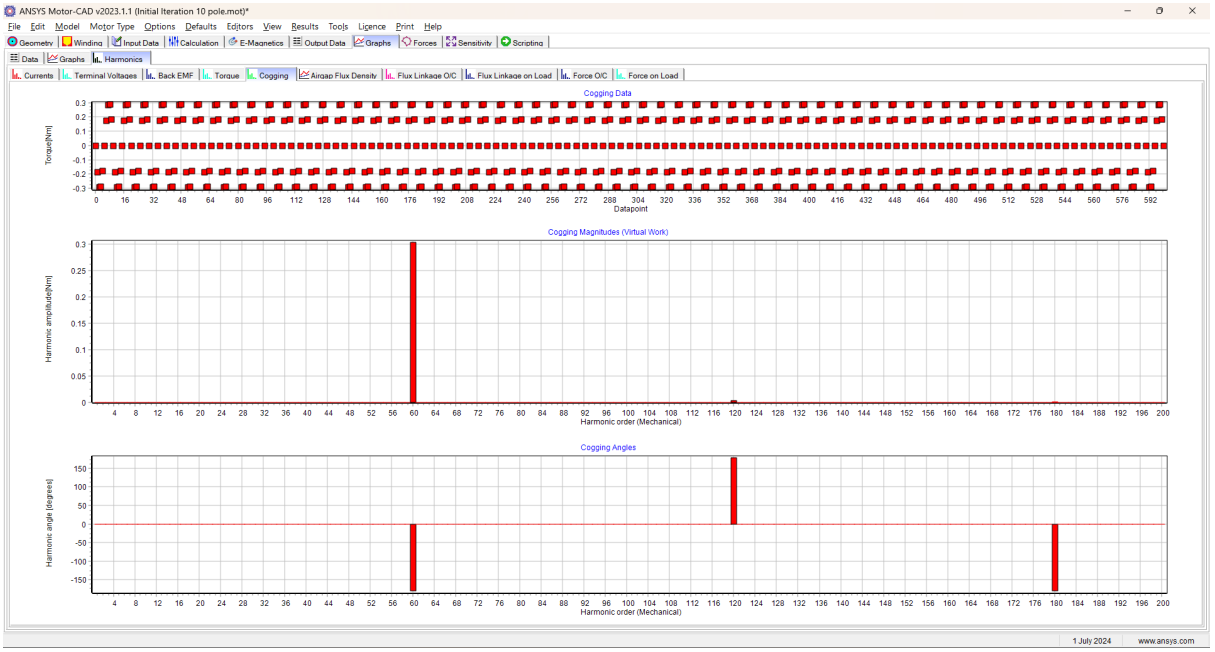
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Currents Terminal Voltages Back EMF Torque Cogging Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Force O/C Force on Load
Cogging Data
Torque(Nm)
Datapoint
Cogging Magnitudes (Virtual Work)
Harmonic amplitude(Nm)
Harmonic order (Mechanical)
Cogging Angles
Harmonic angle (degrees)
Harmonic order (Mechanical)
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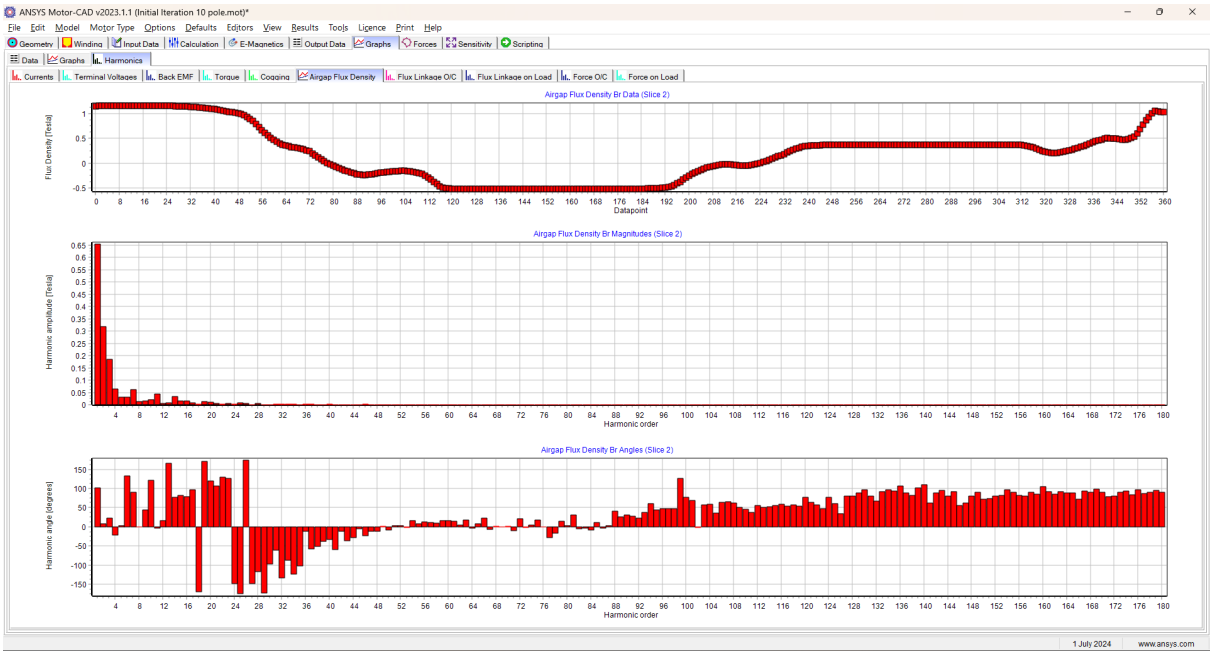
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Currents Terminal Voltages Back EMF Torque Cogging Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Force O/C Force on Load
Airgap Flux Density Br Data (Slice 2)
Flux Density (Tesla)
Datapoint
Airgap Flux Density Br Magnitudes (Slice 2)
Harmonic amplitude (Tesla)
Harmonic order
Airgap Flux Density Br Angles (Slice 2)
Harmonic angle (degrees)
Harmonic order
1 July 2024
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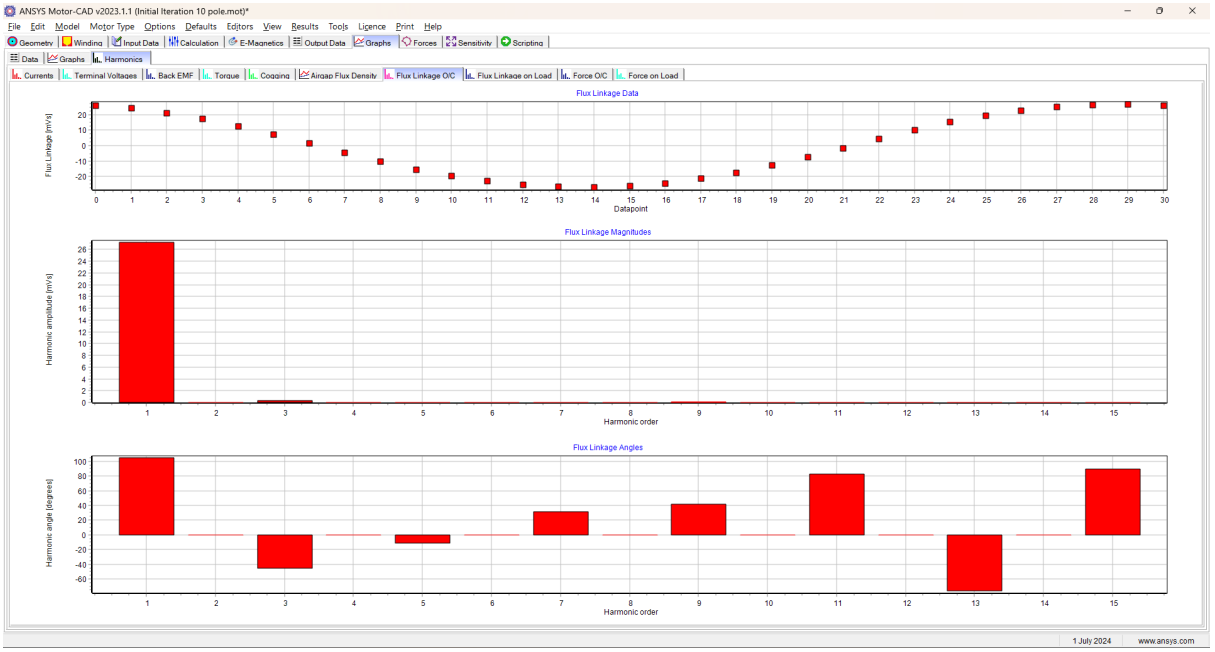
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Currents Terminal Voltages Back EMF Torque Cogging Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Force O/C Force on Load
Flux Linkage Data
Flux Linkage (mV-s)
Datapoint
Flux Linkage Magnitudes
Harmonic amplitude (mV-s)
Harmonic order
Flux Linkage Angles
Harmonic angle (degrees)
Harmonic order
1 July 2024
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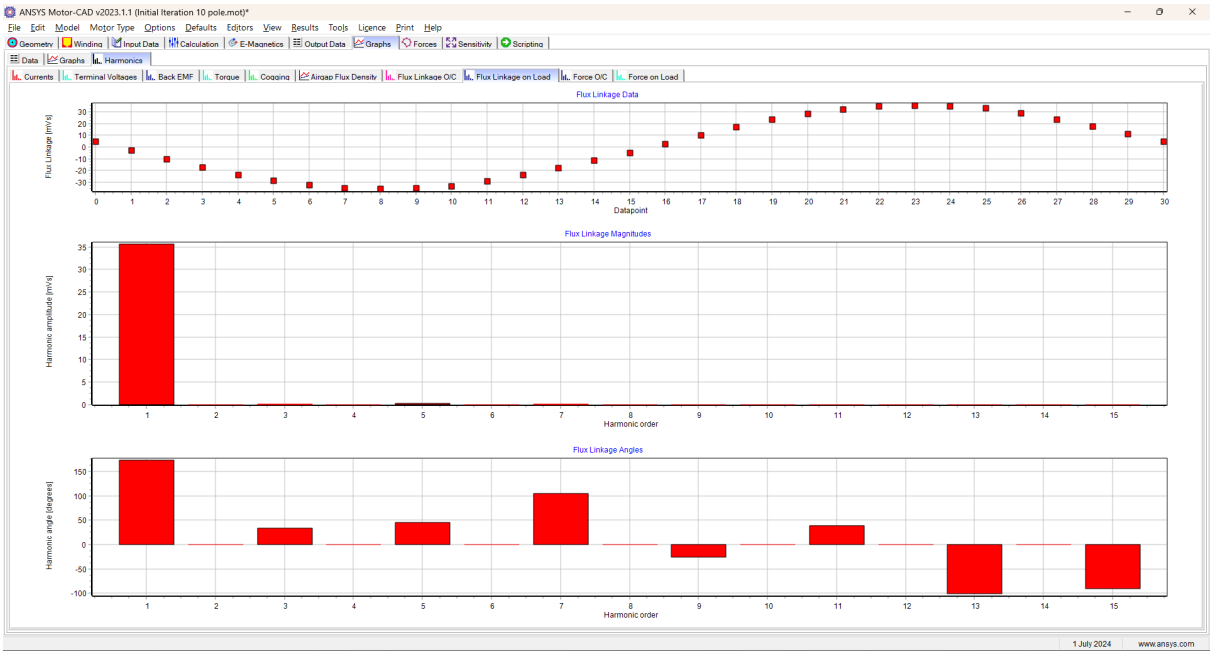
