SmartNetics

Database editing

Tutorial - May 2025
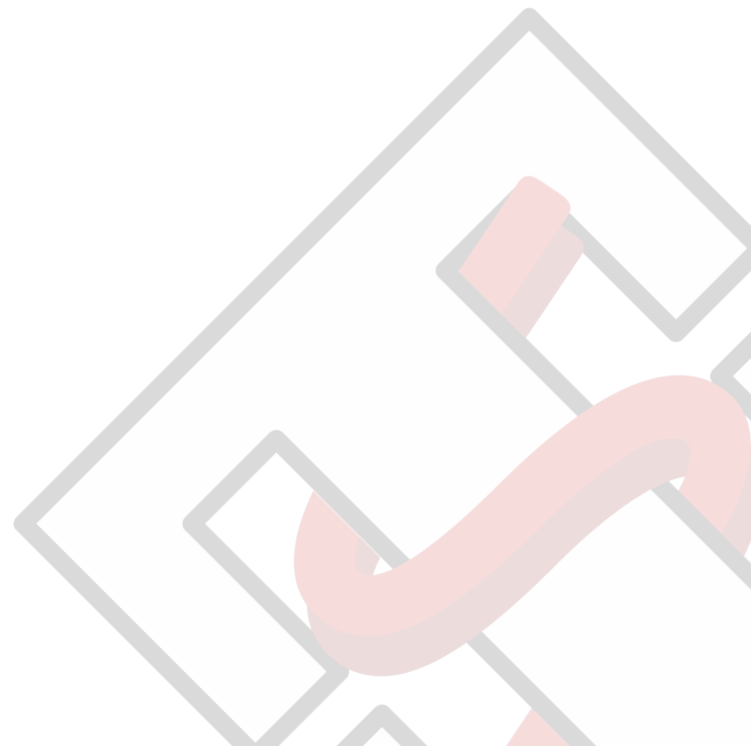
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Introduction

In the current version, modifying an entry of the database or adding a new one cannot be done inside SmartNetics.

Databases can still be edited to modify an entry or to add new ones, in two ways:

- Editing the csv (Comma Separated Values) files
- Using specific Excel files

In this tutorial an example is provided to guide the user in the two available options.

The csv and Excel versions of the default databases (along with a tool for the automatic conversion) can be downloaded inside a .rar file called "Data bases" under the Utilities section at our website, as shown in the next figure.
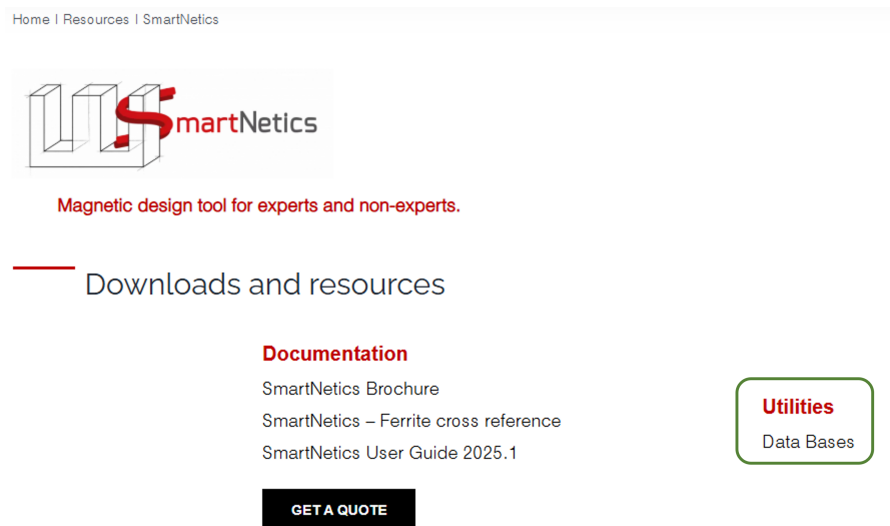

Figure 1: Tool download link

Once downloaded, the user can extract its contents. Notice that the databases in csv format are the same as the ones available as Excel files (.xlsx) and the user can select the one that best fits their needs.

