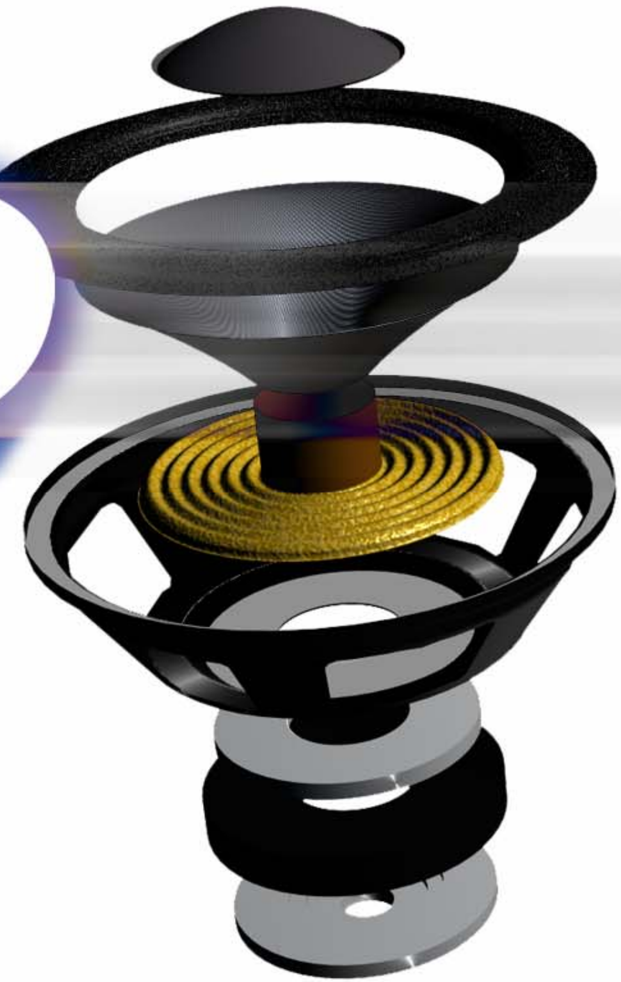
SpeaD

SpeakerDesigner

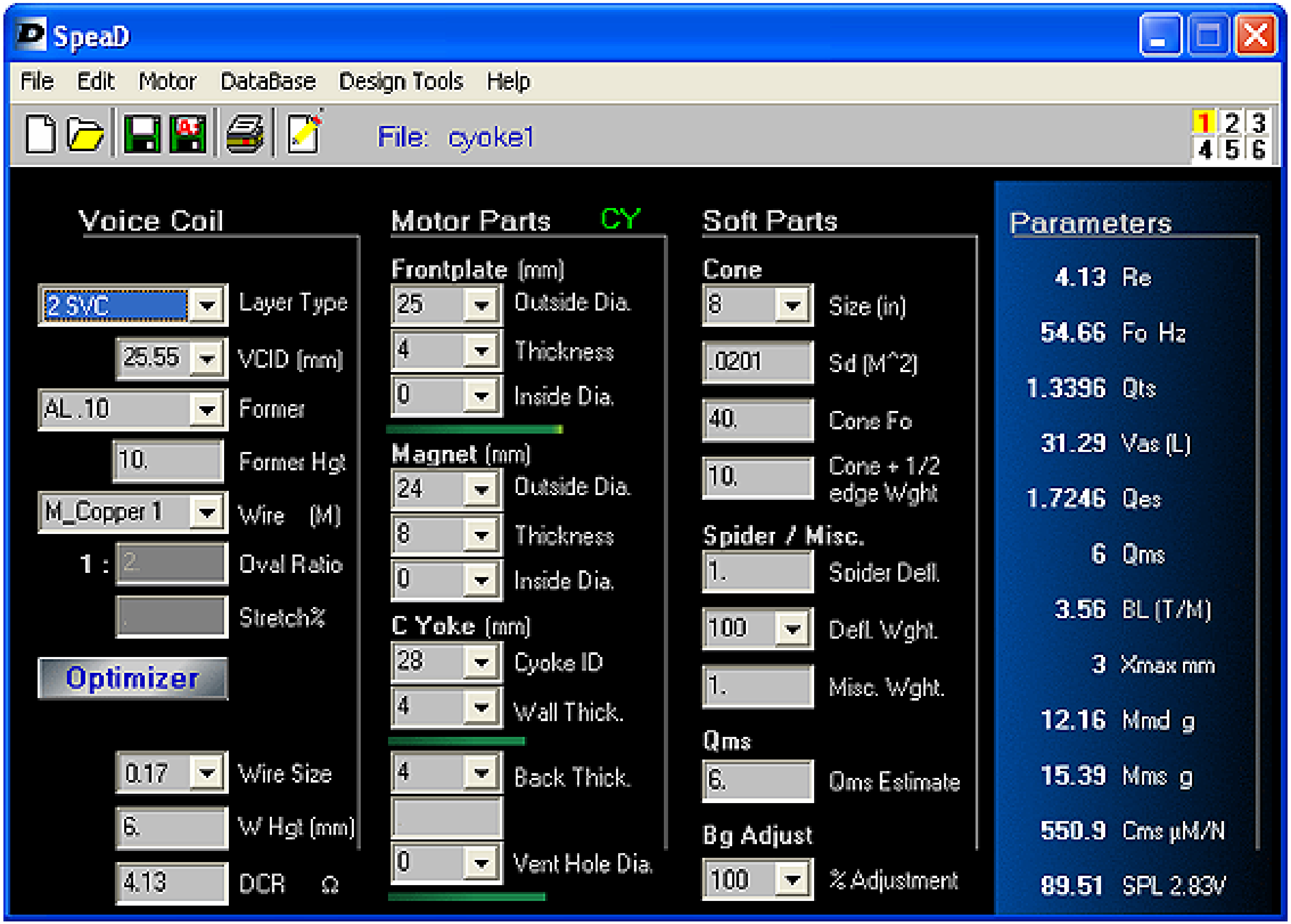


REDROCK
ACOUSTICS

What is Spea*D*?

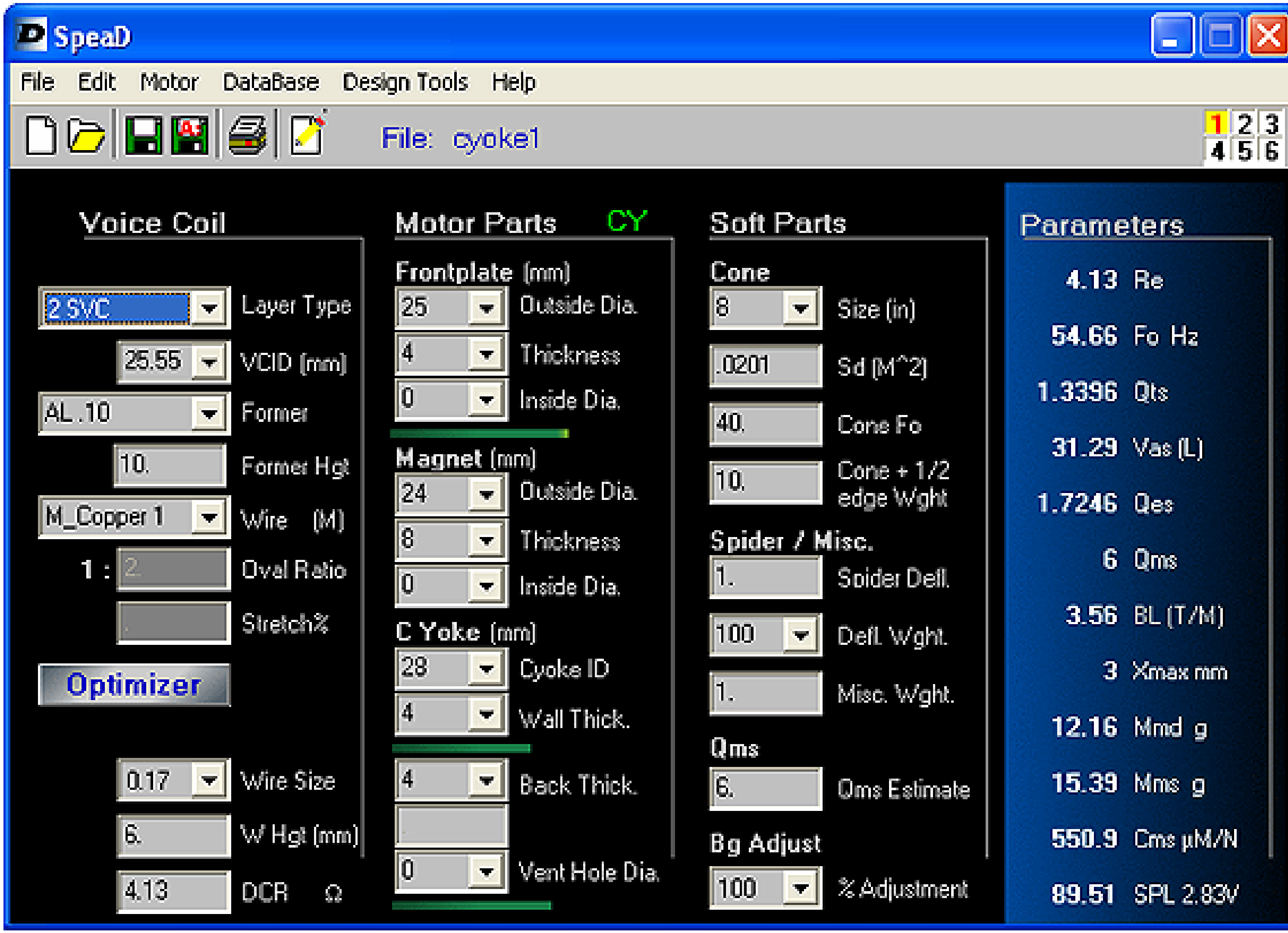
Spea*D* is a revolutionary tool…
that allows a speaker engineer to easily predict the Thiele / Small parameters for any speaker by simply describing its physical parts.

