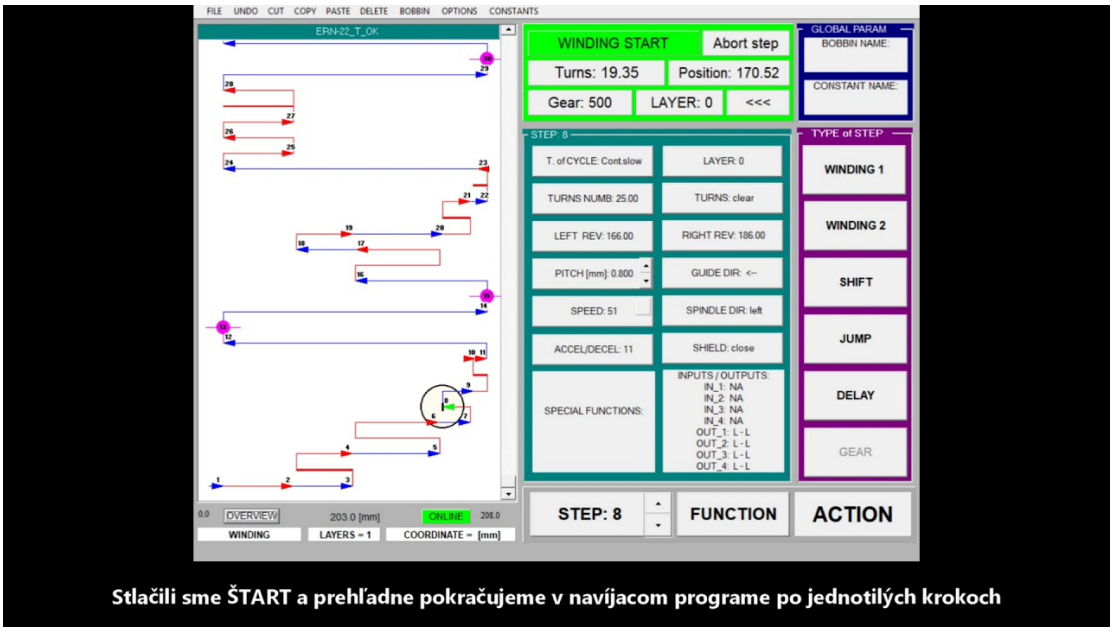
GRAPHIC-T SOFTWARE

Graphic-T software is used to design winding programs for ERN winding machines and is integrated part of the winding machine ERN-T.
It is not designed to use in the other computers except ones that comes with TPC winding machines.
In the Graphic we can work with two modes ONLINE and OFFLINE.
After Graphic-T is opened, the actual running winding program is automatically loaded. Now the Graphic-T is in the ONLINE mode, which is indicated on the bottom of the screen with green capital letters ONLINE.

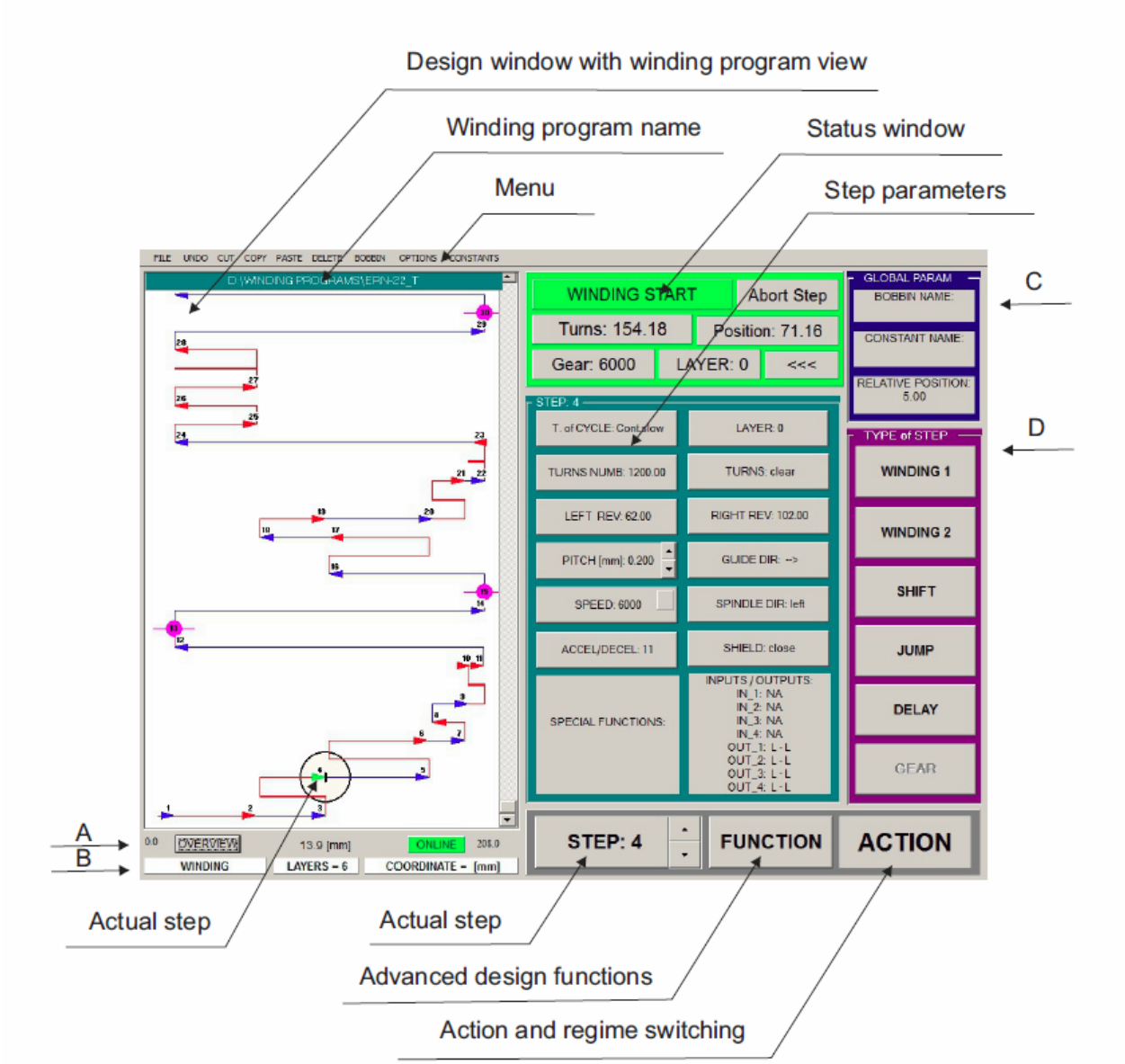
Mode ONLINE

Mode ONLINE always shows actual running winding program, and we can make all the changes of the parameters in this program. In this mode we are also able to wind the coil. In the Graphic scheme (which is located on left side of the screen), we can see actual running step, marked in the circle. By the buttons we see all the parameters of the current step. At the top, in the status bar, is displayed actual state of the winding machine, number of turns, position of wire guide, wire guide direction, layer and the gear set.

VIDEO:



Basic screen of GRAPHIC in winding machine, mode ONLINE



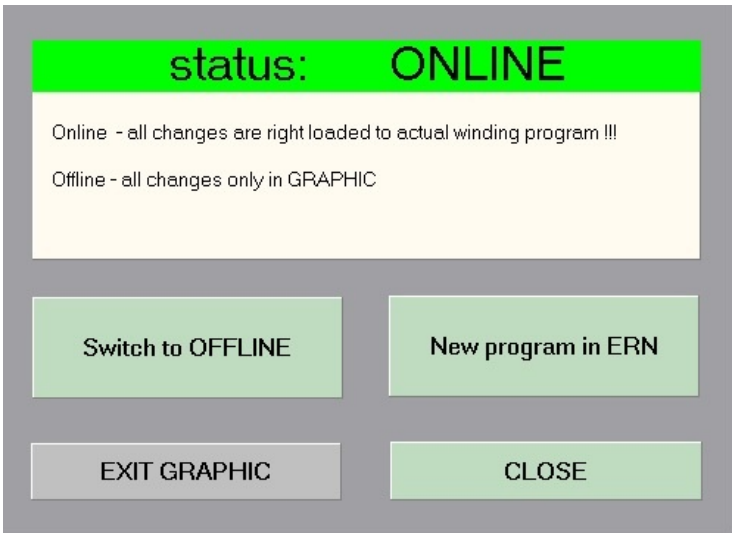
A: Left coordinate of design window (mm), Mode of view, actual maus position (mm), Work mode, Right coordinate of design window (mm)