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Currents Terminal Voltages Back EMF Torque Cogging Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Force O/C Force on Load
Flux Linkage Data
Flux Linkage [mV s]
Datapoint
Flux Linkage Magnitudes
Harmonic amplitude [mV s]
Harmonic order
Flux Linkage Angles
Harmonic angle [degrees]
Harmonic order
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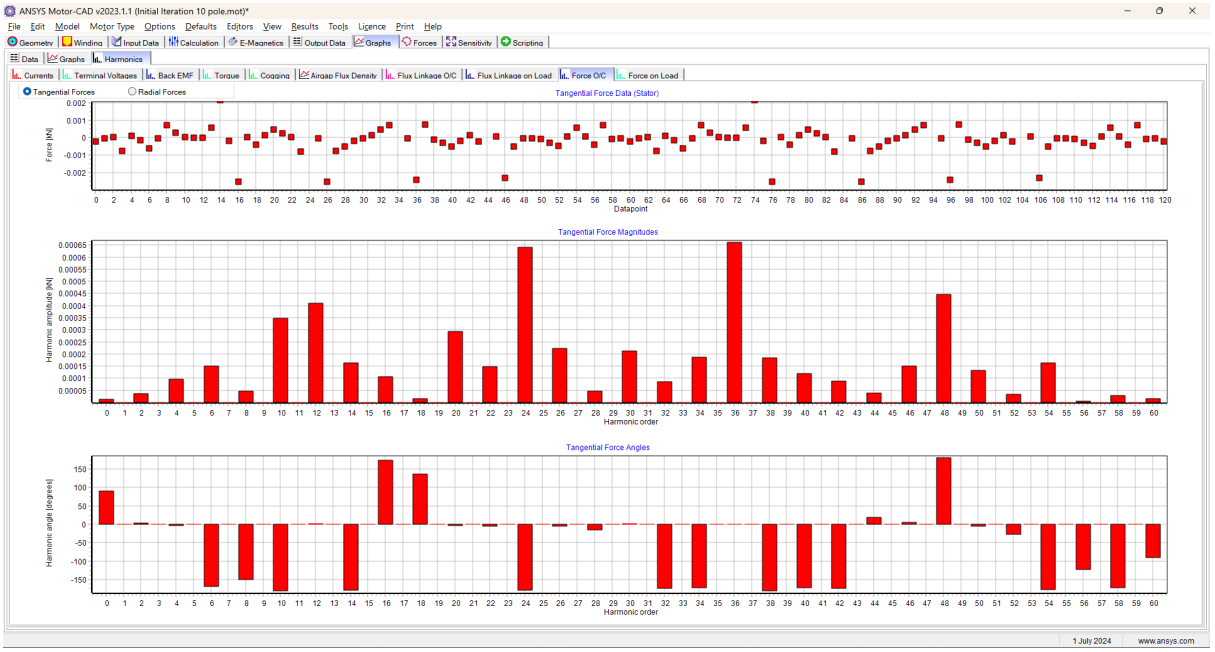
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Data Graphs Harmonics
Currents Terminal Voltages Back EMF Torque Cogging Airgap Flux Density Flux Linkage O/C Flux Linkage on Load Force O/C Force on Load
Tangential Forces
Radial Forces
Tangential Force Data (Stator)
Force [kN]
Datapoint
Tangential Force Magnitudes
Harmonic amplitude [kN]
Harmonic order
Tangential Force Angles
Harmonic angle [degrees]
Harmonic order
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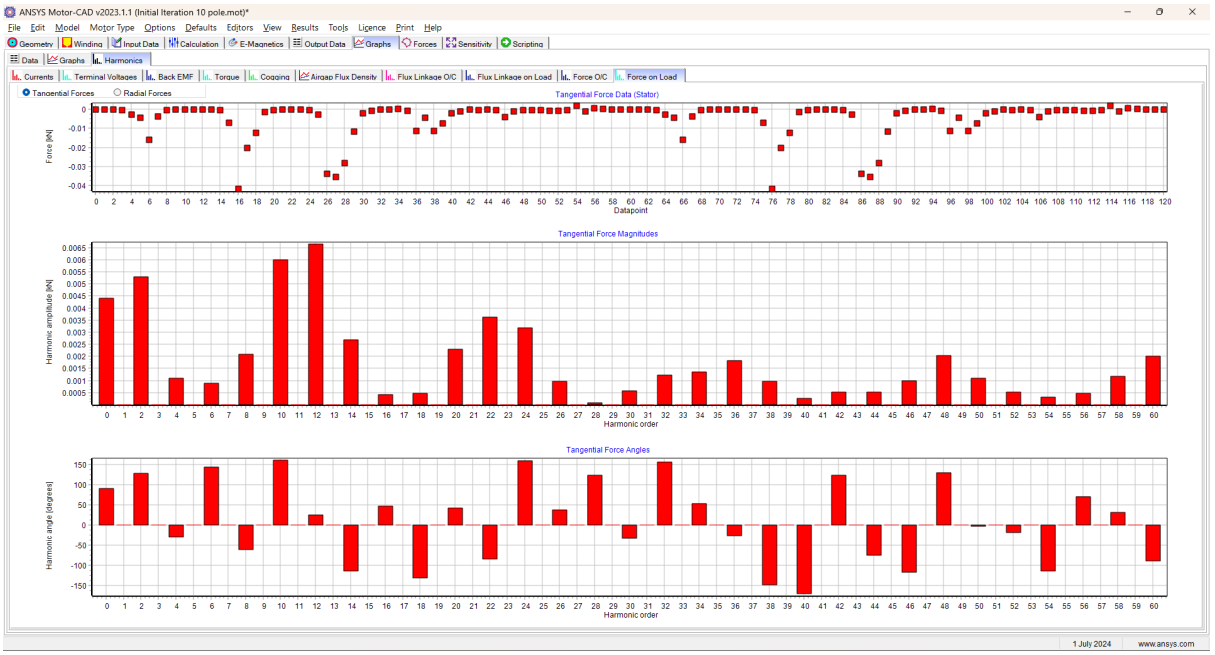
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
Tangential Force Data (Stator)
Force [kN]
Datapoint
Tangential Force Magnitudes
Harmonic amplitude [kN]
Harmonic order
Tangential Force Angles
Harmonic angle [degrees]
Harmonic order
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ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
Stator (Tangential) () Data
Slice 1
Slice 2
Slice 3
Slice 4
Force Density [N/m²]
Time [s]
Stator (Tangential) () Harmonic Amplitude
