



Unit 5S , Lanvale Estate, St. Columb Major Ind. Est, CORNWALL, TR9 6SF **Telephone:** 01637 881520

---

# Software Manual for the Coil Winding Arm Controller MKII Software.

Version 1.0

1<sup>st</sup> January 2018.

This documentation applies for use of the software on the following machines:

- CNC 200mm Coil Winder MK4 fitted with ARM Controller MKII
- Mini Coil Winder MK4 fitted with ARM Controller MKII
- Custom Coil Winders fitted with ARM Controller MKII

<http://www.ukcnc.net>

## Table of Contents

Automated Coil Winding - Tab.....	3
Standard Script Engine – Tab .....	25
Absolute Scripting Mode – Tab.....	39
Manual Winding Mode – Tab .....	44
Settings/Diagnostics – Tab.....	46
Keyboard Mapping – Tab .....	50
Upgrading the Firmware. ....	51

## Automated Coil Winding - Tab.

This tab shows a simple wizard which only needs a few basic settings to be made and you will be up and winding your coil in the quickest time.

CNC Design Ltd 2018 Coil Winder ARM Controller MKII Software V1.1

Automated Coil Winding | Standard Script Engine | Absolute Scripting | Manual Winding Mode | Settings/Diagnostics | Keyboard Mapping | Firmware Upgrade

**Bobbin Dimensions**

(1) Enter Bobbin Width  mm

(2) Enter Total Windings

(3) Enter Wire Size  mm

Closest awg value to mm  awg

Switch to Pickups

TP Calculator  
Tension Calculator  
Convert awg>mm

**Status and Calculations**

Calculated Winds Per Layer       Calculated Wire/Pitch Size       Reply

Calculated Total Layers       Calculated Bobbin Width       -

Bobbin Name Loaded       Hardware Status

**Controls**

Disengage Motors      **Start**      STOP      Pause      Home

Bobbin Motor Jog Buttons: ↑ ↓      Feeder Arm Jog Buttons: ← →

Reverse      Forward      Left      Right

☒ Increment counters when jog buttons clicked      ?      ☐ Manual Speed Override

Feeder Travel per click  mm  
Bobbin Travel per click  rev

**Load/Save Bobbin**

Load/Save Bobbin:       Save      Remove

Enter any notes in this box and click Save. This will save as a note against the selected bobbin.

Homing Configuration: Offset  mm      ☐ Use Homing Offset on Start

Wire Direction: ☒ Right      ☐ Left      Bobbin Direction: ☒ Forward      ☐ Reverse      Ramping Configuration: Pause  Steps

☐ Ramp each layer      ☐ Pause at end of each layer

Bobbin Speed: Desired Speed  RPM      Calculated Speed  RPM

☒ Disable Hover Help Tips      Help

**Status**

Winds Completed       Feeder Position

RPM       Reset      Goto Zero

☐ Return to Zero on Finish

For a quick start you only have to set four parameters in the **Automated Coil Winding** tab to wind a coil.

Set the **Bobbin Width**, Set the **Total Windings**, Set the **Wire Size** and Set the **Desired Speed**. Then simply click the Start Button.

The software will then Wind the coil back and forth until the coil is complete.

Below we will go through each option panel and detail what they are.

**Bobbin Dimensions**

(1) Enter Bobbin Width  mm

(2) Enter Total Windings

(3) Enter Wire Size  mm

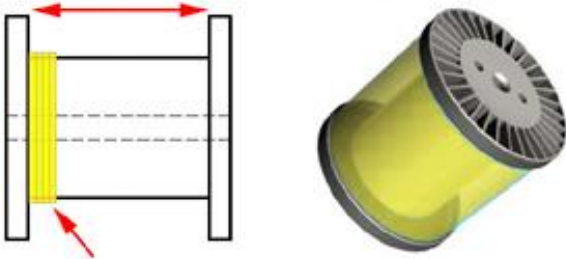
Closest awg value to mm  awg

Switch to Pickups

TPL Calculator

Tension Calculator

Convert awg>mm



The **Convert awg>mm** will take the value entered in the box and convert from awg to millimetres. This is a handy tool for people used to dealing with awg wire sizes.

In the example above it has converted 22awg, which calculates to be 0.6438mm.

The **Switch to Pickups** button changes the screen from normal bobbins to the Guitar Pickup screen. This will be covered later on in the manual.

The **TPL Calculator** button will bring up a calculator panel on the screen. This will be covered later on in the manual.

The **Tension Calculator** button will bring up a calculator panel on the screen. This will be covered later on in the manual.

Next, with three simple steps you can setup the software to wind your desired coil.

- 1.) **Enter the width of your bobbin** is the actual length of the bobbin you wish to wind wire across.
- 2.) **Enter Total Windings** for the coil you wish to make.
- 3.) **Enter the wire Size** you wish to wind but also allow for the coating. Typically this can be 10%-15% of the size of the wire.

After you have set these parameters, then the software will auto calculate the nearest settings that are suitable for the machine you have connected and will display them in the **Status and Calculations** panel.

Status and Calculations			
Calculated Winds Per Layer	16	Calculated Wire/Pitch Size	0.645
Calculated Total Layers	31.25	Calculated Bobbin Width	10.32
Bobbin Name Loaded	1	Hardware Status	Un-Plugged

Based on the parameters entered in the **Bobbin Dimensions** panel, the actual working values that get sent to the Coil Winding Machine are displayed in the **Status and Calculations** panel. These calculations take into consideration the machine that is connected to your computer and also the resolution settings applied.

In the example above, it has taken the parameters and calculated that the 16 winds will be wound each layer and based on the width of wire, this would make the actual winding area of wire cover 10.32mm and not the 10mm specified.

On the back of these calculations, it has also calculated that 31.25 layers will be wound onto the bobbin. This is 16 winds to the right for the first layer and then 16 winds to the left for the second layer and so on until the total windings are complete.

Now if your bobbin width is 10mm maximum then you will need to reduce the bobbin size to reduce the windings per layer. The simple fact is that 10mm will not divide by the width of your wire  $10\text{mm}/0.6438=15.53$  unless you are going to chop your wire in half at the end of each layer, which is not possible !

In the screenshot below, you can see by reducing the Bobbin Width to 9.99mm it has reduced the layers to 15 and also the bobbin width to 9.675mm. Not ideal as you may get spacing created between each winding, which leads to uneven windings as your layers build up.

The ideal bobbin would be the correct width to allow the exact number of windings you require using the wire you need to use. But this is not always possible.

Bobbin Dimensions

(1) Enter Bobbin Width

9.99

mm

(2) Enter Total Windings

500

(3) Enter Wire Size

0.6438

mm

Closest awg value to mm

22

awg

Switch to Pickups

TPL Calculator

Tension Calculator

Convert awg>mm

Status and Calculations

Calculated Winds Per Layer

15

Calculated Wire/Pitch Size

0.645

Reply

Calculated Total Layers

33.33333

Calculated Bobbin Width

9.675

Bobbin Name Loaded

1

Hardware Status

Un-Plugged

We also have some status display objects in this panel.

**Reply** is the answer coming back from the Coil Winding Machine after each command is sent.

**Hardware Status** shows if the Coil Winding Machine is connected or not connected to the computer.

**Bobbin Name Loaded** is the name of the bobbin that has been chosen from the drop down box in the Load/Save Bobbin panel below.

As you can see all of the objects in this panel are for information purposes only and cannot be set by the person using the software.



Load/Save Bobbin

Bobbin number 1 ▼

Save Remove

Test Bobbin

Homing Configuration

Offset 10 mm ☐ Use Homing Offset on Start

Wire Direction

☒ Right ☐ Left

Bobbin Direction

☒ Forward ☐ Reverse

Ramping Configuration

Pause 10

Steps 50

☐ Ramp each layer ☐ Pause at end of each layer

Bobbin Speed

Desired Speed 600 RPM

Calculated Speed 600 RPM

☒ Disable Hover Help Tips

The **Load/Save Bobbin** panel not only allows you to save and remove bobbin parameters, but also lets you set other parameters that will affect the coil you are winding. These settings, along with other settings from other panels get saved to the computers registry, which can be backed up and reloaded in the future. This is usually due to either moving the software to a new machine and wanting to bring your saved bobbins across to it, or in case of a failure.

Starting from the top of the panel and working downwards we first have the drop down box. This will allow you to choose previously saved bobbin configurations.

When clicking the **Save** button it will ask for a name that you wish to call the bobbin and save all the parameters set for that bobbin to the registry. If you wish to remove the saved bobbin from the registry, then click the **Remove** button and it will delete that bobbin.

The yellow box below the drop down box is for any notes you wish to save against that bobbin. These notes will be saved along with other parameters and recalled when a bobbin is selected.

**Homing Configuration** group box.

Sets the offset distance that the feeder arm will move away from the limit switch when the **Home** button is clicked.

For example if it is set to 10mm then when the **Home** button is clicked the feeder arm will move to the left until it gets to the limit switch on the machine. It will then move to the right 10mm.

By ticking the **Use Homing Offset on Start** option will cause the machine to home when the Start button has been clicked. The machine will then home before the winding starts.

This option is only available for machines with the homing/limit switches installed.

**Wire Direction** group box.

Sets the direction for the feeder arm when winding starts.

**Bobbin Direction** group box.

Sets the direction for the bobbin when winding starts.

**Ramping Configuration** group box.

We use stepper motors on our machines then to get them to higher speeds we need to ramp up the motor speed gradually.

You have two variables you can set to get the desired curve as such.

The Steps variable is the divider of the target frequency that we want the bobbin motor to run at. So if the software calculated that the bobbin motor should run at 1000kHz and the steps box is set to 100 then we can see that the steps would be  $1000/100 = 10$  Hz increments.

The Pause variable is the time between each increment.

**Ramping each layer** checkbox.

If this box is left unchecked then the machine will ramp up at the beginning of the winding routine and at the end only. When the feeder gets to the end of the layer it will simply change direction. If the box is checked then the bobbin motor and feeder motor will ramp up at the start of each later and ramp down at the end of each layer.

**Pause at the end each Layer** checkbox.

Checking this box will pause the machine after each layer has been wound. This option can only be used if **Ramping each layer** is also checked.



**Bobbin Speed** group box.

Desired speed is the variable that will tell the machine what speed you want the bobbin motor to run at.

As the bobbin motor and feeder motor are interpolated, then most of the time the speed of the bobbin motor will be divided down to set the speed of the feeder arm motor to suit and keep that interpolation correct. But if you require the wire size or movement pitch to be a large number that requires the feeder arm motor to run faster than the bobbin motor, then the bobbin motor will automatically drop and the calculated speed will be displayed below.

**Disable Hover Help Tips** checkbox.

You can move the mouse over any object within the software and if left over that object for a certain amount of time a Hover Tip will appear giving you information on that object.

By checking this box then it will stop these hover tips appearing.



The **Status** panel has the following objects.

**Padlock** Icon

Clicking on this will ask you for a password and is used by the developers for diagnostics and troubleshooting if needed. You should never have to go into this area.

**Winds Completed** display.

Displays the amount of winding that have been wound.

**Feeder Position** display.

Displays the position of the feeder arm on the machine.

**RPM** display.

Displays the speed that the bobbin motor is running at.

**Reset** button.

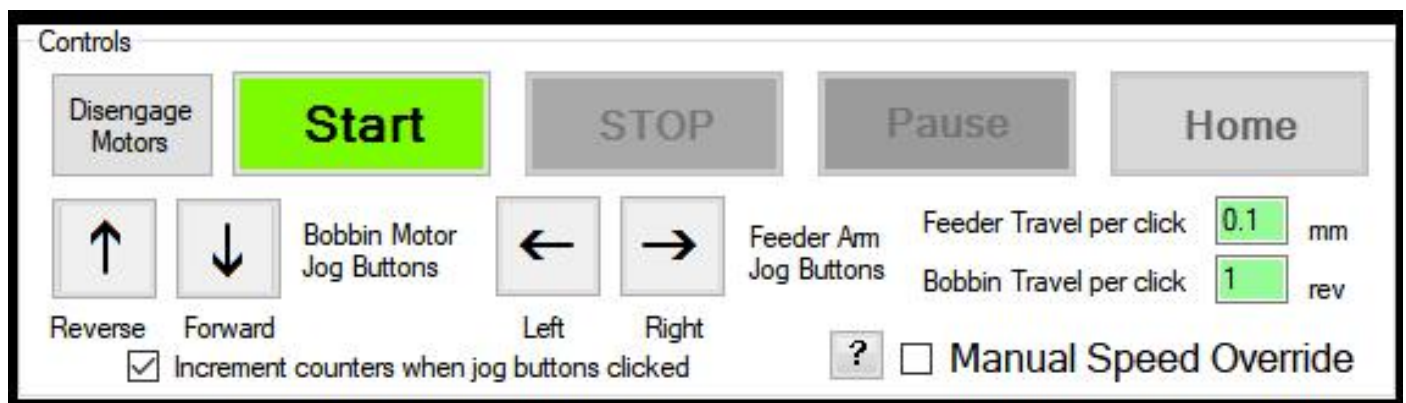
Pressing this button will reset the feeder position to zero.

**Goto Zero** button.

Pressing this button will tell the feeder arm to return to its zero position.

**Return to Zero** checkbox.

If this is checked then when the machine has finished its winding routine the feeder arm will automatically move back to the zero position.



The **Controls** panel has the following objects.

**Disengage Motors** button.

When clicked this will disengage the motors so they can be turned by hand.

The motors will automatically re-engage when start or jog buttons are clicked.

You will not be able to disengage the motors when paused, but if you need to move the motors at this point, then simply turn the power off to the motors via the switch. Do the adjustments and then turn the power back on before pressing resume in the software.

**Start** button.

Clicking this button starts the winding routine.

**Stop** button.

Clicking this button stops the winding routine.

**Pause/Resume** button.

While winding is in progress and you wanted to pause the machine, then click this button. It will then turn to a flashing Resume status and clicking it again will allow the machine to carry on from where it was paused.

While paused you can cancel the winding routine by pressing the stop button.