B: Actual step – Step type, Number of layers, Guide end position

C: Actual Bobbin and Constants

D: Step type choosing

Options for ONLINE mode



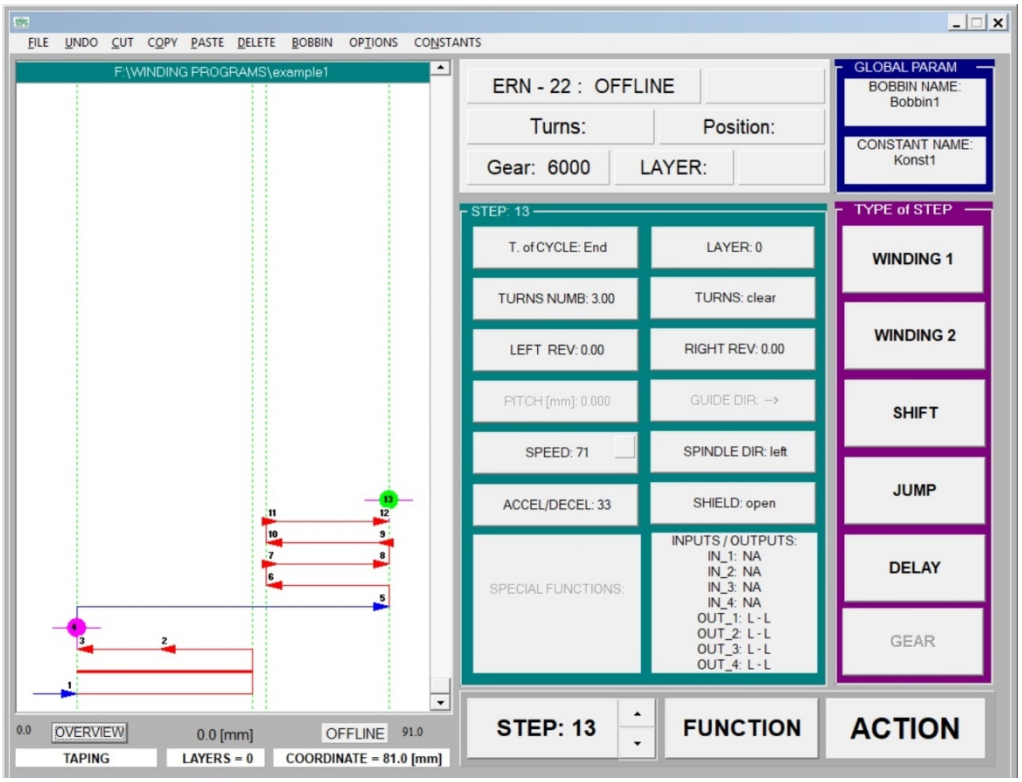
New program in ERN - Erases currently running program in the winding machine and we can write the new one.
Switch to OFFLINE – After the pressing of this button, machine is switched to OFFLINE mode, and all of the following changes of the program are made only in the memory of the Graphic program thus it has no influence on currently running winding program at the ERN winding machine.

Mode OFFLINE

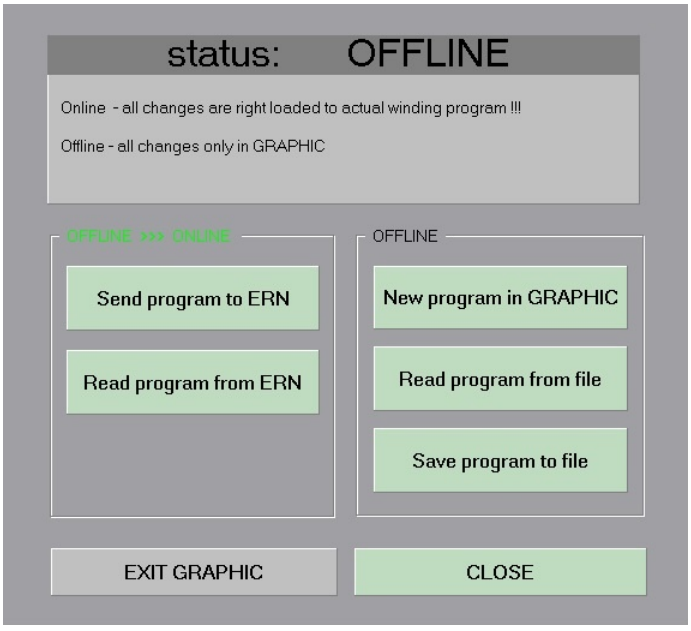
Mode OFFLINE: In this mode we can create new blueprint of the program only in the memory of the Graphic without interfering currently running winding program inside of ERN winding machine itself. After we are done with new blueprint of the program, we have two options.
We can save the file in the memory as a winding program or we can send it straight in to the ERN winding machine. In case we send it straight in to the winding machine, we will automatically rewrite currently running program and the winding machine is also switched to the ONLINE mode at the same time.

(All the recent versions of Graphic from year 2005 to 2017, worked only in OFFLINE mode with the winding programs located in the files of the computer memory.)

After pressing of indication button ONLINE/OFFLINE mode, or ACTION button, new window with the options for chosen mode is displayed.



Options for OFFLINE mode



Send program to ERN - Winding program which is opened in the memory of the Graphic, we send it in to the winding machine ERN, thus with this action we rewrite actual running program and at the same time the mode is switched to ONLINE. Here we can run this program or correct it straight in the winding machine.

Read program from ERN - From winding machine ERN to Graphic we load actual running winding program. At the same time the machine is switched in to ONLINE mode and we can correct actual running program in the ERN machine.

New program in Graphic - On the screen of the Graphic program we erase actual running program, and only after erasing the program we can create new one (program in the winding machine didn't change).

Read program from file - From the file we open the winding program which will display on the screen. We can do corrections (program in the winding machine didn't change).

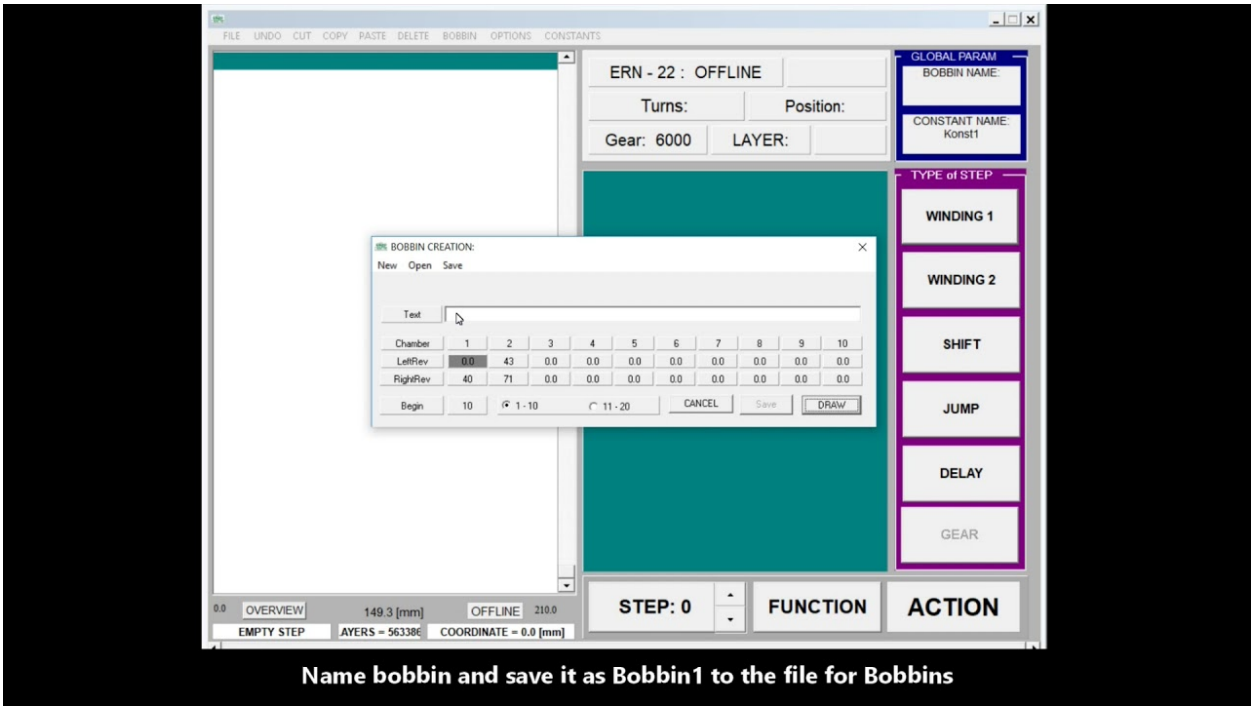
Save program to file - We can save in to the file the blueprint of winding program which we actual working with in Graphic (program in the winding machine didn't change).

HOW TO CREATE WINDING PROGRAM

Recommended procedure for creating a winding program

1. We can create BOBBIN: menu_ BOBBIN -> Design

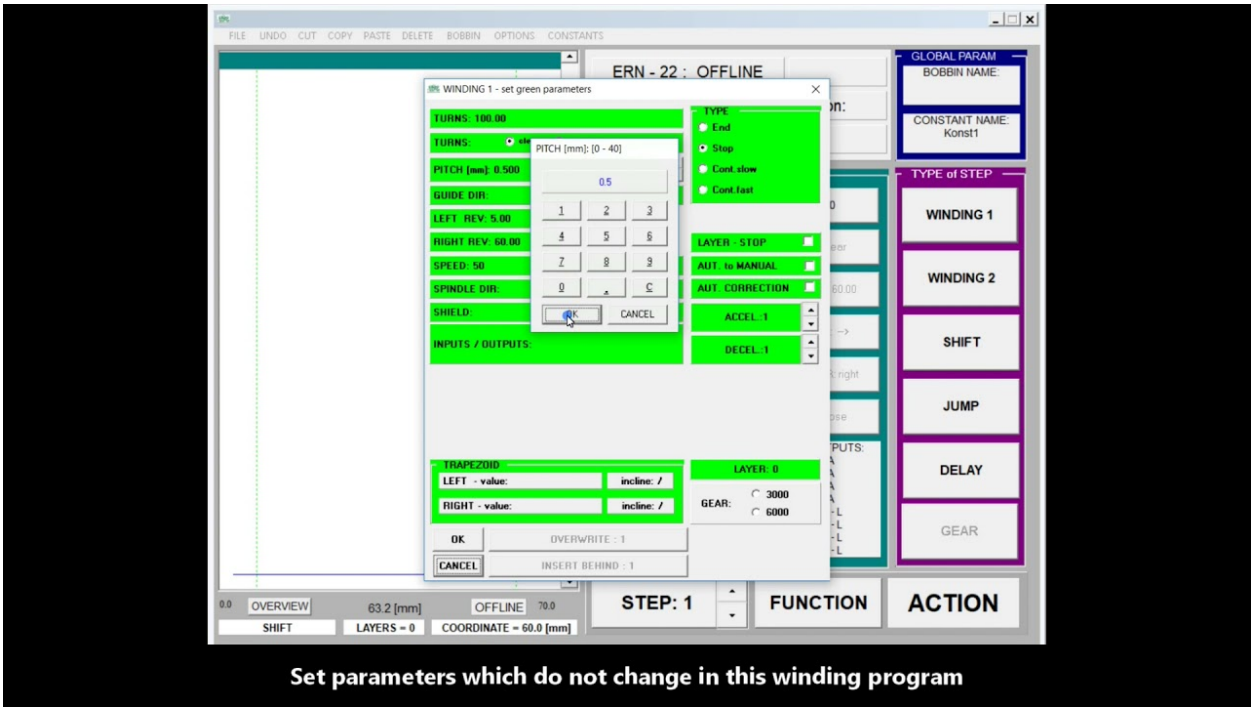
VIDEO:



Create_Bobbin

2. We can preset parameters for individual types of steps and functions:
menu_CONSTANTS -> type of step / function

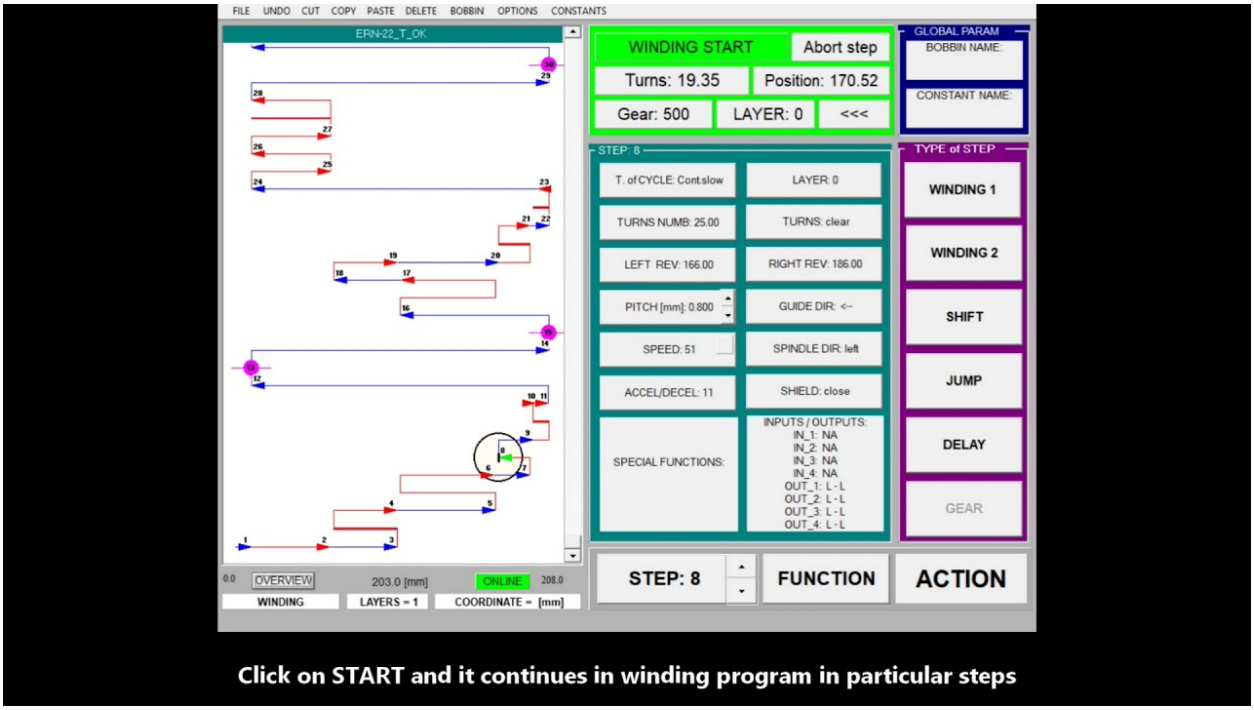
VIDEO:



Set parameters which do not change in this winding program

3. We will start programming individual steps of winding program, and we strongly recommend that the first step of program be shift to the coordinate where we start winding.

VIDEO:



Click on START and it continues in winding program in particular steps

Note: for models that allow to programmatically switch GEAR (e.g. ERN 62), we recommend programming in step no. 1 switching the initial gear and in step no. 2 program shift to the coordinate where we start winding

4. We add further steps of winding program, we program their parameters and we can use the FUNCTIONS appropriately. We will create required winding program.

5. In last step of winding program, set the cycle type parameter to END, so that after starting from this step, the program is moved to the beginning and step number 1 is performed (similar to after turning on winding machine)

Program saving to a file

The created winding program can be saved to a file only in OFFLINE mode.

If we are in ONLINE mode, we will switch to the OFFLINE state before saving:

ACTION_button -> Switch to OFFLINE

In OFFLINE mode, we name the winding program and save it to a file:

ACTION_button -> Save program to file (saves in ERN-T format)
or
menu_FILE -> Save as….

Save as ERN-T - the basic option for ERN-T winding machine programs

Save as ERN-T + warnings - option to save programs that contain warnings (without this option warnings will not be saved together with the program)

Save as ERN-G, ERN-C - this option allows you to save the program in an older format intended for ERN-G and ERN-C winding machines

Winding of created program

If we use Graphic on the machine, we can wind created winding program.

If we are in ONLINE mode, we will move to step 0 or to the last step of program and press START on the winder.

If we are in OFFLINE mode, we need to rewrite the existing winding program with our program:

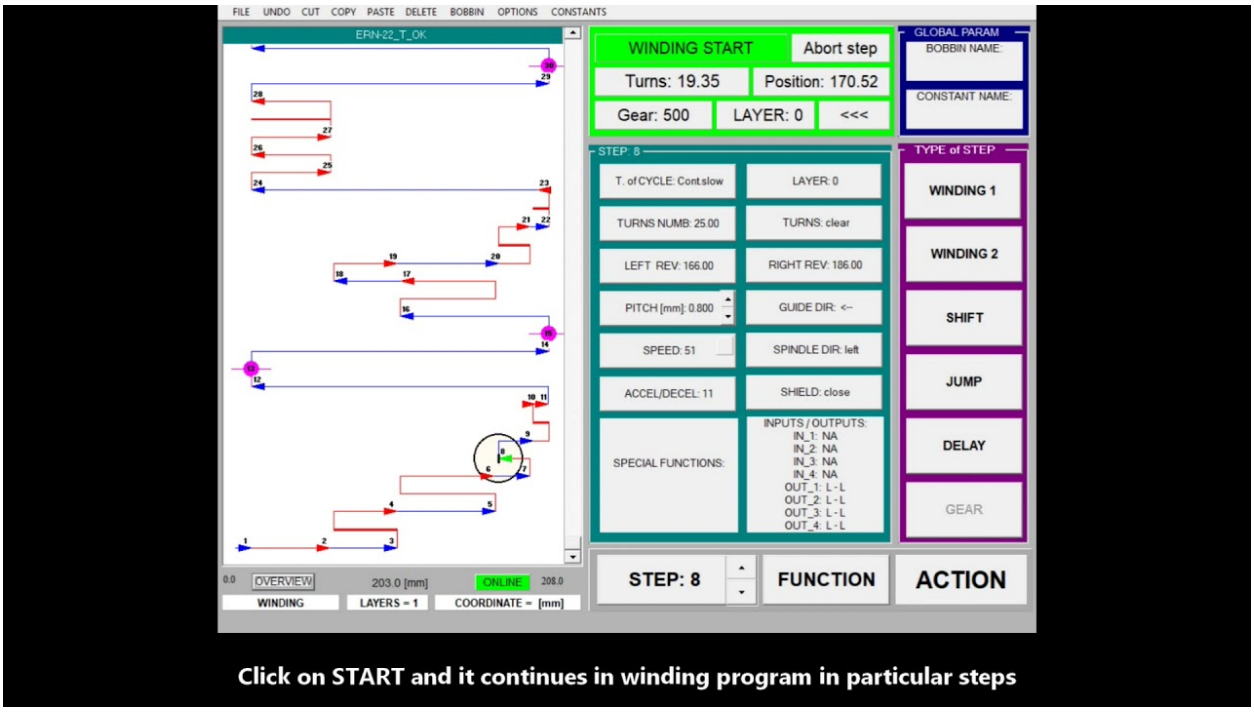
ACTION_button -> Send program to ERN

The program overwrites the current winding program, machine is initialized, displays our winding program and we can wind. Press START-button.

In the design window, the circle winds the currently wound step, the buttons show the parameters of the step and at the top of the status window shows the status of the winder, the number of turns wound, the position of the guide, the direction of the guide, layer and gear.

As we gradually wind the individual steps of the program, we also move through the steps in the design window. In the STOP state, we can end the currently wound step by pressing the END STEP button.

VIDEO:



Program loading from file

Before winding, we need to read created winding programs from the file and send them to winding machine. Winding program can be loaded from file only in OFFLINE mode.

If we are in ONLINE mode, we will switch to the OFFLINE state before saving:

ACTION_button -> Switch to OFFLINE

In OFFLINE mode, we load the winding program from the file:

ACTION_button -> Read program from file
or
menu_FILE -> Open

Graphic can also load winding programs created on older types and automatically converts them to the format for ERN-T winding machine.