Amplitude [N/m²]
Harmonic Order
Stator (Tangential) () Harmonic Angle
Angle [Deg]
Harmonic Order
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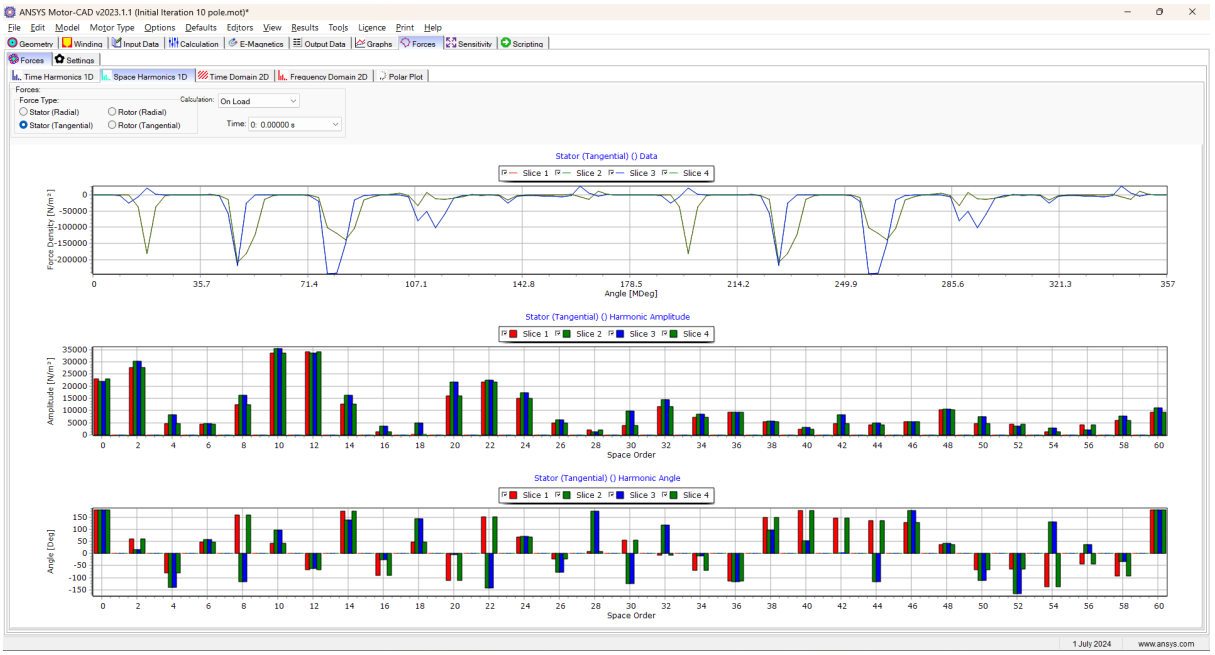
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
Stator (Tangential) () Data
Force Density [N/m²]
Angle [MDeg]
Stator (Tangential) () Harmonic Amplitude
Amplitude [N/m²]
Space Order
Stator (Tangential) () Harmonic Angle
Angle [Deg]
Space Order
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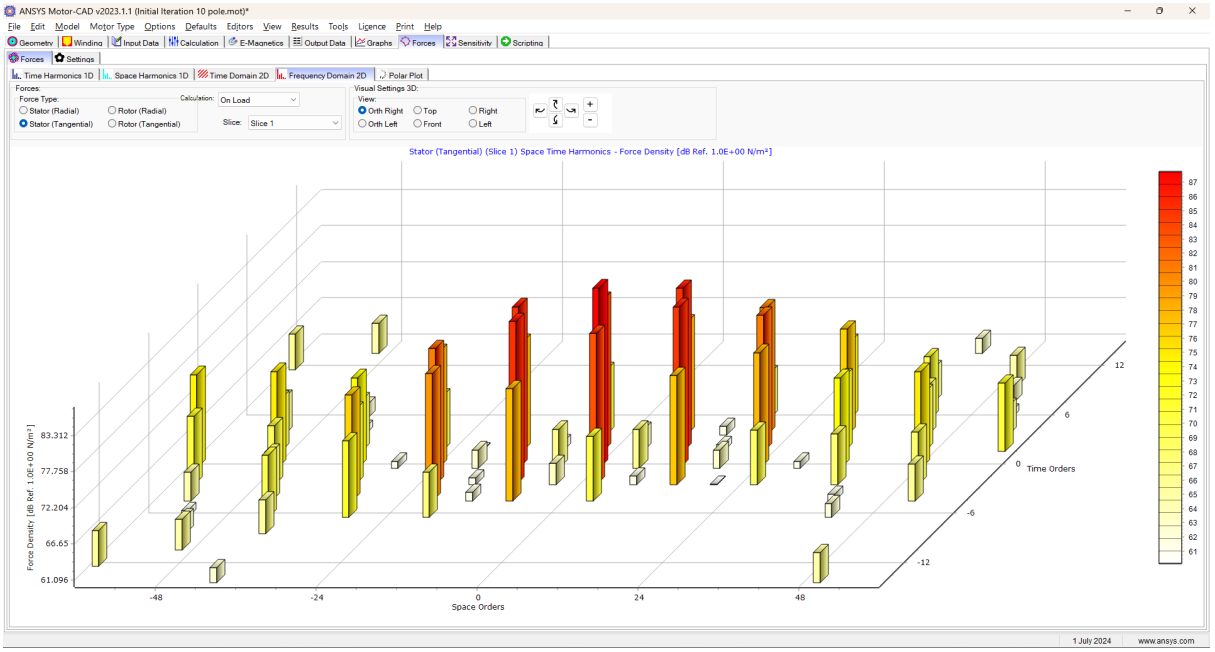
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
Stator (Tangential) (Slice 1) Space Time Harmonics - Force Density [dB Ref. 1.0E+00 N/m²]
Force Density [dB Ref. 1.0E+00 N/m²]
Space Orders
Time Orders
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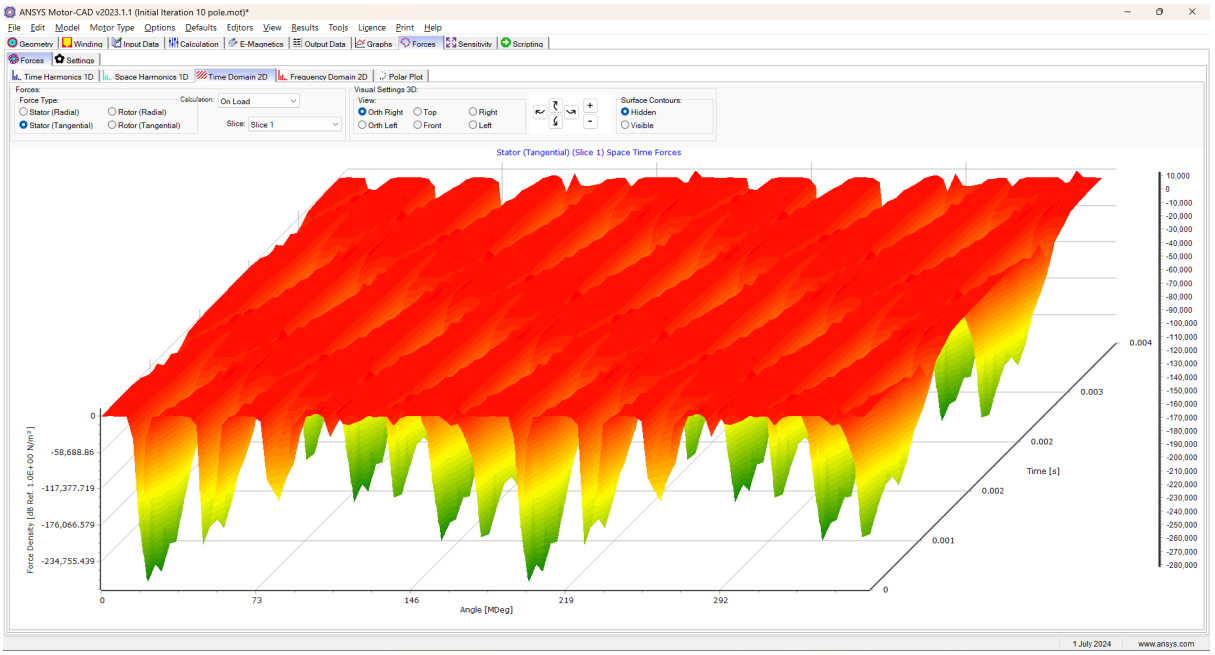
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Winding Input Data Calculation E-Magnetics Output Data Graphs Forces Sensitivity Scripting
Forces Settings
Time Harmonics 1D Space Harmonics 1D Time Domain 2D Frequency Domain 2D Polar Plot
Forces:
Force Type:
Stator (Radial)
Rotor (Radial)
Stator (Tangential)
Rotor (Tangential)
Calculation: On Load
Slice: Slice 1
Visual Settings 3D:
View:
Orth Right
Top
Right
Orth Left
Front
Left
Surface Contours:
Hidden
Visible
Stator (Tangential) (Slice 1) Space Time Forces
Force Density (dB Ref. 1.0E+00 N/m²)
0
-58,688.86
-117,377.719
-176,066.579
-234,755.439
Angle [MDeg]
0
73
