The Power Factor Correction Circuit Simulation and PFC Inductor Design with SIMPLORER® and PExprt®

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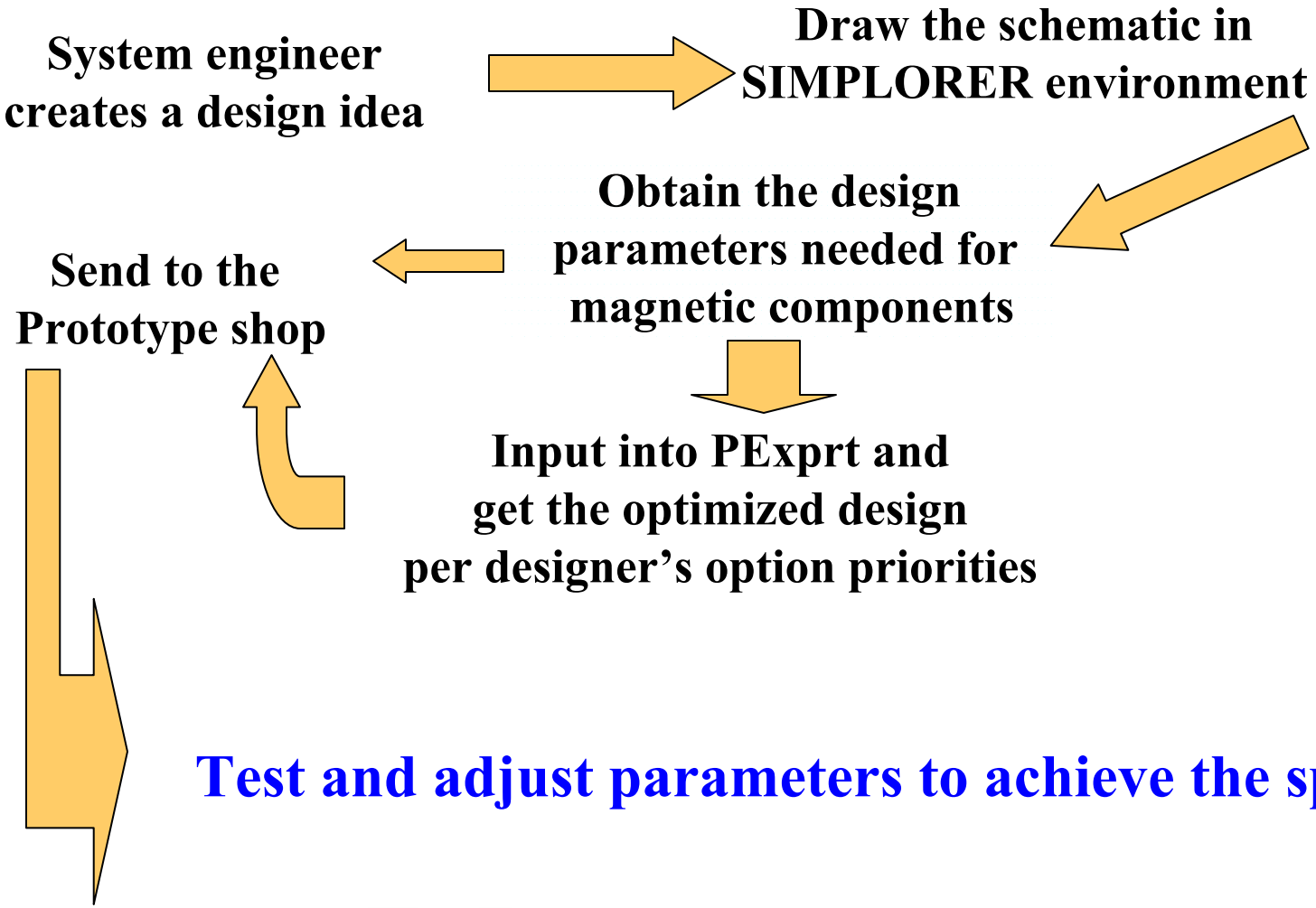