The loaded winding program is drawn on the screen and we can edit it in OFFLINE mode, or if we are working on machine we can overwrite the existing winding program and start winding it:

ACTION_button -> Send program to ERN

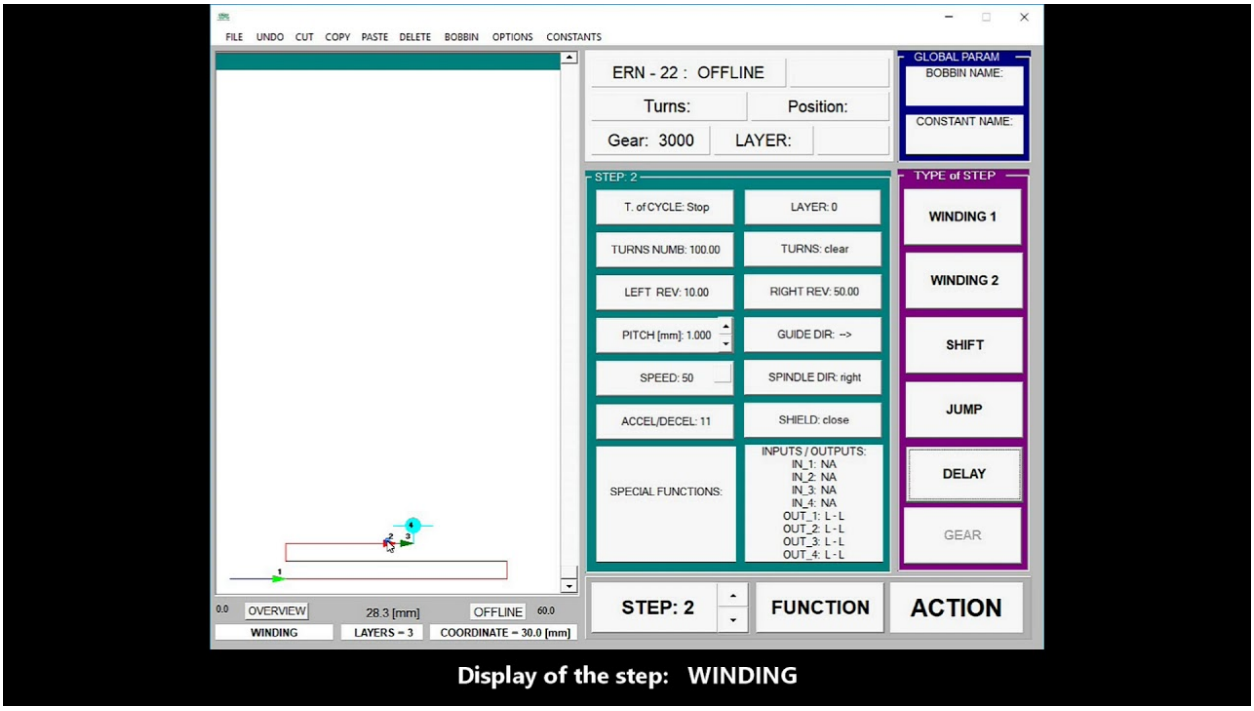
The program overwrites the existing winding program and the winder is initialized. Graphic automatically switches to the ONLINE state and we can rewind.

Programming

Types of winding steps and their graphical representation

We know five types of winding steps, of which we compose the winding program. Each type of winding step has its own button, while for the type of winding we have two buttons so that we can preset two sets of typical parameters.

VIDEO:



SHIFT

Guide moving to the defined position at the desired speed.

WINDING

Winding of required number of turns between two defined coordinates at the selected speed. Winding turn to turn with the pitch, which is usually based on the diameter of the wound wire.

Graphic displaying:

A thin red line indicates one winding layer, a thick red line indicates several winding layers. The total number of layers of the current winding step is listed in the LAYERS field below the design window.

A special type of winding is TAPING, in which the wire guide does not move. It is used, for example, to wind an insulating foil between individual windings.
Taping has a separate graphic displaying.

JUMP

From the current position of the guide, it moves the guide by a defined value to the right or left.

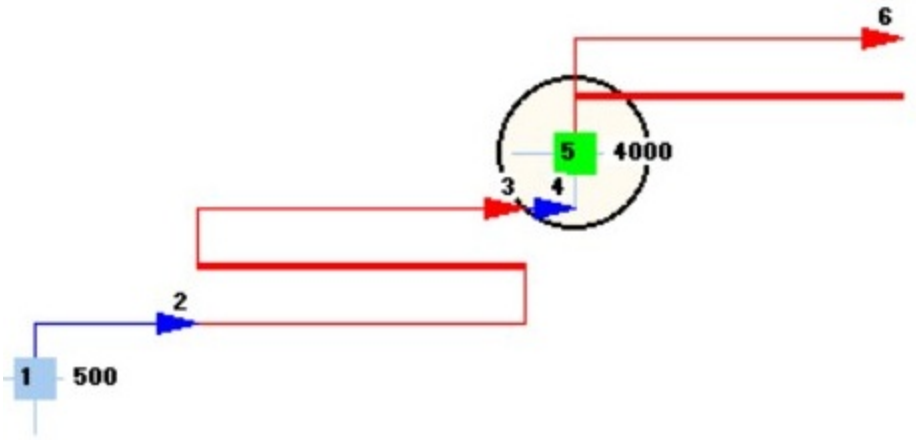
PAUSE

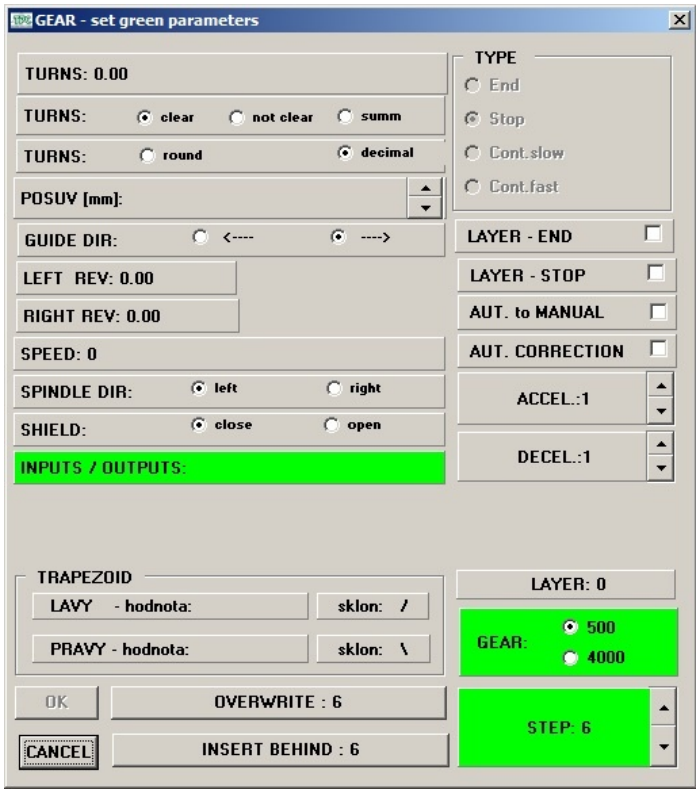
Inserts a defined time into the winding process. It is used in automated winding, when we control the winding process using inputs and outputs and we need some time to safely perform the necessary technological operations.

GEAR

Some of the models of the winding machines (example ERN 62), are equipped with automatic switch of the gears, which is controlled by winding program. Process of the gear switch alone is one step of programing.

To change the gear set is used GEAR – the type of step. Change of the gear is graphically showed as light blue square. Next to this icon is located number which means maximum turns of the rounds per minute of chosen gear.

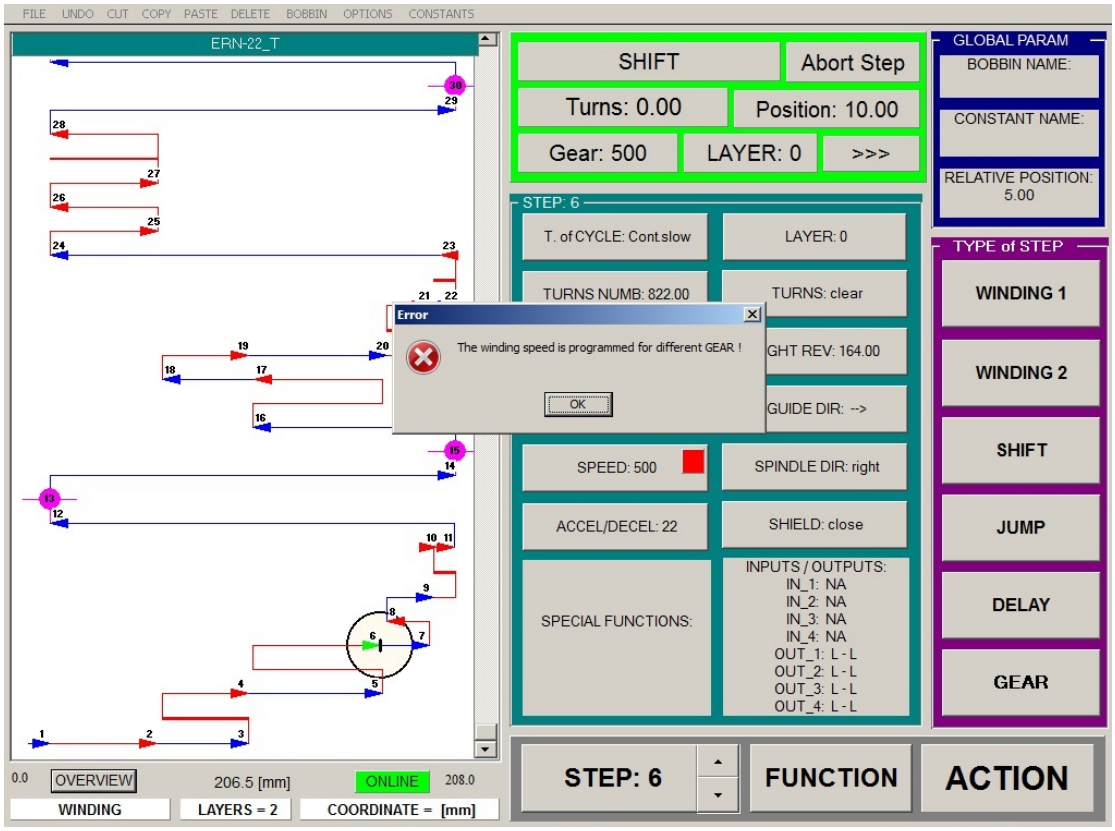




To be able to automatically switch the gears, this possibility must be allowed in switch gear settings, which are displayed on the screen right after winding machine is turned on. It is necessary to set GEAR FROM PROGRAM. After this option is activated and after the winding machine is turned on, it will change the gear to lower RPM and continue to manage the gear set by the winding program.

In case we have the winding program with switching gears, but we have had set fixed gear, the winding machine will display error message THE FIXED GEAR IS SET.