Also while paused the Left and Right button can be used to jog the feeder arm to a new position. This will not increment the feeder position and can be used for adjustments needed without having to restart the whole winding routine from the beginning.

**Home** button.

This can only be used if there are limit/homing switches installed on the machine. Based on the variable set in the **Homing Configuration** will determine the distance that the feeder arm will travel away from the limit switch once it has been triggered.

**Reverse** button.

This is a manual jog for the bobbin motor and when clicked the bobbin motor will move in the reverse direction.

**Forward** button.

This is a manual jog for the bobbin motor and when clicked the bobbin motor will move in the forward direction.

**Left** button.

This is a manual jog for the feeder arm and when clicked the feeder arm will move to the left.

**Right** button.

This is a manual jog for the feeder arm and when clicked the feeder arm will move to the right.

**Feeder Travel per click** variable.

Sets the travel in millimetres that the feeder arm will move if either the **Left** or **Right** buttons are clicked.

**Bobbin Travel per click** variable.

Sets the amount of revolutions that the bobbin motor will move if either the **Forward** or **Reverse** buttons are clicked.

**Manual Speed Override** checkbox.

If checked then when the **Start** button is clicked the software will pass control over to the manual speed controller on your controller box.

The manual controller dial needs to be fully turned to the left before it will start to wind and the speed of the bobbin motor and feeder arm will increase or decrease depending on the position of the dial.

Bobbin Dimensions

(1) Enter Bobbin Width  mm

(2) Enter Total Windings

(3) Enter Wire Size  mm

Closest awg value to mm  awg

Switch to Pickups

TPL Calculator

Tension Calculator

Convert awg>mm

On the **Bobbin Dimensions** panel we have a **TPL Calculator** button.  
When clicked this switches the appearance of the panel as can be seen below

TPL Calculator

Enter Required TPL:

Enter Bobbin Width:

Feeder Resolution:

Enter Total Layers:

Calculated Bobbin Width:

Calculated Wire Size:

Calculated Windings:

Enter your Required Turns Per Layer (TPL)  
Then Click Calculate to get the result of what  
the wire size should be.  
Adjust the TPL till you get as close to the bobbin  
width/height you require.

Calculate Populate Results Close

This will allow you to calculate the Turns Per Layer by simply entering the turns required for each layer, the bobbin width and the amount of layers you wish to wind.

**Close** button.

Closes the TPL panel.

**Calculate** button.

This will populate the result green boxes with the values that have been calculated, based on what you entered in the top boxes.

**Populate Results** button.

This will take the values that have just been calculated and populate the main bobbin dimensions screen.

CNC Design Ltd 2018 Coil Winder ARM Controller MKII Software V1.1

Automated Coil Winding | Standard Script Engine | Absolute Scripting | Manual Winding Mode | Settings/Diagnostics | Keyboard Mapping | Firmware Upgrade

**Bobbin Dimensions**

(1) Enter Bobbin Width  mm

(2) Enter Total Windings

(3) Enter Wire Size  mm

Closest awg value to mm  awg

Switch to Pickups

TPL Calculator

Enter Required TPL:

Enter Bobbin Width:

Feeder Resolution:

Enter Total Layers:

Calculated Bobbin Width:

Calculated Wire Size:

Calculated Windings:

Enter your Required Turns Per Layer (TPL) Then Click Calculate to get the result of what the wire size should be. Adjust the TPL till you get as close to the bobbin width/height you require.

Calculate | Populate Results | Close

Status

Winds Completed  Feeder Position

RPM

Reset | Goto Zero

Return to Zero on Finish ☐

Disengage Motors | **Start** | STOP | Pause | Home

Bobbin Motor Jog Buttons: Up, Down, Left, Right

Feeder Arm Jog Buttons: Left, Right

Feeder Travel per click  mm

Bobbin Travel per click  rev

Reverse ☐ Forward ☒ Increment counters when jog buttons clicked

Manual Speed Override ☐

Above after clicking the Populate Results button.

**Bobbin Dimensions**

(1) Enter Bobbin Width  mm

(2) Enter Total Windings

(3) Enter Wire Size  mm

Closest awg value to mm  awg

Switch to Pickups

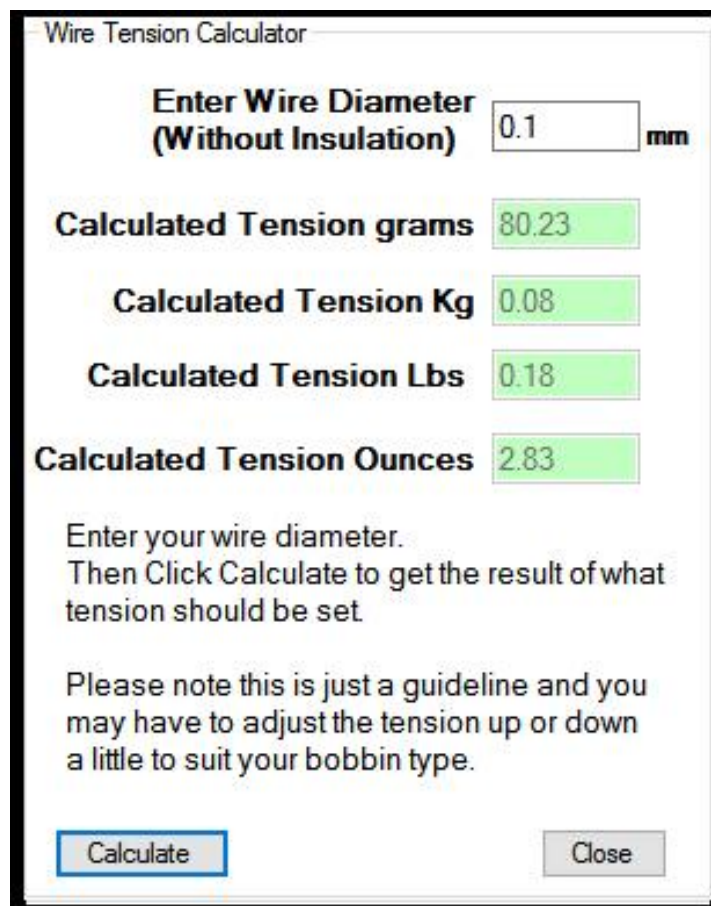
TPL Calculator

Tension Calculator

Convert awg>mm



On the **Bobbin Dimensions** panel we have a **Tension Calculator** button.  
When clicked this switches the appearance of the panel as can be seen below



The image shows a 'Wire Tension Calculator' dialog box. It has a title bar 'Wire Tension Calculator'. Inside, there is a text input field for 'Enter Wire Diameter (Without Insulation)' with the value '0.1' and a unit 'mm'. Below this are four green boxes showing calculated tension values: 'Calculated Tension grams' (80.23), 'Calculated Tension Kg' (0.08), 'Calculated Tension Lbs' (0.18), and 'Calculated Tension Ounces' (2.83). There is instructional text: 'Enter your wire diameter. Then Click Calculate to get the result of what tension should be set.' and a disclaimer: 'Please note this is just a guideline and you may have to adjust the tension up or down a little to suit your bobbin type.' At the bottom are two buttons: 'Calculate' and 'Close'.

Input	Calculated Tension grams	Calculated Tension Kg	Calculated Tension Lbs	Calculated Tension Ounces
0.1 mm	80.23	0.08	0.18	2.83

**Close** button.

Closes the Tensioner panel.

**Calculate** button.

This will take the wire size entered in the top box and give the results in the green boxes.

Bobbin Dimensions

(1) Enter Bobbin Width  mm

(2) Enter Total Windings

(3) Enter Wire Size  mm

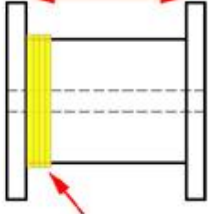

Closest awg value to mm  awg

Switch to Pickups

TPL Calculator

Tension Calculator

Convert awg>mm

On the **Bobbin Dimensions** panel we have a **Switch to Pickups** button.  
When clicked this switches the appearance of the panel as can be seen below

CNC Design Ltd 2018 Coil Winder ARM Controller MKII Software V1.1

Automated Coil Winding | Standard Script Engine | Absolute Scripting | Manual Winding Mode | Settings/Diagnostics | Keyboard Mapping | Firmware Upgrade

Bobbin Dimensions

Interpretation of Guitar Bobbin Dimensions.

Length  mm

Width  mm

Height  mm

Total Windings

Wire Size  mm

Resistance

Closest awg value to mm  awg

Mixed TPL Mode

Switch to Bobbins

(1) Enter Pickup Height  mm

(2) Enter Total Windings

(3) Enter Wire Size  mm

Save/Edit Mixed TPL

TPL Calculator

Tension Calculator

Convert awg>mm

Notice we use Height instead of width that we use on normal bobbin.

Status and Calculations

Calculated Winds Per Layer

Calculated Wire/Pitch Size

Calculated Total Layers

Calculated Pickup Height

Bobbin Name Loaded

Hardware Status

Controls

Disengage Motors

Start

STOP

Pause

Home

Bobbin Motor Jog Buttons

Feeder Arm Jog Buttons

Feeder Travel per click  mm

Bobbin Travel per click  rev

Reverse

Forward

Left

Right

Increment counters when jog buttons clicked

Manual Speed Override

Load/Save Pickup

1960 Strat

Save

Remove

Populate Default Pickups

Homing Configuration

Offset  mm

Use Homing Offset on Start

Wire Direction

Bobbin Direction

Ramping Configuration

Pause

Steps

Ramp each layer

Pause at end of each layer

Bobbin Speed

Desired Speed  RPM

Calculated Speed  RPM

Disable Hover Help Tips

Help

Status

Winds Completed

Feeder Position

RPM

Reset

Goto Zero

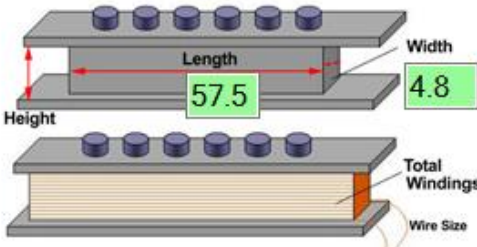
Return to Zero on Finish

We now have a guitar pickup picture displayed and also a few more options.



Bobbin Dimensions

Interpretation of Guitar Bobbin Dimensions.



Height 57.5

Width 4.8

Total Windings

Wire Size

Notice we use Height instead of width that we use on normal bobbin.

Resistance 6.33K

Closest awg value to mm 22

Mixed TPL Mode

Switch to Bobbins

(1) Enter Pickup Height 10.8 mm

(2) Enter Total Windings 8293

(3) Enter Wire Size 0.0635 mm

Save Mixed TPL

TPL Calculator

Tension Calculator

Convert awg>mm

The main thing that has changed is that we now have extra variables that can be set and saved against the bobbin.

These are shown in green and are for information only. They do not affect the way the pickup is wound.

Load/Save Pickup

Nothing Saved Yet

Save Remove Populate Default Pickups

Enter any notes in this box and click Save.  
This will save as a note against the selected bobbin.

Homing Configuration

Offset 10 mm ☐ Use Homing Offset on Start

Also you will notice that we now have a **Populate Default Pickups** button.

When you first run the software you will see that nothing has been saved yet.

But by click the **Populate Default Pickups** button it will populate the database with a set of common guitar pickups.

Any of these once loaded can be changed and saved back to suit your custom needs.

Load/Save Pickup

1950-1951 Tele Bridge

1950-1951 Tele Bridge

1950-1960 Tele Neck

1951-1964 Tele Bridge

1954 Strat

1955 Strat

1956 Strat

1957 Strat

1958 Strat

A new feature is the Mixed TPL Mode button.

The screenshot shows the 'Bobbin Dimensions' software interface. On the left, there are two diagrams of guitar bobbins. The top diagram is labeled 'Interpretation of Guitar Bobbin Dimensions.' and shows a bobbin with dimensions: Length 57.5, Width 4.8, and Height 10.8. The bottom diagram shows a bobbin with dimensions: Total Windings 8293 and Wire Size 0.0635. Below the diagrams, it says 'Notice we use Height instead of width that we use on normal bobbin.' On the right, there are input fields for 'Mixed TPL Mode' (circled in red), 'Switch to Bobbins', '(1) Enter Pickup Height' (10.8 mm), '(2) Enter Total Windings' (8293), '(3) Enter Wire Size' (0.0635 mm), and 'Resistance' (6.33K). There are also buttons for 'Save Mixed TPL', 'TPL Calculator', 'Tension Calculator', and 'Convert awg>mm'. A note at the bottom says 'Closest awg value to mm' with the value 22.

Bobbin Dimensions

Interpretation of Guitar Bobbin Dimensions.

Length 57.5

Width 4.8

Height 10.8

Total Windings 8293

Wire Size 0.0635

Notice we use Height instead of width that we use on normal bobbin.

Resistance 6.33K

Closest awg value to mm 22

Mixed TPL Mode

Switch to Bobbins

(1) Enter Pickup Height 10.8 mm

(2) Enter Total Windings 8293

(3) Enter Wire Size 0.0635 mm

Save Mixed TPL

TPL Calculator

Tension Calculator

Convert awg>mm

A lot of our customers that are winding Guitar Pickups are now using the Scripting Engine for creating some Mixed Turns Per Layer(TPL) to build up their coil shapes into various shapes and also to try and get close to a Scatter Wind effect.

We do have a Beta Scatter Winding tab in the software, but it is based on a different position per revolution, rather than allowing for mixed TPL setups, that can then be merged together.

A quick couple of paragraphs on Scatter Winding first.

