Technical Data Summary, Ultract type direct drive generator

Generator Type MotorCode = "U318W100.20.3 - G - R0 - pa"

Document DocNum = "preliminary - offer purpose only"

Reference data:

T_coolant = 20 C

T_copper = 100 C

S1_Δt = 80 C

Cooling Type

$Cooling_{Coolindex,0}$ = "water + glycole cooling"

Output power, cont. duty S1, wn2, coil at Tcopper	$Pout(Itherm(wn2), wn2) = 260.9 \cdot kW$
Rated speed	$wn2 = 2000 \cdot rpm$
Max speed	$wn3 = 2200 \cdot rpm$
Generator constant	$Mcst = 24.548 \cdot N \cdot \frac{m}{\sqrt{watt}}$
Breakover torque in short circuit	$Cul = 3.5 \times 10^3 \cdot N \cdot m$

Physical data:

Maximum mechanical speed	$Wmax = 3 \times 10^3 \cdot rpm$
Rotor inertia, magnet ring	$Jrot = 0.701\,kg \cdot m^2$
Max. shock on Generator, any direction	$Shk := 2 \cdot g$
Max. vibration level on Generator, any direction	$Vlevel := 2 \cdot g$
Outer diameter	$Dstin = 325 \cdot mm$
Stator mass, active part	$Mstat = 156.1472\,kg$
Airgap, mechanical,	$Agap = 1.2 \cdot mm$
Maximum inner rotor diameter	$Diamin = 184.3978 \cdot mm$
Outer rotor diameter	$Diamax = 470 \cdot mm$
Stack radial length	$\frac{Stk1}{2} = 240 \cdot mm$
Insulation class	Class H
Cooling	$Cooling_{Coolindex,0}$ = "water + glycole cooling"
Magnet mass	$Mmag = 13.6076 \cdot kg$
Total mass, active part only	$Mtotal = 207.1956\,kg$

Thermal data:

Generator max loss at wn2	$Loss(Imnominale, wn2) = 6.845 \cdot kW$
Thermal impedance, copper to air over frame, 1 m/sec	$Rth = 9.5094 \times 10^{-3} \cdot K \cdot watt^{-1}$
Thermal capacity	$Cth = 6.5582 \times 10^{4} \cdot joule \cdot K^{-1}$
Thermal time constant	$ta = 623.6467\ s$
Treshold of built-in PTC	$PTCt := 130 \cdot K$
Coolant flow (water) (temp. rise=10K)	$Fl = 9.8112 \cdot \frac{liter}{min}$
Temp. rise in coolant	$Dt = 10\ K$
Max. coolant inlet temperature	$Intemp := 40$ C

Electrical data:

Pole number	$Pn = 12$
Connection	Wye
Rated voltage	$\lvert Vgen(Itherm(wn2), wn2) \rvert \cdot \sqrt{3} = 323.8 \cdot volt$
Rated current	$Itherm(wn2) = 479 \cdot amp$
Back EMF between phases, tol +/-7%, 20C	$EMF = 1.6 \cdot volt \cdot sec$
Torque constant	$Kt = 2.8 \cdot N \cdot m \cdot amp^{-1}$
Temperature coefficient of back EMF and Kt	Dke/Dt = -0.11%/K
Winding resistance, 20 C	$Rw = 8.8708 \times 10^{-3} \cdot ohm$
Winding inductance	$Lc = 0.1484 \cdot mH$
Frequency at wn	$Fn = 200 \cdot Hz$
Min. demagnetization current, 125 C	$Ipk = 4.5941 \times 10^{3} \cdot amp$
Efficiency at rated power	$Eff(Itherm(wn2), wn2) = 0.9732$