146
219
292
Time [s]
0
0.001
0.002
0.002
0.003
0.004
10,000
0
-10,000
-20,000
-30,000
-40,000
-50,000
-60,000
-70,000
-80,000
-90,000
-100,000
-110,000
-120,000
-130,000
-140,000
-150,000
-160,000
-170,000
-180,000
-190,000
-200,000
-210,000
-220,000
-230,000
-240,000
-250,000
-260,000
-270,000
-280,000
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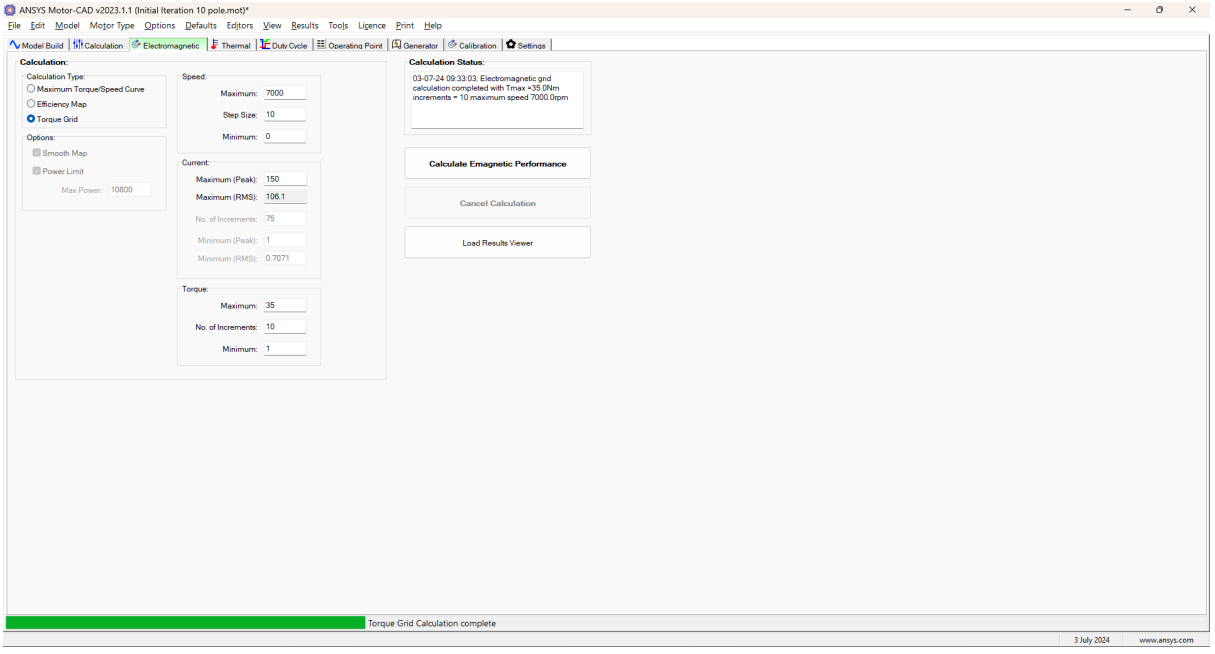
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Model Build Calculation Electromagnetic Thermal Duty Cycle Operating Point Generator Calibration Settings
Calculation:
Calculation Type:
Maximum Torque/Speed Curve
Efficiency Map
Torque Grid
Options:
Smooth Map
Power Limit
Max Power: 10800
Speed:
Maximum: 7000
Step Size: 10
Minimum: 0
Current:
Maximum (Peak): 150
Maximum (RMS): 106.1
No. of Increments: 75
Minimum (Peak): 1
Minimum (RMS): 0.7071
Torque:
Maximum: 35
No. of Increments: 10
Minimum: 1
Calculation Status:
03-07-24 09:33:03: Electromagnetic grid calculation completed with Tmax =35.0Nm increments = 10 maximum speed 7000.0rpm
Calculate Emagnetic Performance
Cancel Calculation
Load Results Viewer
Torque Grid Calculation complete
3 July 2024
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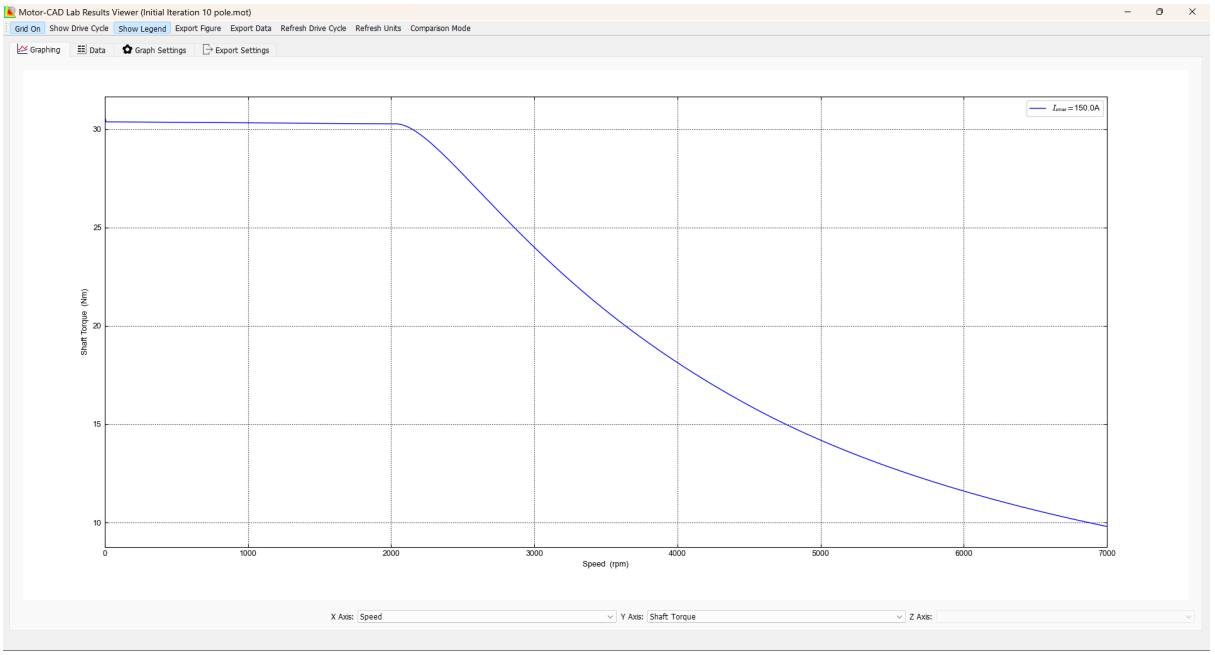
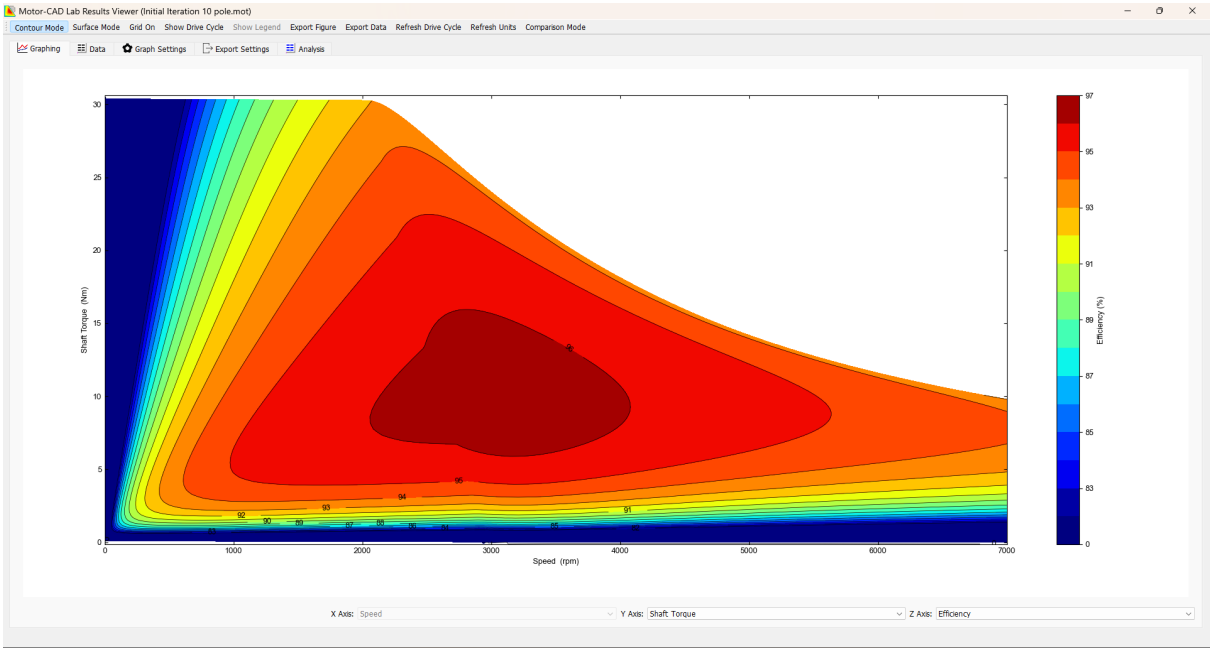
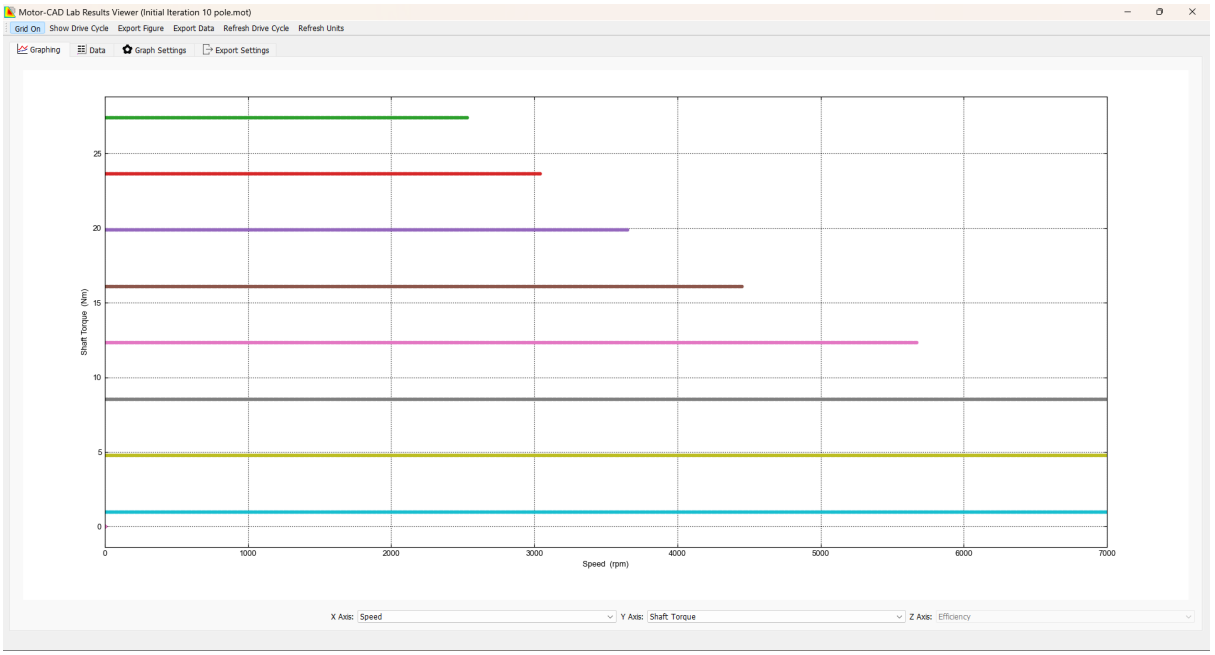
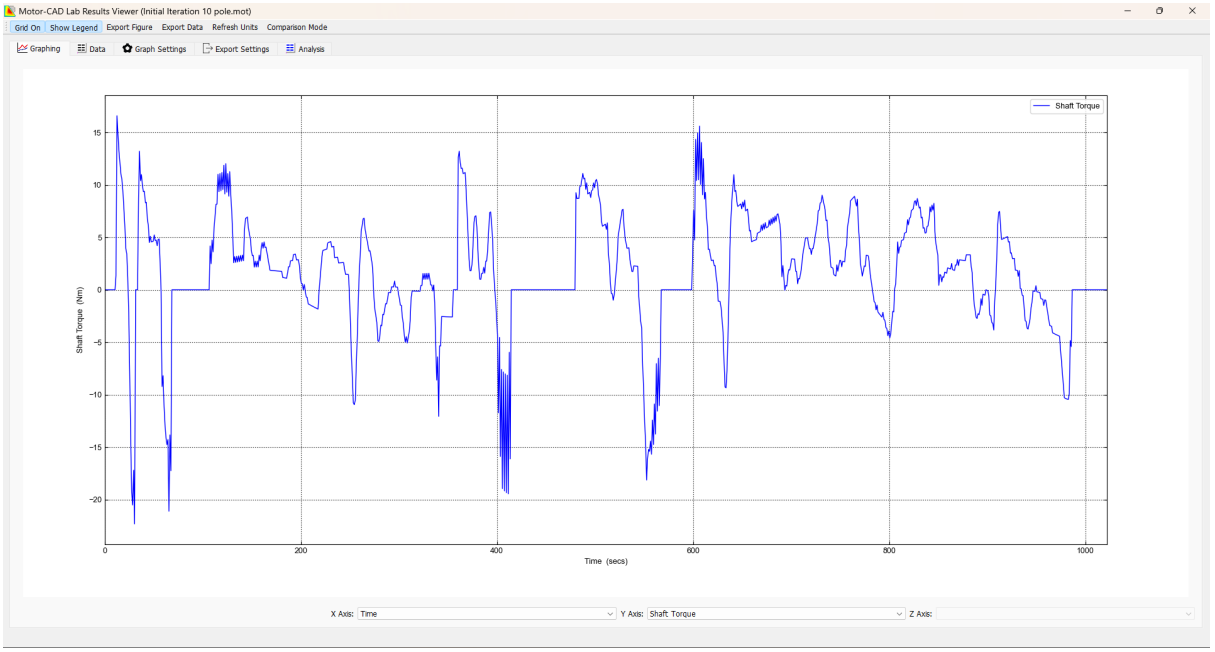
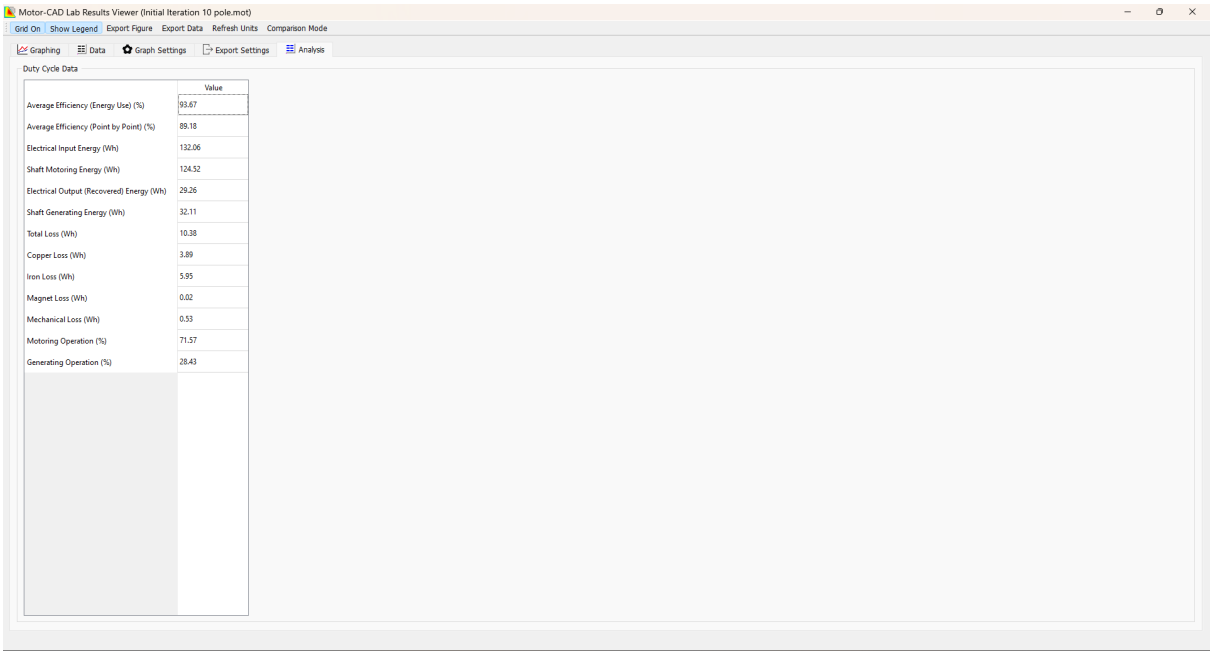
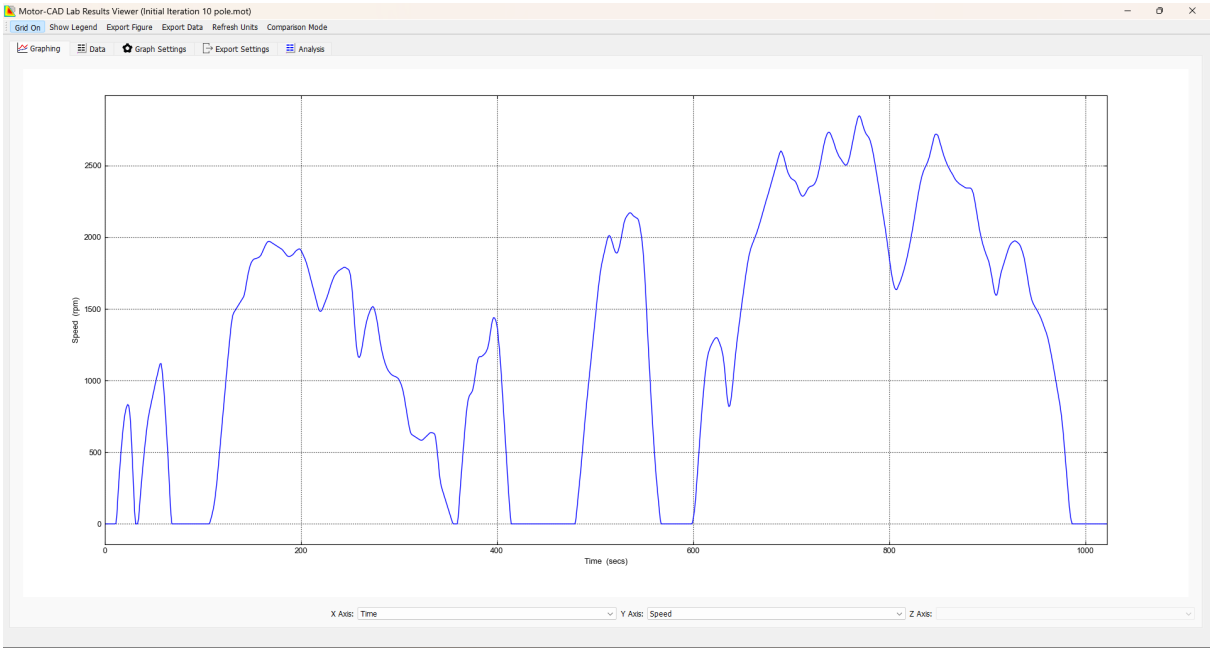