After the start of the winding step where programmed gear is not matching real set of gear on the machine we see error message and in the speed button is displayed red traffic light icon.
It is necessary to correct the speed in the step.

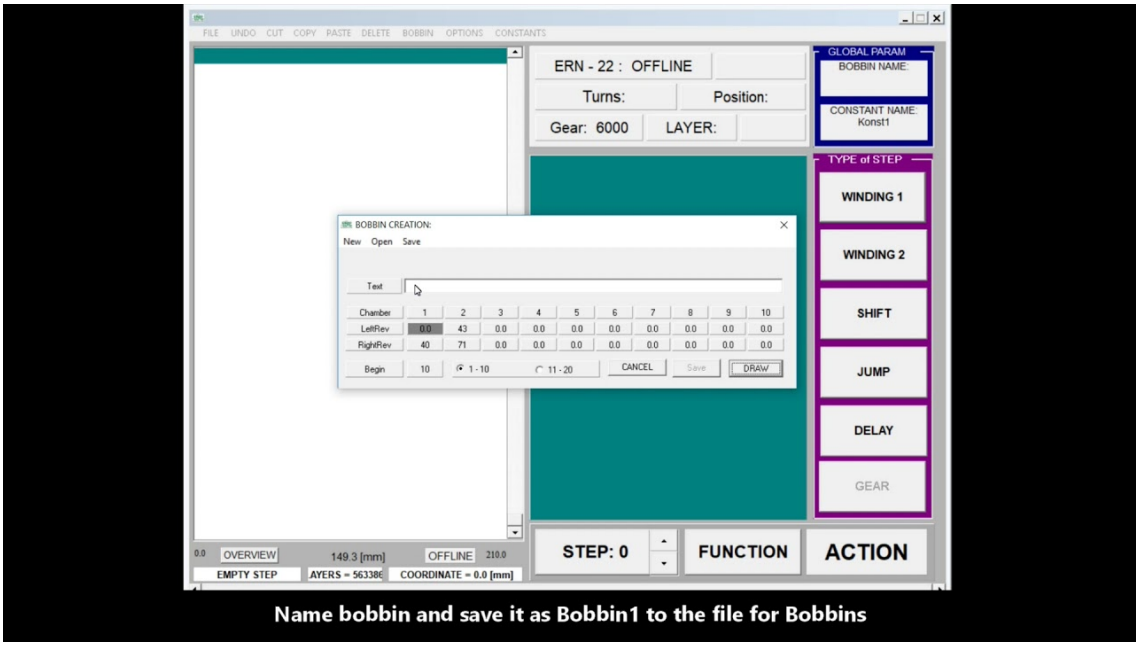


Note: If the winding program with the option of automatic switching of the gears is copied to model of winding machine without the option of automatic switching of the gears, then the winding step GEAR is ignored. Newer models of machines will show error message FIXED GEAR SET.

Bobbin creating

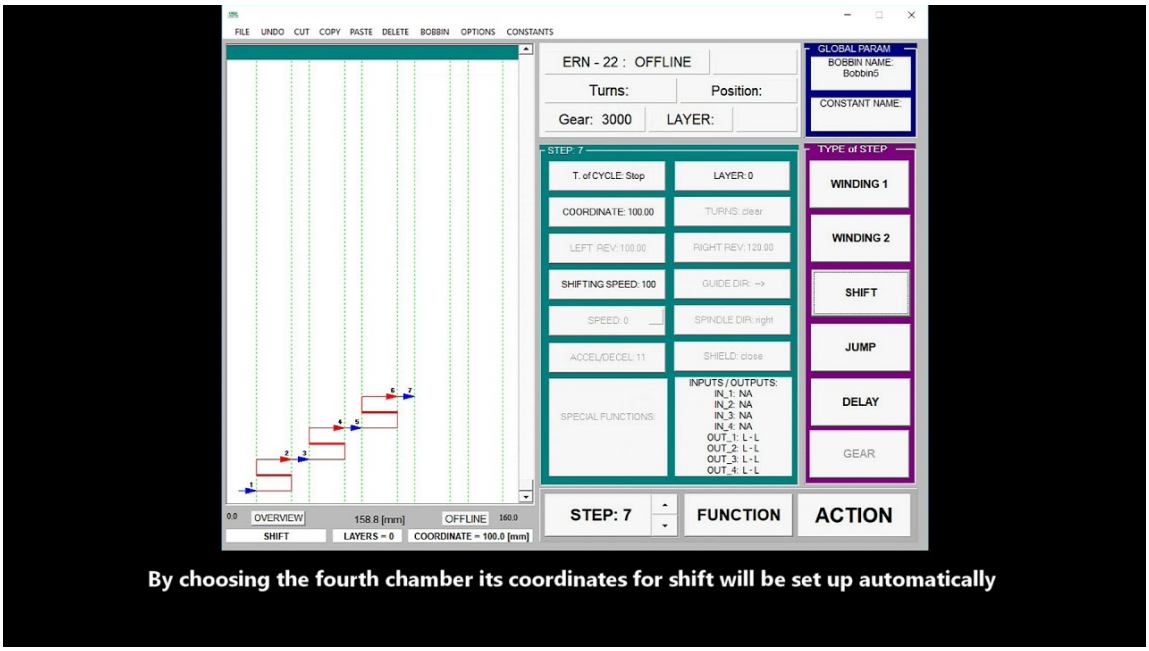
Bobbin creating with real coordinates is all the more important the more chambers the coil has and the more windings there are in the chambers. After bobbin creating, the coordinates of its chambers are automatically preset to the reversal points and we do not have to enter them laboriously, just with one click we select the current chamber. After bobbin creating, we will save it to a file. We can then load or edit it at any time in the future.

VIDEO:



Use of the bobbin in programming:

VIDEO:



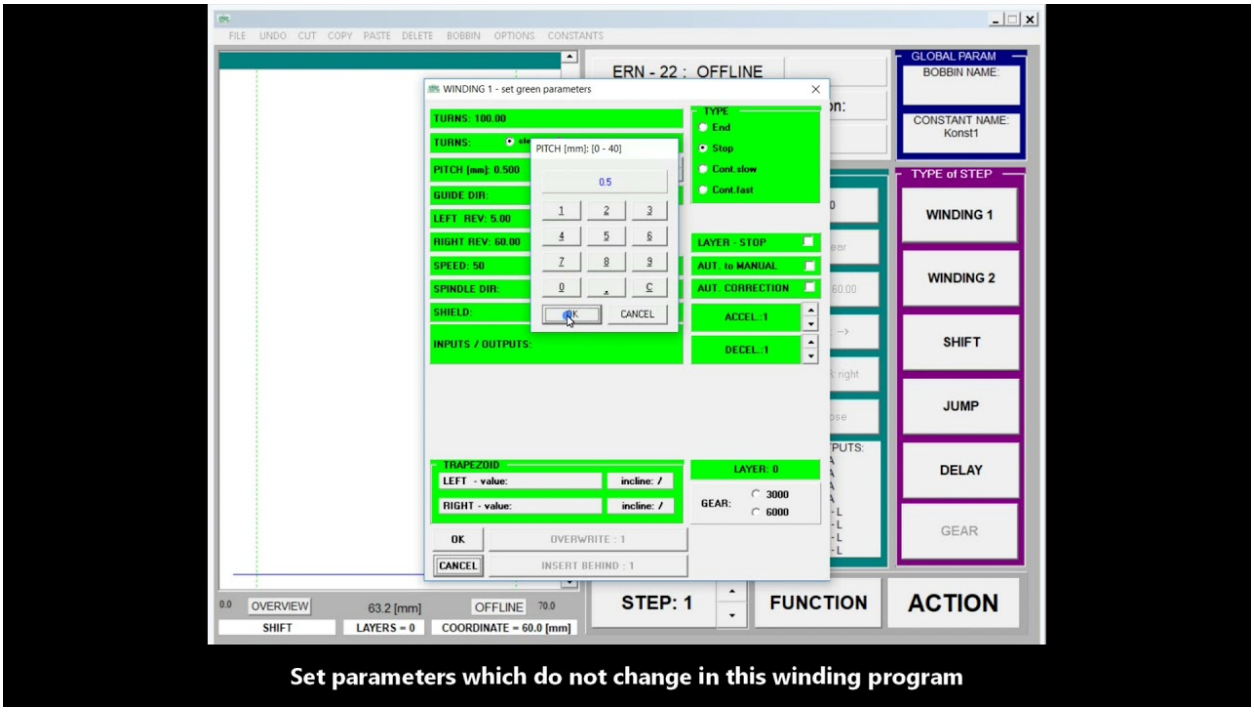
Constants - presetting parameters

Constants are preset parameters that the program offers us when we select a button with a step type (WINDING ... GEAR) or a button of some functions.
If we create a program that has many steps, usually some parameters are still the same (e.g. speed, direction of rotation, pitch, cycle type, shield ...).
We can preset these parameters in constants and we no longer have to enter them at every step, we program only those parameters that change.

For the type of winding step we have two buttons WINDING 1 and WINDING 2, so we can preset two different sets of parameters for winding.