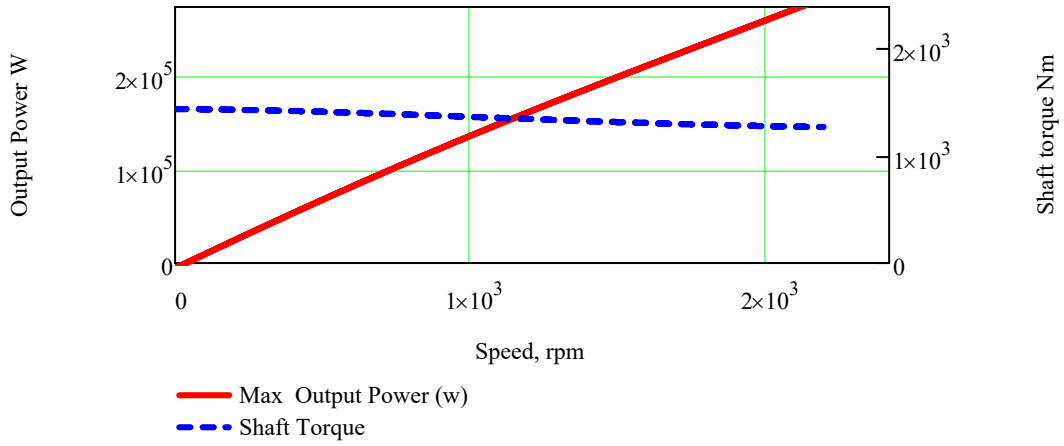
Nominal (design) data at operating point 1

Input Mechanical Torque	$Input\_Torque = 1226 \cdot N \cdot m$
Input Mechanical Power	$Input\_Power = 257 \cdot kW$
Speed	$wn2 = 2000 \cdot rpm$
Nominal power	$Pnominale = 250 \cdot kW$
Nominal current	$Imnominale = 458.0407 \cdot amp$
Nominal voltage	$Vgennom = 323.6859 \cdot volt$
Nominal power factor	$Cosfinom = 0.9735$
Nominal efficiency	$Effnom = 0.973$
Direct current	$Idnom = 0 \cdot amp$
Quadrature current	$Iqnom = 458.0407 \cdot amp$

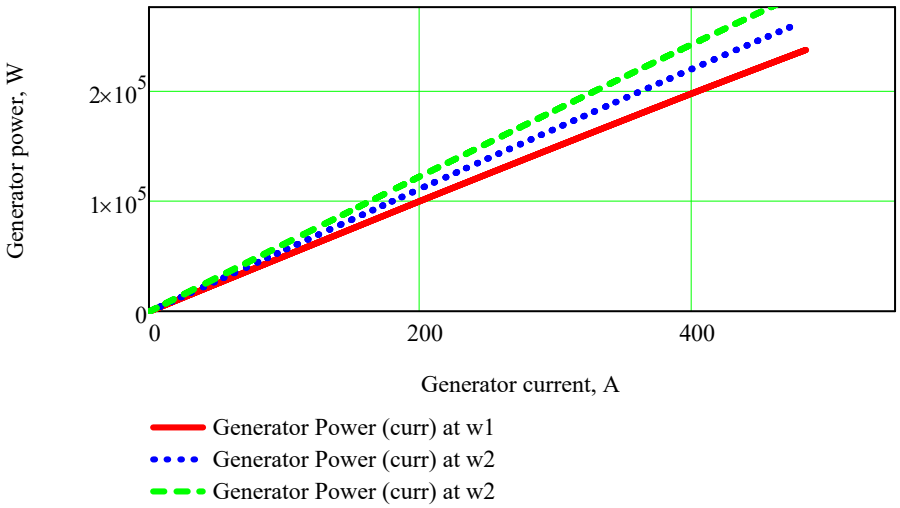
NOTE: These are the values at the generator terminals and NOT on the grid.
The power fed into the grid must be reduced of the Inverter and the AFE losses
For the overall efficiency must therefore be considerarate the sum of the generator losses + Inverter + AFE

Maximum generator electric output power (W) and shaft torque (Nm) versus speed (rad/sec), electric loss only (frameless generator), sinusoidal current control, Id=0