### ***What is scatter winding?***

*When wire is wound into coils on a pickup, the most basic definition of scatter-wound means "non-uniform."*

*Imagine a spool of thread that doesn't have thread on it yet that you're going to wrap thread around.*

*If you were to wrap that thread in a uniform way, you would start the wrap on one side, with each consecutive wrap following the other until you reach the other side, then start wrapping in the other direction and crisscross until you were finished.*

*If you were to wrap the same thread in a non-uniform way where you wrap a few times on one side, then go straight to the other side and get a few wraps there, then to the middle and "fill" the spool in a non-uniform way, that's a scatter-wind.*

## ***Does scatter winding have a “standard?”***

*No. Scatter-winding is particular to manufacturer. Seymour Duncan will scatter-wind differently than Lindy Fralin and differently than other pickup makers and so on. In addition, there are also pickup makers who scatter-wind by hand, and still others who will use a machine. There is no single “right way” to scatter-wind.*

*What pickup makers do is experiment with different scatter-wind techniques until they find one they think works well, and go with that.*

One of the down sides of using the scripting is that for higher speeds, each command will need to be ramped up and ramped down. If not then the motors will just stall. Just like any CNC machine out there, that is using Stepper motors, they need to be ramped.

Now the big question or observation I get is that in the Automated Tab, you can setup all the parameters of the pickup you wish to wind, click on the start button and away the machine will go, without it having to ramp up and down each layer.

The main reason we can do this is because the feeder (with small wire) is never running faster than the bobbin motor and the speed it is running at 99% of the time means we can change direction of the feeder without ramping.

So we calculate total windings, along with the turns per layer and send this as one command to the firmware. You will still get a ramp at the beginning and also a ramp at the end of the winding. But no ramping in-between layers as the firmware simply changes direction of the feeder when it hits it desired TPL.

With the scripting we send one command for each layer.

So now to try and make winding a little bit smoother, we have added a new button on the Automated tab Pickup Screen. This is called Mixed TPL mode and allows you to save different combinations of winding sets and to execute them one after the other.

You will still need to ramp up and down for each set, but depending on how many windings are in a set and how many total winds you need to do, it will reduce the ramping per layer a lot.

Main rules to stick to are to make sure each winding set you create has at least two layers and that total layers are a whole number (Integer).

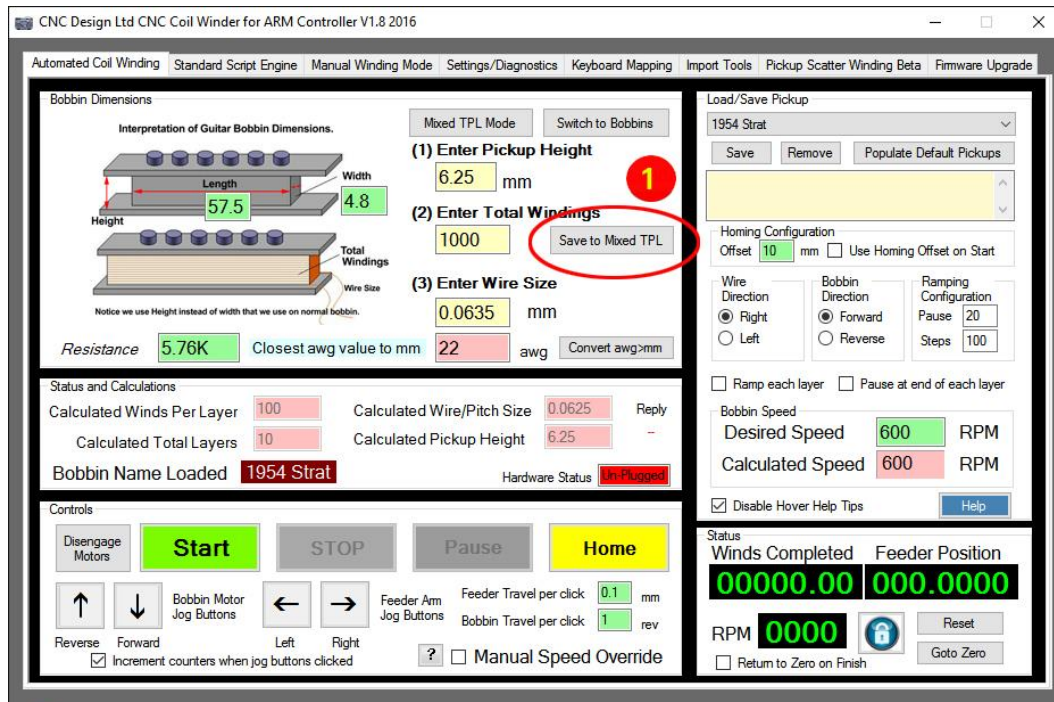
The reason for this is so you do not lose your zero point in-between the winding sets. If you try to send say 10 windings at a 1.0mm pitch for the first layer and then send 5 windings at

1.0mm for the next layer, then obviously the starting point for the next command is not at zero point and it would actually be 5.0mm.

In the scripting engine you could send a movement command to bring it back to zero, but for this feature under the Mixed TPL Mode, that will not be possible.

So a little bit of a trade off, but it should suit most people's needs.

Here are some screenshots with instructions on how it works.



**1** Set the Pickup Height, Windings and wire size, then click Save to Mixed TPL.



CNC Design Ltd CNC Coil Winder for ARM Controller V1.8 2016

Automated Coil Winding | Standard Script Engine | Manual Winding Mode | Settings/Diagnostics | Keyboard Mapping | Import Tools | Pickup Scatter Winding Beta | Firmware Upgrade

**Bobbin Dimensions**

Interpretation of Guitar Bobbin Dimensions.

Length: 57.5 mm  
Width: 4.8 mm  
Height: 57.5 mm  
Total Windings: 1000  
Wire Size: 0.0635 mm

Resistance: 5.76K Closest awg value to mm 22 awg Convert awg>mm

Mixed TPL Mode Switch to Bobbins

(1) Enter Pickup Height 6.25 mm

(2) Enter Total Windings 1000 Save to Mixed TPL

(3) Enter Wire Size 0.0635 mm

Status and Calculations

Calculated Winds Per Layer 100 Calculated Wire/Pitch Size 0.0625 mm Reply

Calculated Total Layers 10 Calculated Pickup Height 6.25 mm

Bobbin Name Loaded 1954 Strat Hardware Status Un-Plugged

Controls

Disengage Motors Start STOP Pause Home

Reverse Forward Bobbin Motor Jog Buttons Left Right Feeder Arm Jog Buttons Feeder Travel per click 0.1 mm Bobbin Travel per click 1 rev

☒ Increment counters when jog buttons clicked ☐ Manual Speed Override

Save To Mixed TPL List

Saved Mixed TPL combinations

Nothing Saved Yet

Save Remove

Please Enter a name for this entry

MTPL1

Please enter a name and click the Save button to add it to the drop down list.

This will allow you to save the settings of the pickup as a Mixed TPL combination..

Saved Mixed TPL combinations can only be used in the Mixed TPL Mode.

Click Close to return.

**Calculated Total Layers must always be an even integer number.**

Close

Status

Winds Completed 00000.00 Feeder Position 000.0000

RPM 0000

☐ Return to Zero on Finish

Reset Goto Zero

- 1 Check the Total Layers and make sure this is greater than 1 and also an even number.
- 2 Here is where you can specify a name for your winding setup before saving it to the Combination List.

CNC Design Ltd CNC Coil Winder for ARM Controller V1.8 2016

Automated Coil Winding | Standard Script Engine | Manual Winding Mode | Settings/Diagnostics | Keyboard Mapping | Import Tools | Pickup Scatter Winding Beta | Firmware Upgrade

**Bobbin Dimensions**

Interpretation of Guitar Bobbin Dimensions.

Length: 57.5 mm  
Width: 4.8 mm  
Height: 57.5 mm  
Total Windings: 1000  
Wire Size: 0.0635 mm

Resistance: 5.76K Closest awg value to mm 22 awg Convert awg>mm

Mixed TPL Mode Switch to Bobbins

(1) Enter Pickup Height 6.25 mm

(2) Enter Total Windings 1000 Save to Mixed TPL

(3) Enter Wire Size 0.0635 mm

Status and Calculations

Calculated Winds Per Layer 100 Calculated Wire/Pitch Size 0.0625 mm Reply

Calculated Total Layers 10 Calculated Pickup Height 6.25 mm

Bobbin Name Loaded 1954 Strat Hardware Status Un-Plugged

Controls

Disengage Motors Start STOP Pause Home

Reverse Forward Bobbin Motor Jog Buttons Left Right Feeder Arm Jog Buttons Feeder Travel per click 0.1 mm Bobbin Travel per click 1 rev

☒ Increment counters when jog buttons clicked ☐ Manual Speed Override

Save To Mixed TPL List

Saved Mixed TPL combinations

Nothing Saved Yet

Save

Please Enter a name for this entry

1000 Winds 100TPL

Please enter a name and click the Save button to add it to the drop down list.

This will allow you to save the settings of the pickup as a Mixed TPL combination..

Saved Mixed TPL combinations can only be used in the Mixed TPL Mode.

Click Close to return.

**Calculated Total Layers must always be an even integer number.**

Close

Status

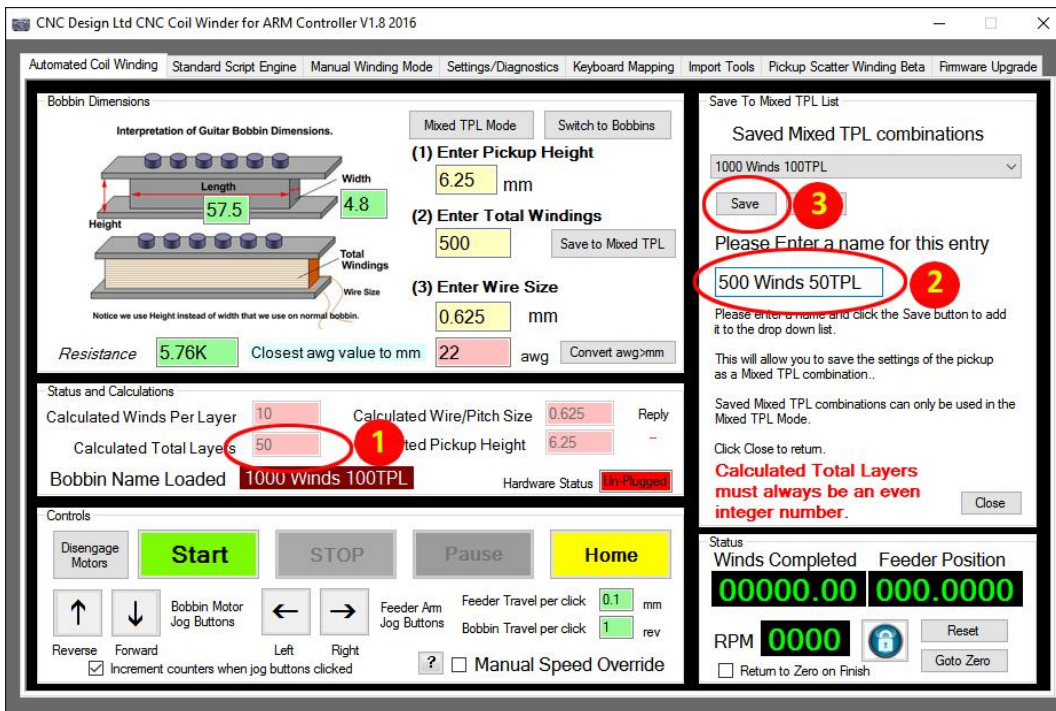
Winds Completed 00000.00 Feeder Position 000.0000

