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**New Version 4.1.0 Now Available**

Now with Split Bobbin/Sector Winding Features



# Magnetics Designer

**Software That Makes Transformer and Inductor Design Easy!!**

Magnetics Designer is a software program that provides a fast and simple way to design all types of transformers and inductors, a key part of all electronic systems and power supplies. Virtually any single phase, layer or sector wound, inductor or transformer, from 10Hz to over 5MHz, can be designed and analyzed. All variations from small (planar) to large (power pole) are supported.

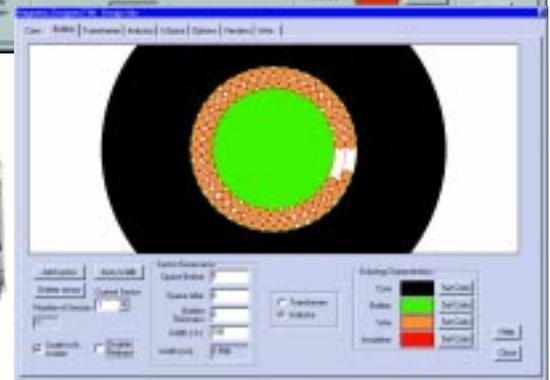
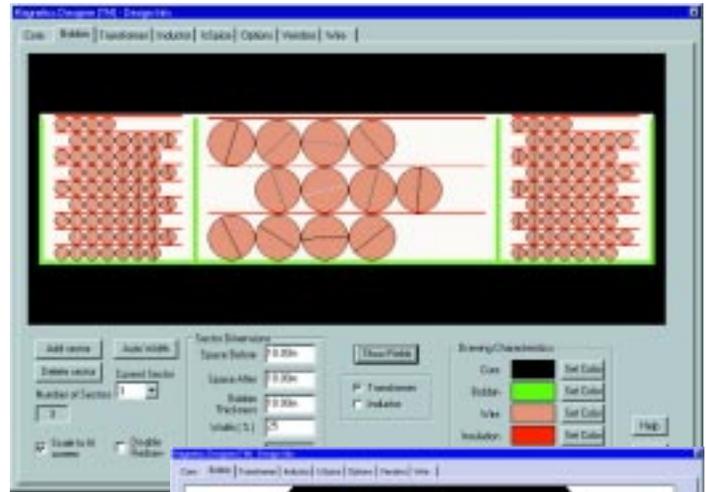
Magnetics Designer produces a complete transformer or inductor structure based upon your electrical specifications. A database with thousands of cores and a wide variety of materials and wire are included to cover all of your needs. However, you can add your own cores, wire, and material information using our supplied Excel® spreadsheet (see requirements below).

Magnetics Designer uses proprietary algorithms to select the appropriate core, number of turns, and wire sizes to minimize the total power dissipation for a given temperature rise in the smallest possible core. The program predicts magnetizing and leakage inductance, interwinding capacitance, peak flux density, DC and AC winding resistance, copper loss (both AC and DC), core loss, weight, temperature rise, window fill percentage and more.

Version 4.1.0 is packed with new features. Major enhancements include the ability to handle sector winding configurations and a new bobbin tab that depicts the winding structure. New field solution algorithms produce magnetic field maps that describe the core flux behavior (*shown below*). The field solutions give you more accurate calculation of the AC resistance.

## Magnetics Designer...

- Analyzes, designs, and optimizes all types of transformers and inductors from electrical specifications; from low to high frequency (>5MHz)
- Can tackle applications like 60Hz single phase line transformers, high frequency switching regulator transformers, AC/output chokes, flyback and forward converter transformers, planar magnetics and more
- Produces a complete winding sheet and detailed electrical performance reports
- Allows you to compare designs quickly and easily
- Contains a complete database of cores, materials, and wire. Core vendors such as TDK, Magnetics, Philips, Thomson, Micrometals, Siemens, Kaschke, Vac, and Fair-Rite are represented. You can use formvar, square or double square magnet wire, Litz wire, pcb traces, or foil including silver or aluminum compositions
- Allows you to change over 20 design parameters such as allowed temperature rise, allowed window fill, number of turns, wire gauge and type, bobbin margins, number of parallel strands, gap length, layer insulation thickness, wrapper thickness, and end margin lengths
- Allows you to split, move, and interleave windings and set variable size sectors



**Download A FREE Demo Kit!**

**Web Site: [www.intusoft.com](http://www.intusoft.com)**

email: [info@intusoft.com](mailto:info@intusoft.com)

**Hardware/Software Requirements:** PC running Windows 95/98 or NT, 8 Meg ram minimum; Microsoft Excel (version 5.0a and up) is required only for core database editing.