Editing the csv files

Any database csv file can be modified in any text editor, like Notepad++. Although it is possible to edit files this way, the user is encouraged to be careful when doing so, since the format of every table cell should be maintained. To reduce this risk, it is advised to copy one of the table rows, paste it at the bottom of the file and then edit its contents (at least the name of the item). Please, ensure that the number and format of fields for the new entry matches the ones of the existing rows, leaving empty cells if needed.

*The first line of the csv file contains the row names and should be left as is to avoid problems during the load.

As an example, we will add a new item to the "Core material" database. Lets assume the user wants to add a new entry, called ARL91, that has the following properties:

- **Material:** ARL91
- **B sat (T):** 0.425
- **alpha ($-$):** 1.419999968
- **beta ($-$):** 2.884999936
- **Kc ($W/(HzTm^3)$):** 5.2757381578545
- **Density ($kg/m3$):** 4800
- **Initial permeability mu_i @25° ($-$):** 1000
- **High amplitude permeability mu_a ($-$):** 2500 at B = 0.285 and T = 25
- **Characteristic B-H points (T and A/m):** Unknown
- **Conductivity (S/m):** 0.2
- **Thermal conductivity ($W/(m \cdot K)$):** 4.25
- **Specific heat ($J/(kg \cdot K)$):** 750
- **Thermal expansion coefficient ($1/K$):** 1.1e-05
- **Composition:** Ferrite
- **H_DC mu compensation (H in Oe):** Unknown
- **BH curve coefficients (H in Oe):** Unknown

This made-up material happens to be very similar to 3C94, which is already present in the database. The only differences between them are the name ("Material") and the permeability, which is much higher in 3C94 (both "Initial permeability mu_i @25° (−)" and "High amplitude permeability mu_a (−)"). The values of those fields for the original material 3C94 are:

- **Material:** 3C94
- **Initial permeability mu_i @25° (−):** 2300
- **High amplitude permeability mu_a (−):** 4851 at B = 0.285 and T = 25

Having identified a similar material, the first step is to copy and paste it at the end of the file, as shown in Figure 2.

Figure 2: csv entry copied and pasted

Now, the user can edit the different parameters in the new material, while keeping the remaining ones to ensure a correct format, as shown in Figure 3.

Figure 3: Modified core material

Notice that even though "Contemplated?" is not intrinsically a property of the material, it is still a row required in the database and has to be considered when adding a new entry. The value of this particular variable can be modified inside SmartNetics later.

Once the database is modified, it can be loaded inside SmartNetics, as described in section "Load a database" in this same document.

Editing the Excel files

To help the user when modifying entries or adding new ones, an alternative way is provided. This procedure is divided in two steps, first the user must edit the Excel database, and then convert it to a csv file to be loaded into SmartNetics.

1 Edit the database

Following the example shown above for the csv files, a new core material will be added to the database, this time by means of the Excel files. In this case we will create an Iron Powder material, which parameters provided by the manufacturer usually differ from those of ferrites.

Lets assume the user wants to add a new material to the database called ARL91u, that shares many of the values of XFlux 60u but with two differences (on top of the material name): an increased equivalent initial permeability ("Initial permeability mu_i @25° ($-$)") of 91 and different values for the "BH curve coefficients (H in Oe)".

As in the previous example, the first step is to copy one material and paste it at the bottom of the file, as shown in the next figure (notice that this particular database has different Excel sheets for ferrites and iron powder):