The current setting of constants can be saved to a file (menu: CONSTANTS -> Save) or loaded from a file (menu: CONSTANTS -> Open)

VIDEO:



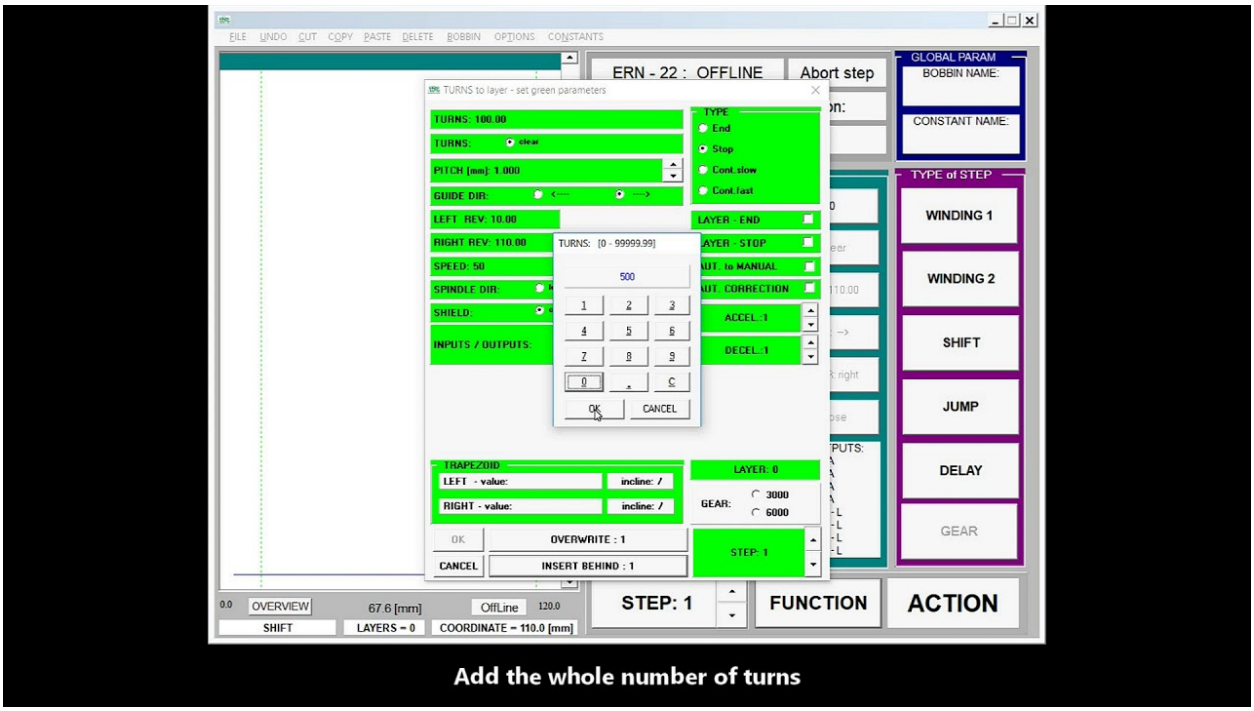
FUNCTIONS

After pressing the FUNCTIONS button, a window will appear with a selection of functions that make the creation of the winding program easier and faster.

TURNS to layers

The function calculates the specified number of turns into individual layers, and saves each layer in a separate step. When entering the function, it is important to set the correct direction of the guide by which the calculation of turns into layers is performed. The function can overwrite the current step or insert a new step.

VIDEO:

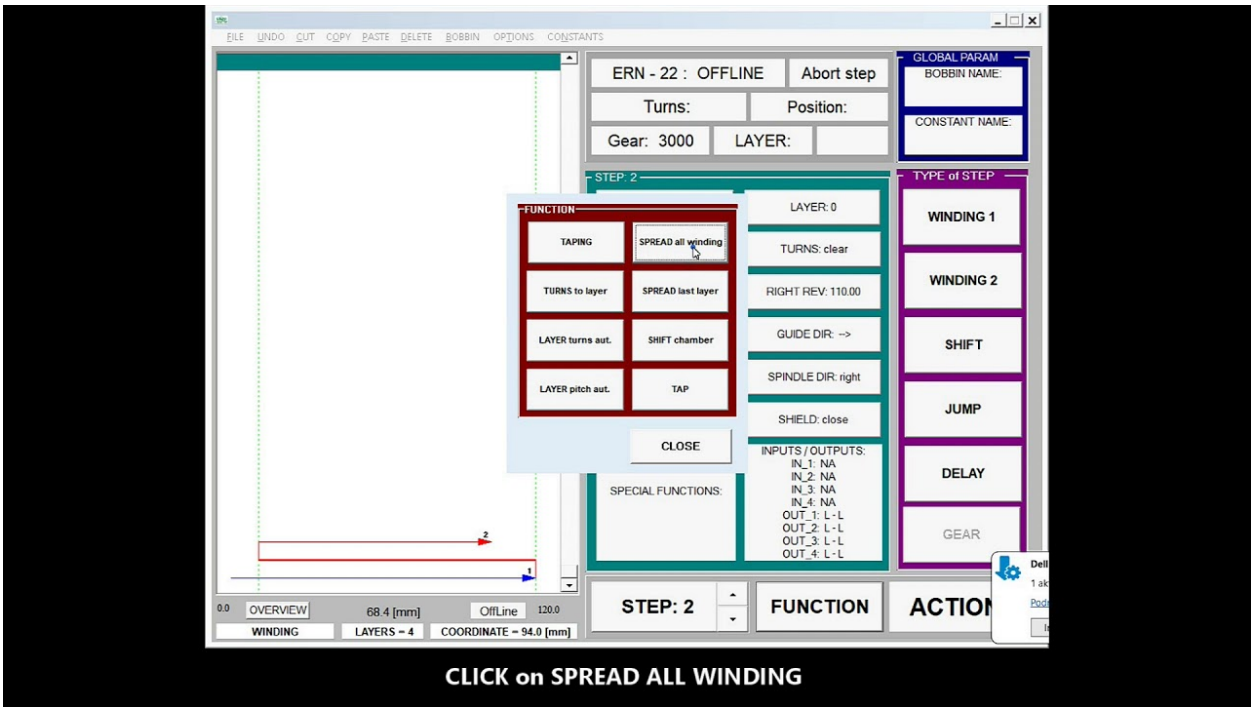


SPREAD all winding

The function for the existing step calculates a suitable pitch so that the entire winding expands and ends at one of the reversal points.

As a coordinate, we select the reversal point to which we want to perform turns expansion. The function adjusts the current step.

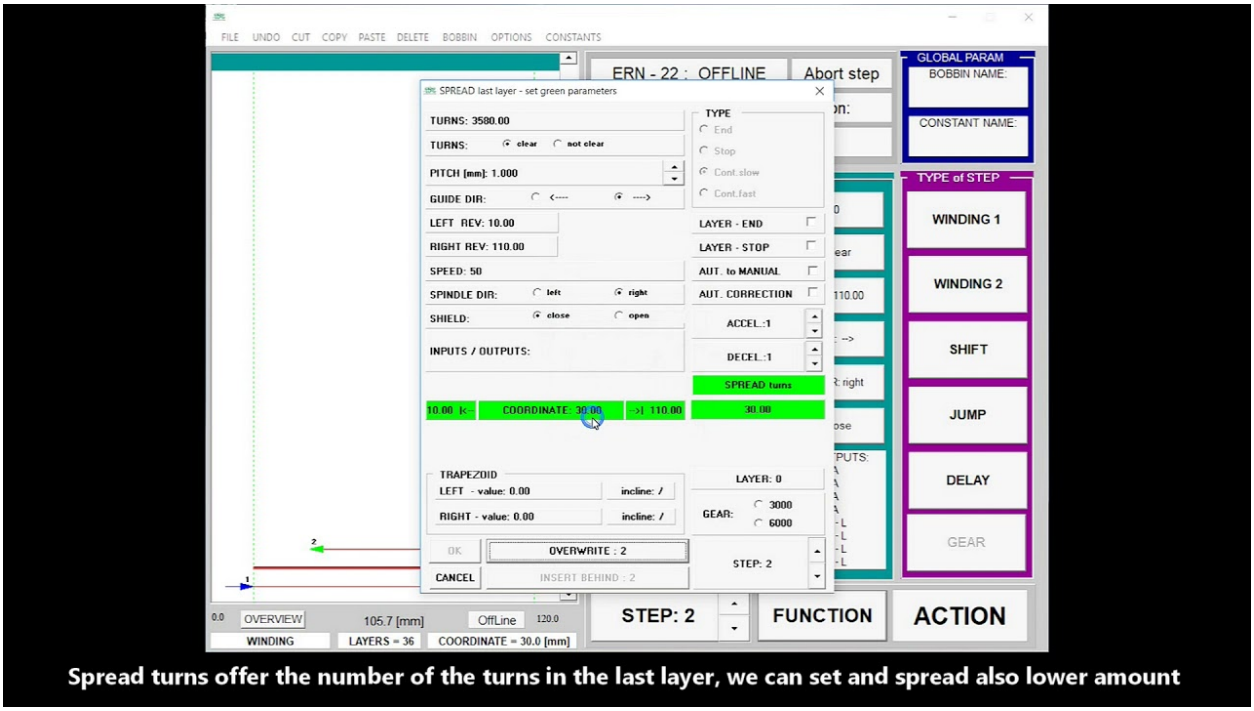
VIDEO:



SPREAD last layer

The function does not spread the entire winding, but only the specified number of turns in the last layer so that it expands and ends at one of the reversal points.
This expanded number of turns is automatically added as the next step. The function offers spread of the last layer, but we can also reduce this value and expand a smaller number of turns. As a coordinate, we select the reversal point to which we want to perform turns expansion. The function adjusts the current step and adds a new step.