RPM 0000

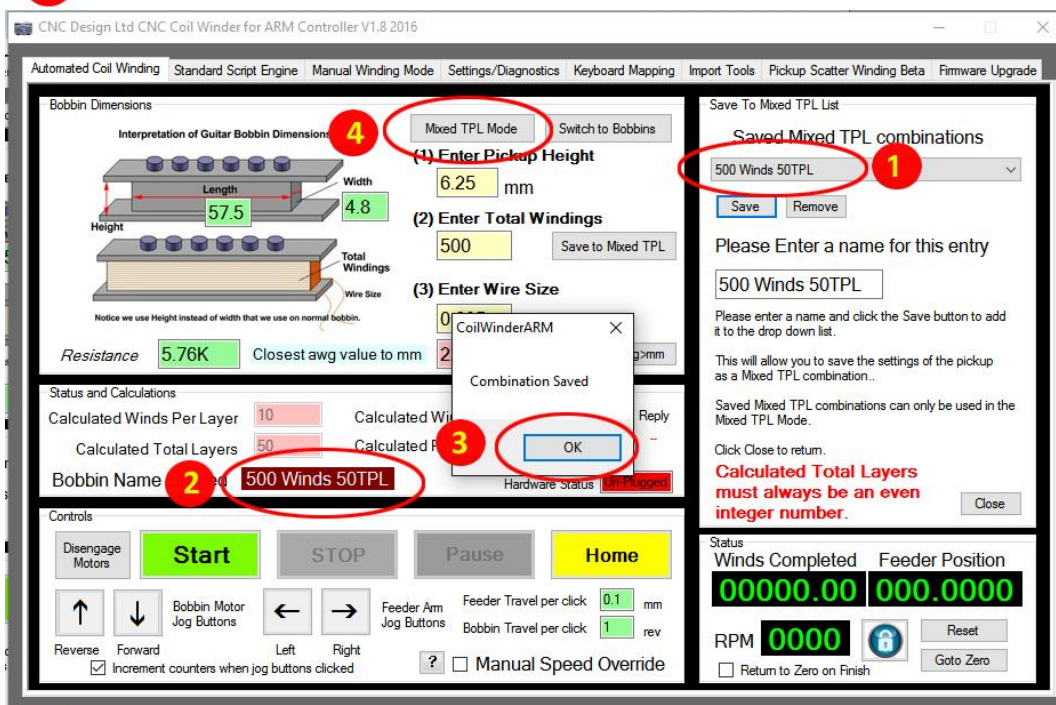
☐ Return to Zero on Finish

Reset Goto Zero

- 1 So to save this, enter a Name
- 2 Click the Save button

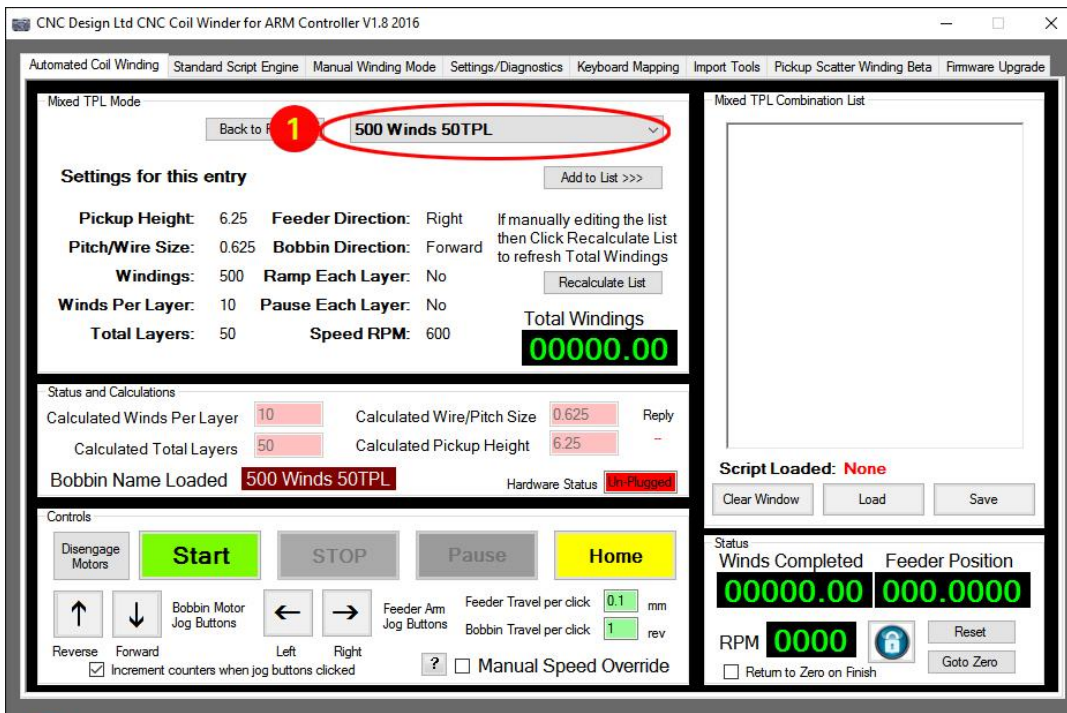


- 1 Next we setup another winding setup and check the Total Layers is an even number.
- 2 Choose a name
- 3 Click the Save button

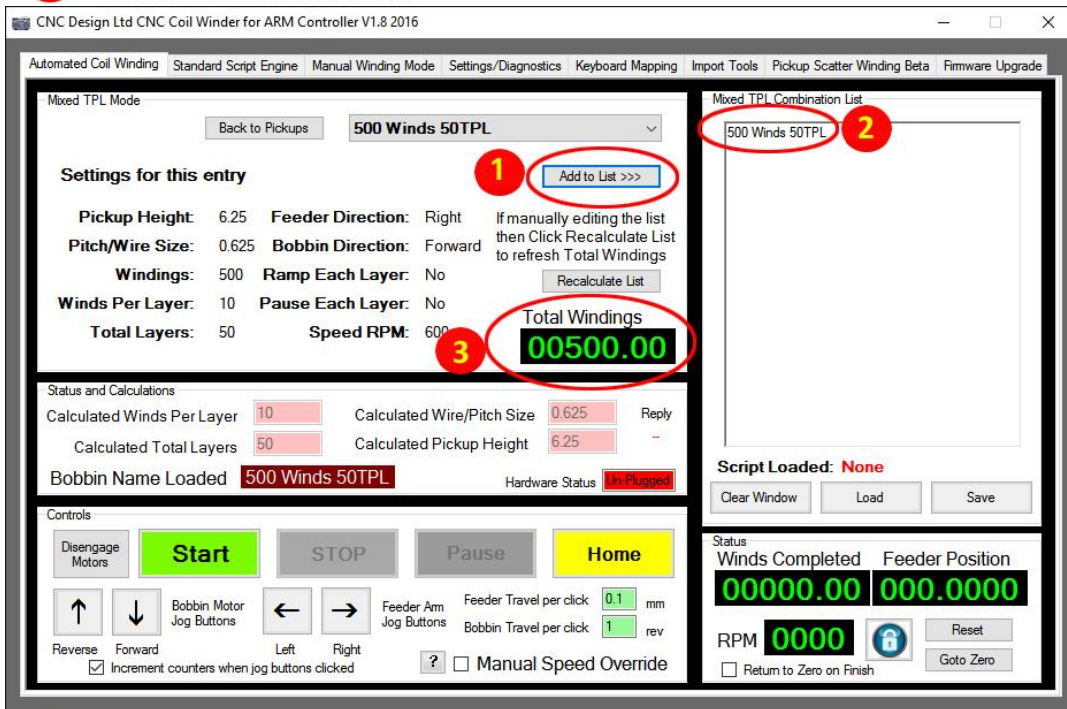


- 1 Once saved the winding setup should be now listed in the drop down box.
- 2 Also the Bobbin Name should update.
- 3 Click the OK button
- 4 Next to use the TPL combinations we have saved, we click the Mixed TPL Mode button.



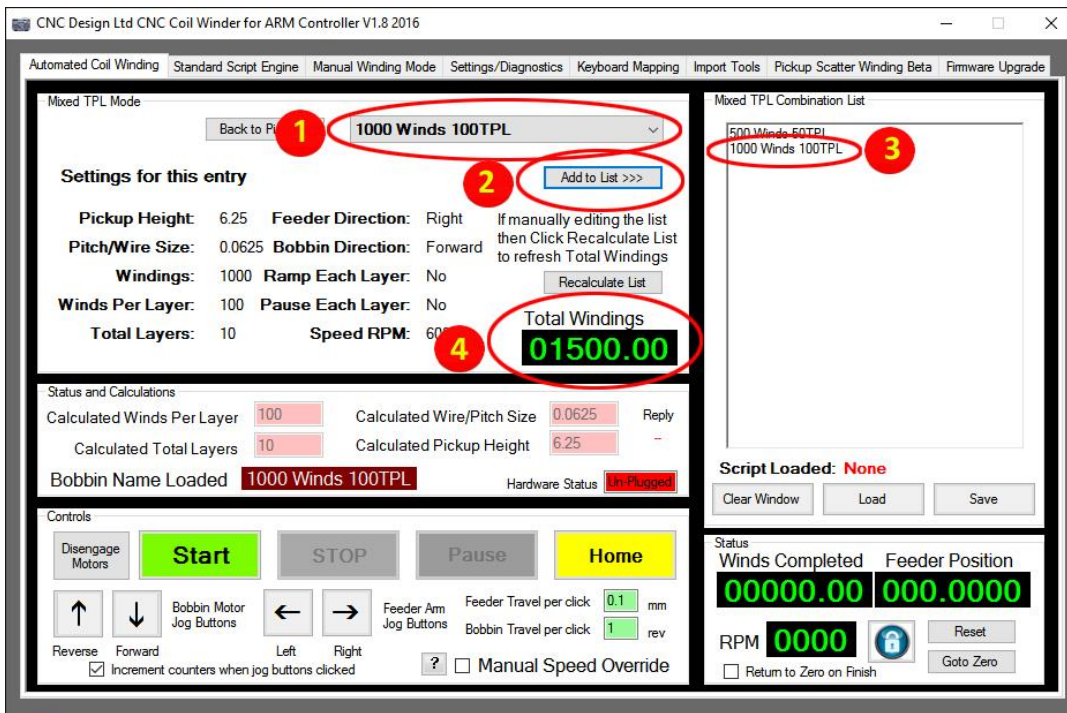


- 1 We can see our saved items are available from the drop down list. When selected all the various settings will be shown in the relevant boxes.

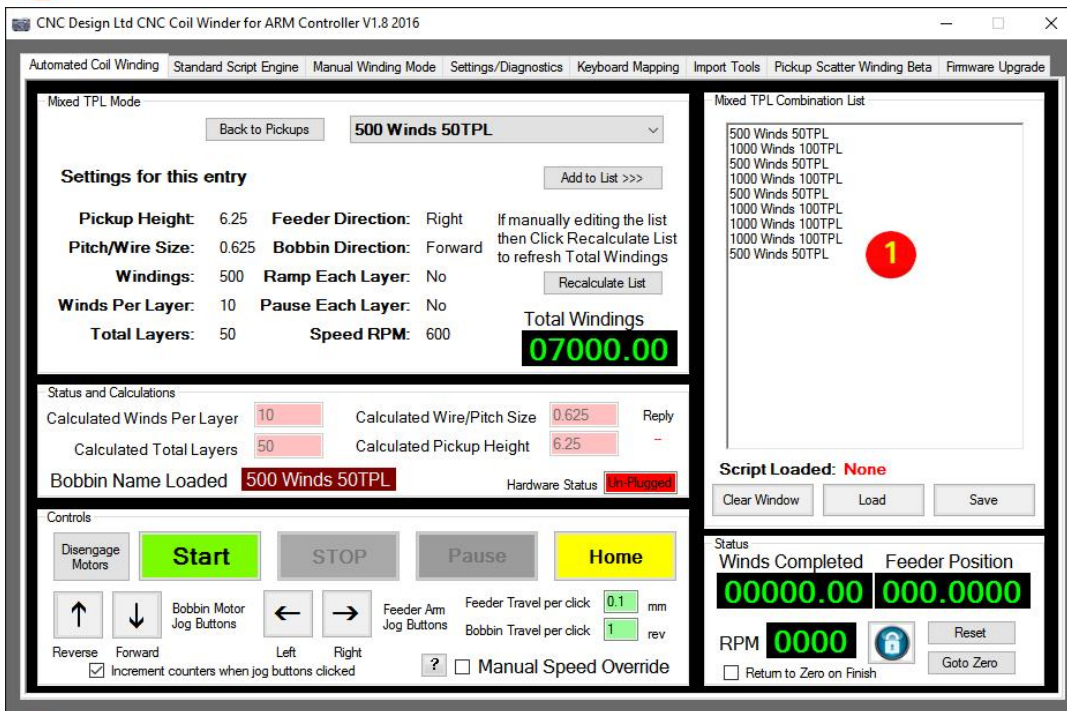


- 1 Click Add to List button
- 2 The item shown in the drop down box will now be added to the list on the right hand side.
- 3 The total Windings counter will be updated.

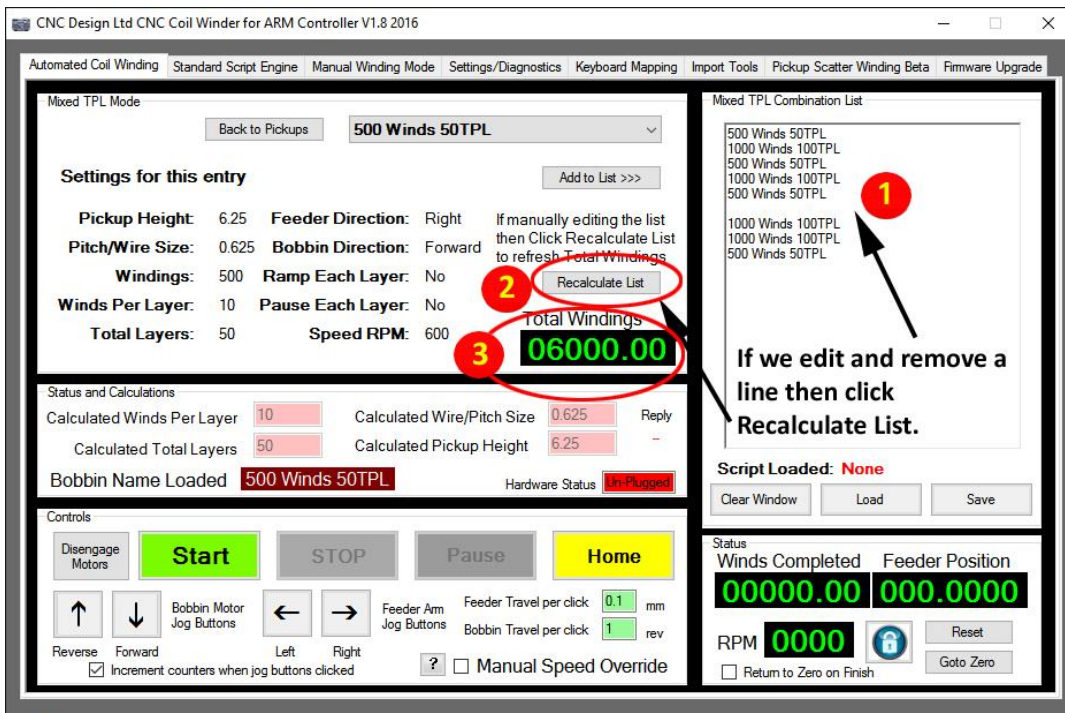




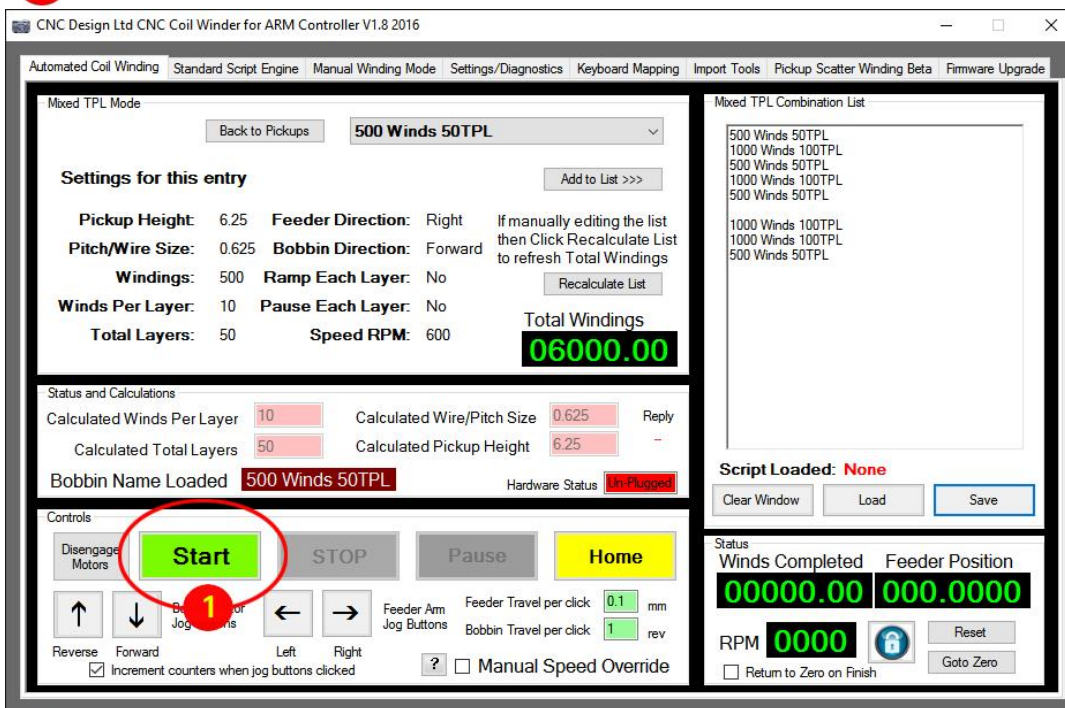
- 1 We now choose another item from the drop down list.
- 2 Click the Add to List button
- 3 The TPL Combination List should now be updated with the new item.
- 4 The total Windings counter will be updated adding the windings from each entry on the list.