Reference data: T_coolant = 20 C T_copper = 100 C S1_Δt = 80 C



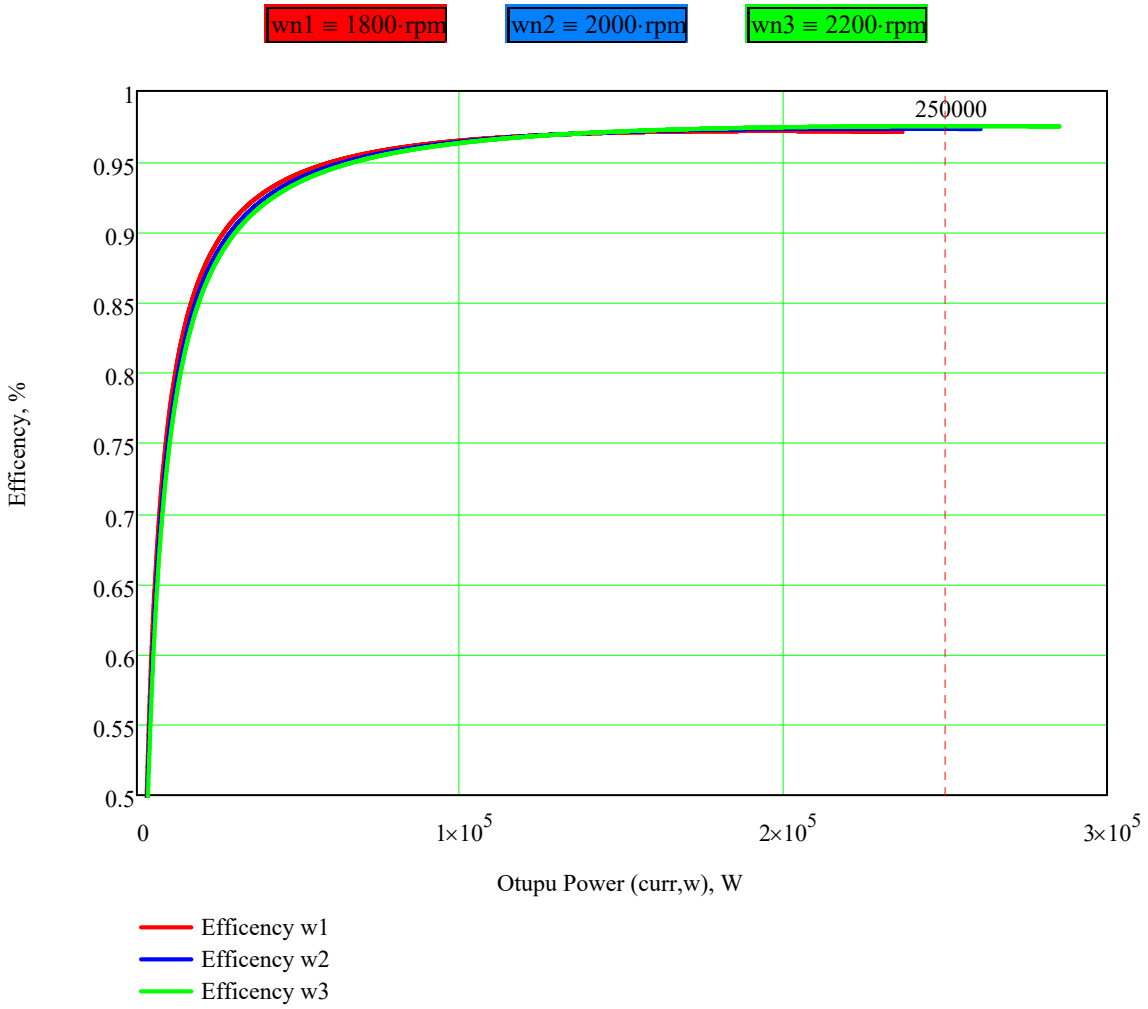
Generator power(W) versus current at wn1,2,3 speeds, sinusoidal current control,Id=