Motor-CAD Lab Results Viewer (Initial Iteration 10 pole.mot)
Grid On
Show Drive Cycle
Show Legend
Export Figure
Export Data
Refresh Drive Cycle
Refresh Units
Comparison Mode
Graphing
Data
Graph Settings
Export Settings
I_{rms} = 150.0A
Shaft Torque (Nm)
Speed (rpm)
X Axis: Speed
Y Axis: Shaft Torque
Z Axis:

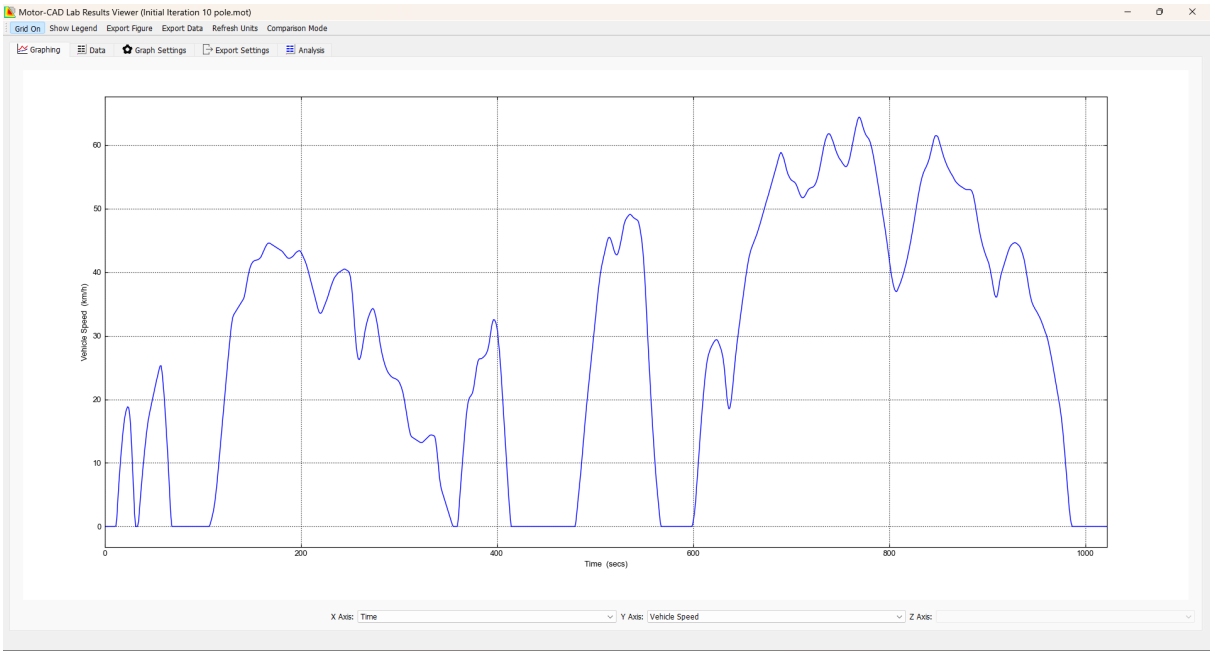

Motor-CAD Lab Results Viewer (Initial Iteration 10 pole.mot)
Contour Mode
Surface Mode
Grid On
Show Drive Cycle
Show Legend
Export Figure
Export Data
Refresh Drive Cycle
Refresh Units
Comparison Mode
Graphing
Data
Graph Settings
Export Settings
Analysis
Shaft Torque (Nm)
Speed (rpm)
Efficiency (%)
X Axis: Speed
Y Axis: Shaft Torque
Z Axis: Efficiency

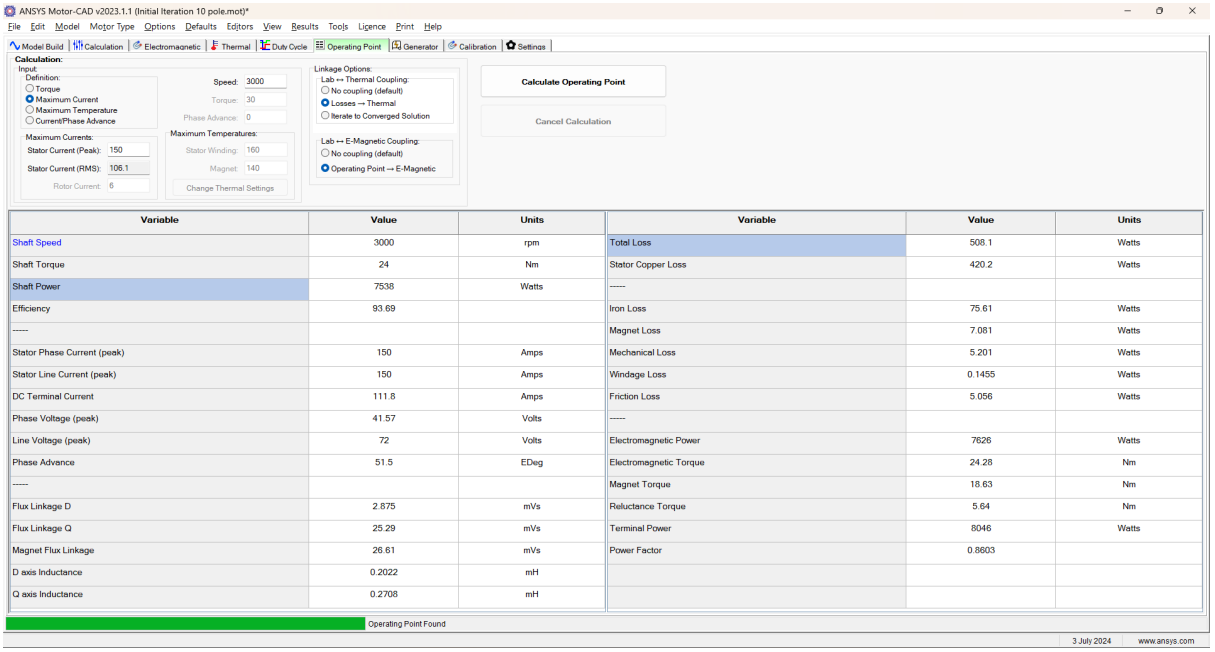

Motor-CAD Lab Results Viewer (Initial Iteration 10 pole.mot)
Grid On
Show Drive Cycle
Export Figure
Export Data
Refresh Drive Cycle
Refresh Units
Graphing
Data
Graph Settings
Export Settings
Shaft Torque (Nm)
Speed (rpm)
X Axis: Speed
Y Axis: Shaft Torque
Z Axis: Efficiency


Motor-CAD Lab Results Viewer (Initial Iteration 10 pole.mot)
Grid On
Show Legend
Export Figure
Export Data
Refresh Units
Comparison Mode
Graphing
Data
Graph Settings
Export Settings
Analysis
Shaft Torque
Shaft Torque (Nm)
Time (secs)
X Axis: Time
Y Axis: Shaft Torque
Z Axis:


Motor-CAD Lab Results Viewer (Initial Iteration 10 pole.mot)
Grid On
Show Legend
Export Figure
Export Data
Refresh Units
Comparison Mode
Graphing
Data
Graph Settings
Export Settings
Analysis
Duty Cycle Data
Value
Average Efficiency (Energy Use) (%) 93.67
Average Efficiency (Point by Point) (%) 89.18
Electrical Input Energy (Wh) 132.06
Shaft Motoring Energy (Wh) 124.52
Electrical Output (Recovered) Energy (Wh) 29.26
Shaft Generating Energy (Wh) 32.11
Total Loss (Wh) 10.38
Copper Loss (Wh) 3.89
Iron Loss (Wh) 5.95
Magnet Loss (Wh) 0.02
Mechanical Loss (Wh) 0.53
Motoring Operation (%) 71.57
Generating Operation (%) 28.43


Motor-CAD Lab Results Viewer (Initial Iteration 10 pole.mot)
Grid On
Show Legend
Export Figure
Export Data
Refresh Units
Comparison Mode
Graphing
Data
Graph Settings
Export Settings
Analysis
Speed (rpm)
2500
2000
1500
1000
500
0
0
200
400
600
800
1000
Time (secs)
X Axis: Time
Y Axis: Speed
Z Axis:





Variable	Value	Units
Shaft Speed	3000	rpm
Shaft Torque	24	Nm
Shaft Power	7538	Watts
Efficiency	93.69	

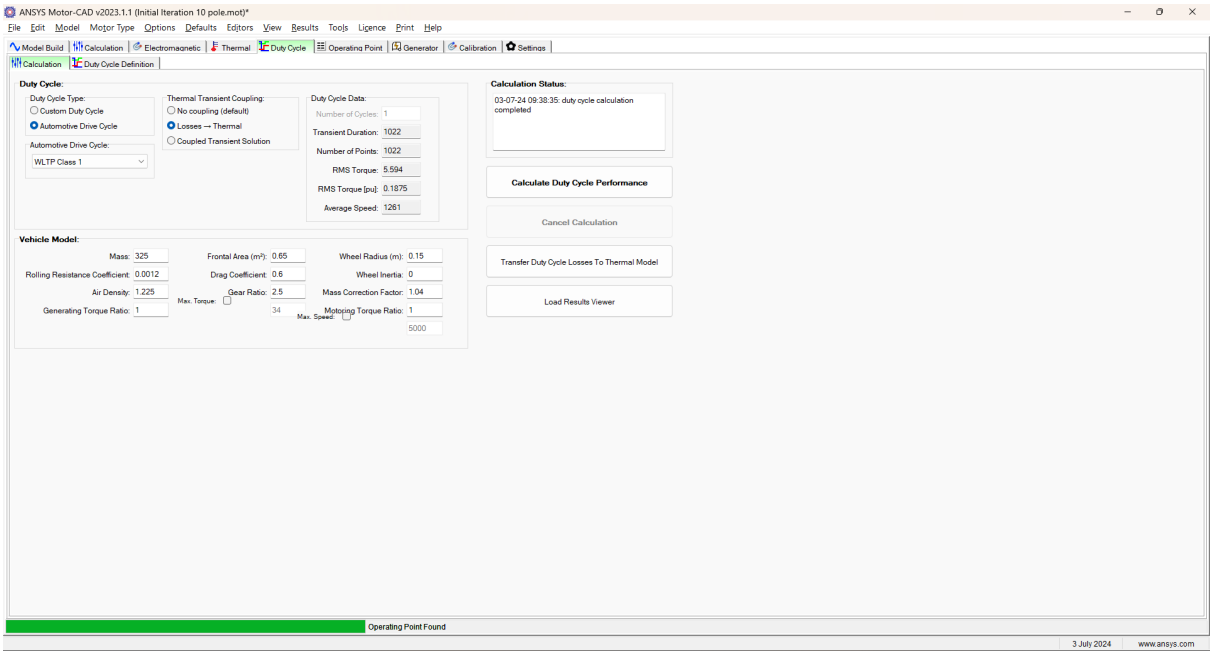
Stator Phase Current (peak)	150	Amps
Stator Line Current (peak)	150	Amps
DC Terminal Current	111.8	Amps
Phase Voltage (peak)	41.57	Volts
Line Voltage (peak)	72	Volts
Phase Advance	51.5	EDeg