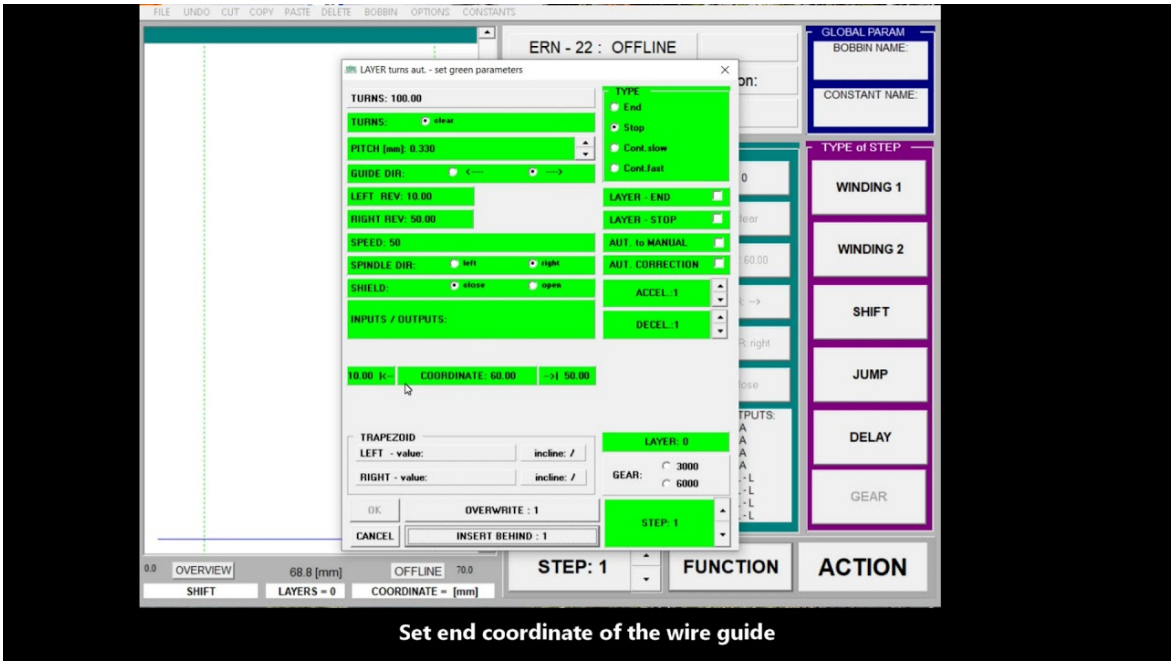
VIDEO:



LAYER turns aut.

At the entered pitch, the function calculates the required number of turns so that we reach one of the reversal points, which we determine by setting the direction of the guide. The function can overwrite the current step or insert a new step.

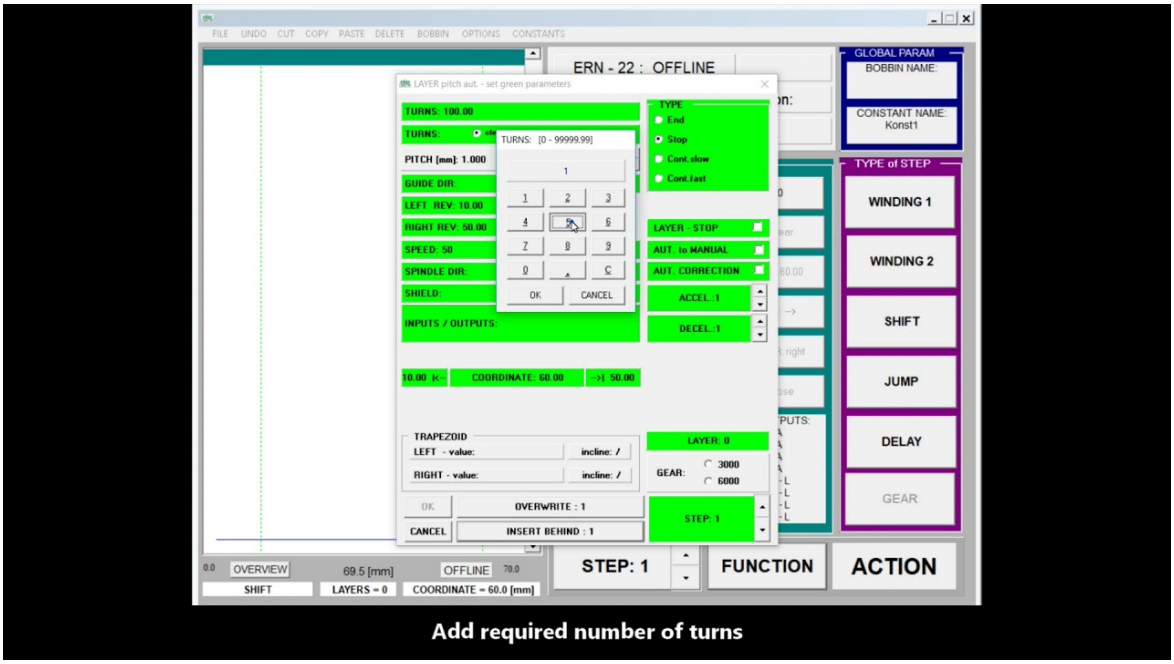
VIDEO:



Set end coordinate of the wire guide

LAYER pitch aut.

VIDEO:



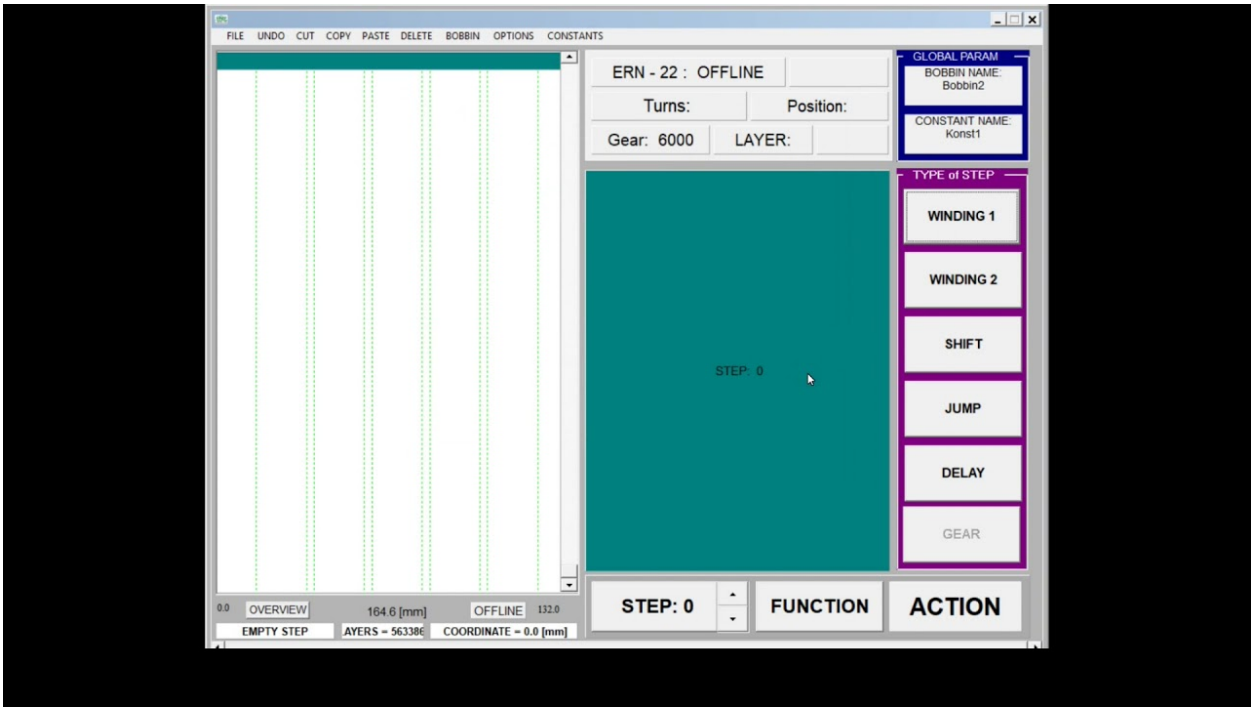
Add required number of turns

At the specified number of turns, the function calculates the required pitch so that we get to one of the reversal points, which we determine by setting the direction of the guide. The function can overwrite the current step or insert a new step.

SHIFT chamber

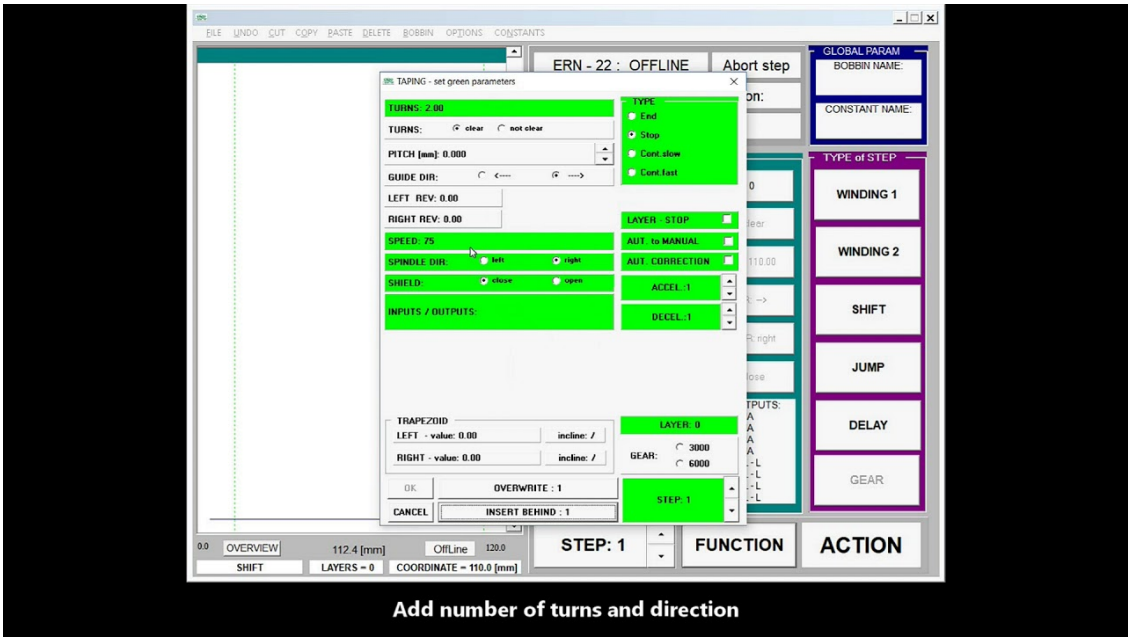
After entering the chamber number, the function will offer us the values of the reversal points, one of which we will set as the target point for moving the guide.
The function can overwrite the current step or insert a new step.