- 1 Now we can add various combinations that we require to the List to build up our total windings.



- 1 You can manually edit the items in the list and remove as shown above.
- 2 After any manual editing make sure you click on the Recalculate List button
- 3 The total Windings counter will be updated.



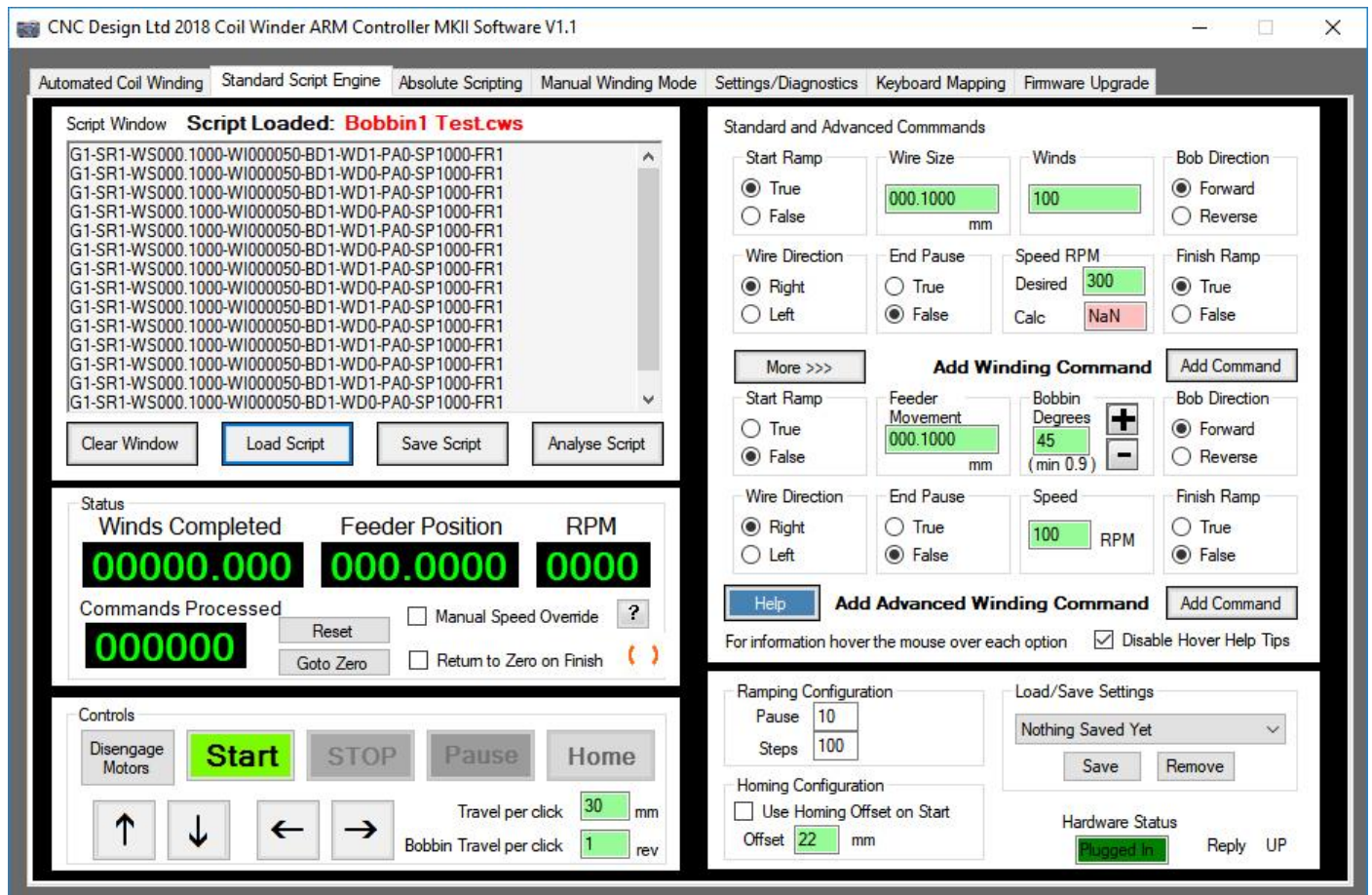
- 1 Make sure your machine is plugged in and then hit start!  
It should now go through each entry in the list and execute the command.

## Standard Script Engine – Tab

This tab allows us to have more control over the coil winding process by allowing us to create a series of commands to control bobbin windings and feeder movement.

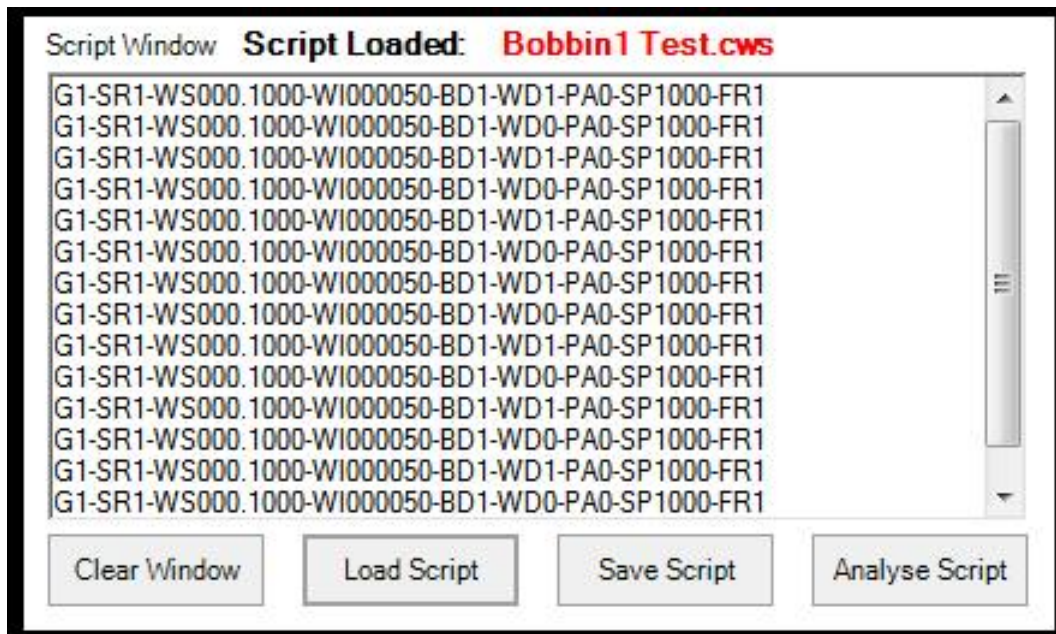
These commands can be built up and saved as a script for later use.

Creating the commands is very simple by using the GUI interface to choose the options you want for each new command and press the **Add Command** button.





Below we will go through each option panel and detail what they are.



The **Script Window** panel has the following objects

The Script window itself is where each command is appended to and built up.

The command structure is very simple to understand and a quick breakdown is.

**G1** – This lets the software know it is a Standard command.

**SR1** – Sets the Start Ramp to on.

**WS000.1000** – Sets the Wire Size or pitch to 0.1mm to move per wind.

**WI000050** – Sets the amount of winds to be completed.

**BD1**- Sets the Bobbin Direction to forward

**WD1** – Sets the Wire Direction to move to the right.

**PA0** – Tells the software not to pause for each layer.

**SP1000** – Sets the speed to 1000 RPM

**FR1** – Sets the Finish Ramp to on.

This will again interpolate the bobbin and feeder motors so that they start and stop at the exact time across each wind.

If you just wanted the feeder arm to move and not the bobbin motor then simply set the windings to zero (**WI000000**). When this command is then executed it would move the feeder arm 0.1mm.

The same if you just wanted the bobbin motor to do 50 turns without the feeder moving. Set the wire size to zero (**WS000.0000**).

There are also another set of commands that can be added to your script.

**\*comment** - Anything with a \* in front of it will be treated as a comment.

**M1-message** -Pauses the script and allows a message to be displayed.

**M2-Start Loop10** – Start of loop command. Any commands inserted between the M2 and M3 commands will be repeated. In this example 10 times.

**M3-End Loop** – End of loop command.

**M4-Zero Windings Counter** – Zero the Total Windings counter

**M5-Zero Feeder Position** – Zero the Feeder Position.

**M6-Pause100** – Pause between commands

Rather than manually adding commands, we would recommend using the GUI Add Command buttons to build the script as each command has to be in this exact format as shown above.

**Clear Window** button.

Clears the current window and deletes your script. If it has not been saved beforehand then you will not be able to recover it.

**Load Script** button.

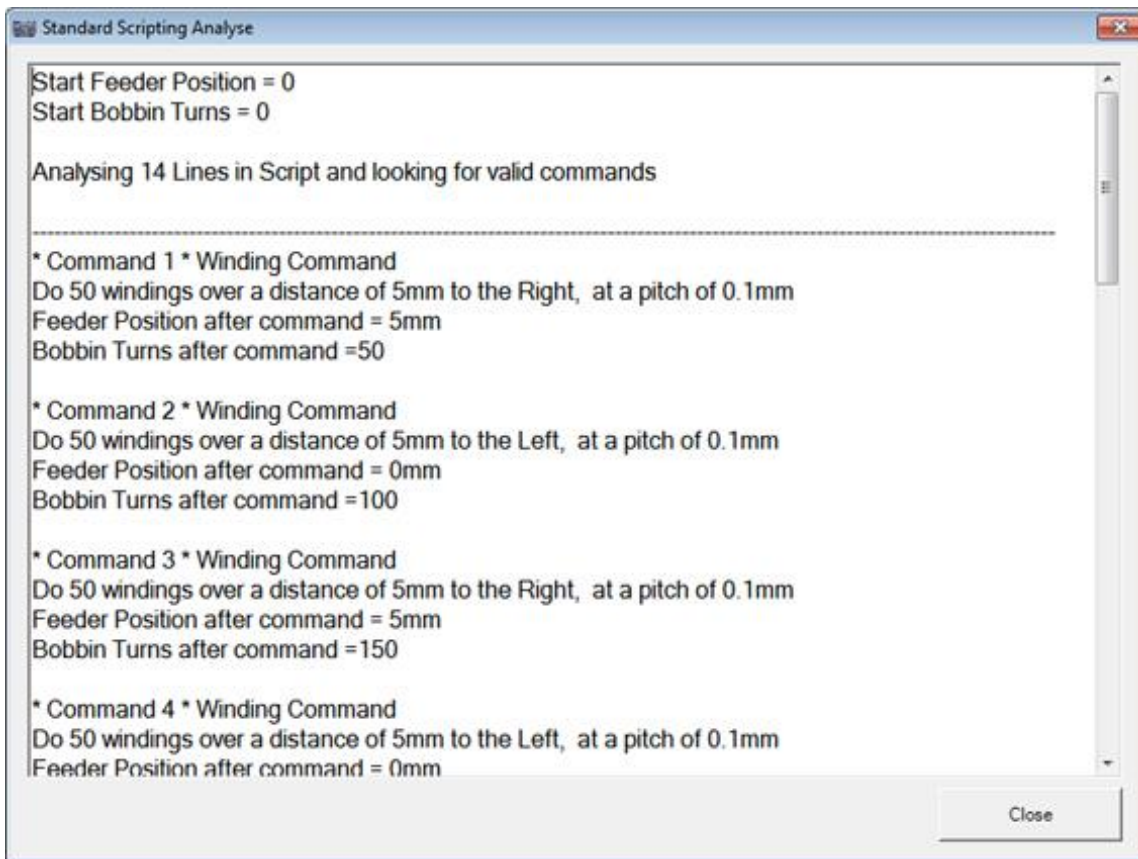
Loads a script from the computers file system into the script window.

**Save Script** button.

Saves the script in the Script Windows to the computers file system and allows you to choose where to save it and what filename to call it.

**Analyse Script** button.

This runs through your script and then opens up a separate window with the result of your script.



As you can see, our command1 of:

G1-SR1-WS000.1000-WI000050-BD1-WD1-PA0-SP1000-FR1

Instructs the machine to do 50 windings, with the feeder moving 0.1mm per wind.

Below we will look at the GUI interface for adding these commands.