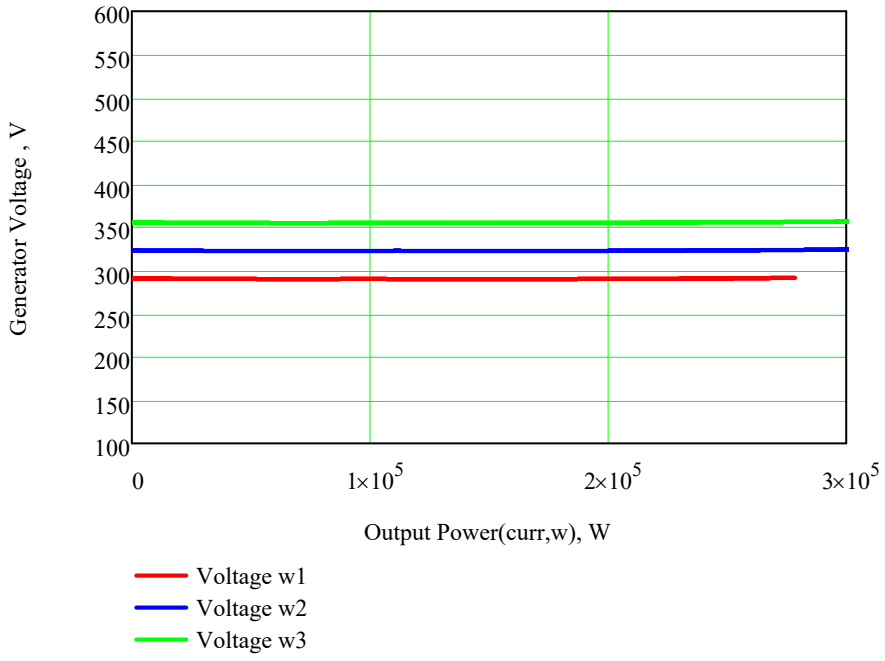
Dati di targa - nameplate data

Generator Code	MotorCode = "U318W100.20.3 - G - R0 - par"	Nominal speed	wn2 = 2000·rpm
Pole Number	Pn = 12	Shaft torque	Tgen(wn2) = 1279.9·N·m
Rated voltage	|Vgen(Itherm(wn2), wn2)| ·√3 = 324·volt	EMF voltage	EMF = 1.6349·V·s
Rated current	Itherm(wn2) = 479·amp	Rated output power	Pout(Itherm(wn2), wn2) = 260.87·kW

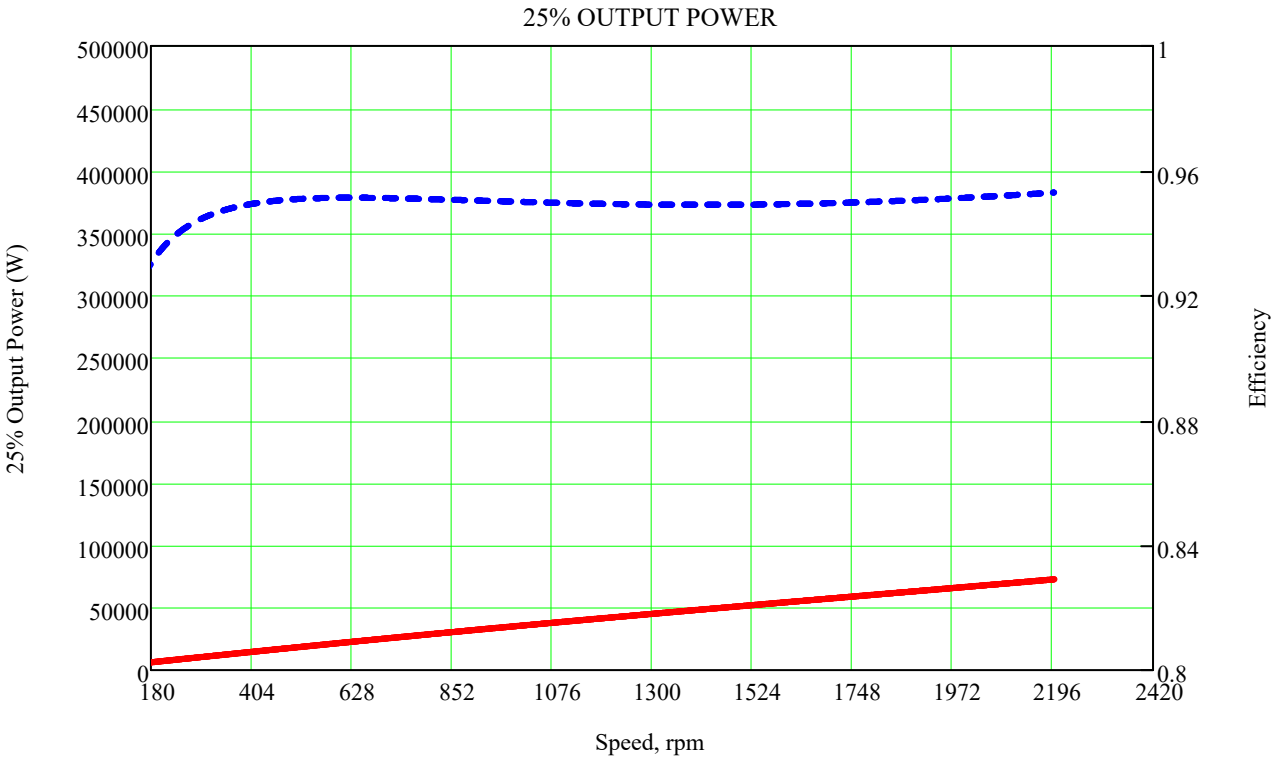
Efficiency vs. output power at wn1,2,3 rpm, converter load (sinusoidal Id control)