SpeaD is actually 3 tools that combine to create a complete speaker design.



SpeaD is actually 3 tools that combine to create a complete speaker design.

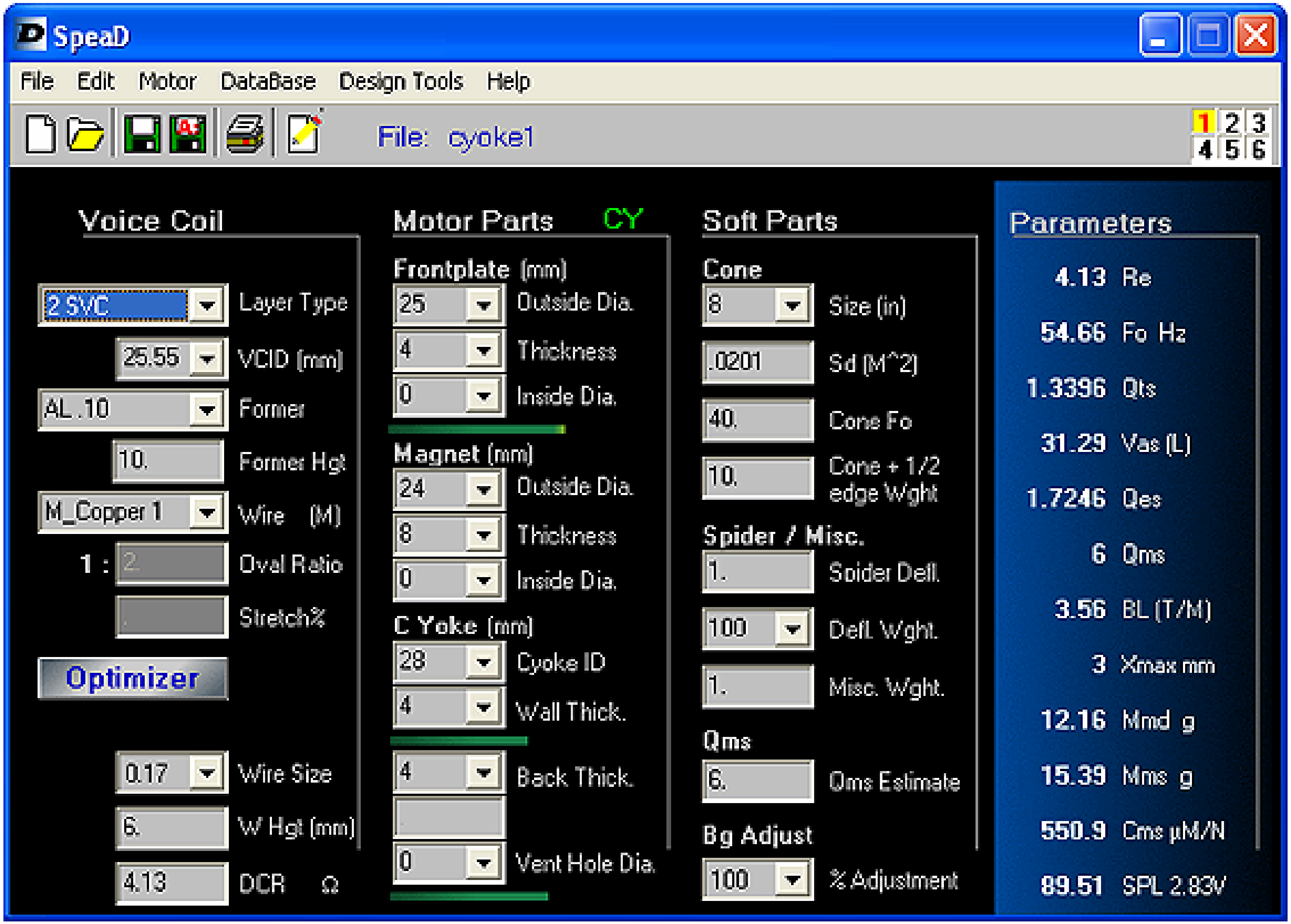
Voice Coil Designer



SpeaD is actually 3 tools that combine to create a complete speaker design.

Voice Coil Designer

Magnet System Designer



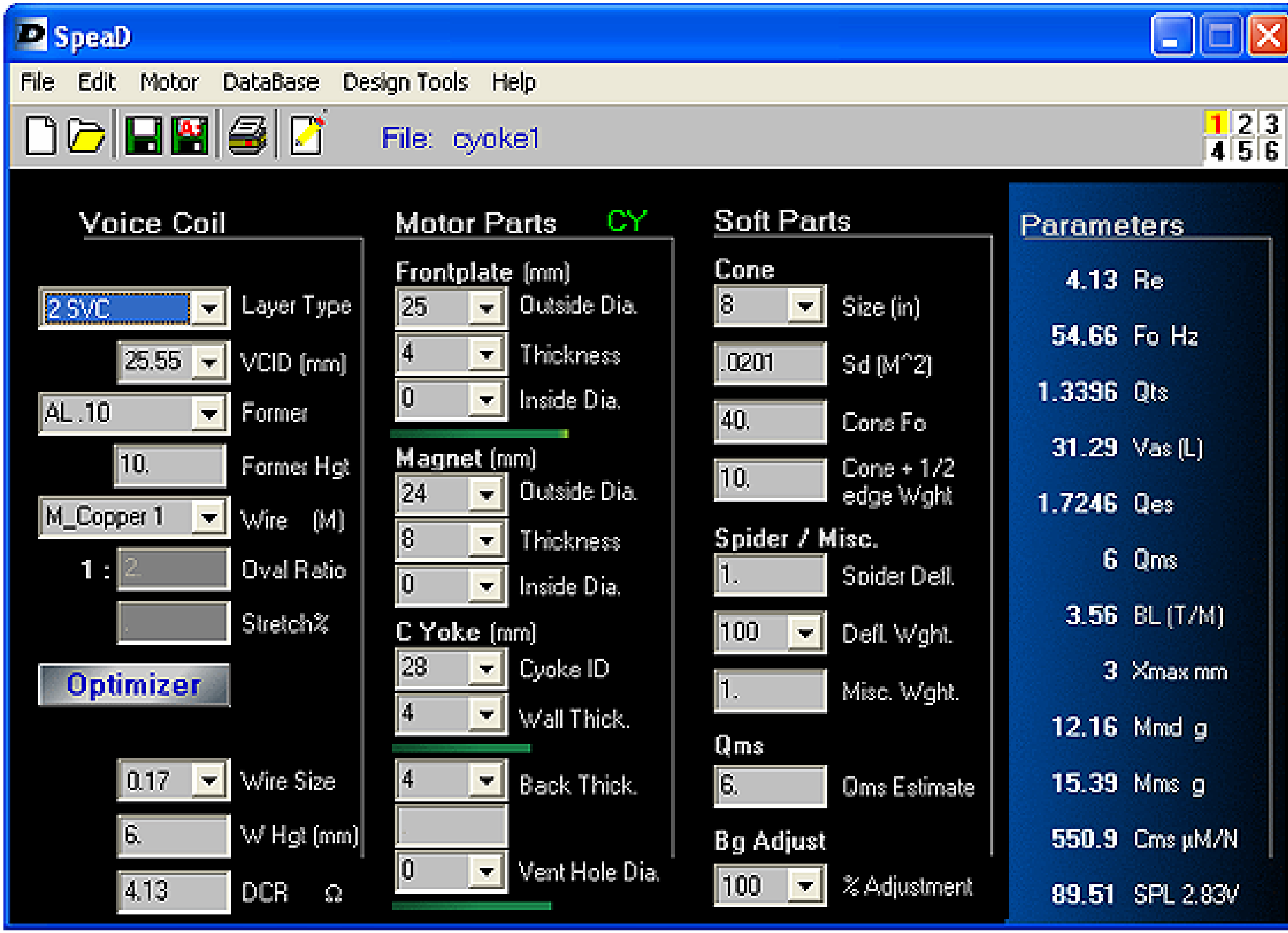
SpeaD is actually 3 tools that combine to create a complete speaker design.