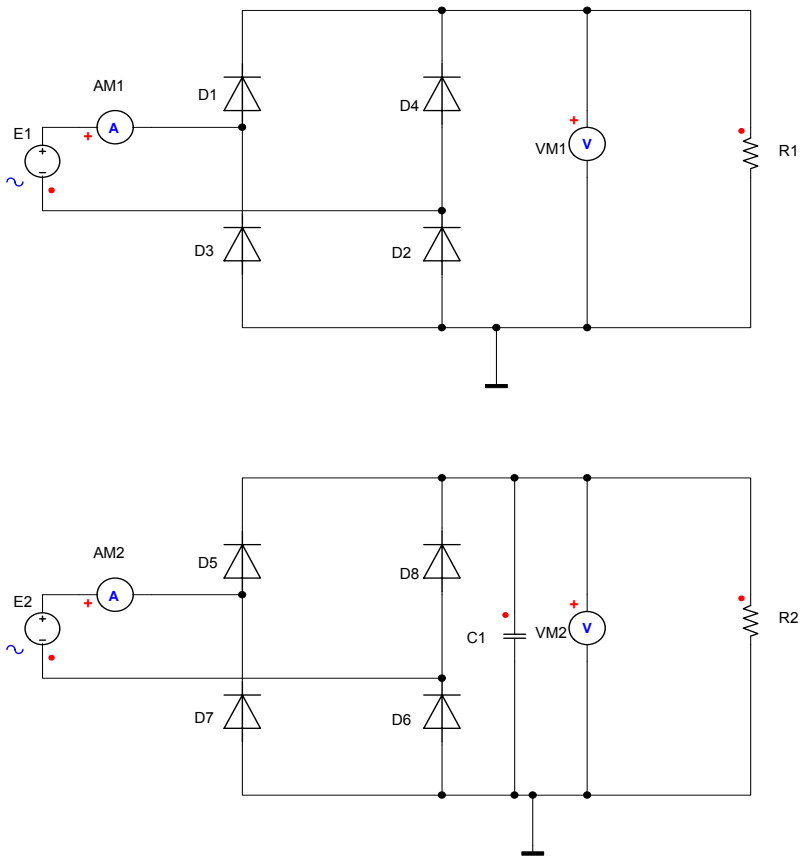
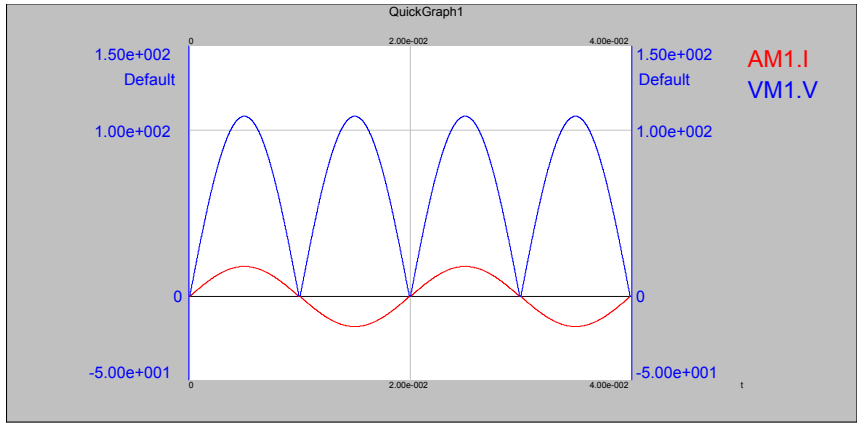
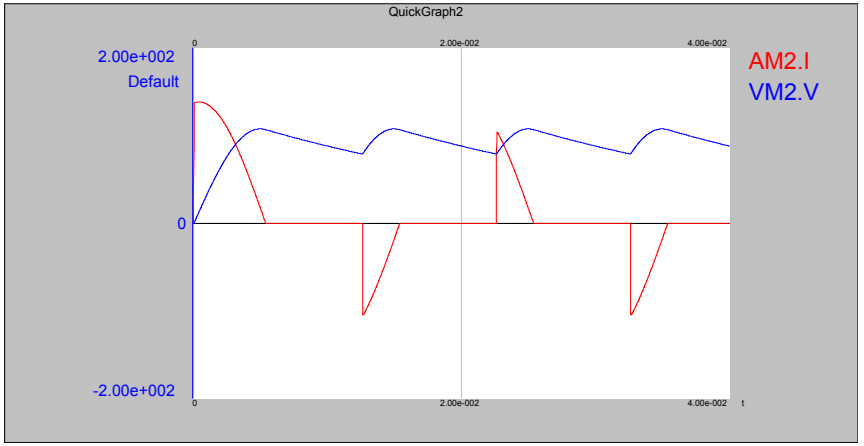
The Integrated Simulation and Design Tools: SIMPLORER® and PExprt®