# Magnetics Designer



## Powerful Algorithms That Boost Your Productivity

Magnetics Designer has a number of unique features that set it apart from all programs, past and present, that have attempted to tackle transformer and inductor design. The software includes a level of sophistication, ease of use, and power that no home grown approach can match.



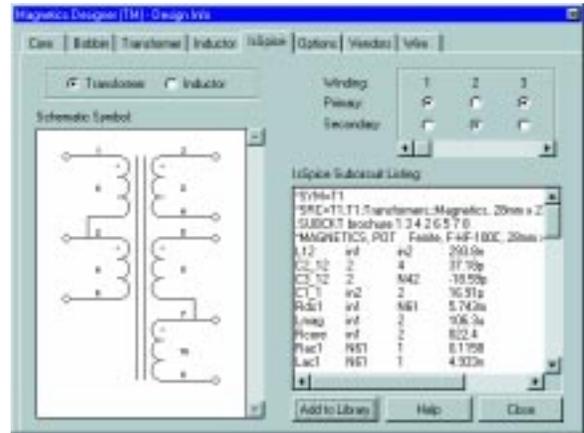
The **Core Selection Screen** (above) gives you thousands of cores to choose from. The database is extensible, allowing you to add your own “exotic” cores, materials, and wire information. A database of core manufacturers, core distributors, wire distributors, and transformer manufacturers is also included, along with the ability for you to add your favorite vendor to the list.



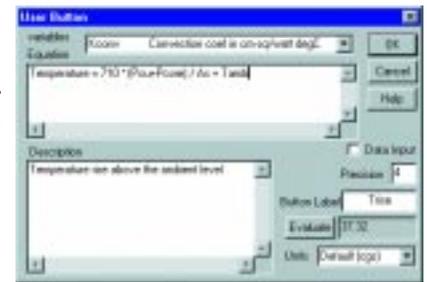
Magnetics Designer’s powerful algorithms perform thousands of optimizations allowing you to trade-off over 20 different design parameters, (**Transformer Screen** above).

### Unique Features Set Magnetics Designer Apart

Magnetics Designer produces a Berkeley **SPICE model** of your transformer or inductor design as shown in the **SPICE Model Screen** (next). The model includes 1st and 2nd order effects such as AC/DC resistance, frequency dependent losses, leakage inductance, and intertwining capacitance. OrCAD® (Capture®), or Intusoft (SpiceNet) **schematic symbols** are also produced so that you can immediately make use of your design in a simulation.



Magnetics Designer can be customized. The program exposes all of the key design variables and allows you to create your own mathematical equations (**User Button screen**, right) with them. With this feature, you have unparalleled flexibility in deriving your own performance merits and optimization criteria.



Magnetics Designer produces a detailed “winding sheet” that describes your magnetic device and how it should be constructed. You can even e-mail your design reports directly to a manufacturer.

Stop designing transformers and inductors using tedious hand calculations! With the features and power of Magnetics Designer you can create better designs faster and dramatically improve your productivity.



**Where was Magnetics Designer Developed?**  
The Magnetics Designer software was originally developed by Analytic Artistry, the leader in the field of nonlinear magnetics design tools. In 1995, Intusoft acquired the rights to the “Transformer and Inductor Spreadsheet”, originally a DOS based program. Intusoft ported the Analytic Artistry product to Windows, added a number of key enhancements, and changed the name to Magnetics Designer. Power supply designers with decades of real-world experience have validated the software at both companies.

**How Does Magnetics Designer Work?**  
Please contact Intusoft for our Magnetics Application Notes or check out <http://www.intusoft.com/mag.htm>.