SpeaD SpeakerDesigner

Voice Coil Designer

Magnet System Designer

Soft Parts Designer



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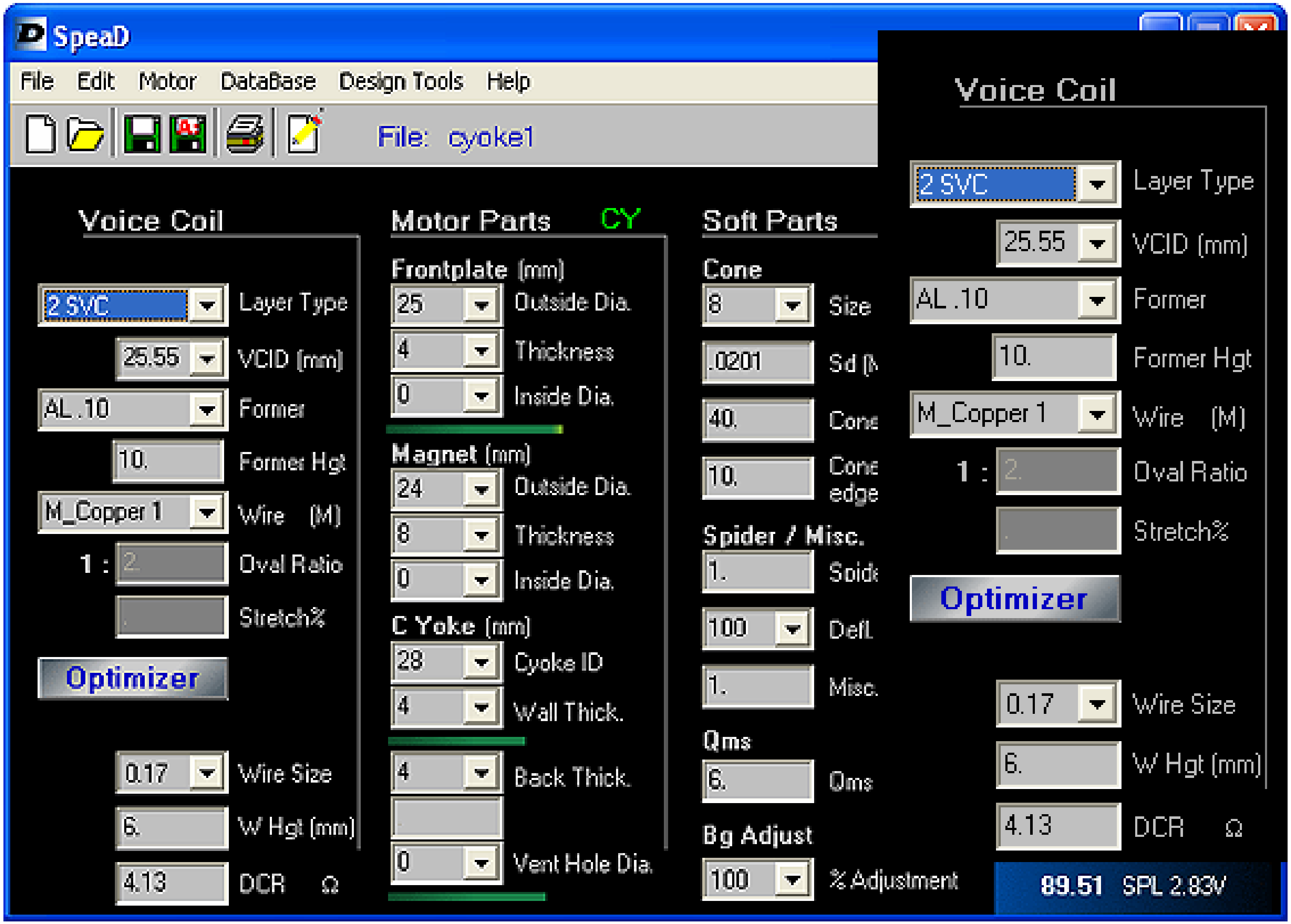
Voice Coil Design Tool

Voice Coil Designer

Magnet System Designer

Soft Parts Designer



Voice Coil Design Tool

36 different coil types for virtually every possible coil design you can imagine.

These include:

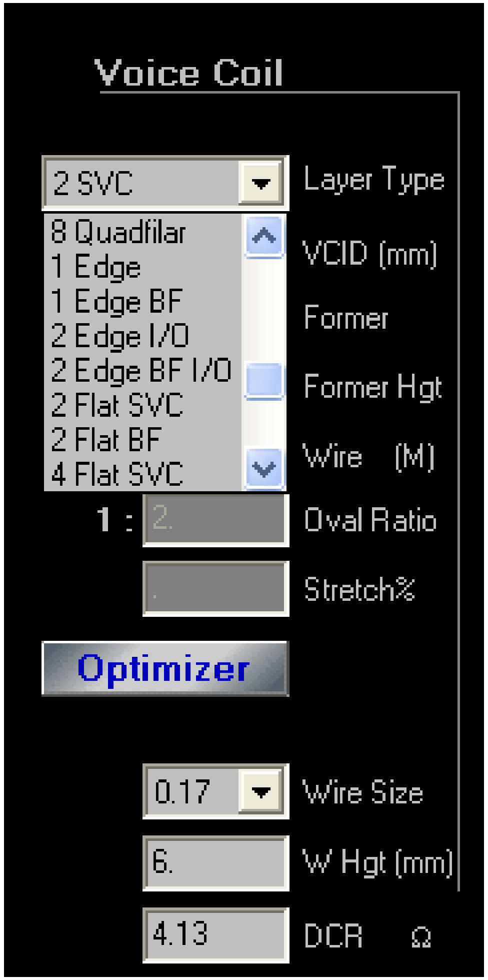
1, 2, 4, 6, and 8 layers

1, 2, 3, 4 inputs

Bifilar, trifilar and quadfilar winding

Edge wound, flat wound, and inner/outer wound

All possible combinations of the above



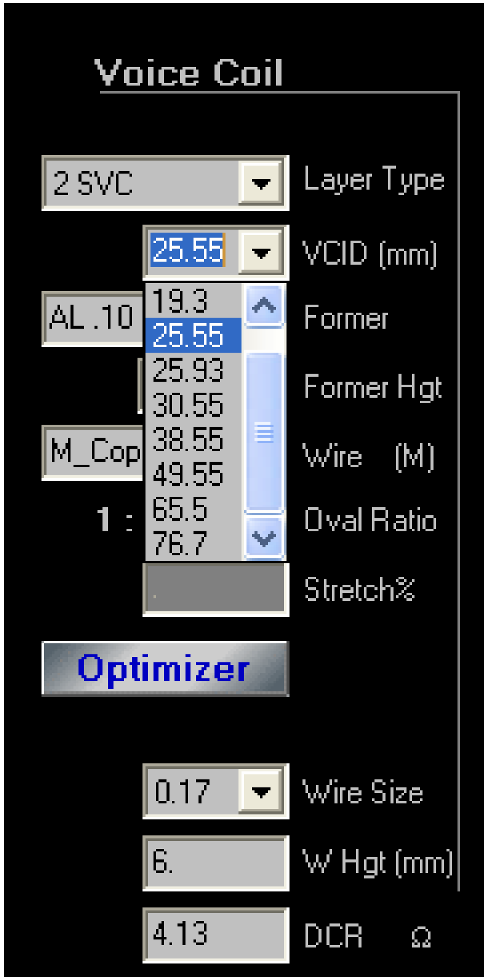
Voice Coil Design Tool

The voice coil Inside Diameter can be entered manually or you can choose from a list of standard coil sizes.

This list can be modified to include all of your factories' standard sizes.

