



MAGNETISiM

Defining Winding: PCB

GUI Overview

TAB MENU

Core Geometry Tab (Ctrl+1)

Winding Geometry Tab (Ctrl+2)

Sim Config Tab (Ctrl+3)

Magnet Tab (Ctrl+4)

INPUT FRAME

The screenshot displays the MAGNETISiM software interface. At the top, a menu bar includes 'File', 'Edit', 'Tool', and 'Help'. On the left, a vertical 'TAB MENU' contains four icons: a core symbol (Ctrl+1), a winding symbol (Ctrl+2), a gear (Ctrl+3), and a magnet symbol (Ctrl+4). The main area is divided into two sections. The 'Core Geometry' section features dropdown menus for 'Manufacturer', 'Geometry Core', and 'Core Reference', followed by input fields for dimensions A [mm] through I [mm] and 'Gap [mm]', all currently set to 0. The 'Core Material' section includes a 'Material' dropdown, tabs for 'Magnet', 'Power Loss', 'Electrical', and 'Thermal', and input fields for 'Real Permeability', 'Imag Permeability', and 'Conductivity', all set to 0. A button 'Add Permeability(f) Curve' and a checkbox 'Permeability(f) from Internal-Database' are also present. On the right, the 'MODELER WINDOW' shows a 2D plot with axes ranging from -0.6 to 0.6. At the bottom of the plot are buttons for 'Export', 'Refresh Plot', and 'Fit All'. A 'BAR TOOL' is indicated at the top right of the window.

BAR TOOL

MODELER WINDOW

Winding Geometry Selection – PCB

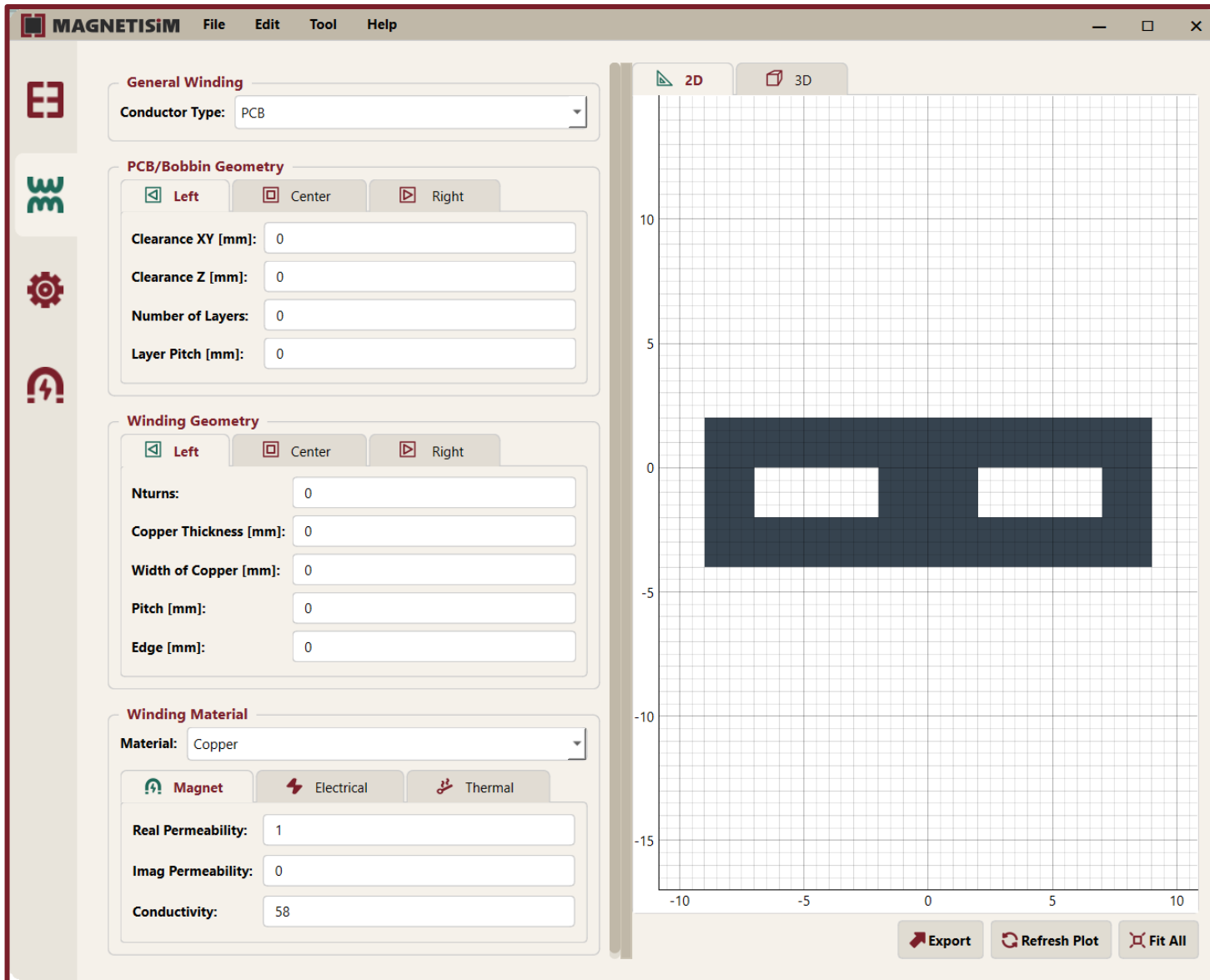
The screenshot displays the MAGNETISiM software interface for configuring a PCB winding. The main configuration panel on the left is divided into several sections:

- General Winding:** Conductor Type is set to PCB.
- PCB/Bobbin Geometry:** Left, Center, and Right tabs are visible. Clearance XY [mm], Clearance Z [mm], Number of Layers, and Layer Pitch [mm] are all set to 0.
- Winding Geometry:** Left, Center, and Right tabs are visible. Nturns, Copper Thickness [mm], Width of Copper [mm], Pitch [mm], and Edge [mm] are all set to 0.
- Winding Material:** Material is set to Copper. Magnet, Electrical, and Thermal tabs are visible. Real Permeability is 1, Imag Permeability is 0, and Conductivity is 58.

The central 2D plot area shows a dark blue rectangular core with two white rectangular cutouts, representing the winding geometry. The plot axes range from -10 to 10 on both X and Y. At the bottom of the plot area are buttons for Export, Refresh Plot, and Fit All.

Before configuring the winding details, make sure your core geometry is properly selected and visualized in the modeler window.

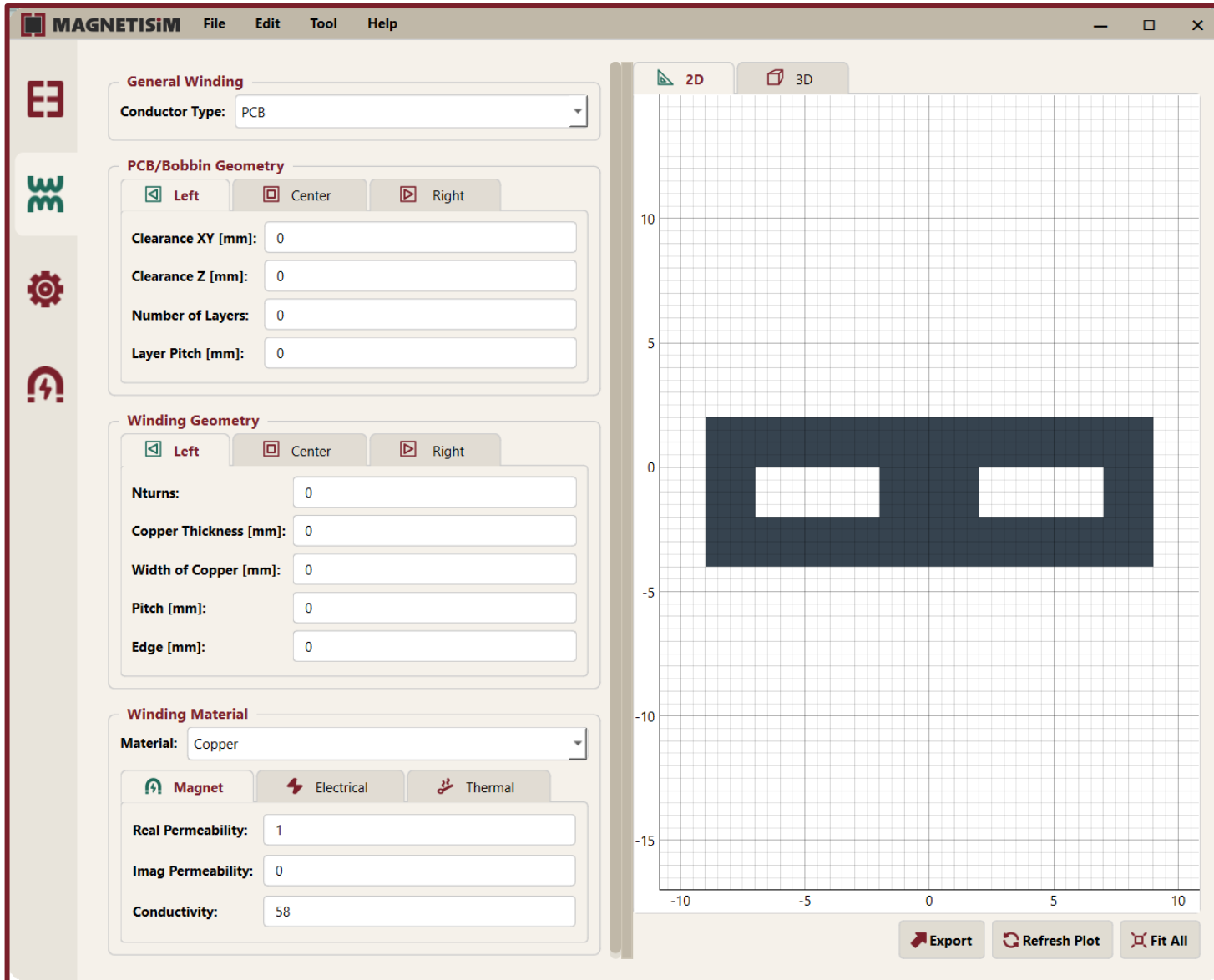
PCB/Bobbin Geometry



Once in the **Winding Geometry tab**, the first step is to configure the overall boundaries of your board in the **PCB/Bobbin Geometry section**.

- **Clearance XY** - This sets the horizontal safety margin or distance between the PCB traces and the core walls.
- **Clearance Z** - This defines the vertical safety distance.
- **Number of Layers** - Here you specify the total number of conductive copper layers your PCB design will have.
- **Layer Pitch** - This dictates the vertical separation between each of those PCB layers.

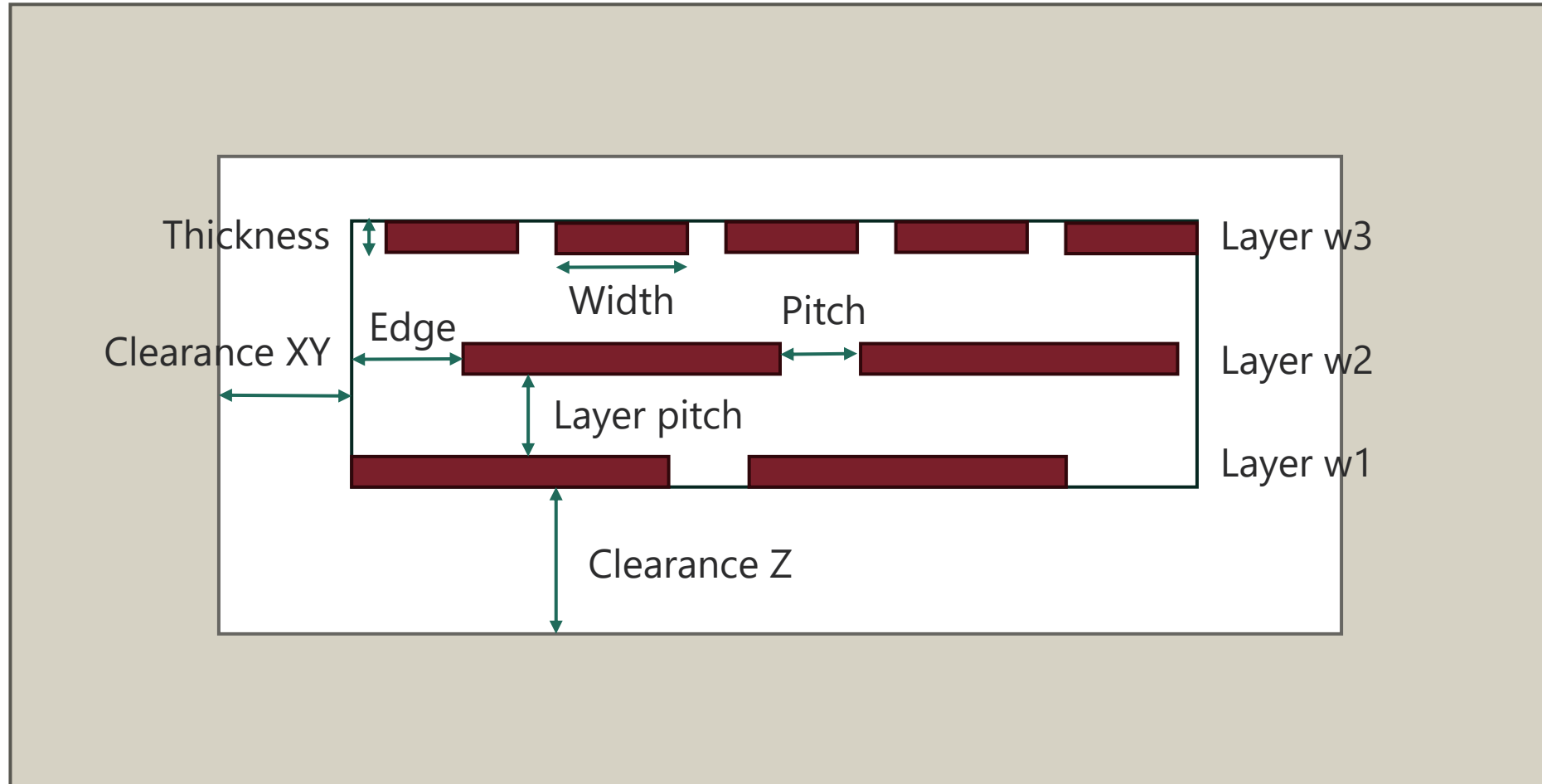
Winding Geometry



After defining the board structure, move to the **Winding Geometry section** to specify the physical dimensions of the tracks.

- **Nturns** - The number of turns per layer.
- **Copper Thickness** - The vertical thickness of the PCB copper trace.
- **Width of Copper** - The horizontal width of the copper trace.
- **Pitch** - The spacing between adjacent turns on the exact same layer.
- **Edge** - The physical margin or distance from the edge of the PCB.

PCB Distribution parameters



The screenshot displays the MAGNETISiM software interface, divided into a settings panel on the left and a visualization area on the right.

PCB/Bobbin Geometry

- Left Center Right
- Clearance XY [mm]: 0.3
- Clearance Z [mm]: 0.1
- Number of Layers: 6
- Layer Pitch [mm]: 0.2400

Winding Geometry

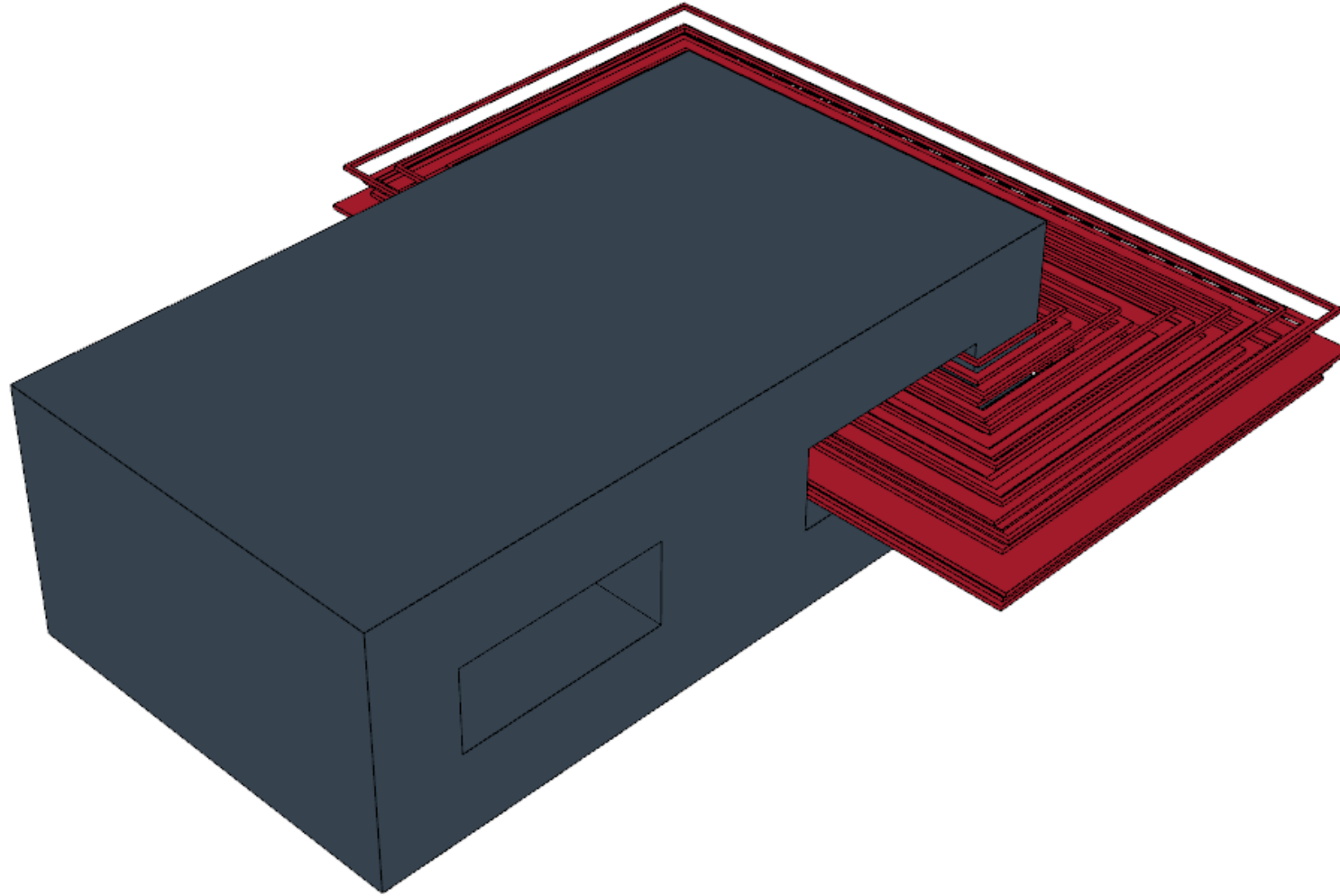
- Left Center Right
- Nturns: 1,2,3,4,5,6
- Copper Thickness [mm]: 0.1
- Width of Copper [mm]: 4,2,1,0.4,0.2,0.1
- Pitch [mm]: 0.1,0.1,0.5,0.7
- Edge [mm]: 0,0,0.3,0

Winding Material

Material: Copper

The visualization area shows a 2D grid with a vertical axis from -2 to 1. Red horizontal bars represent winding layers, labeled w1 through w6. The bars are arranged in a staggered pattern, with w1 at the bottom and w6 at the top. The bars are colored red and have varying widths and positions, corresponding to the winding geometry settings.

3D View of the example



Defining simple winding

PCB/Bobbin Geometry

Left Center Right

Clearance XY [mm]: 1

Clearance Z [mm]: 1

Number of Layers: 1

Layer Pitch [mm]: 0

Winding Geometry

Left Center Right

Nturns: 1

Copper Thickness [mm]: 0.2

Width of Copper [mm]: 3

Pitch [mm]: 0

Edge [mm]: 0

Winding Material

Material: Copper

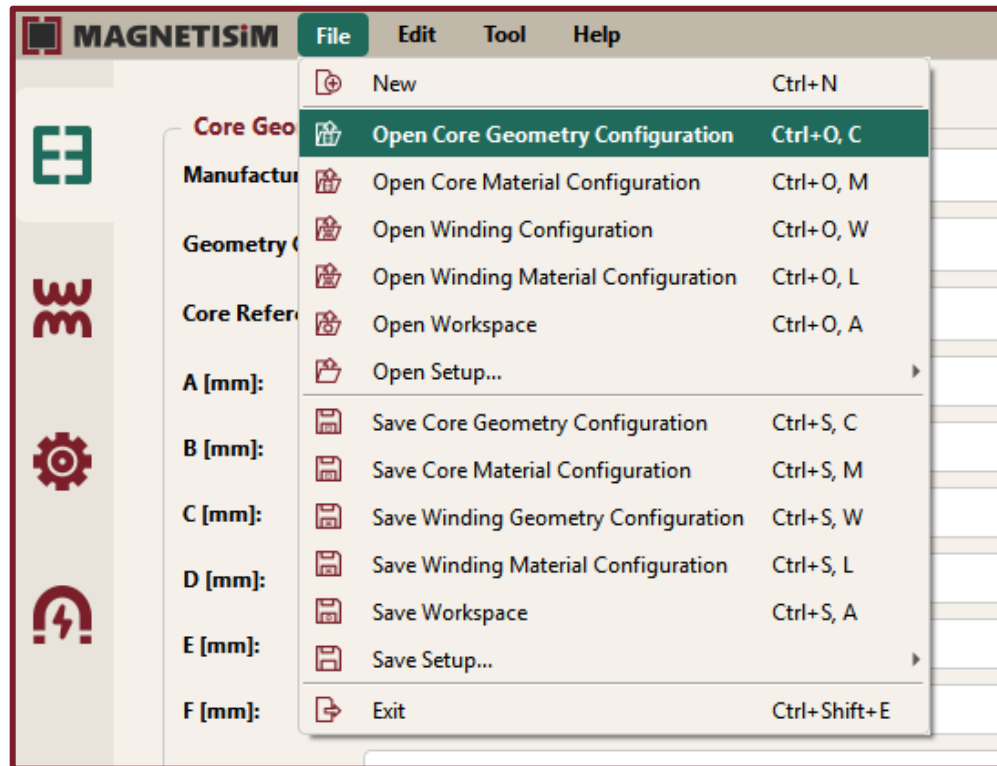
Magnet Electrical Thermal

2D Grid Plot (x: -4 to 2, y: -4 to 4):

- Dark blue area: x from -4 to 2, y from -4 to 2
- White area: x from -2 to 2, y from -2 to 2
- Red bar 1: x from -1 to 1, y = -1
- Red bar 2: x from 2 to 3, y = -1 (labeled w7)

Winding: PCB – *.json

All the winding parameters you carefully configured are structured and saved in a *.json file format. This JSON file dynamically stores specific values for different sections of the core, such as the left, center, and right legs (e.g., "ClearanceXY_Left", "Nlayers_Center", "WidthCopper_Right"). This standard format makes it incredibly easy to save your workspace, load previous configurations, or share templates via the [MAGNETISiM GitHub repository](#).



```
{
  "ConductorType": "PCB",
  "ClearanceXY_Left": 1.0,
  "ClearanceXY_Center": 0.0,
  "ClearanceXY_Right": 1.0,
  "ClearanceZ_Left": 2.0,
  "ClearanceZ_Center": 10.0,
  "ClearanceZ_Right": 1.0,
  "Nlayers_Left": 3,
  "Nlayers_Center": 3,
  "Nlayers_Right": 1,
  "LayerPitch_Left": [
    # per layers,
  ],
  "LayerPitch_Center": [
    # per layers,
  ],
  "LayerPitch_Right": [
    # per layers,
  ],
  "Nturns_Left": [
    # per layers,
  ],
  "Nturns_Center": [
    # per layers,
  ],
  "Nturns_Right": [
    # per layers,
  ],
  "CopperThickness_Left": [
    # per layers,
  ],
  "CopperThickness_Center": [
    # per layers,
  ],
  "CopperThickness_Right": [
    # per layers,
  ],
  "WidthCopper_Left": [
    # per layers,
  ],
  "WidthCopper_Center": [
    # per layers,
  ],
  "WidthCopper_Right": [
    # per layers,
  ],
  "Pitch_Left": [
    # per layers,
  ],
  "Pitch_Center": [
    # per layers,
  ],
  "Pitch_Right": [
    # per layers,
  ],
  "Edge_Left": [
    # per layers,
  ],
  "Edge_Center": [
    # per layers,
  ],
  "Edge_Right": [
    # per layers,
  ],
}
..... Continue->
```



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