Standard and Advanced Commands

Start Ramp

☒ True
☐ False

Wire Size

000.1000 mm

Winds

100

Bob Direction

☒ Forward
☐ Reverse

Wire Direction

☒ Right
☐ Left

End Pause

☐ True
☒ False

Speed RPM

Desired 300  
Calc 300

Finish Ramp

☒ True
☐ False

More >>>

Add Winding Command

Add Command

Start Ramp

☐ True
☒ False

Feeder Movement

000.1000 mm

Bobbin Degrees

45  
(min 0.9)

Bob Direction

☒ Forward
☐ Reverse

Wire Direction

☒ Right
☐ Left

End Pause

☐ True
☒ False

Speed

100 RPM

Finish Ramp

☐ True
☒ False

Help

Add Advanced Winding Command

Add Command

For information hover the mouse over each option
☒ Disable Hover Help Tips

Ramping Configuration

Pause 10  
Steps 100

Load/Save Settings

Nothing Saved Yet  
Save Remove

Homing Configuration

☐ Use Homing Offset on Start  
Offset 22 mm

Hardware Status

Un-Plugged

Reply

--

The **Standard and Advanced Commands** panel is shown above.

All the settings above the first Add Command button are a standard command.

All the settings above the next Add Command button are advanced commands.



## Add Standard Winding Command

Standard and Advanced Commands

<b>Start Ramp</b> <input checked="" type="radio"/> True <input type="radio"/> False	<b>Wire Size</b> 000.1000 mm	<b>Winds</b> 100	<b>Bob Direction</b> <input checked="" type="radio"/> Forward <input type="radio"/> Reverse
<b>Wire Direction</b> <input checked="" type="radio"/> Right <input type="radio"/> Left	<b>End Pause</b> <input type="radio"/> True <input checked="" type="radio"/> False	<b>Speed RPM</b> Desired 300 Calc 300	<b>Finish Ramp</b> <input checked="" type="radio"/> True <input type="radio"/> False

**Add Winding Command**      Add Command

The objects for the standard command are as follows:

### **Start Ramp** group box.

Sets whether the bobbin and feeder motors should ramp up on the beginning of the command.

Usually you would always set this to **True** unless using the servo motor option.

If setting it as **False** with stepper motors on the machine and running at speeds over 100RPM then you are going to jam the motor. So please be aware of this.

### **Wire Size** group box.

This can be set for just moving the feeder arm or moving it per winding revolution.

If the **Winds** variable is set to greater than zero then the feeder arm will move the distance of the **Wire Size** variable each turn of the bobbin motor.

If the **Winds** variable is set to zero then the feeder arm will move the total distance of the millimetres set in the **Wire Size** variable.

### **Winds** group box.

Sets the total winds for this command.

### **Bobbin Direction** group box.

Sets the direction of the bobbin motor for this command.

### **Wire Direction** group box.

Sets the direction of the feeder motor for this command.

### **End Pause** group box.

Tells the software to pause after the command has completed.

The Pause button will change to Resume and will need to be clicked before the next command is executed.

### **Speed RPM** group box.

Desired speed is the variable that will tell the machine what speed you want the bobbin motor to run at.

As the bobbin motor and feeder motor are interpolated, then most of the time the speed of the bobbin motor will be divided down to set the speed of the feeder arm motor to suit and keep that interpolation correct. But if you require the wire size or movement pitch to be a large number that requires the feeder arm motor to run faster than the bobbin motor, then the bobbin motor will automatically drop and the calculated speed will be displayed below.

### **Finish Ramp** group box.

Sets whether the bobbin and feeder motors should ramp down at the end of the command. Usually you would always set this to **True** unless using the servo motor option.

### **Add Command** button.

After setting all the other options above this button, you simply click this button to add the command to the script window.

### **Add Advanced Winding Command**

<b>Start Ramp</b> <input type="radio"/> True <input checked="" type="radio"/> False	<b>Feeder Movement</b> <input type="text" value="000.1000"/> mm	<b>Bobbin Degrees</b> <input type="text" value="45"/> ( min 0.9 ) + -	<b>Bob Direction</b> <input checked="" type="radio"/> Forward <input type="radio"/> Reverse
<b>Wire Direction</b> <input checked="" type="radio"/> Right <input type="radio"/> Left	<b>End Pause</b> <input type="radio"/> True <input checked="" type="radio"/> False	<b>Speed</b> <input type="text" value="100"/> RPM	<b>Finish Ramp</b> <input type="radio"/> True <input checked="" type="radio"/> False
<b>Add Advanced Winding Command</b>			<b>Add Command</b>

The objects for the advanced command are as follows:

### **Start Ramp** group box.

Sets whether the bobbin and feeder motors should ramp up on the beginning of the command.

**Wire Size** group box.

This is the distance that the feeder arm will move per degree movement of the bobbin motor.

**Bobbin Degrees** group box.

Sets the movement in degrees of the bobbin motor for this command.

**Bobbin Direction** group box.

Sets the direction of the bobbin motor for this command.

**Wire Direction** group box.

Sets the direction of the feeder motor for this command.

**End Pause** group box.

Tells the software to pause after the command has completed.

The Pause button will change to Resume and will need to be clicked before the next command is executed.

**Speed** group box.

This variable that will tell the machine what speed you want the bobbin motor to run at.

**Finish Ramp** group box.

Sets whether the bobbin and feeder motors should ramp down at the end of the command.

**Add Command** button.

After setting all the other options above this button, you simply click this button to add the command to the script window.

## More Commands

On the **Standard and Advanced Commands** panel there is also a More >>> button.

The screenshot shows the 'Standard and Advanced Commands' panel. It contains two sections: 'Standard and Advanced Commands' and 'Add Winding Command'. The 'Standard and Advanced Commands' section has controls for Start Ramp, Wire Size (000.1000 mm), Winds (100), Bob Direction (Forward), Wire Direction (Right), End Pause (False), Speed RPM (Desired 300, Calc 300), and Finish Ramp (True). The 'Add Winding Command' section has controls for Start Ramp (False), Feeder Movement (000.1000 mm), Bobbin Degrees (45), Bob Direction (Forward), Wire Direction (Right), End Pause (False), Speed (100 RPM), and Finish Ramp (False). A 'More >>>' button is circled in red in the 'Standard and Advanced Commands' section. At the bottom, there is a 'Help' button, an 'Add Advanced Winding Command' button, and a checkbox for 'Disable Hover Help Tips'.

When clicked it brings up a new panel with Extra commands that can be inserted into your script.

The screenshot shows the 'Extra Standard Commands' panel. It contains several checkboxes and input fields for adding commands to a script. The options are: Add Comment (with a text input field), Add Pause and Message (with a text input field), Add Pause between commands (Ms) (with a value of 100), Reset Winds Counter to Zero, Reset Feeder Position to Zero, Add Start Loop with count (with a value of 10), and Add Finish Loop. Below these options, there is instructional text: 'If you want to loop a command then add a Start Loop command along with the count before the command.', 'Next add the winding or movement command.', 'Then finally add a Finish Loop command', and 'At the moment only 1 loop command can be used per script'. At the bottom, there are buttons for 'Less <<<<', 'Add Command', and 'Add Command'.

**\*comment** - Anything with a \* in front of it will be treated as a comment.

**M1–message** -Pauses the script and allows a message to be displayed.

**M2-Start Loop with Count** – Start of loop command. Any commands inserted between the M2 and M3 commands will be repeated. In this example 10 times.

**M3-Finish Loop** – End of loop command.

**M4-Zero Windings Counter** – Zero the Total Windings counter

**M5-Zero Feeder Position** – Zero the Feeder Position.

**M6-Pause100** – Pause between commands

**Less<<<<** button.

This closes the panel.

**Add Command** button.

After setting all the other options above this button, you simply click this button to add the command/commands to the script window.

For information hover the mouse over each option ☒ Disable Hover Help Tips

---

<b>Ramping Configuration</b> Pause <input type="text" value="10"/> Steps <input type="text" value="100"/>	<b>Load/Save Settings</b> <input type="text" value="Nothing Saved Yet"/> <input type="button" value="Save"/> <input type="button" value="Remove"/>
<b>Homing Configuration</b> <input type="checkbox"/> Use Homing Offset on Start Offset <input type="text" value="22"/> mm	<b>Hardware Status</b> <input type="button" value="Un-Plugged"/> Reply --

The objects for the other options on the panel are as follows:

**Disable Hover Help Tips** checkbox.

You can move the mouse over any object within the software and if left over that object for a certain amount of time a Hover Tip will appear giving you information on that object. By checking this box then it will stop these hover tips appearing.

**Ramping Configuration** group box.

We use stepper motors on our machines then to get them to higher speeds we need to

ramp up the motor speed gradually.

You have two variables you can set to get the desired curve as such.

The Steps variable is the divider of the target frequency that we want the bobbin motor to run at. So if the software calculated that the bobbin motor should run at 1000kHz and the steps box is set to 100 then we can see that the steps would be  $1000/100 = 10$  Hz increments.

The Pause variable is the time between each increment.

**Homing Configuration** group box.

Sets the offset distance that the feeder arm will move away from the limit switch when the **Home** button is clicked.

For example if it is set to 10mm then when the **Home** button is clicked the feeder arm will move to the left until it gets to the limit switch on the machine. It will then move to the right 10mm.

By ticking the **Use Homing Offset on Start** option will cause the machine to home when the Start button has been clicked. The machine will then home before the winding starts.

This option is only available for machines with the homing/limit switches installed.

**Reply** is the answer coming back from the Coil Winding Machine after each command is sent.

**Hardware Status** shows of the Coil Winding Machine is connected or not connected to the computer.

The **Load/Save Settings** group box.

Allows you to save and remove scripting parameters.

When clicking the **Save** button it will ask for a name that you wish to call the set and save all the parameters to the registry. If you wish to remove the saved set from the registry, then click the **Remove** button and it will delete it.





The **Status** panel has the following objects

**Winds Completed** display.

Displays the amount of winding that have been wound.

**Feeder Position** display.

Displays the position of the feeder arm on the machine.

**RPM** display.

Displays the speed that the bobbin motor is running at.

**Commands Processed** display.

Displays the amount of commands that have been processed.

**Reset** button.

Pressing this button will reset the feeder position to zero.

**Goto Zero** button.

Pressing this button will tell the feeder arm to return to its zero position.

**Return to Zero** checkbox.

If this is checked then when the machine has finished its winding routine the feeder arm will automatically move back to the zero position.

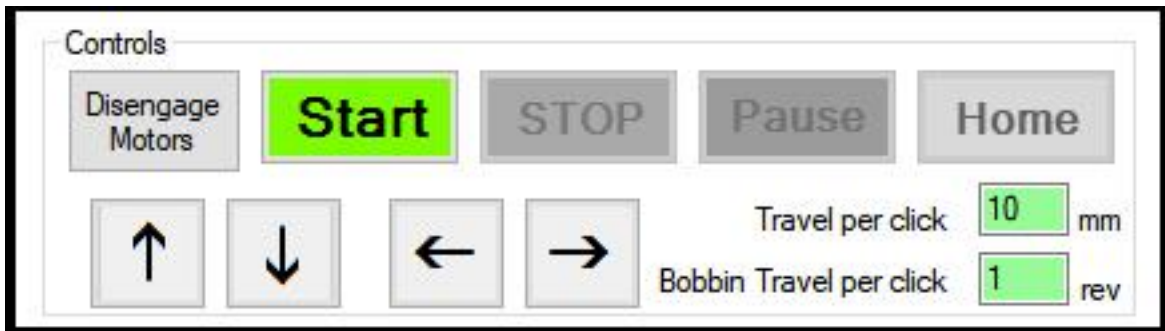
**Manual Speed Override** checkbox.

If checked then when the **Start** button is clicked the software will pass control over to the manual speed controller on the controller box.

The manual controller dial needs to be fully turned to the left before it will start to wind and the speed of the bobbin motor and feeder arm will increase or decrease depending on the position of the dial.

Ramping will be disabled for this mode as not needed and it will be down to control of the user to make sure the speed is controlled so no jamming of the motors will occur.





The **Control** panel has the following objects

**Disengage Motors** button.

When clicked this will disengage the motors so they can be turned by hand.

The motors will automatically re-engage when start or jog buttons are clicked.

You will not be able to disengage the motors when paused, but if you need to move the motors at this point, then simply turn the power off to the motors via the switch. Do the adjustments and then turn the power back on before pressing resume in the software.

**Start** button.

Clicking this button starts the winding routine starting with the first command in the script window.

**Stop** button.

Clicking this button stops the winding routine.

**Pause/Resume** button.

While winding is in progress and you wanted to pause the machine then click this button. It will then turn to a flashing Resume status and clicking it again will allow the machine to carry on from where it was paused.

While pause you can cancel the winding routine by pressing the stop button.

Also while paused the Left and Right button can be used to jog the feeder arm to a new position. This will not increment the feeder position and can be used for adjustments needed without having to restart the whole winding routine from the beginning.

**Home** button.

This can only be used if there are limit/homing switches installed on the machine. Based on

the variable set in the **Homing Configuration** will determine the distance that the feeder arm will travel away from the limit switch once it has been triggered.

**Left** button.

This is a manual jog for the feeder arm and when clicked the feeder arm will move to the left.

**Right** button.

This is a manual jog for the feeder arm and when clicked the feeder arm will move to the right.