Database files for standard sizes from Poyun and other Chinese suppliers are included with the software.

Additional database files can be loaded from the Redrock Acoustics website.



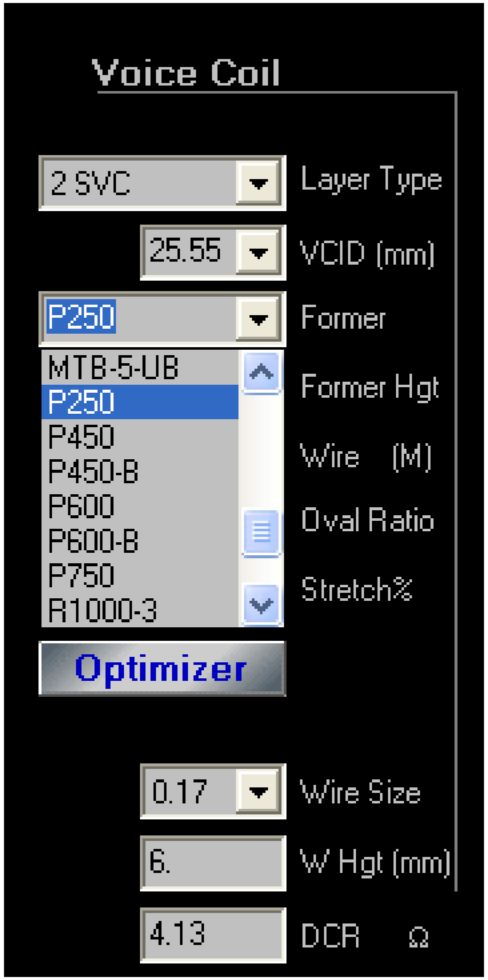
Voice Coil Design Tool

Former Materials are chosen from a database of standard materials. The database includes all of the important material properties.

This database can be modified to include all of your factories' standard materials.

Database files for standard materials from Poyun, other Chinese suppliers and Hisco are included with the software.

Additional database files can be loaded from the Redrock Acoustics website.

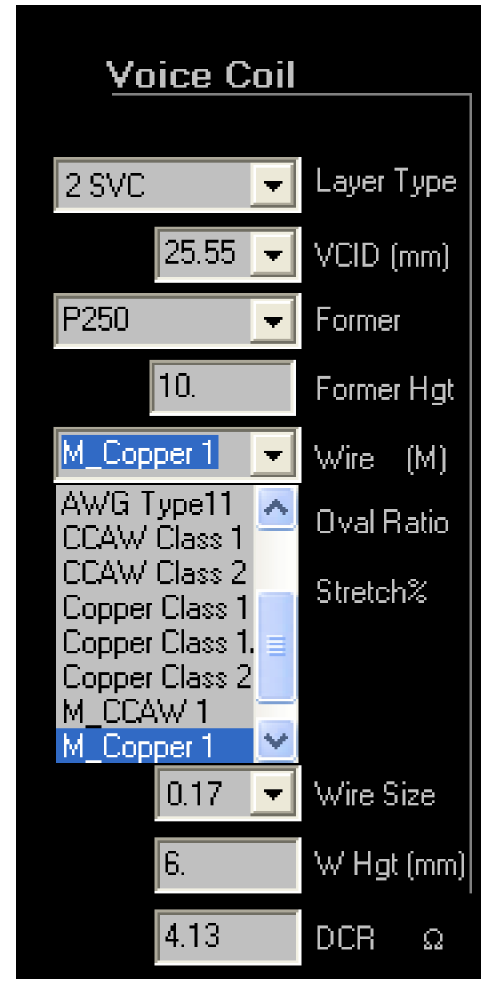


Voice Coil Design Tool

Spea*D* uses wire databases that include specifications for each wire size. This is far more accurate than a simple resistance / mass calculation for a wire material.

Each wire type <u>and size</u> has a unique forming "history" that effects it resistance properties. This history can cause differences of more than 8% when compared to calculations based on its material alone.

SpeaD includes databases for Copper, CCAW, and Aluminum wire in both single and double builds from .1mm to more than 1.0 mm. (and equivalent AWG wire)



Voice Coil Design Tool

When edge or flat wound coil types are designed, the “Oval Ratio” and Stretch inputs become enabled.

“Oval Ratio” is the ratio of height to width of a flat coil wire.

The process of flattening a round wire, stretches the wire and changes it properties. Spea*D* calculates these changes based on how much the wire stretches. The green number next to the stretch% input box is a “hint” for the typical stretch%

For wires that are formed flat, there are equivalent round wire sizes that can be used for its properties calculations.

Voice Coil Design Tool

One of the most useful parts of the Voice Coil Design tool is the “Optimizer”

It allows you to quickly design a coil with your required specifications.

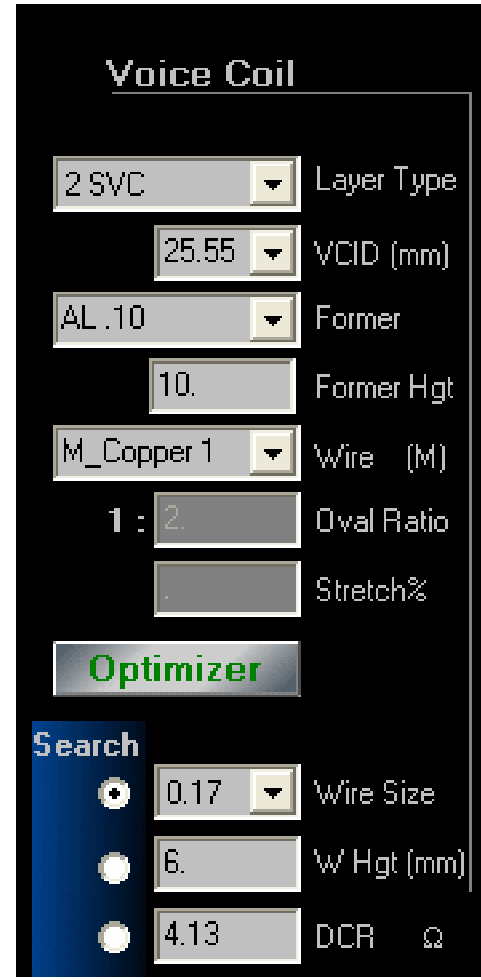
An two of the three input values of

Wire Size

Winding Height

DCR

Will calculate the third value.



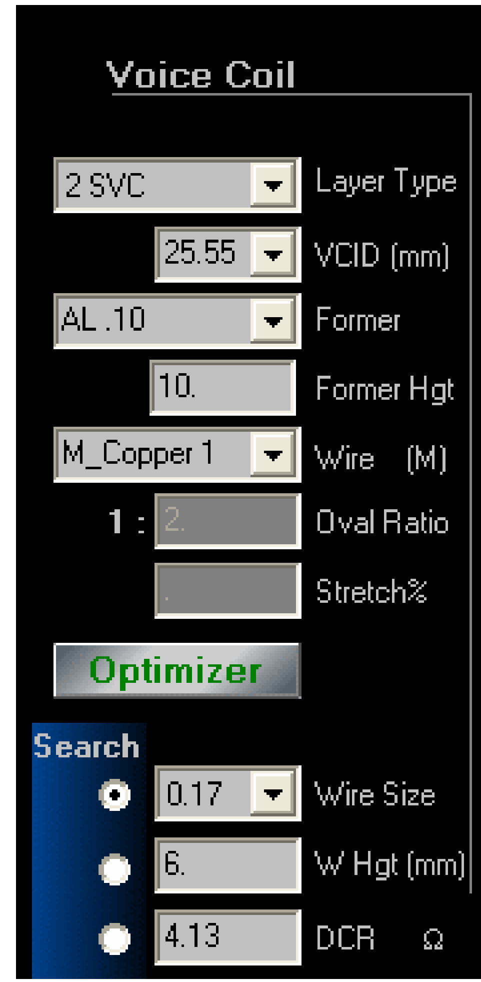
Voice Coil Design Tool

For example to find wire size:

This coil design used a target DCR of 4 ohms and

a winding height target of 6mm

The winding height was entered last, so SpeaD found the wire closest to the targets and then adjusted the DCR to the closest value using that wire.