Figure 4: Excel entry copied and pasted

If the user wants to use the check-boxes provided in Excel in the "Contemplated?" column, after copying a row they have to modify the connection of the new checkbox. That is done by right clicking on the checkbox - Format control - Cell link and updating its value, as shown in the next figure:
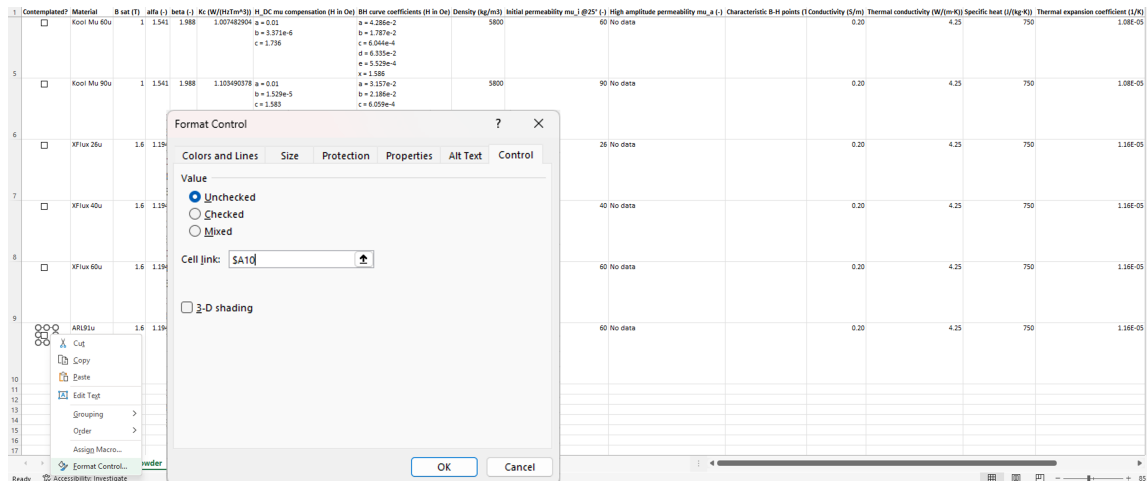

Figure 5: Excel "Contemplated?" modification

If the user prefers to avoid that step, the checkbox can be erased and the values "TRUE" or "FALSE" can be used instead, as shown in Figure 6 (the font color has been set to black to display the values).

Figure 6: Excel "Contemplated?" modification alternative

Once the new material has been created and its name modified, the required parameters can be changed.

To highlight the advantages of this editing method over the csv one shown before, we will edit one of the most complex cells, "BH curve coefficients (H in Oe)", which is composed by a structure with many fields.

The new parameters can be modified in the top box inside Excel, keeping the names at the left side of the equal signs and the signs themselves, as shown in Figure 7.

Figure 7: Editing a structure cell in Excel

Once the database is modified, the user has to convert it to a csv file to be loaded inside SmartNetics.

2 Convert to csv

To ease the conversion, a small tool is provided by Power Smart Control, in the same compressed file that contains the csv and Excel databases.

2.1 Install

This small stand alone tool is developed in Matlab, but the user does not need a Matlab license to run it. Although the tool is relatively small, the first time it is installed it needs to install not Matlab itself but a free compressed version of its needed functions, so it may take a while.

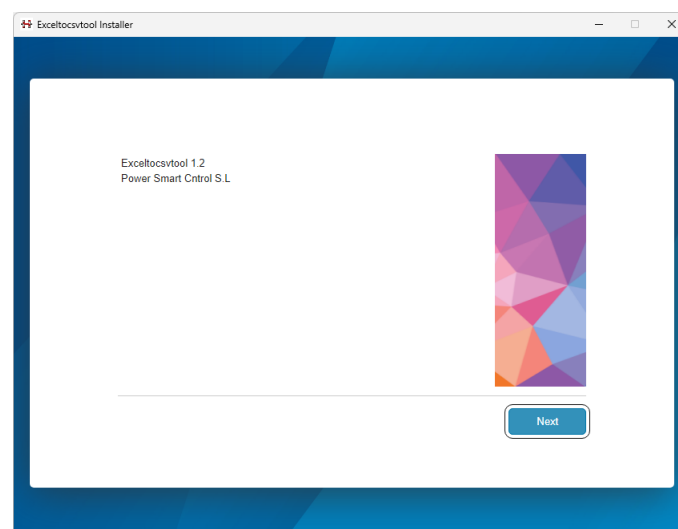The first step of the installation process is shown in Figure 8. The user only needs to press "Next".