**Feeder Travel per click** variable.

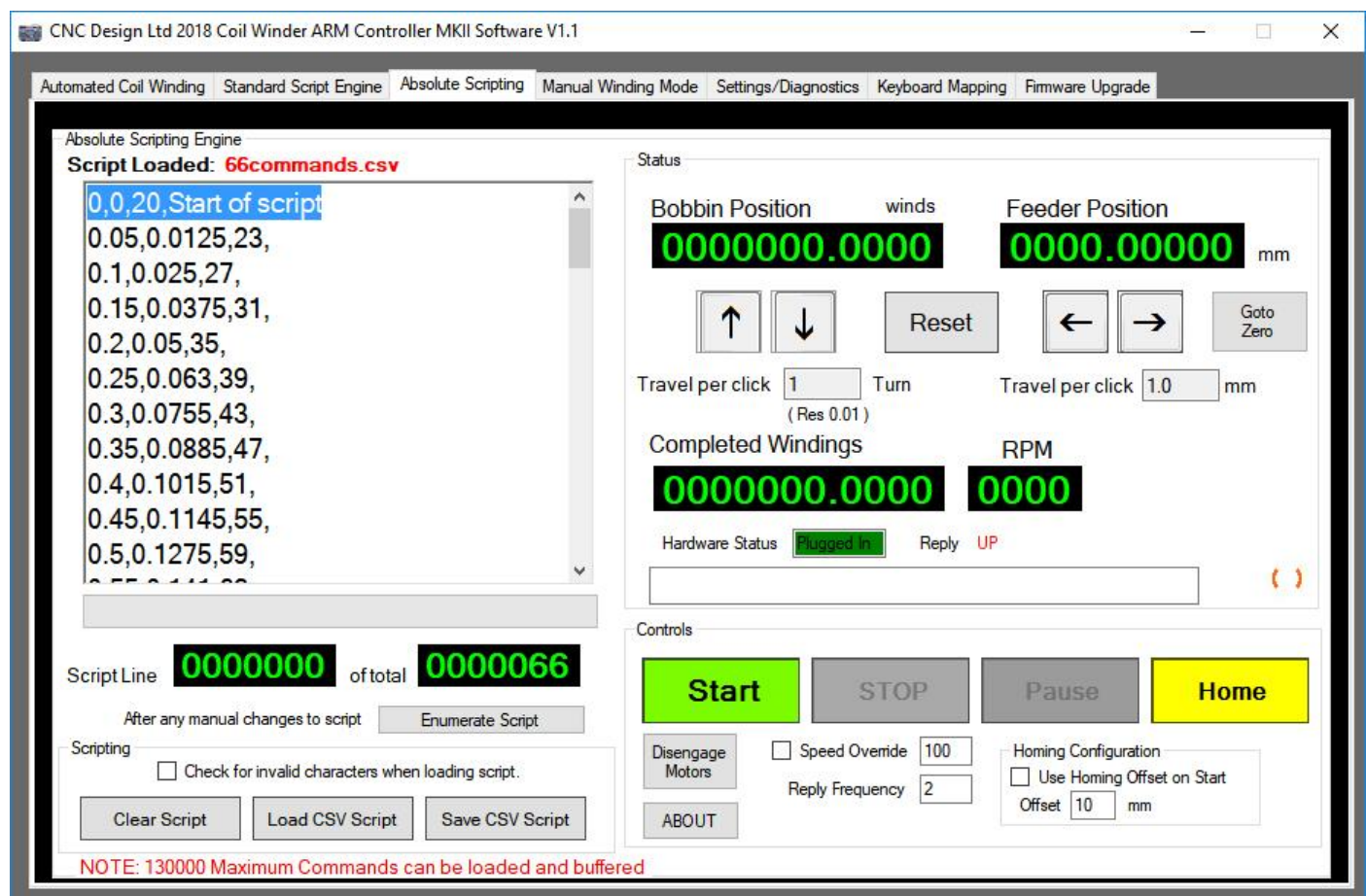
Sets the travel in millimetres that the feeder arm will move if either the Left or Right button are clicked.

## Absolute Scripting Mode – Tab

With the new ARM Controller MKII, we have now on board Flash memory that can be used for buffering loads of small commands. This removes any small delays that can be caused by the USB communications latency.

Unlike the Standard Scripting Engine which is Incremental positioning for each command, this is absolute positioning on each command.

For example if you set the bobbin position to be 10.00 and feeder position to be 5.00 in a command (10.00,5.00,100,) then it will rotate the bobbin 10 times and move the feeder by 5mm. If you then send a command (11.00,6.00,100,) it will move the bobbin by 1 turn and the feeder by 1mm, at a speed of 100 RPM.

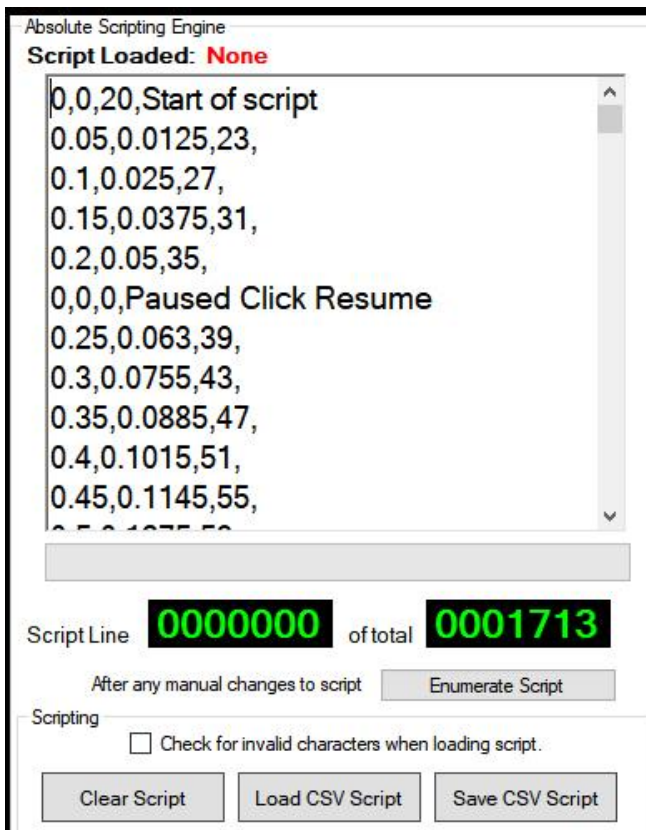


The scripts can be created in Excel spreadsheet and saved as a CSV file. This can then be loaded into the script window. The format for each command is:

Bobbin position, Feeder position, Speed, Comment

If the bobbin, feeder and speed are set to zero (0,0,0,Paused) then the script will pause and display the comment.

You will need to create your own ramping if required as shown in the example.



The **Absolute Scripting** panel has the following objects.

**Script Line** display.

Displays which line of the script is being executed out of the total number of lines loaded.

**Clear Script** button.

Clears the current window and deletes your script. If it has not been saved beforehand then you will not be able to recover it.

**Load Script** button.

Loads a CSV script from the computers file system into the script window.

**Save Script** button.

Saves the script in the Script Windows to the computers file system and allows you to choose where to save it and what filename to call it.

**Enumerate Script** button.

After manually editing the script in the window, you will need to enumerate it by clicking this button.

The check for invalid characters should not now be needed and was there while we were testing. But handy to check if your script file has any hidden characters in there.

Status

Bobbin Position	winds	Feeder Position	
<b>0000000.0000</b>		<b>0000.00000</b>	mm
<input type="button" value="↑"/> <input type="button" value="↓"/>	<input type="button" value="Reset"/>	<input type="button" value="←"/> <input type="button" value="→"/>	<input type="button" value="Goto Zero"/>
Travel per click <input type="text" value="1"/> Turn		Travel per click <input type="text" value="1.0"/> mm	
( Res 0.01 )			
Completed Windings		RPM	
<b>0000000.0000</b>		<b>0000</b>	
Hardware Status <input type="button" value="Plugged In"/>	Reply -		
<input type="text"/>			

The **Status** panel has the following objects.

**Bobbin Position** display.

Displays the position of the bobbin on the machine.

**Feeder Position** display.

Displays the position of the feeder arm on the machine.

**Completed Windings** display.

Displays the amount of winding that have been wound.

**RPM** display.

Displays the speed that the bobbin motor is running at.

**Reset** button.

Pressing this button will reset the bobbin and feeder position to zero.

**Reverse** button.

This is a manual jog for the bobbin motor and when clicked the bobbin motor will move in the reverse direction.



**Forward** button.

This is a manual jog for the bobbin motor and when clicked the bobbin motor will move in the forward direction.

**Left** button.

This is a manual jog for the feeder arm and when clicked the feeder arm will move to the left.

**Right** button.

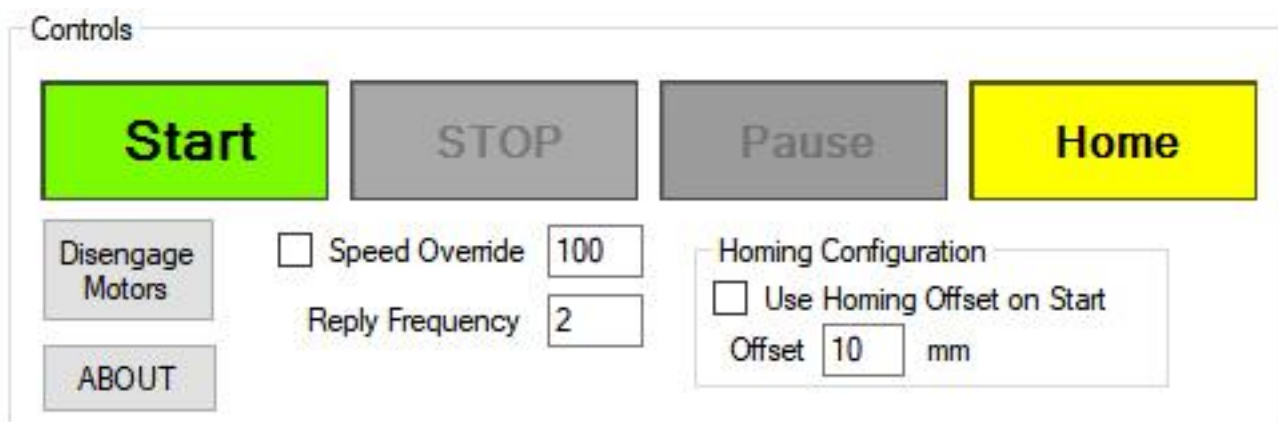
This is a manual jog for the feeder arm and when clicked the feeder arm will move to the right.

**Feeder Travel per click** variable.

Sets the travel in millimetres that the feeder arm will move if either the **Left** or **Right** buttons are clicked.

**Bobbin Travel per click** variable.

Sets the amount of revolutions that the bobbin motor will move if either the **Forward** or **Reverse** buttons are clicked.



The **Control** panel has the following objects

**Start** button.

Clicking this button starts the buffering routine first and once all the commands are buffered to the controller, then it will start winding.

**Stop** button.

Clicking this button stops the winding routine.

***Pause/Resume*** button.

While winding is in progress and you wanted to pause the machine then click this button. It will then turn to a flashing Resume status and clicking it again will allow the machine to carry on from where it was paused.

Because of the nature of the absolute scripting, it is not possible to use ramping. So again this should only be used at low speeds.

***Home*** button.

This can only be used if there are limit/homing switches installed on the machine. Based on the variable set in the ***Homing Configuration*** will determine the distance that the feeder arm will travel away from the limit switch once it has been triggered.

***Speed Override*** checkbox.

If checked then the speed is ignored in the script and it will use the value set. You have no ramping when this is selected, so only suitable for low speeds.

***Reply Frequency*** box.

Due to the speed and small movements, it can sometimes not be possible to receive replies back from the controller as quick as they are being executed and you could get some stalling or lockups. We recommend keeping this set to 2 or above.

***Homing Configuration*** group box.

Sets the offset distance that the feeder arm will move away from the limit switch when the ***Home*** button is clicked.

For example if it is set to 10mm then when the ***Home*** button is clicked the feeder arm will move to the left until it gets to the limit switch on the machine. It will then move to the right 10mm.

By ticking the ***Use Homing Offset on Start*** option will cause the machine to home when the Start button has been clicked. The machine will then home before the winding starts.

This option is only available for machines with the homing/limit switches installed.

***Disengage Motors*** button.

When click this will disengage the motors so they can be turned by hand.

The motors will automatically re-engage when start or jog buttons are clicked.

You will not be able to disengage the motors when paused, but if you need to move the motors at this point, then simply turn the power off to the motors via the switch. Do the adjustments and then turn the power back on before pressing resume in the software.

**ABOUT** button.

This will display a short description of the commands, but also allow you to load a sample script when the button is clicked.

### Absolute Scripting Format

With this scripting engine you can load up a CSV file which has the format of Bobbin Position, Feeder Position, Speed, Comment

Example

```
100.00,50.000,100,Comment
102.00,55.000,100,Comment
```

Move bobbin 100 turns(100 winds), move feeder to 50mm(50mm move)  
At a speed of 100RPM  
Move bobbin 102 turns(2 winds), move feeder to 55mm(5mm move)  
At a speed of 100RPM

This absolute position for each command.  
Setting Speed to 0 will pause and ignore that command.

**Buffer Mode Can only be used with MKII ARM Controller**

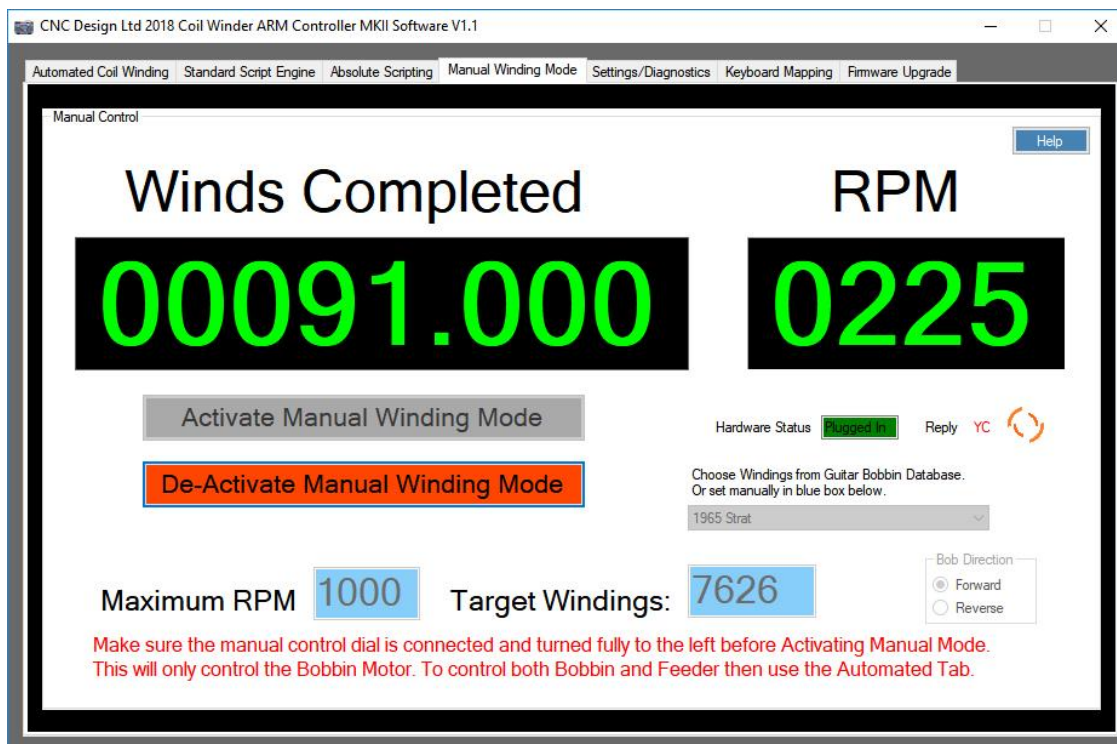
## Manual Winding Mode – Tab

This mode is for people wishing to use their machine for semi-automatic winding of guitar pickups.

This will only turn the bobbin motor and control will be handed over to the manual controller, which must be connected to the controller box.

The manual controller dial needs to be fully turned to the left before it will start to wind and the speed of the bobbin motor and feeder arm will increase or decrease depending on the position of the dial.

Ramping will be disabled for this mode as not needed and it will be down to control of the user to make sure the speed is controlled so no jamming of the motors will occur.



**Activate Manual Winding** Mode button

This will start the winding routine.

**DeActivate Manual Winding** Mode button

This will stop the winding routine.

**Target Windings** variable.

This is the amount of windings you wish the machine to do.

It can be set manually by clicking on the blue input box and entering a number or using the drop down box and choosing from a previously saved pickup bobbin.

**Bobbin Direction** group box.

Sets the direction of the bobbin motor for this command.

**Winds Completed** display.

Displays the amount of winding that have been wound.

**RPM** display.

Displays the speed that the bobbin motor is running at.

**Reply** is the answer coming back from the Coil Winding Machine after each command is sent.

**Hardware Status** shows of the Coil Winding Machine is connected or not connected to the computer.

## Settings/Diagnostics – Tab

CNC Design Ltd 2018 Coil Winder ARM Controller MKII Software V1.1

Automated Coil Winding | Standard Script Engine | Absolute Scripting | Manual Winding Mode | **Settings/Diagnostics** | Keyboard Mapping | Firmware Upgrade

**Please do not touch these settings unless you know what you are doing.**

Settings

Current Config: **Mini Coil Winder**

200mm Coil Winder | Mini Coil Winder | Auto Detect | Backup

**Bobbin Motor**

Frequency: 13.333333328 | SPBR: 800 | Feeder Jog Speed: 5000 | Bobbin Jog Speed: 80 RPM

**Feeder Motor**

Resolution: 0.0125 | SPFR: 80 | BSP: 1

☐ Enable Timeout Alert | ☐ Enable Command Pause | ☐ Limit Switches Installed | ☐ Emergency Stop Installed | ☐ Reverse Bobbin Motor | ☒ Reverse Feeder Motor

Timeout: 10 seconds | Pause: 50 Mseconds | Pause Boundary: 1 mm

Set Default Startup: Absolute Script Engine | Save

Diagnostics - This has been included for support reasons and generally you do not have to worry or even need to know the outputs being displayed.

DB Out	Bobbin Motor Freq	FBD	Feeder Motor Freq	FFD
11111111	0	79.999999968	0	79.999999968
DD Out	BFQ Raw LSB	BDFQ Raw LSB	FFQ Raw LSB	FDFQ Raw LSB
255	0	21474.836471410	0	21474.836471410
Raw RPM Feedback	BCP	Base Speed	FCP	Calculated RPM
	0	7999.9999968	0	
Fram Buffer count	Fram sector	Buffer Counter	Reset Flash	Switch Out
		0		255

Firmware

Firmware | Help

CNC Design Ltd Coil Winder ARM Controller MKII V1.1

Change Colours

Background | Foreground | Border | Reset to Default

Info

<http://www.ukcnc.net>

CNCDesign | Copyright 2018

This tab has a mixture of settings and also diagnostics displays.

The diagnostic displays you do not have to really worry about and more there for trouble shooting if needed.

Below we will go through the settings that can be changed to suit your machine and any add-ons you use.

Settings

Current Config: **Mini Coil Winder**

200mm Coil Winder | Mini Coil Winder | Auto Detect | Backup

**Bobbin Motor**

Frequency: 13.333333328 | SPBR: 800 | Feeder Jog Speed: 5000 | Bobbin Jog Speed: 80 RPM

**Feeder Motor**

Resolution: 0.0125 | SPFR: 80 | BSP: 1

☐ Enable Timeout Alert | ☐ Enable Command Pause | ☐ Limit Switches Installed | ☐ Emergency Stop Installed | ☐ Reverse Bobbin Motor | ☒ Reverse Feeder Motor

Timeout: 10 seconds | Pause: 50 Mseconds | Pause Boundary: 1 mm

Set Default Startup: Absolute Script Engine | Save



**Current Config** display.

This displays what configuration has been detected when the machine is plugged into your computer or displays what has been manually set.

**200mm Coil Winder** button.

Sets the correct variables needed for the 200mm Coil Winding Machine.

**Mini Coil Winder** button.

Sets the correct variables needed for the Mini Coil Winding Machine.

**Auto Detect** button.

Automatically communicates with the Coil Winding Machine attached to the machine to detect what model it is and sets the correct variables needed.

**Backup** button.

This backs up all the bobbins and all the settings for all tabs within the software and allows you to save as a .REG file.

If you move the software onto a new machine then make sure you use this button to back up the settings and then copy the .REG file over to your new computer.

Next just double click the .REG file and follow the instructions on the screen.

When you launch the software on the new machine it should pick up all the settings.

**Frequency** display.

This value is automatically calculated on the value of the SPBR variable.

**SPBR** variable.

This variable sets the Steps Per Bobbin Revolution needed to suit the Coil Winding Machine attached to your computer.

**Feeder Jog Speed** variable.

Sets the speed of the feeder arm motor when using the Jog buttons. This is set in frequency, rather than RPM.

**Bobbin Jog Speed** variable.

Sets the speed of the bobbin motor when using the Jog buttons. This is set in RPM.

**Resolution** display.

Displays the resolution of the feeder arm.

This value is automatically calculated on the value of the SPFR variable and BSP variable.

**SPBR** variable.

This variable sets the Steps Per Feeder Revolution needed to suit the Coil Winding Machine attached to your computer.

**BSP** variable.

This variable sets the Ballscrew Set Pitch needed to suit the Coil Winding Machine attached to your computer.

**Pause Boundary** variable

If the pause button is used near the start of each layer and at the end of each layer then it can throw either the position read off or not complete the pause.

This is because when the Pause key is clicked when winding and there is not enough travel left in the winding for a ramp down and then a ramp up after pause.

By the default the Pause boundary is 1.0mm into the wind and the width of bobbin minus 1.0mm.

**Set Default Startup** variable

Sets which tab should display on start-up of the software.

**Enable Timeout Alert** checkbox

Enables the command timeout value for communications. If no reply has come back to the software from the controller in the value entered, then it will cause an alert box to be displayed.

**Enable Command Pause** checkbox

Enables the pause between commands sent from the Standard Scripting Engine. This is useful if small commands are sent and you need to slow it down to avoid communication conflicts.

**Limit Switches installed** checkbox

If you have installed the limit/homing and emergency stop kit onto your 200mm Coil Winder then you need to check this option to let the software know. It will then enable the homing features of the software.

**Emergency Stop installed** checkbox

If you have installed the limit/homing and emergency stop kit onto your 200mm Coil Winder then you need to check this option to let the software know. It will then enable the extra features of the software.

**Reverse Bobbin Motor** checkbox

Will reverse the direction of the bobbin motor to suit motor attached to your machine.

### **Reverse Feeder Motor** checkbox


Will reverse the direction of the feeder motor to suit motor attached to your machine.

### **Save** button.

Saves the settings that have been set in all the variables above.

Diagnostics - This has been included for support reasons and generally you do not have to worry or even need to know the outputs being displayed.

DB Out 11111111	Bobbin Motor Freq 0	FBD 79.999999968	Feeder Motor Freq 0	FFD 79.999999968
DD Out 255	BFQ Raw LSB 0	BDFQ Raw LSB 21474.836471410	FFQ Raw LSB 0	FDFQ Raw LSB 21474.836471410
Raw RPM Feedback	BCP 0	Base Speed 7999.9999968	FCP 0	Calculated RPM
Fram Buffer count	Fram sector	Buffer Counter 0	Reset Flash	Switch Out 255



The only control on the middle section is the **Reset Flash** button.

This is only to be used when installing a new Flash Chip on the controller board. It then resets the counters on the controller and initialises the new memory installed.

The other display boxes are for information when diagnosing any issues.

<b>Firmware</b> Firmware CNC Design Ltd Coil Winder ARM Controller MKII V1.1	<b>Change Colours</b> Background Foreground Border Reset to Default	<b>Info</b> <a href="http://www.ukcnc.net">http://www.ukcnc.net</a> CNCDesign Limited Copyright 2018
--	--	---

At the bottom of the tab we also have some other settings.

### **Firmware** button.

When clicked it displays the current Firmware of the connected Coil Winding Machine.

Under the **Change Colours** group box we have:

### **Background** button.

Changes the background colour of each tab.

### **Foreground** button.

Changes the foreground colour of each tab.

### **Border** button.

Changes the border colour of each tab.

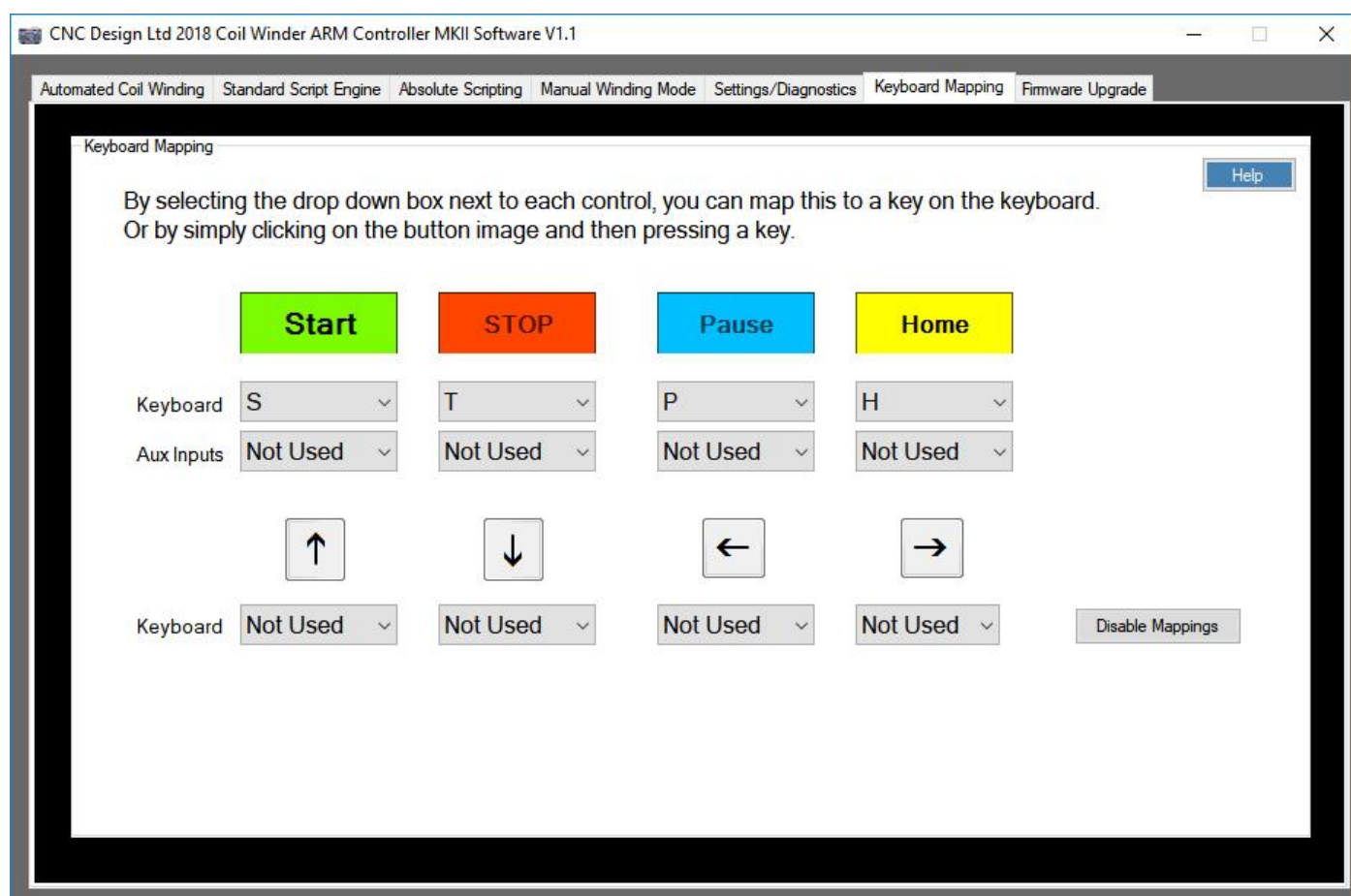
**Reset to Default** button.

Sets all colours back to the original style.

**Info** box.

Clicking on URL will take you to product web page.

## Keyboard Mapping – Tab



This tab lets you map keyboard keys to the buttons within the software.

By selecting the drop down box next to each control, you can map this to a key on the keyboard. Or by simply clicking on the button image and then pressing a key.

Also these keys can be mapped to inputs on the controller board that have switches attached.

## Upgrading the Firmware.

With the new ARM Controller MKII you can no longer upgrade the firmware via the software and will need to use a JTAG programmer that is supplied with the machine.

Please check the download area of our website for the full instructions, depending on what machine you have.

<http://www.ukcnc.net/index.php/downloads/>