# Magnetics Designer

## Features and Benefits Summary

### Benefits

- ◆ Magnetics Designer is a synthesis tool. Unlike competing solutions, which are primarily analysis tools, Magnetics Designer actually generates the winding structure and picks the optimum geometry for you.
- ◆ Magnetics Designer is fast. Analytical multi-parameter optimization schemes allow you to design interactively. Finite element analysis is performed at key points in the optimization process to insure accuracy.
- ◆ Magnetics Designer is powerful. The algorithms are time tested and proven over thousands of designs. The accurate analytical calculations allow you to interactively explore different design trade-offs. This is not possible with FEA-only solutions.
- ◆ Magnetics Designer is flexible. It exposes all key input variables and constants. Nothing is hidden. You can even manipulate the basic equations used by the program or add your own performance merits.
- ◆ Magnetics Designer is user friendly. All operations are graphically driven. The program constructs an optimal design with minimal user interaction.
- ◆ Magnetics Designer works in your environment. A complete winding sheet report with all manufacturing details is output in text format along with a SPICE model that can be used with any SPICE program.
- ◆ Magnetics Designer is affordable. Unlike competing solutions requiring several products this one program does it all at a reasonable price.

### Program Inputs & Outputs

- ◆ User Inputs (General): Core Family\*, Material\*, Temperature Rise\*, Frequency\*, Window Fill, Flux Swing, max Flux Density, max Strands, min Turns, Winding Pitch, Current Density, Peak Flux Density, Current Waveform Shape, Bobbin Thickness *Per winding parameters*: min Strands, AC/DC Current, Wire Type, Wire Strands, Start/Finish ID, Insulation Layer, Wrapper, and Margin, Pitch, and Thermal Model
- ◆ User Inputs : (Transformer specific) *Per winding parameters*: Voltage/Current\*, Sector size, Space before and after sector
- ◆ User Inputs : (Inductor specific) Volt-seconds\*, *Per winding parameters*: Current Peak\*, Minimum inductance\*
- ◆ Program Outputs (General) Geometry, Temperature Rise, Winding Fill, Core Weight, Copper Weight, Total Weight, Core Loss, Copper Loss, Total Losses, Magnetizing Inductance *Per winding parameters*: # of turns, wire size, # of strands, # of layers, AC/DC Resistance, Leakage Inductance, Inter-winding Capacitance, IR Drop, Copper Loss, Loaded Voltage, Weight, Current Density
- ◆ Program Outputs (Inductor specific) Maximum Inductance

NOTE: \* means required. Magnetics Designer exposes other input and output parameters. Please see the on-line help for a complete list or contact Intusoft. The parameters listed above represent a simplified list.

### Core-Material-Wire Database

- ◆ Vendors: Philips, Siemens, Magnetics and TDK, VAC, Kaschke, Kawatetsu, Fair-Rite, Ferrite International, Thomson and Skinner, and Micrometals
- ◆ Core types: Cut C, DS, E, EC, EE-Din, EE-Lam, EER, EFD, EI-Lam, EP, EPC, ETD, Planar, PM, Pot, PQ, RM, RS, Tape Wound, Toroid, U, UI, and UU cores.
- ◆ Core Materials: Orthonol, Permalloy, Supermendur, F, H, K, P, R, W, TSF, PC30, PC40, PC44, M-15, M-6, M-19, Orthosil, 3C80, 3C81, 3C85, 3F3, 3F4, N27, N41, N49, N62, N67, B50, B51, B52, K2004, K2006, K2008, Vitroperm, and HiFlux
- ◆ You can customize or augment the database using Microsoft Excel (version 5.0a or greater)
- ◆ Wire Type: Round, square, double square, foil, PCB, and Litz wire. Custom wire sizes can also be defined

### Reports and Visualizations

- ◆ Visual picture of the core/winding structure
- ◆ Magnetic field maps showing the distribution of the flux density and direction on the winding structure
- ◆ Detailed SPICE model (can be used with any SPICE program) including magnetizing inductance, core impedance, DC/AC winding resistance, leakage inductance, and interwinding capacitance. Parasitics include proximity effect, interleaving effects, skin effect, dimensional effects, and frequency harmonics
- ◆ Reconfigurable schematic symbol for ICAP/4 or OrCAD® systems
- ◆ Winding Sheet with design information suitable for manufacturing
- ◆ Summary report including all knowledge of the magnetic design and its performance