Voice Coil Design Tool

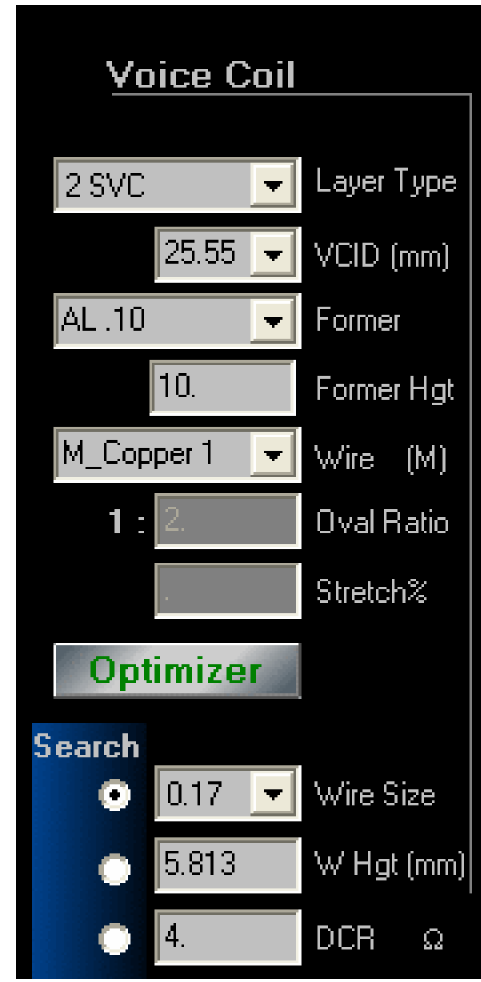
For example to find wire size:

This coil design used a target DCR of 4 ohms and

a winding height target of 6mm

The winding height was entered last, so SpeaD found the wire closest to the targets and then adjusted the DCR to the closest value using that wire and winding height.

If the DCR is entered last, winding height is adjusted to the required DCR.



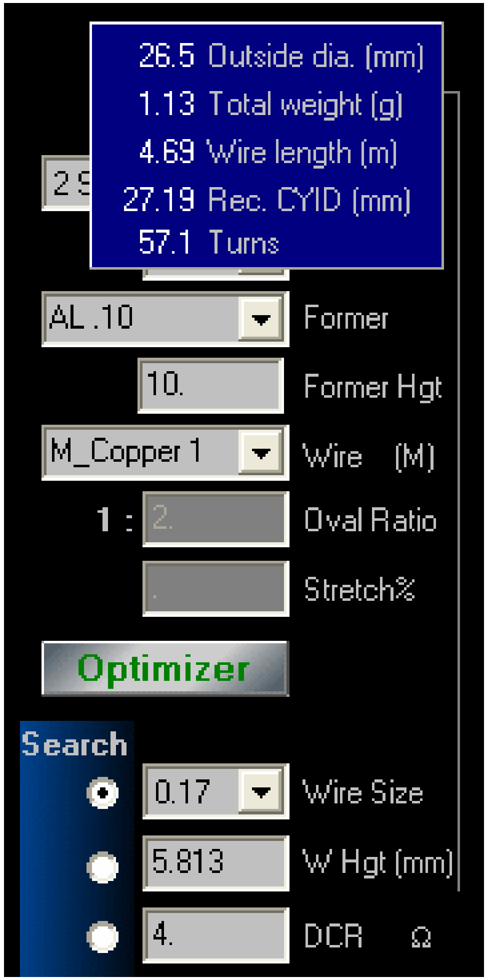
Voice Coil Design Tool

Once a Voice Coil Design is complete, more information about the design is available.

This includes:

- Outside Diameter
- Total Weight
- Wire Length
- Turns
- Recommended Frontplate or Cyoke ID

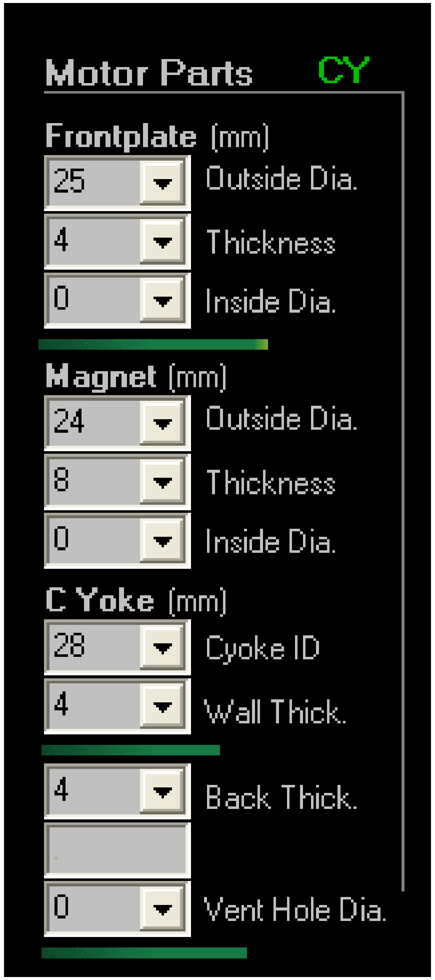
(Based on user-defined clearances and thermal expansion)



Magnet System Design Tool

The Spea*D* Magnet System Design Tool is by far the most complex component of the software.

Underneath the simple interface is a highly accurate model of the magnetic behavior of all of the motor parts.

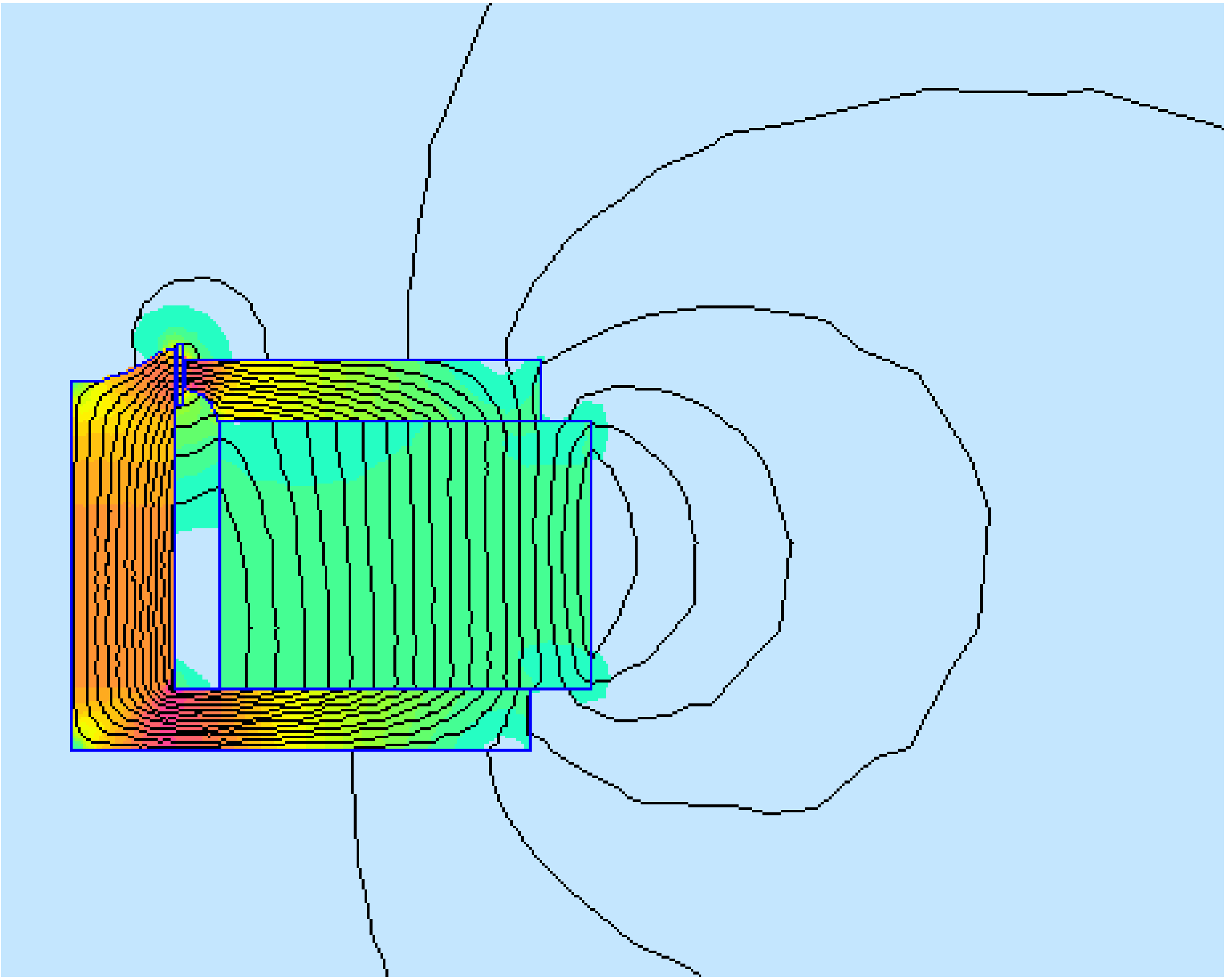


Magnet System Design Tool

Values are calculated for each of the Primary Permeance Paths
(The 12 lines outside the magnet and steel that you see in this flux plot.)

These paths are summed and the Permeance Coefficient is calculated.

The potential B in the metal parts is then calculated and a saturation model is applied using the BH curve of the material.



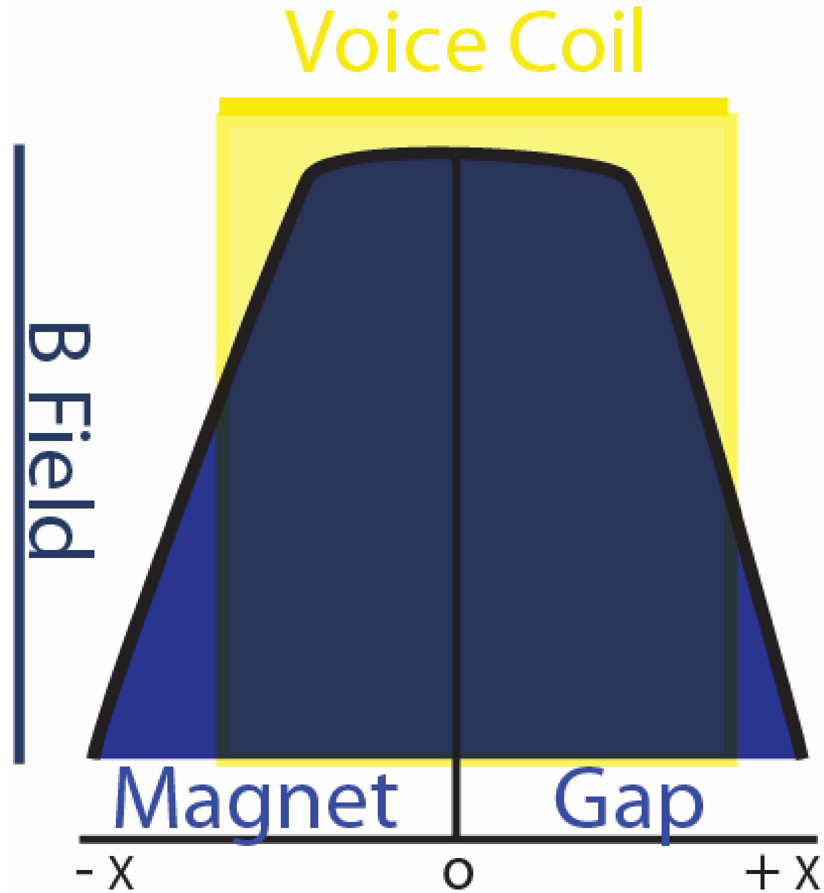
Magnet System Design Tool

From these calculations, Spea*D* creates a profile of the B Field including the stray flux outside of the gap.

The total B over the length of the voice coil is calculated.

This value is multiplied by the length of the wire and the result is a very accurate prediction of BL

Because SpeaD is actually calculating the energy in the area outside the gap, an accurate prediction of the functional Xmax can also be made.

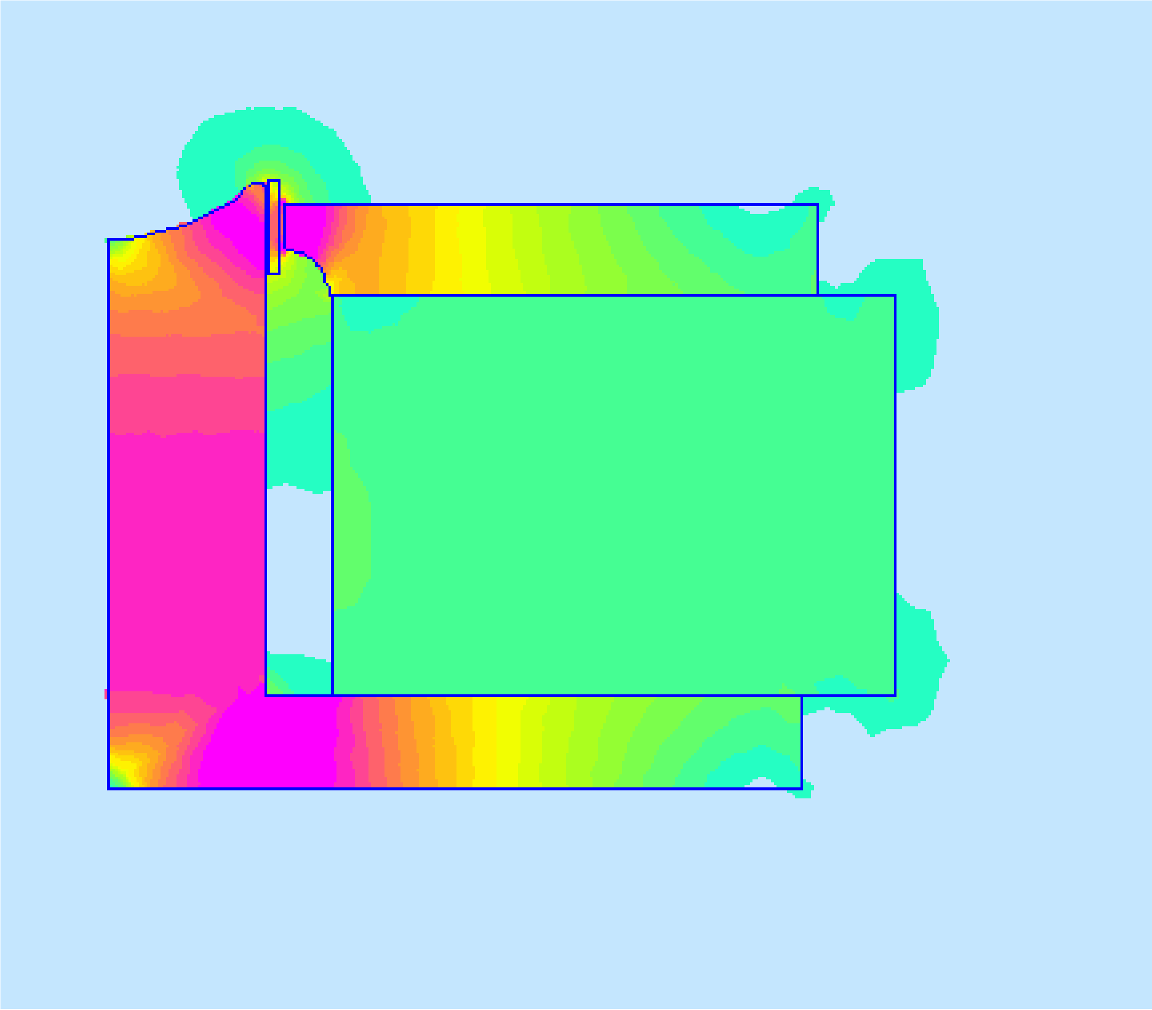


Magnet System Design Tool

Spea*D*'s models include a nonlinear prediction of saturation (all the of the red areas) using the BH curves of the steel parts.

Saturation is calculated in the Pole, Frontplate and Backplate for standard motors.

and the Frontplate, Cyoke walls and Cyoke back for cupped motors.



Magnet System Design Tool

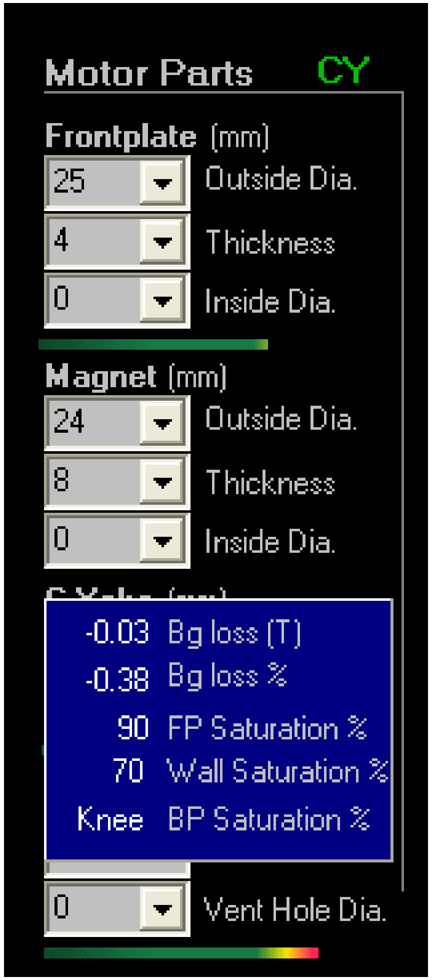
The saturation levels for each part are shown by colored bars next to their input values.

Green bars mean that the part is not in saturation.

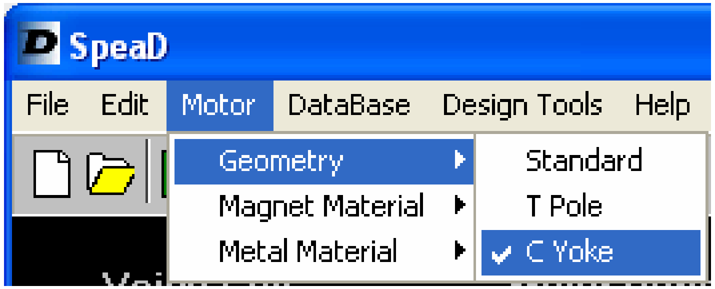
Yellow means that it has entered the knee of the BH curve and Red means that is in saturation.

An additional information window can be brought up that shows how close the part is to saturation and the amount of B lost as the part enters saturation.

In this case the back wall of the Cyoke is in the Knee area of the BH curve and a small loss of B has occurred.



Magnet System Design Tool



The Magnet Design Models include:

•Standard Geometry (External Ring Magnets)

Including extended poles

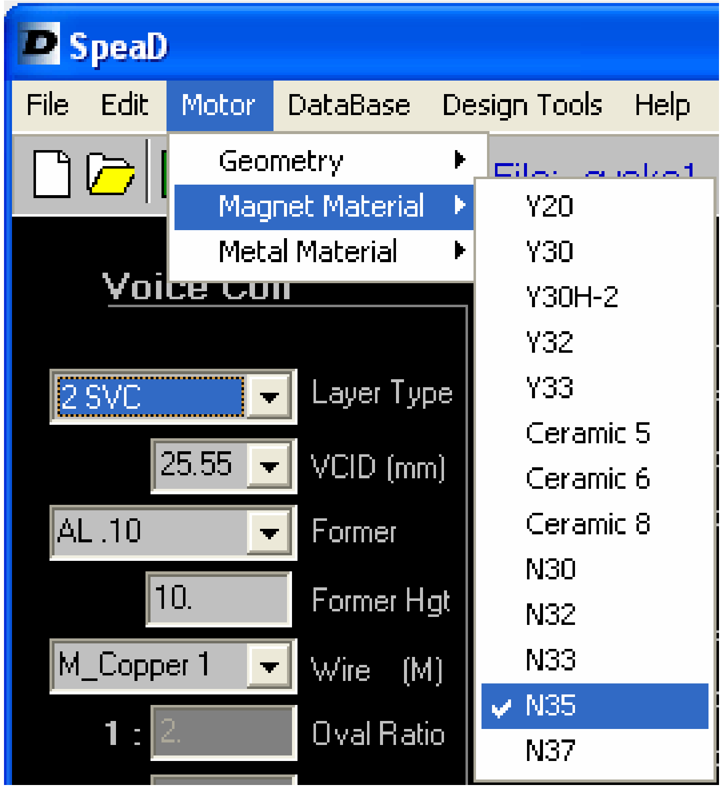
•T Pole Geometry

•C Yoke Geometry (Internal Disc or Ring Magnets)

Magnet System Design Tool

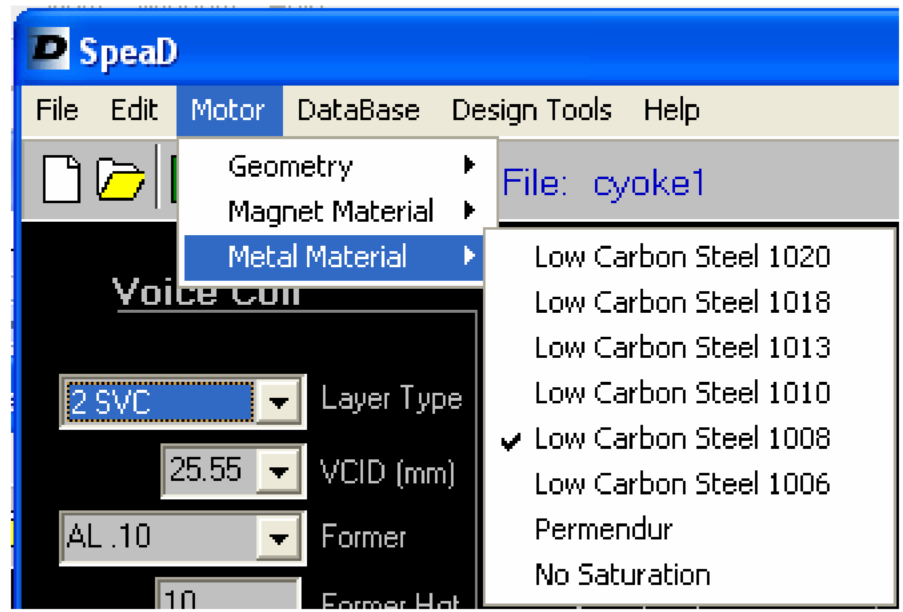
A wide range of magnet materials is included with Spea*D* and more can be easily added.

The standard database includes most common ceramic and neodymium magnet materials used in the US and China.



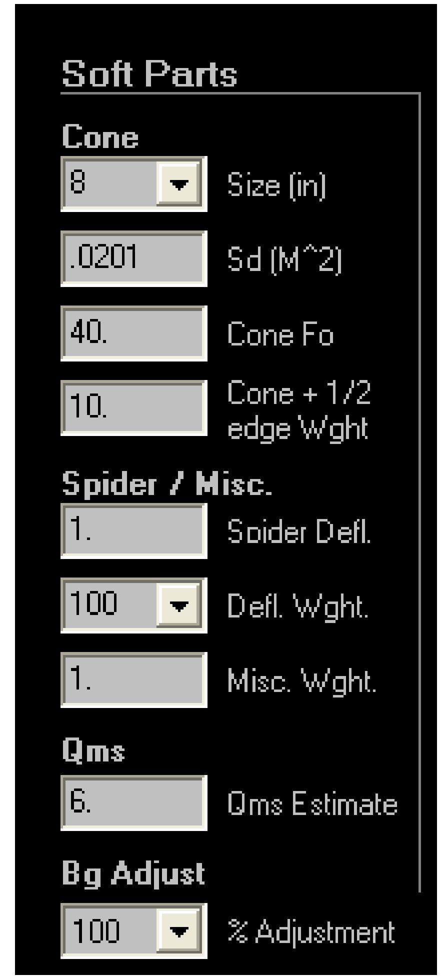
Magnet System Design Tool

Material data (BH curves) for most common steels are built into Spea*D*.



Soft Parts Design Tools

The final information required for a Spea*D* design is descriptions of the Cone and Spider, estimates of miscellaneous weight (dust cap, glue etc.) and finally, the Qms.



Soft Parts Design Tools

The cone is defined by three parts:

Its Size or Sd

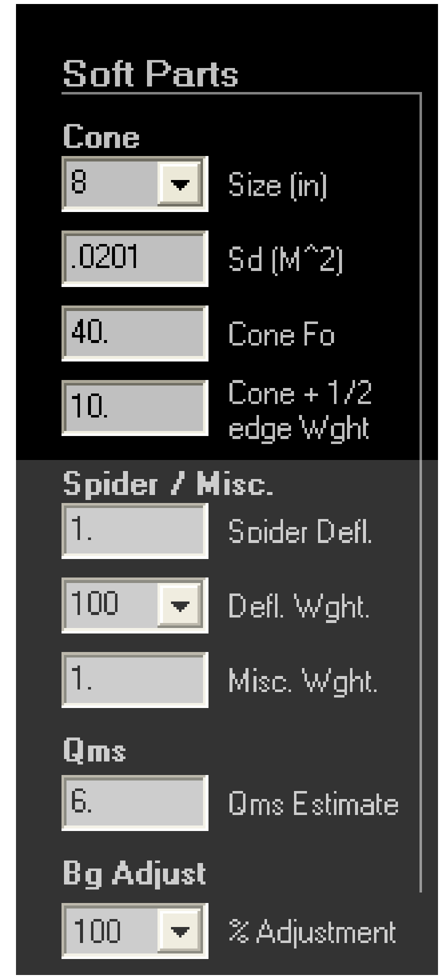
An editable list of standard sizes and their Sd's is available from a dropdown box.

The Cone Fo

A standard specification from all cone suppliers.

Cone and ½ edge weight.

This is simple, just cut ½ of the edge off and weigh the cone.



Soft Parts Design Tools

The spider is defined by its standard specifications:

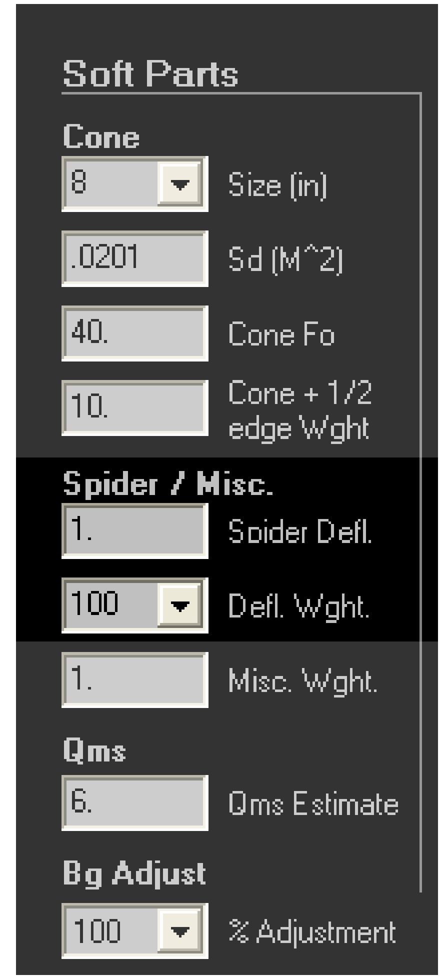
- Deflection
- Mass added for deflection

It is important to note that deflection measurements are the single biggest cause for errors in SpeaD predictions.

Spiders are all non-linear. The stiffness at low deflections is much different than at high deflections.

It is important to measure a spider in the range it will be used.

Spea*D* allows any mass to be used for the calculation and it may be necessary to ask your supplier to test with a large mass for some spiders.



Soft Parts Design Tools

SpeaD SpeakerDesigner

When all data is completed, the results are instantaneous – A complete set of T/S data!

Changing any part value or description immediately shows the change in the parameter set.

Designing a new speaker or making changes to an existing product happens in minutes, rather than days or weeks waiting for parts to see the results.

How accurate are the predictions?

After literally thousands of speaker designs created with SpeaD, the answer seems to be about 5-7% error or better – with good data.

Parameters

3.7	Re
49.25	Fo Hz
0.9944	Qts
38.16	Vas (L)
1.1919	Qes
6	Qms
3.86	BL (T/M)
3.18	Xmax mm
12.32	Mmd g
15.54	Mms g
671.8	Cms µM/N
91.1	SPL 2.83V

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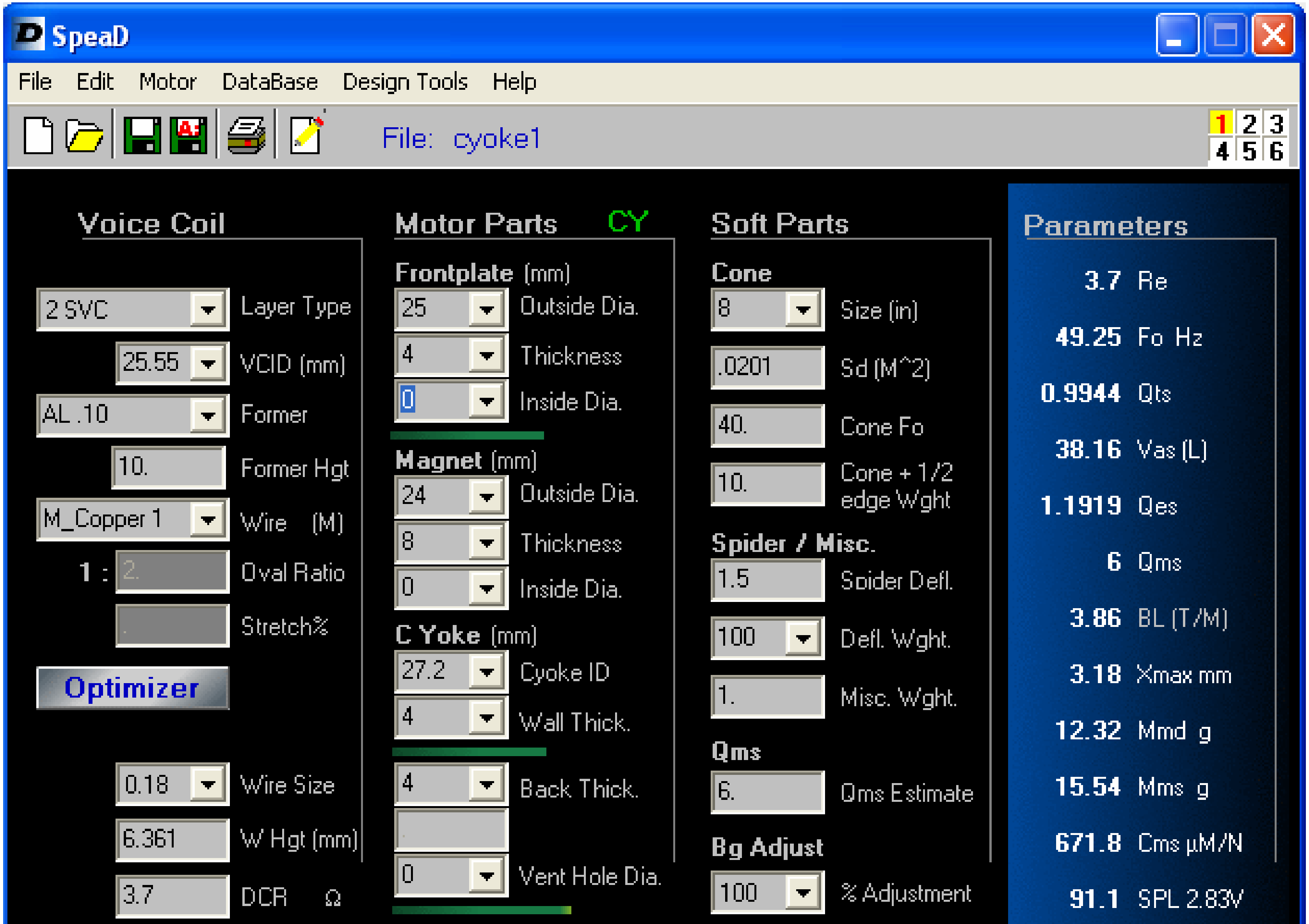
Questions?

SpeakerDesigner



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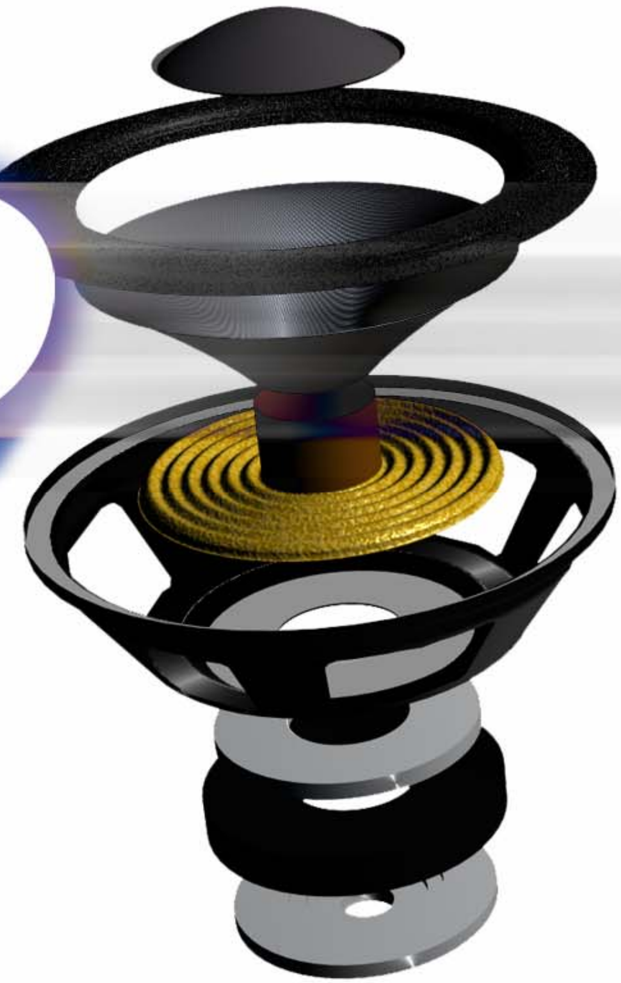

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