Currents Drawn from Power Line without Power Factor Correction







The Parameters Needed to Input into SIMPLORER

Input Data

ICA:

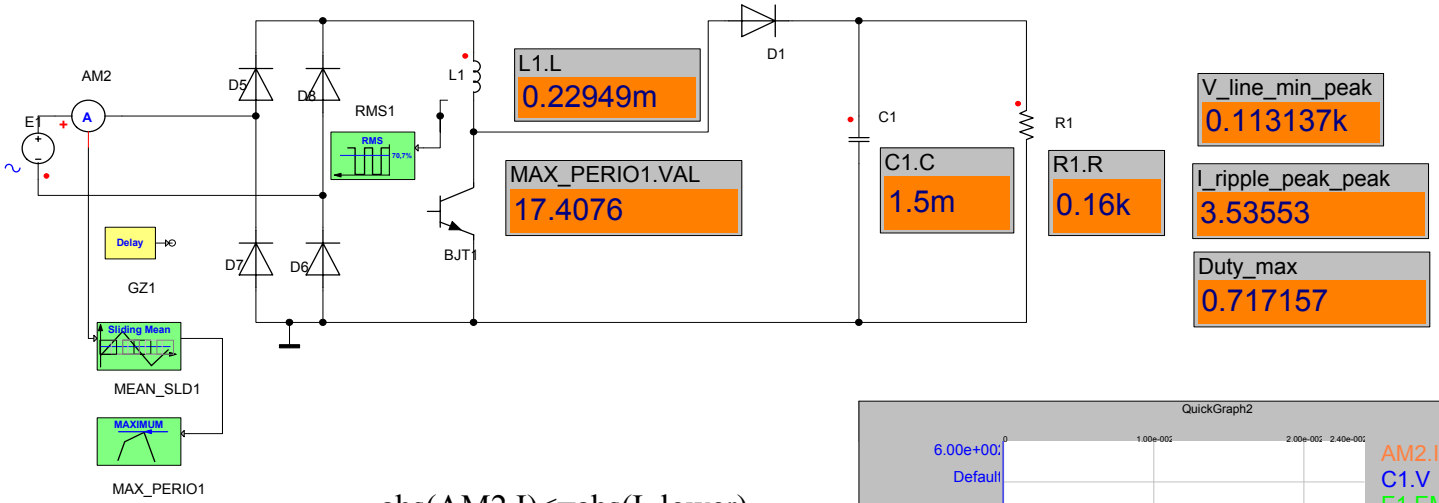
F_chopping := 100k
P_out := 1000
V_out := 400
F_line_min := 47
F_line_max := 65
V_line_min := 80
V_line_max := 270
Transient_Steady := 1
Ripple_coefficient := 0.2

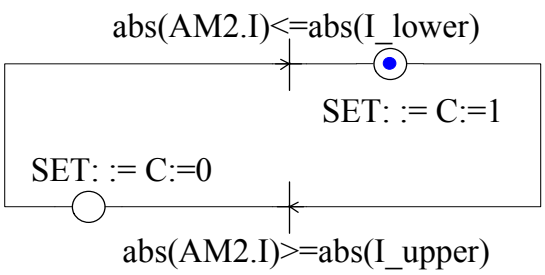
Control Parameters

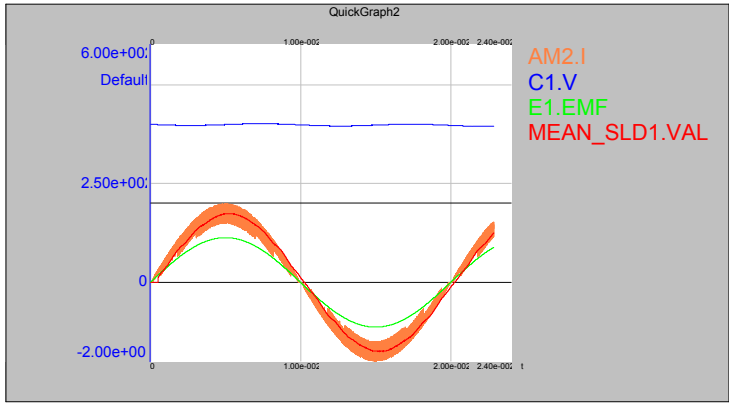
EQU

I := (2*P_out/E1.AMPL)*(E1.EMF/E1.AMPL)
I_upper := 1.1*I
I_lower := 0.9*I
C_out := P_out*1.5u
I_ripple_peak_peak := Ripple_coefficient*(sqrt(2)*P_out/V_line_min)
Duty_max := (V_out-sqrt(2)*V_line_min)/V_out
L_pfc := Sqrt(2)*V_line_min*Duty_max/(F_chopping*I_ripple_peak_peak)