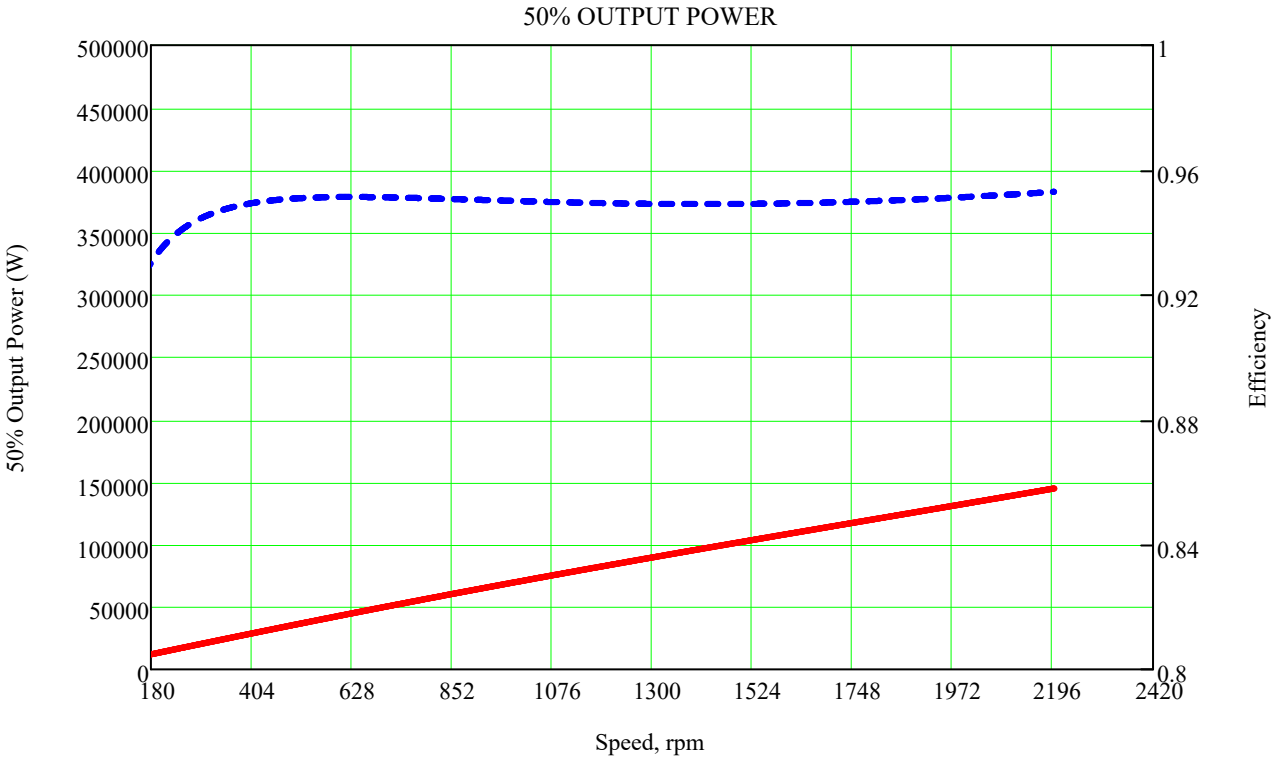


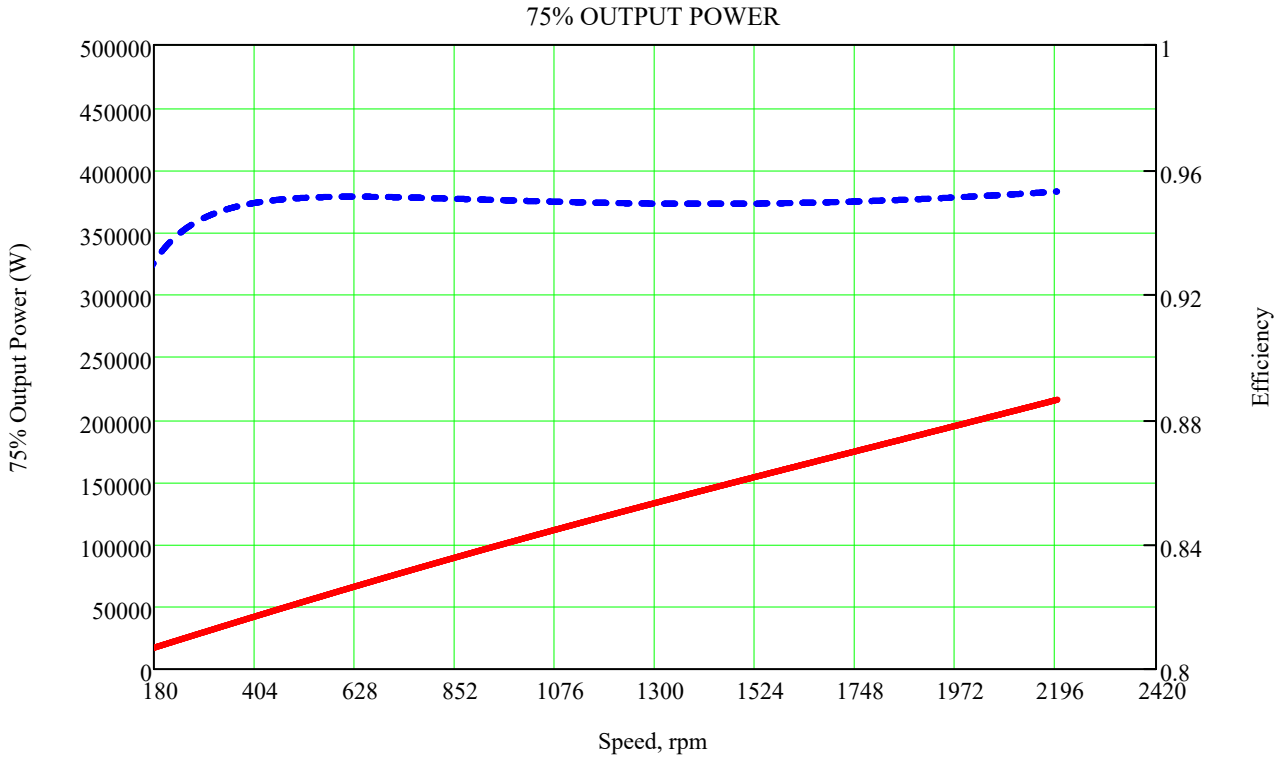
Generator voltage versus output power at wn1,2,3 speeds; sinusoidal current control, Id=0, max temperature (add ~ 8% more voltage at low temperature)