Flux Linkage D	2.875	mVs
Flux Linkage Q	25.29	mVs
Magnet Flux Linkage	26.61	mVs
D axis Inductance	0.2022	mH
Q axis Inductance	0.2708	mH

Variable	Value	Units
Total Loss	508.1	Watts
Stator Copper Loss	420.2	Watts

Iron Loss	75.61	Watts
Magnet Loss	7.081	Watts
Mechanical Loss	5.201	Watts
Windage Loss	0.1455	Watts
Friction Loss	5.056	Watts

Electromagnetic Power	7626	Watts
Electromagnetic Torque	24.28	Nm
Magnet Torque	18.63	Nm
Reluctance Torque	5.64	Nm
Terminal Power	8046	Watts
Power Factor	0.8603	


ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Model Build Calculation Electromagnetic Thermal Duty Cycle Operating Point Generator Calibration Settings
Calculation Duty Cycle Definition
Duty Cycle:
Duty Cycle Type:
Custom Duty Cycle
Automotive Drive Cycle
Automotive Drive Cycle:
WLTP Class 1
Thermal Transient Coupling:
No coupling (default)
Losses → Thermal
Coupled Transient Solution
Duty Cycle Data:
Number of Cycles: 1
Transient Duration: 1022
Number of Points: 1022
RMS Torque: 5.594
RMS Torque [pu]: 0.1875
Average Speed: 1261
Calculation Status:
03-07-24 09:38:35: duty cycle calculation completed
Calculate Duty Cycle Performance
Cancel Calculation
Transfer Duty Cycle Losses To Thermal Model
Load Results Viewer
Vehicle Model:
Mass: 325
Frontal Area (m²): 0.65
Wheel Radius (m): 0.15
Rolling Resistance Coefficient: 0.0012
Drag Coefficient: 0.6
Wheel Inertia: 0
Air Density: 1.225
Gear Ratio: 2.5
Mass Correction Factor: 1.04
Max. Torque: 34
Generating Torque Ratio: 1
Max. Speed: 5000
Motoring Torque Ratio: 1
Operating Point Found
3 July 2024
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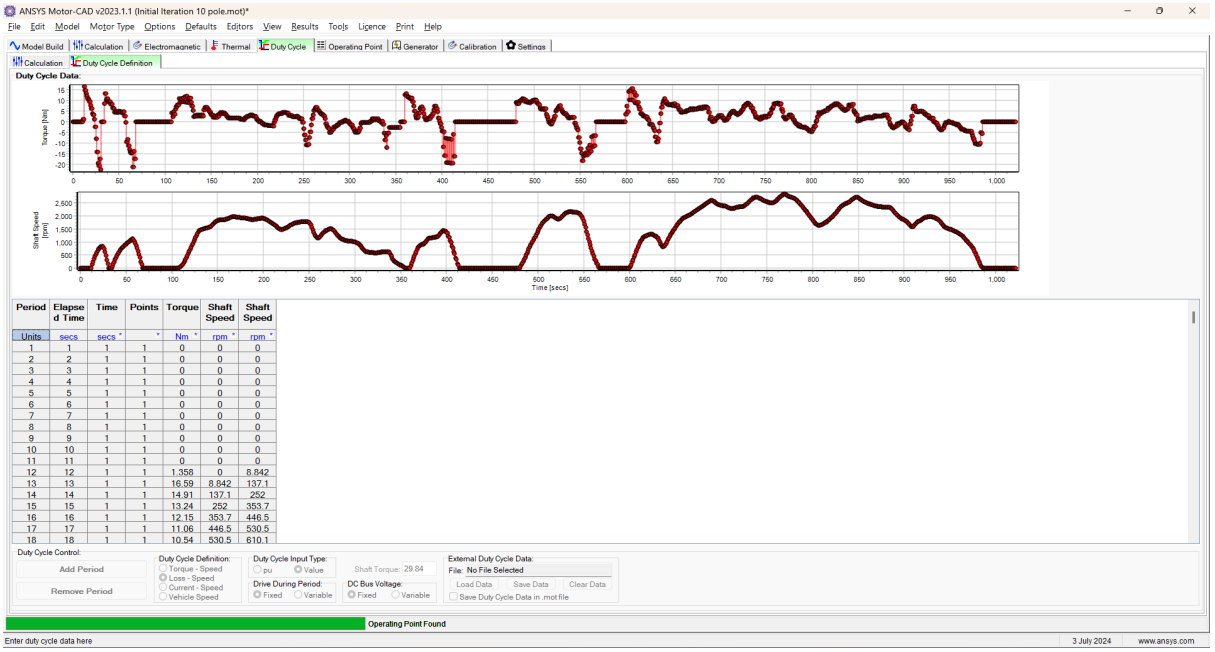
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Model Build Calculation Electromagnetic Thermal Duty Cycle Operating Point Generator Calibration Settings
Calculation Duty Cycle Definition
Duty Cycle Data:
Torque [Nm]
Shaft Speed [rpm]
Time [secs]
Period
Elapsed Time
Time
Points
Torque
Shaft Speed
Shaft Speed
Units secs secs Nm rpm rpm
1 1 1 1 0 0 0
2 2 1 1 0 0 0
3 3 1 1 0 0 0
4 4 1 1 0 0 0
5 5 1 1 0 0 0
6 6 1 1 0 0 0
7 7 1 1 0 0 0
8 8 1 1 0 0 0
9 9 1 1 0 0 0
10 10 1 1 0 0 0
11 11 1 1 0 0 0
12 12 1 1 1.358 0 8.842
13 13 1 1 16.59 8.842 137.1
14 14 1 1 14.91 137.1 252
15 15 1 1 13.24 252 353.7
16 16 1 1 12.15 353.7 446.5
17 17 1 1 11.06 446.5 530.5
18 18 1 1 10.54 530.5 610.1
Duty Cycle Control:
Add Period
Remove Period
Duty Cycle Definition:
Torque - Speed
Loss - Speed
Current - Speed
Vehicle Speed
Duty Cycle Input Type:
pu
Value
Shaft Torque: 29.84
Drive During Period:
Fixed
Variable
DC Bus Voltage:
Fixed
Variable
External Duty Cycle Data:
File: No File Selected
Load Data
Save Data
Clear Data
Save Duty Cycle Data in .mot file
Operating Point Found
Enter duty cycle data here
3 July 2024
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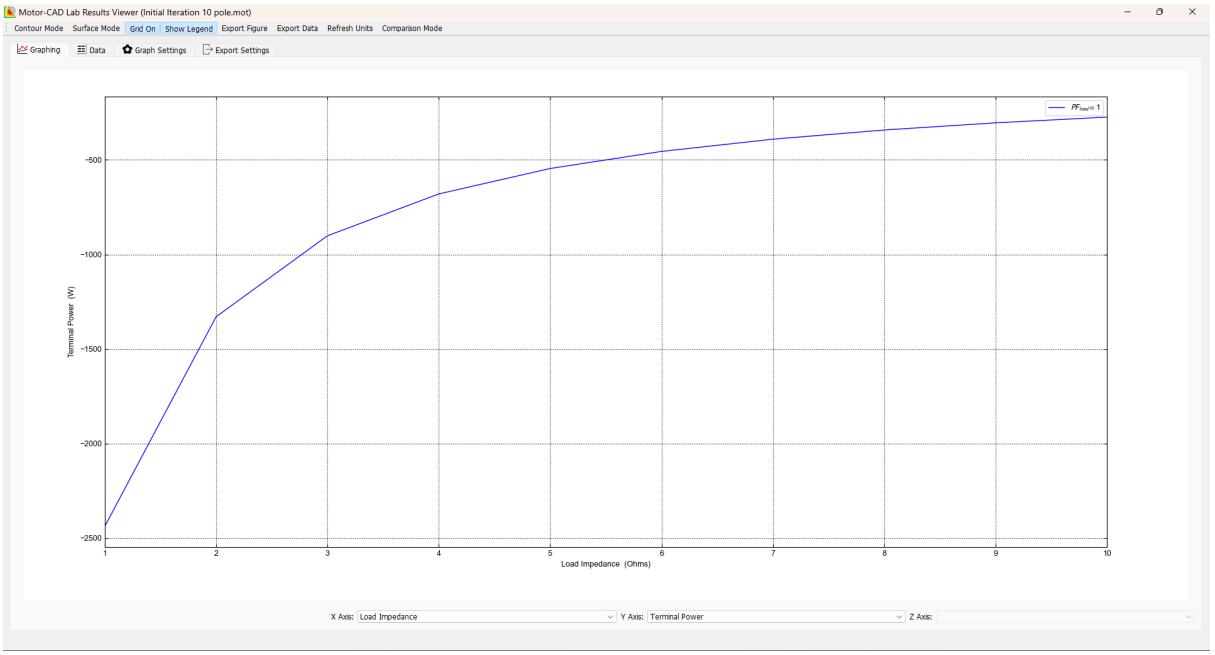
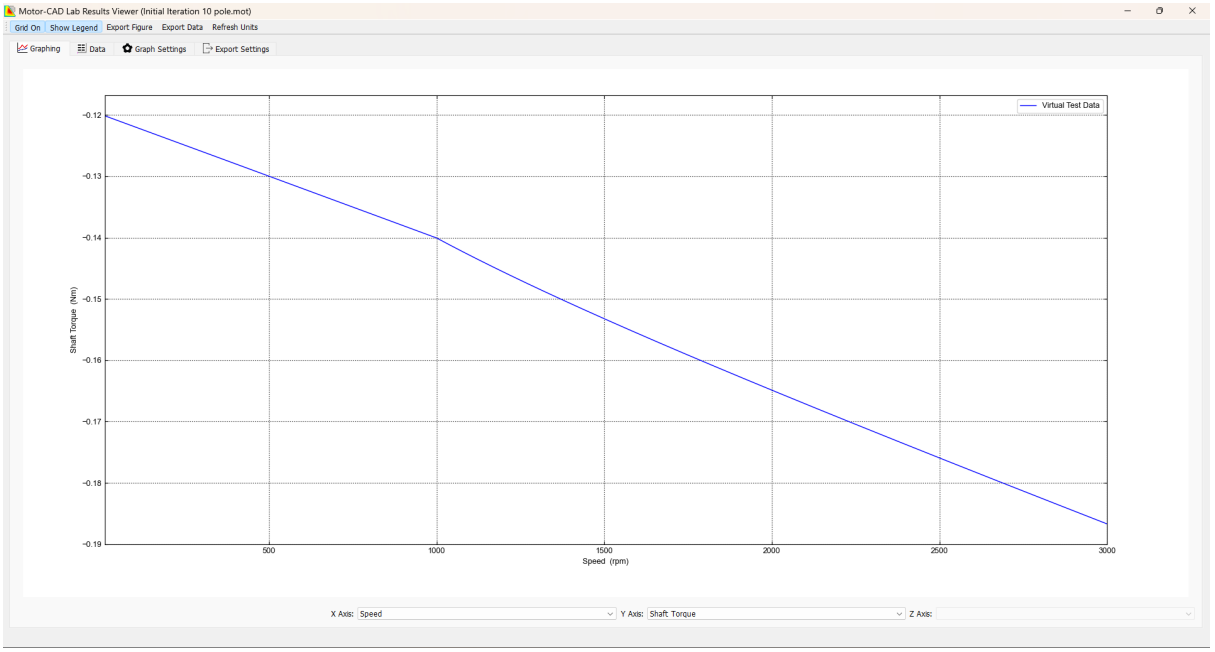
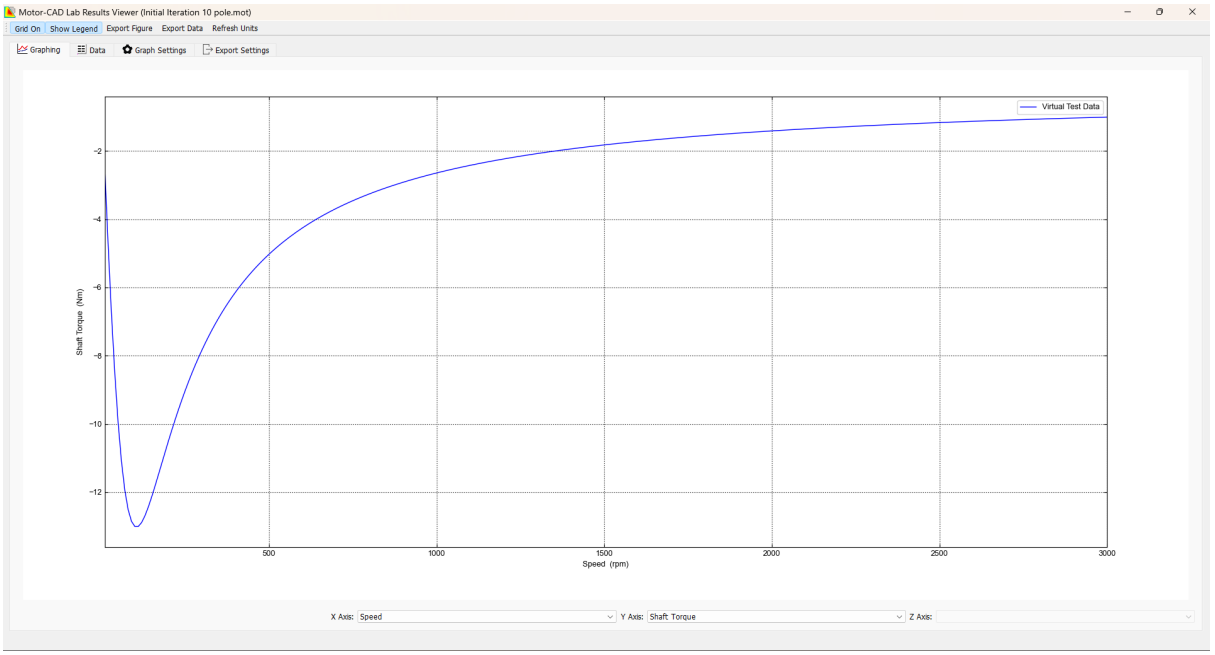
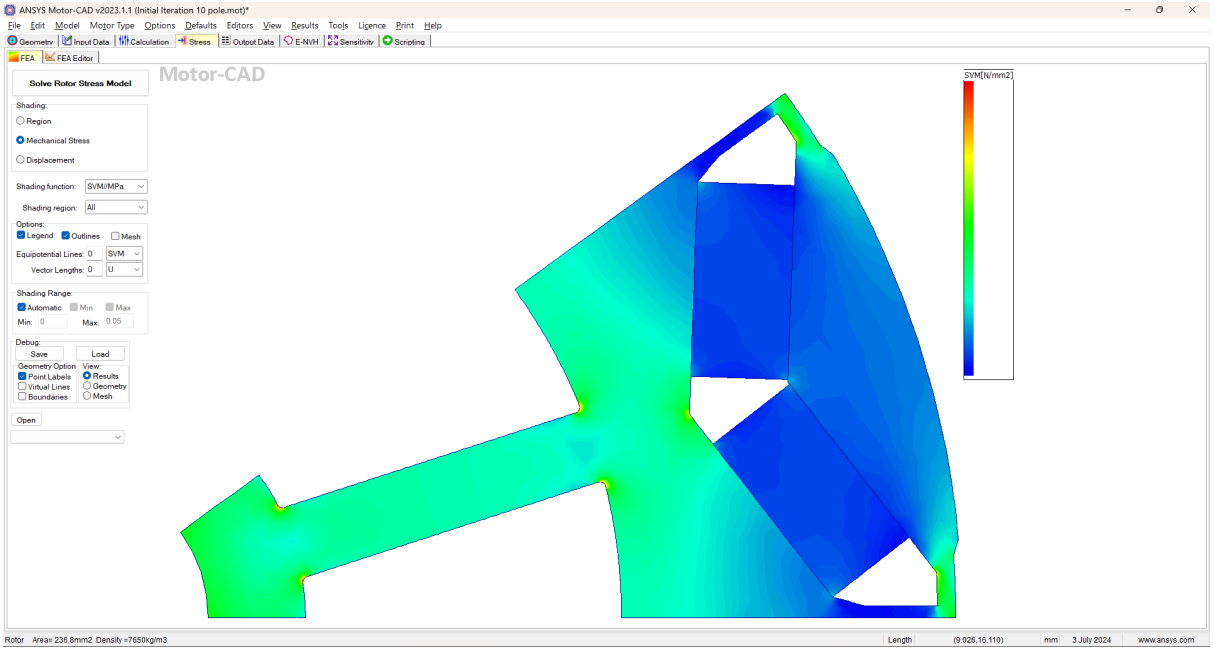


oPEN cIRCUIT



sHORT cIRCUIT


Motor-CAD Lab Results Viewer (Initial Iteration 10 pole.mot)
Grid On
Show Legend
Export Figure
Export Data
Refresh Units
Graphing
Data
Graph Settings
Export Settings
Virtual Test Data
Shaft Torque (Nm)
-2
-4
-6
-8
-10
-12
500
1000
1500
2000
2500
3000
Speed (rpm)
X Axis: Speed
Y Axis: Shaft Torque
Z Axis:


ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry
Input Data
Calculation
Stress
Output Data
E-NVH
Sensitivity
Scripting
FEA
FEA Editor
Solve Rotor Stress Model
Motor-CAD
Shading:
Region
Mechanical Stress
Displacement
Shading function: SVM/MPa
Shading region: All
Options:
Legend
Outlines
Mesh
Equipotential Lines: 0
SVM
Vector Lengths: 0
U
Shading Range:
Automatic
Min
Max
Min: 0
Max: 0.05
Debug:
Save
Load
Geometry Option
Point Labels
Virtual Lines
Boundaries
View:
Results
Geometry
Mesh
Open
SVM[N/mm2]
Rotor Area= 236.8mm2 Density =7650kg/m3
Length
(9.026,16.110)
mm
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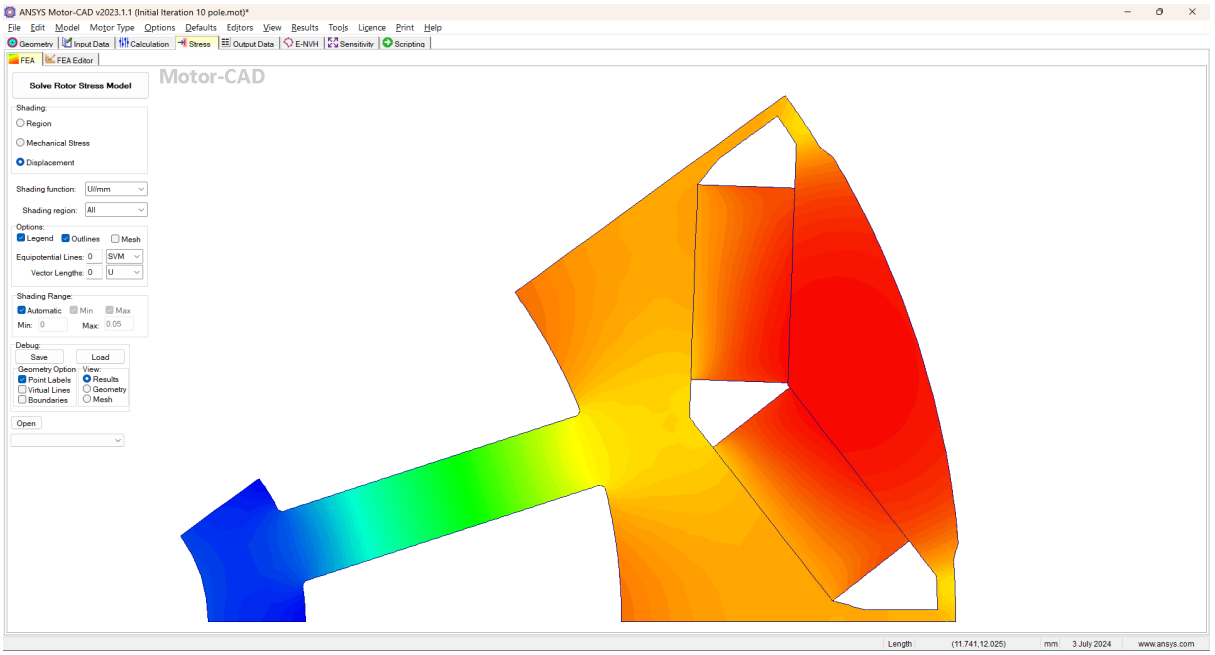
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
Motor-CAD
Solve Rotor Stress Model
Shading:
Region
Mechanical Stress
Displacement
Shading function:
Shading region:
Options:
Legend
Outlines
Mesh
Shading Range:
Automatic
Debug:
Save
Load
Open
Length
(11.741,12.025)
mm
3 July 2024
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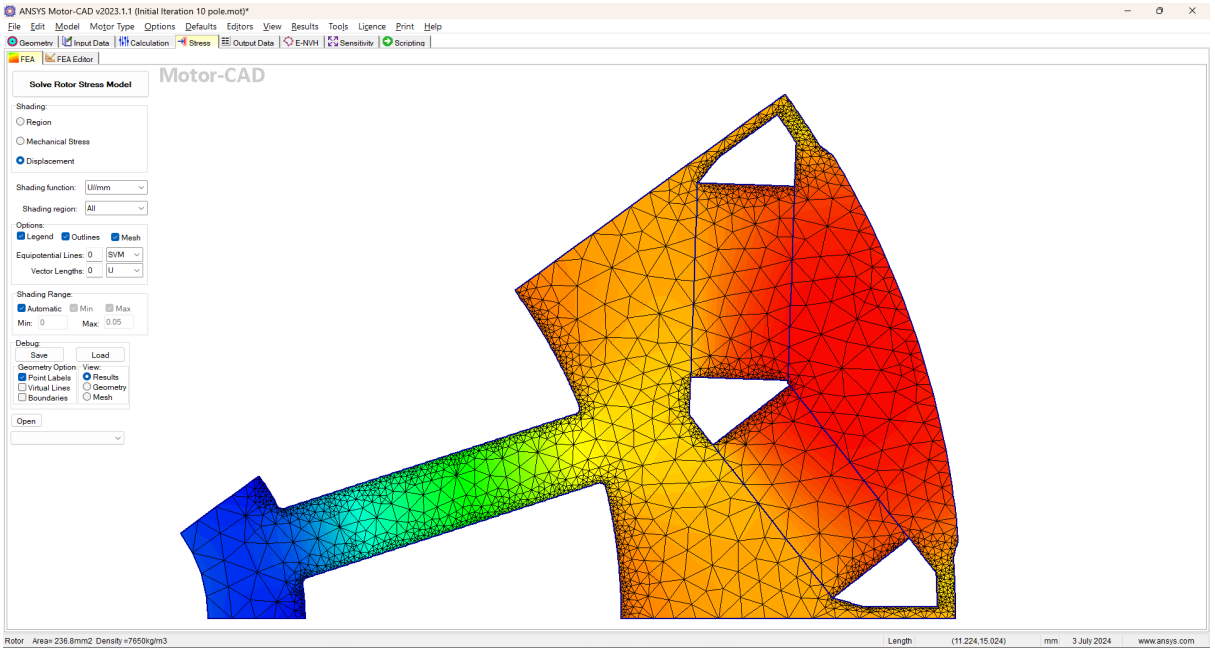
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
Motor-CAD
Solve Rotor Stress Model
Shading:
Region
Mechanical Stress
Displacement
Shading function:
Shading region:
Options:
Legend
Outlines
Mesh
Shading Range:
Automatic
Debug:
Save
Load
Open
Rotor Area= 236.8mm2 Density =7650kg/m3
Length
(11.224,15.024)
mm
3 July 2024
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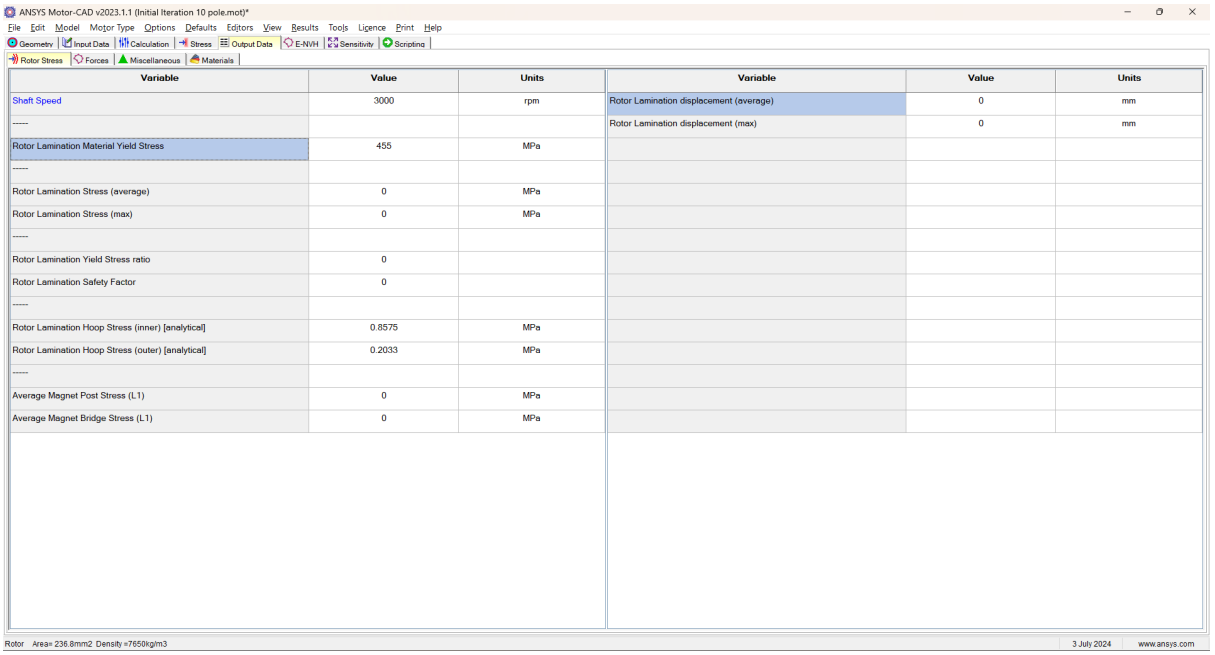
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Input Data Calculation Stress Output Data E-NVH Sensitivity Scripting
Rotor Stress Forces Miscellaneous Materials
Variable Value Units
Shaft Speed 3000 rpm

Rotor Lamination Material Yield Stress 455 MPa

Rotor Lamination Stress (average) 0 MPa
Rotor Lamination Stress (max) 0 MPa

Rotor Lamination Yield Stress ratio 0
Rotor Lamination Safety Factor 0

Rotor Lamination Hoop Stress (inner) [analytical] 0.8575 MPa
Rotor Lamination Hoop Stress (outer) [analytical] 0.2033 MPa

Average Magnet Post Stress (L1) 0 MPa
Average Magnet Bridge Stress (L1) 0 MPa
Variable Value Units
Rotor Lamination displacement (average) 0 mm
Rotor Lamination displacement (max) 0 mm
Rotor Area= 236.8mm2 Density =7650kg/m3
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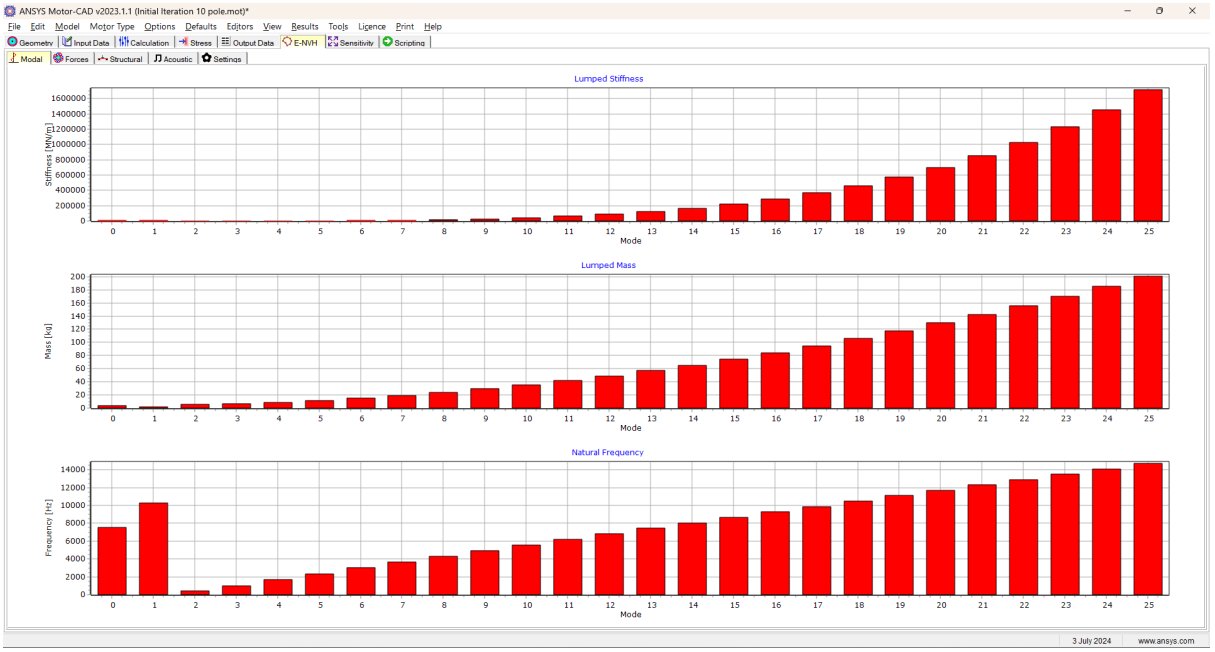
ANSYS Motor-CAD v2023.1.1 (Initial Iteration 10 pole.mot)*
File Edit Model Motor Type Options Defaults Editors View Results Tools Licence Print Help
Geometry Input Data Calculation Stress Output Data E-NVH Sensitivity Scripting
Modal Forces Structural Acoustic Settings
Lumped Stiffness
Stiffness [MN/m]
Mode
Lumped Mass
Mass [kg]
Mode
Natural Frequency
Frequency [Hz]
Mode
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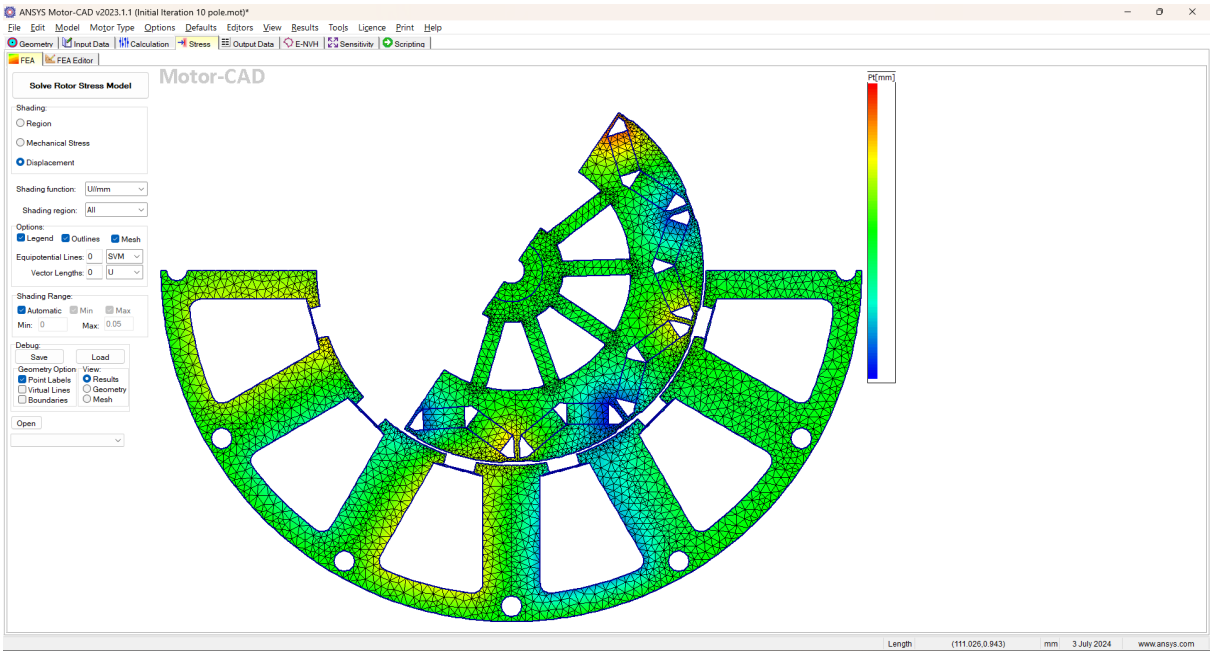

saturation_model