Power Factor Correct Circuit Simulation and Magnetic Design Parameters Obtained

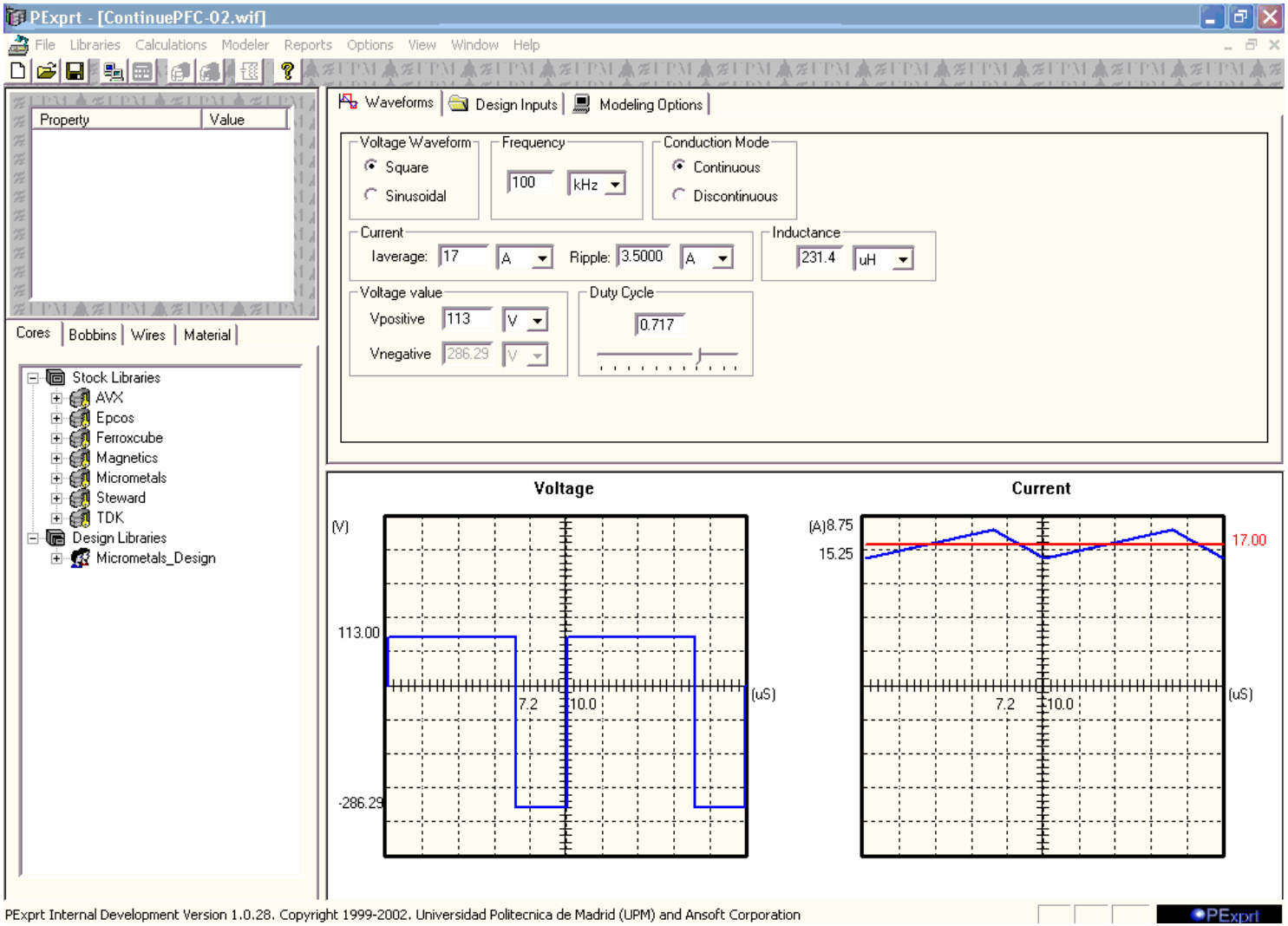




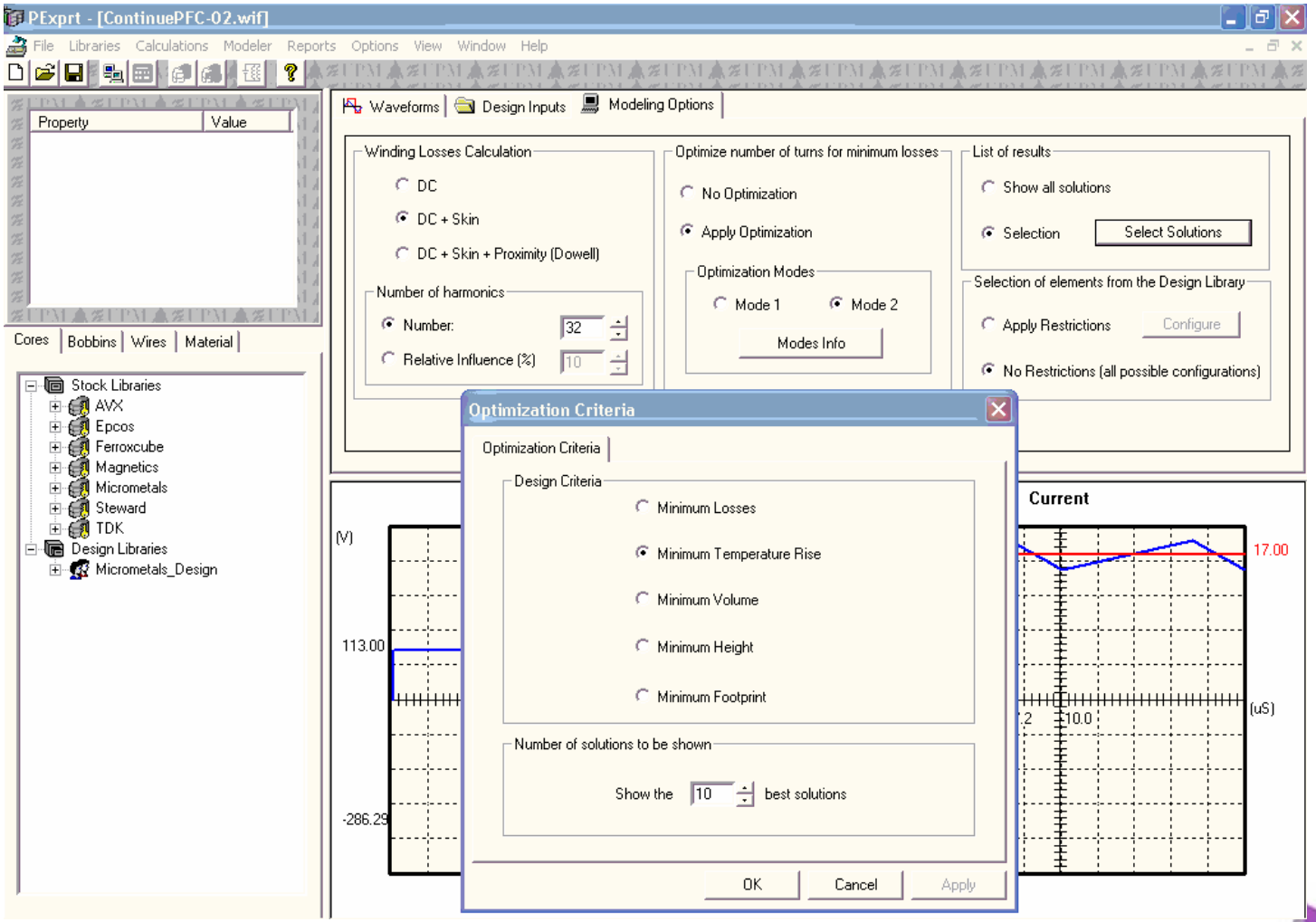


SIMplorer®

Input the Parameters into PExprt



Specify the Optimize Priority for the Design Option List

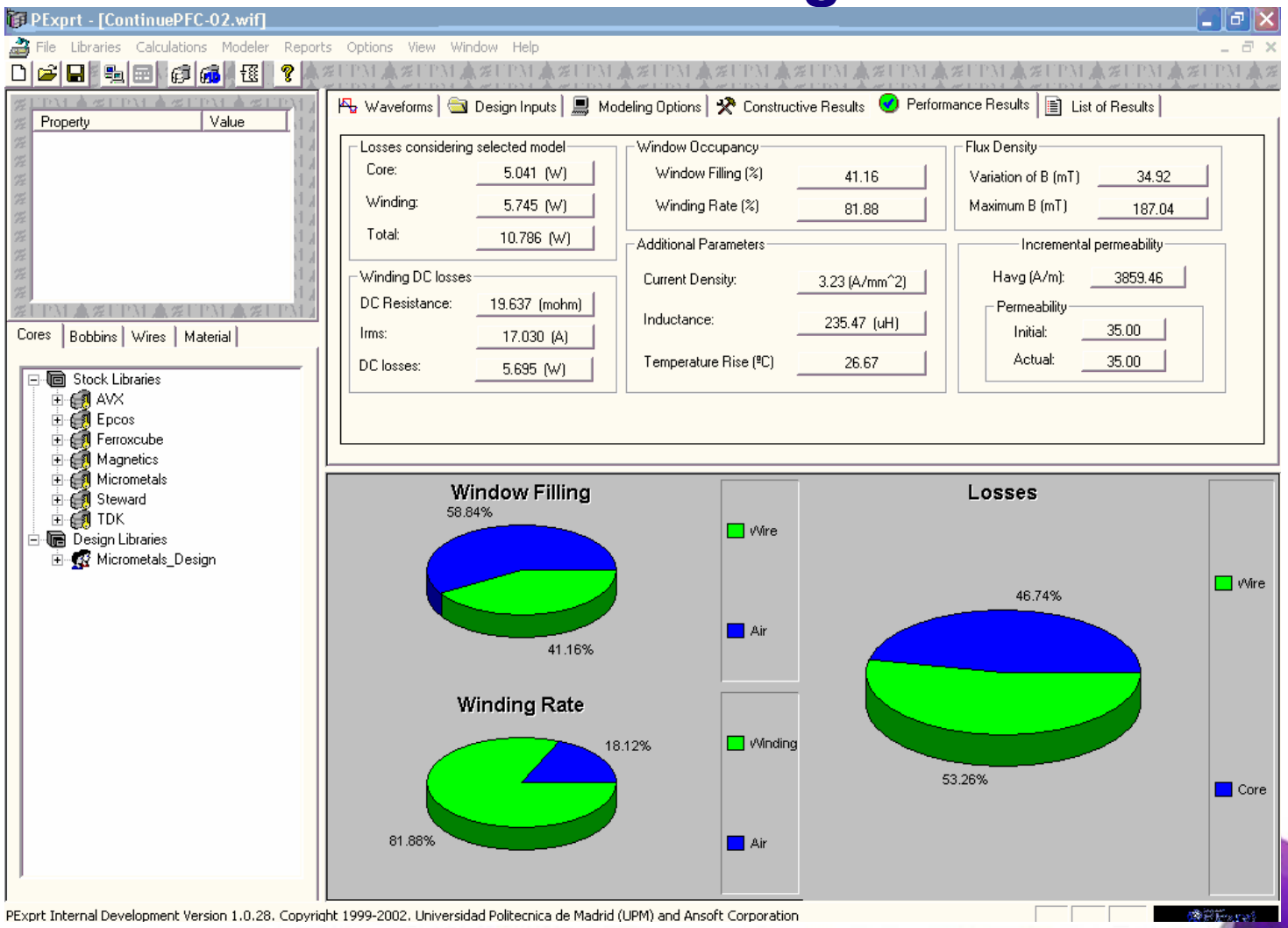


Design List per System Engineer's Design Priorities

Waveforms | Design Inputs | Modeling Options | Constructive Results | Performance Results | List of Results

Core [Name]	Wire [Name]	Volume [mm^3]	Temperature ...	Gap [mm]	Parallel Turns [n]	Power Losses ...	Window Filling...
E305	AWG10	103970.00	26.67	0.0000	1	10.7861	41.16
E305	AWG11	103970.00	29.62	0.0000	1	11.9315	32.88
E305	AWG10	103970.00	32.70	0.0000	1	13.4710	33.32
E305	AWG12	103970.00	33.49	0.0000	1	13.4329	26.25
E305	AWG11	103970.00	34.97	0.0000	1	14.3500	26.62
E305	AWG13	103970.00	38.03	0.0000	1	15.1963	21.00
E305	AWG12	103970.00	38.08	0.0000	1	15.5596	21.25
E305	AWG13	103970.00	41.92	0.0000	1	17.0467	17.00
E305	AWG14	103970.00	43.99	0.0000	1	17.5077	16.72
E305	AWG14	103970.00	46.80	0.0000	1	18.9397	13.54

Magnetic Component Performance for a Selected Design



Conclusions

- Help the system engineer to verify the system design idea promptly.
- Get the magnetic optimized design without magnetic design experience requirement.
- Speed up the process to obtain the total system performance.
- Save the time and money

Thanks for your attention!

Any question?