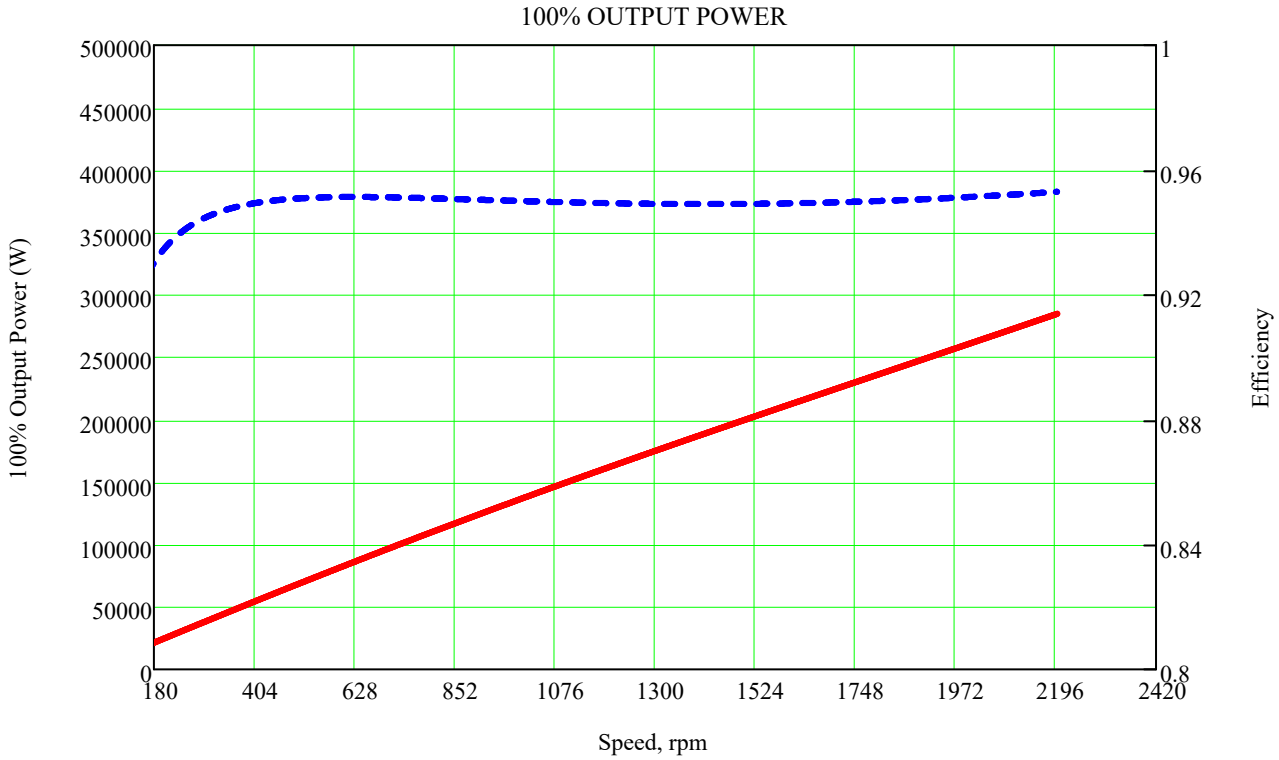


Generator output power and efficeincy at different load values






75% OUTPUT POWER
75% Output Power (W)
500000
450000
400000
350000
300000
250000
200000
150000
100000
50000
0
1
0.96
0.92
0.88
0.84
0.8
Efficiency
180
404
628
852
1076
1300
1524
1748
1972
2196
2420
Speed, rpm


100% OUTPUT POWER
100% Output Power (W)
500000
450000
400000
350000
300000
250000
200000
150000
100000
50000
0
1
0.96
0.92
0.88
0.84
0.8
Efficiency
180
404
628
852
1076
1300
1524
1748
1972
2196
2420
Speed, rpm