Figure 8: Excetl-to-csv tool installation

In the next step, the user can select where to install the tool and whether or not to add a desktop shortcut, as shown in the next figure.
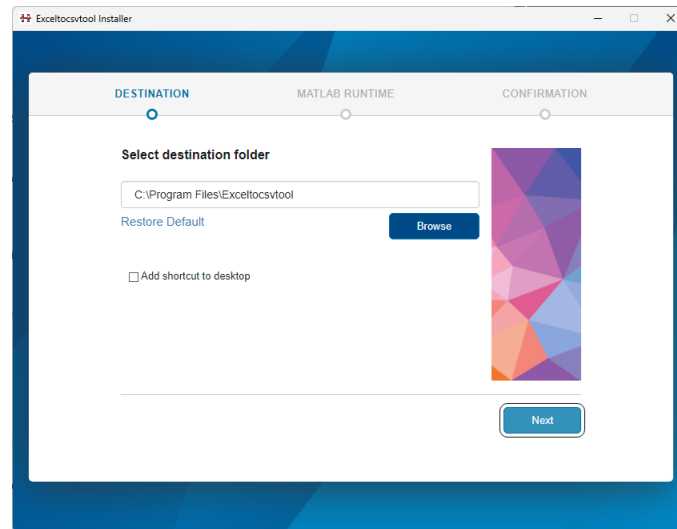

Figure 9: Excetl-to-csv tool installation path

If the user does not have Matlab runtime installed (a free version of the Matlab engine), it will automatically start downloading (this step may take a while). After that, the user can click on "Begin install" to finalize the process, as shown in Figure 10.
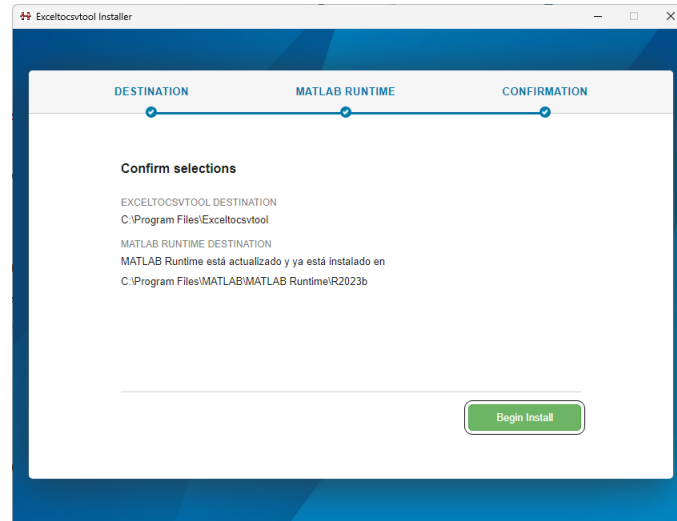

Figure 10: Excetl-to-csv tool installation begin

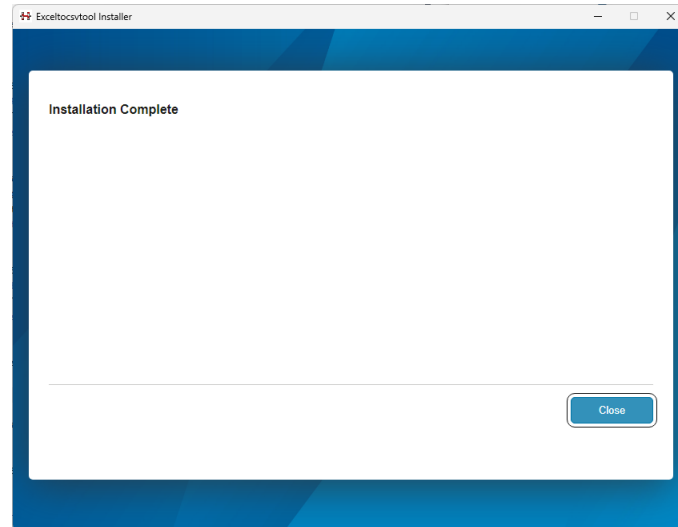After the installation ends, a confirmation message is displayed:

Figure 11: Excetl-to-csv tool installation completed

2.2   Conversion

Once installed, the used can launch it. It consists of a single dialog divided in three parts, depicted in Figure 12 and described below.
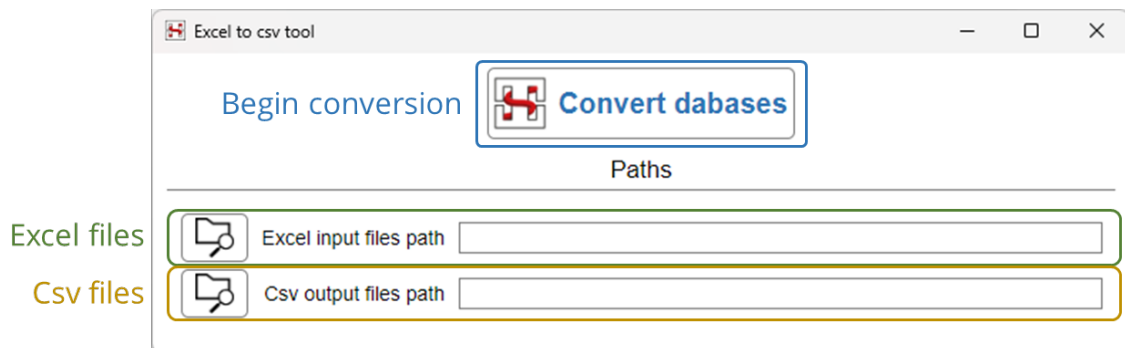

Figure 12: Excel-to-csv tool main window

Begin conversion: After selecting a path from where the Excel files are going to be loaded, and a path for the csv files to be generated, the automatic conversion can begin.

Excel files: Path where the Excel files are stored. Please, take into account that every database file is needed in the path, whether they were modified or not:

- Core geometries.xlsx

- Core materials.xlsx

- Conductors.xlsx

- Conductor materials.xlsx

- Insulators.xlsx

- Sleeves.xlsx

- Connectors.xlsx

Csv files: Path where the csv files are going to be generated.

Once the user clicks on "Convert databases", if everything is correct, the process begins and a new csv version of every Excel file is generated. If the new databases are placed in the folder where SmartNetics is installed they will be automatically loaded at launch. Otherwise, the user can always load any of them manually inside SmartNetics, as described in the following section.

Load a database

When launching SmartNetics, the databases present in the installation folder will be automatically loaded. If the user wants to reload any of them, it can be done inside the second dialog (accessed by the lateral menu): "Configuration", in the first tab: "Databases". Inside this screen, for the selected database, an icon is shown at the left side that allows the user to search for and load a new database, as highlighted in Figure 13.
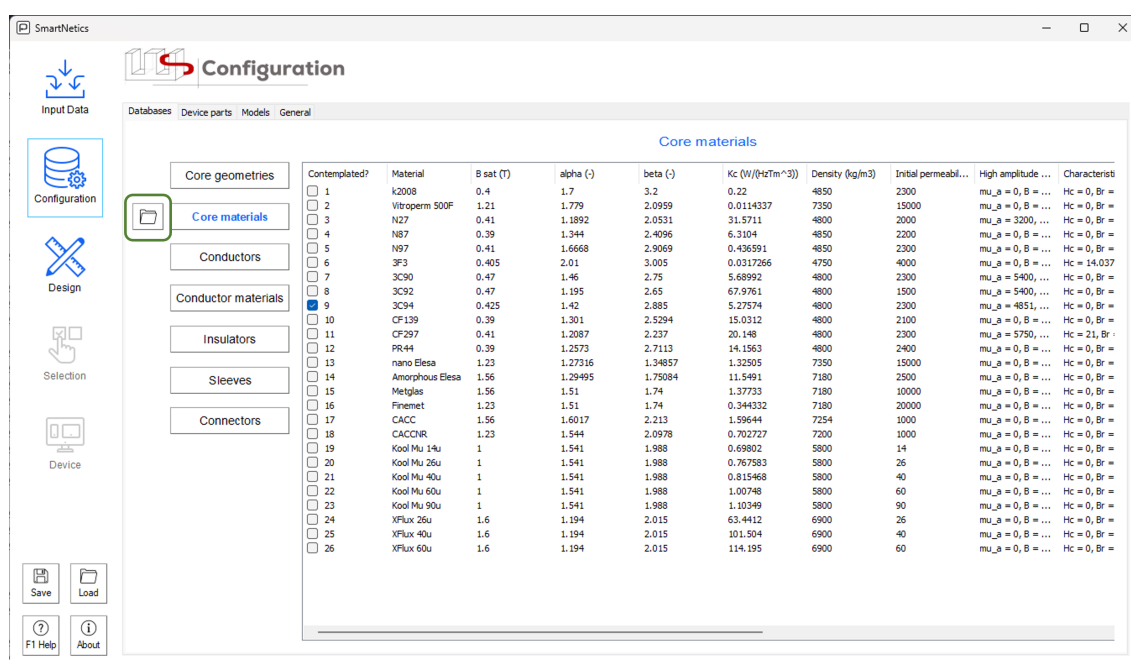

Figure 13: Database load button

Once the user loads a new database, it will overwrite the previous one, including the modifications and new items created. The new core material database, with the new entry (added in the first example of this tutorial) displayed at the bottom of the list, is shown in Figure 14.
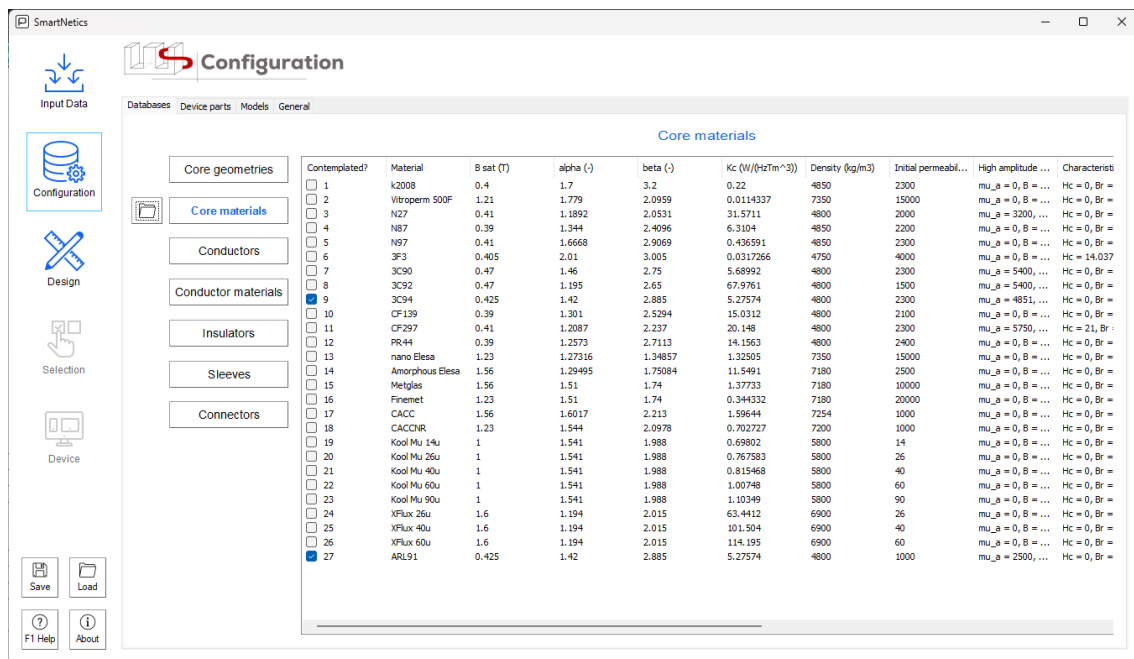
Figure 14: Loaded core material database

After the new database is loaded, the user can begin the design procedure to find every parameter combination that meets the imposed requirements.

Conclusion

In a future release of SmartNetics, a way to edit the databases inside the application will be provided. In the meantime, two alternatives have been presented here to edit any item or to add new ones.

Editing the csv files directly is a more straightforward approach but may be harder, while editing the Excel file eases the modification of complex cells but require an additional file conversion step.

The user can use any of them but is highly encouraged to be careful when editing, since the format of every database has to be kept as is.

Notice that, for convenience, in this tutorial the new database entries have always been placed at the bottom, but the user is free to move them to wherever it best suits their needs.