VIDEO:



TAPING

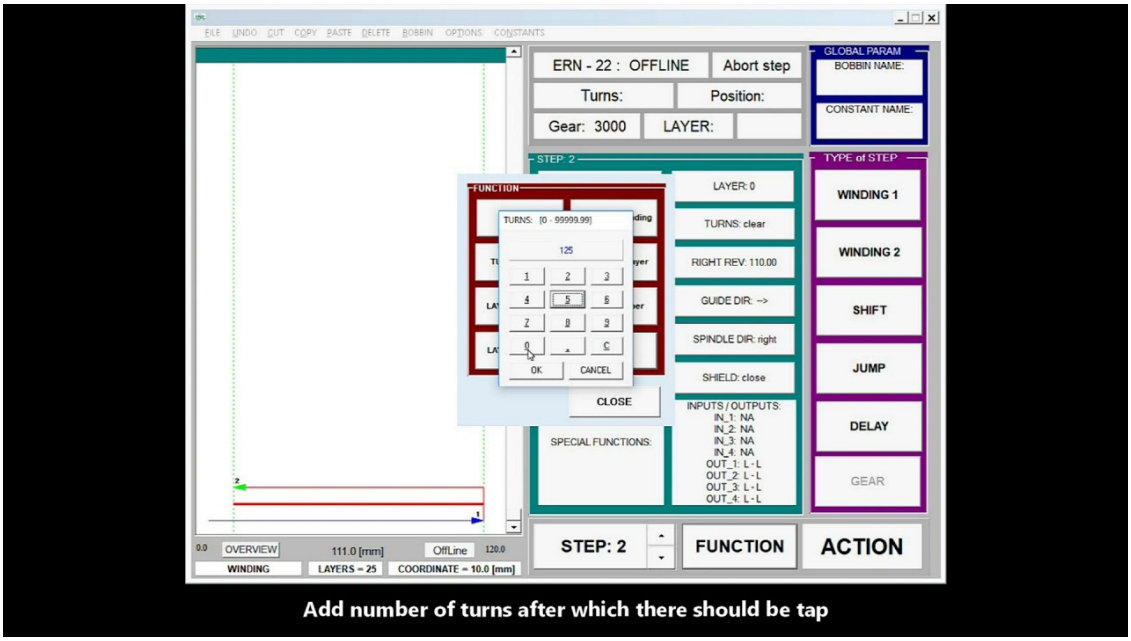
The function creates a special step for winding the isolation, which has zero guide movement. The guide is standing and it is therefore not necessary to define its direction or reversal points. The function can overwrite the current step or insert a new step.



Add number of turns and direction

TAP

The function is used to enter the number of turns after which we want to create a tap. The function starts from the current step and searches for a step with the required number of turns. It divides it into two steps to create the necessary tap.



Add number of turns after which there should be tap

PROGRAM ADJUSTMENTS

Coordinates offset

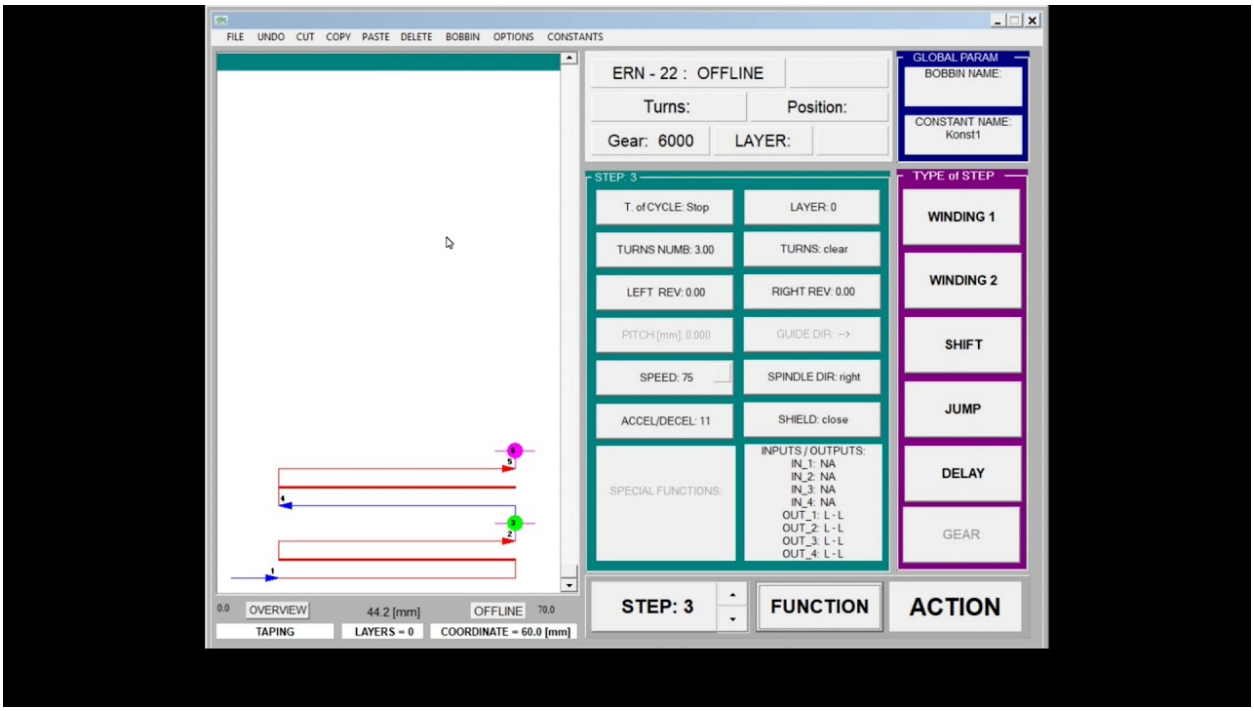
In case we need to move the whole winding program, select in the menu:
OPTIONS -> Shift. A window will open in which we enter the coordinate by how many mm we want to move the program and then select the direction of movement RIGHT or LEFT. The program automatically recalculates the coordinates of all steps and moves the entire winding program.

Marking of winding steps and adjustment of their parameters

When we click on a step marker in the design window, we set this step as current.
Its color changes to bright green (the color of the current step), its number is set and its parameters are listed, which we can adjust.

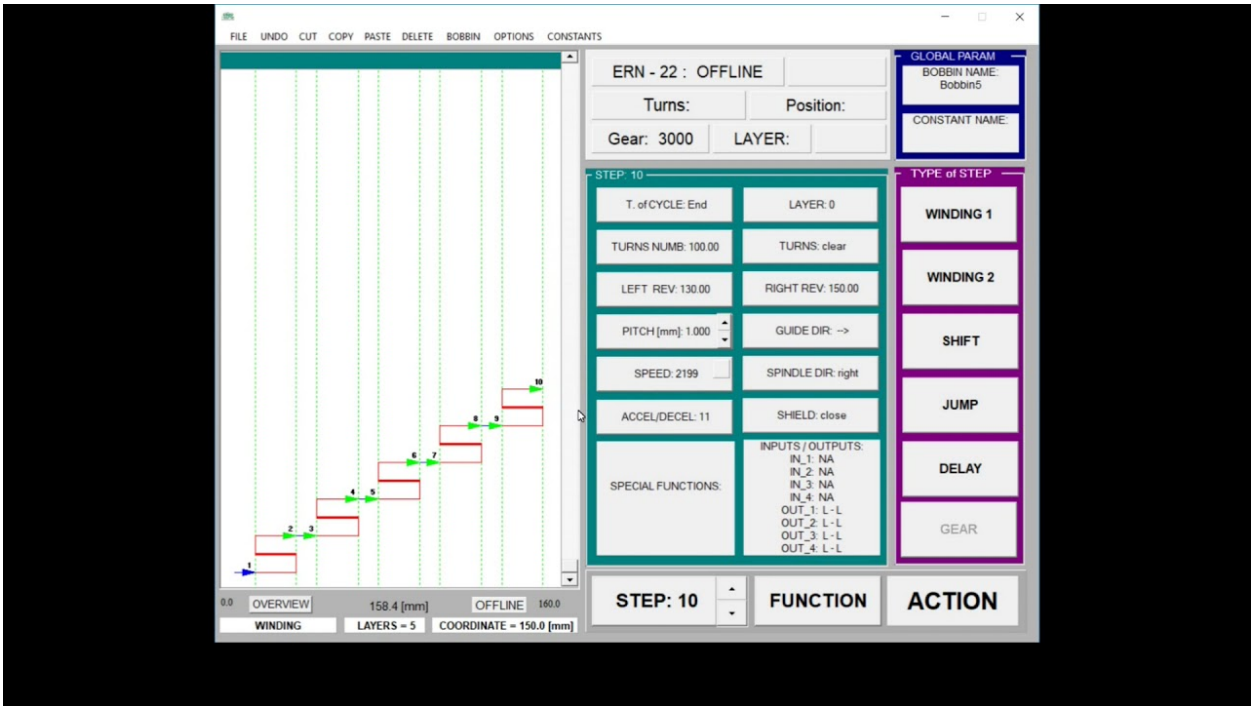
Using the menu we can the current step Cut, Copy, Paste, Delete.

VIDEO:



If we want to select not one step, but a group of steps, then at the initial step we press the left mouse button, which we hold down, and move the mouse to the final step, where we release the button.
We have marked a block of steps with a bright green color, with which we can do the same activities as with one step.
If we have a block of steps selected, the parameter change will be performed in all steps of the block. If the parameter being modified is specific to a given step type, it is modified within the block in all steps with the same step type. For example, the speed change is set in all steps of the WINDING type.

VIDEO:



Program check

After writing the program, we can check whether the program is logically correct and whether it has no formal errors. Start the scan as follows: Menu: CHECK.
We will see a form where the main parameters of the winding steps are listed in the rows and the ERRORS column is on the far right. If the program has errors, their columns are listed in this column (for example - Err 24). Explanations of error codes can be viewed via the ERRORS menu. We can print the form via the PRINT menu.

VIDEO: