

# JCNCScreen

## Intro

JCNCScreen is a frontend for linuxcnc (<http://linuxcnc.org/>). Linuxcnc consists of several processes that control a cnc-machine, i.e. a mill. Of cause, linuxcnc offers frontends too, but none of them suits my needs.

I'm quite outdated, so I need magnifiers to use a default frontend like axis. But in shop I don't like to wear glasses. But that was only one reason to start this exhausting adventure.

The most important reason so far was, that distance to go values beside tip location is not optional, but mandatory – at least for me.

So I started the journey and now I proudly present:



The blue numbers show the tip position and the red numbers are the distance to go for each axis. If relative positions will be changed to absolute values, than the blue numbers turn into green.

On the bottom line you'll find symbol-buttons, that turn application into different mode, or that execute certain actions. JCNCScreen was designed to be the only active application at the machine. So it uses the whole screen (1920x1200).

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The application checks the orientation of the screen and turns itself accordingly into portrait or landscape mode:

The screenshot displays the JCNCScreen application window titled "JCNCScreen - Steuerung für linuxCNC". The main area shows a list of CNC G-code commands, such as `M3 S10000`, `G0 X[1.75781*#<scale>] Y[0.5*#<scale>]`, and `G1 F100.0 Z[-#<depth>]`. Below the code, a table displays real-time coordinates and tool data.

Coordinate	Value	Unit
X	1,602	
Y	1,466	
Z	1,433	
A	-8,901	
W	-23,456	

Coordinate	Value	Unit
X	3,263	
Y	0,000	
Z	0,000	
A	-3,263	
W	0,000	

Parameter	Value	Unit
T6	DL: 30,000	
DR	3,000	
F	100	
FF	12.000	
S	10.000	

The interface also includes a "Datei" button at the top right, a "Meldungen" (Messages) section on the right, and a bottom toolbar with various control icons like home, jog, and power.

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The application can switch into fullscreen mode by commandline parameter (-full). Then the window decorations disappear and you cannot activate another window any more.

As you can't argue about taste, application is customizable, or themeable. For demonstration purpose I provided a darkmode theme.

You can activate the darkmode by commandline switch (-theme dark).



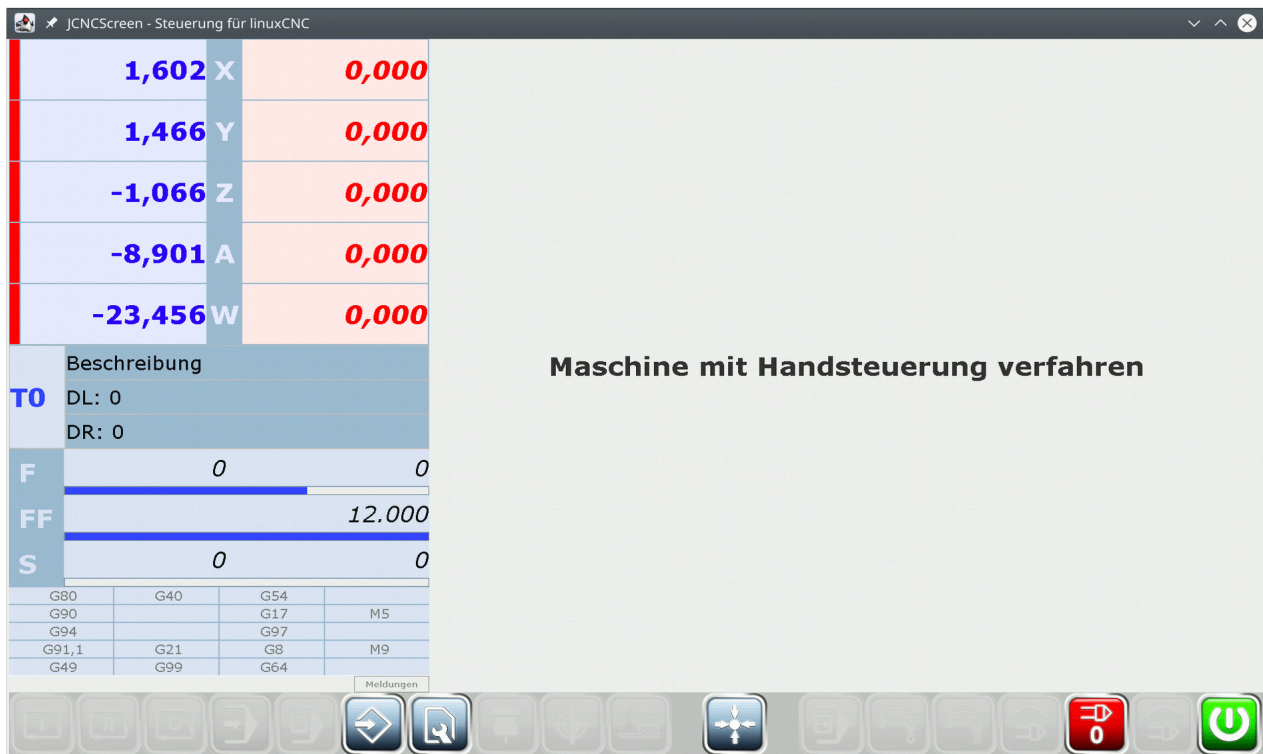
When you start the application from linuxcnc in simulation mode, alle symbol buttons at the bottom are disabled.

First you have to turn off the emergency stop (power button turns into yellow), and then you have to turn on the machine (power button turns into green).

Stil the most symbol buttons keep being disabled, cause the axis need to be homed first.

Where the button „A/R” blazes green, with unhomed axis that button will be the home-all-axis button.

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Its the symbole with the 4 arrows pointing toware the central dot. Control-leds in front of the position fields shine red. When an axis is homed, the led turns into green.





## Application-modes

	<b>Auto</b>	When this button shines green, you can execute gcode-commands from file
	<b>MDI</b>	Manual data input – in this mode, you can enter single commands manually and execute them.
	<b>Edit</b>	<p>Edit gcode-command files. The editing is separated from the file execution (auto mode), so different files can be loaded at each gcode-listener.</p> <p>The root of the gcode-files will be taken from ini-file of linuxcnc. That directory is the root for the filemanager. All other files from the box are invisible to JCNCSreen.</p>






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	<b>Settings</b>	Here you can change fonts and/or colors and you'll find the tool-manager here. This tool-manager will manage all your tools – no matter, whether that tool is known to linuxcnc or not. The tool-manager ist database based, so you don't have to care for storing and saving files
	<b>Tools</b>	The „little“ tool-manager, which is the tooltable of linuxcnc.
	<b>Fixtures</b>	Manage offsets and coordinate systems
	<b>Touch</b>	Helps on measuring workpiece fixtures (with electronic sensing device) <b>This page is not ready yet</b>

## Aktions:




	Start	Active in auto and manual mode and serves to start or continue command execution.
	Pause	Is active as soon as commands are executed. You can interrupt the execution, but linuxcnc backend stays active in between execution of a command. So you can continue by pressing start-button.
	Stop	Is active as soon as commands are executed. Opposed to „pause“-button „stop“ will abort execution of commands without the chance to continue.
	Home (alle Achsen)	Home all axis. Button is only active with unreferenced axis. <b>(machine has to be turned on)</b>

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	Flood cooling	Is active at auto- and manual mode
	Mist cooling	Is active at auto- and manual mode
	Spindle CW	Turn spindle on in clockwise direction
	Spindle Stop	Stop turning spindle
	Spindle CCW	Turn spindle on in counter clockwise direction

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## Switches:

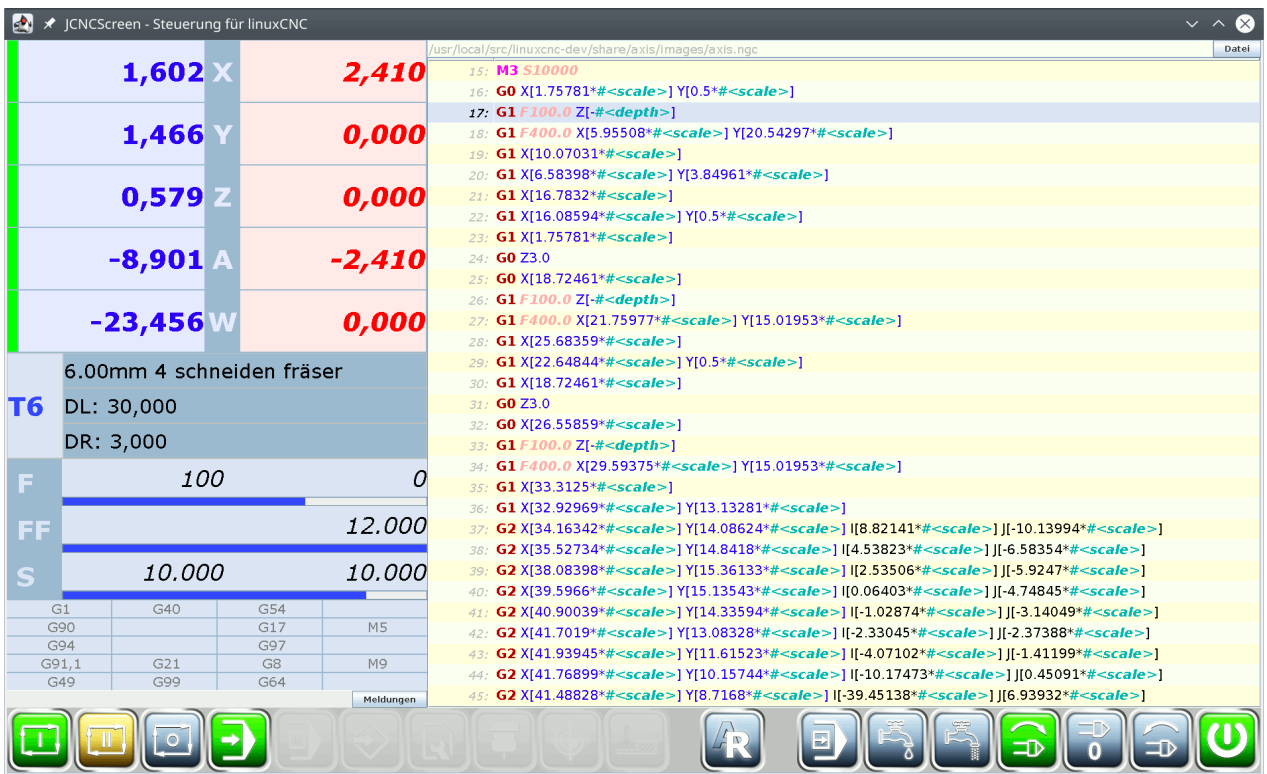
	Single-Step	Additional switch for auto-mode. If you're unsure about your gcode file, you can turn single-step on. Linuxcnc will then execute only one motion command and wait for you to press „start“-button again.
	Relative Position	The axis position shows the tooltip position relative to the active workpiece origin (G54, G55, whatever has been commanded)
	Absolute Position	The axis position shows the tooltip position in absolute / machine offsets (as if G53 would have been activated)



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## A closer look:

### The auto-mode:



Before you can activate this mode, all axis need to be homed. On the upper right you can start the file-manager to load a gcode-file.

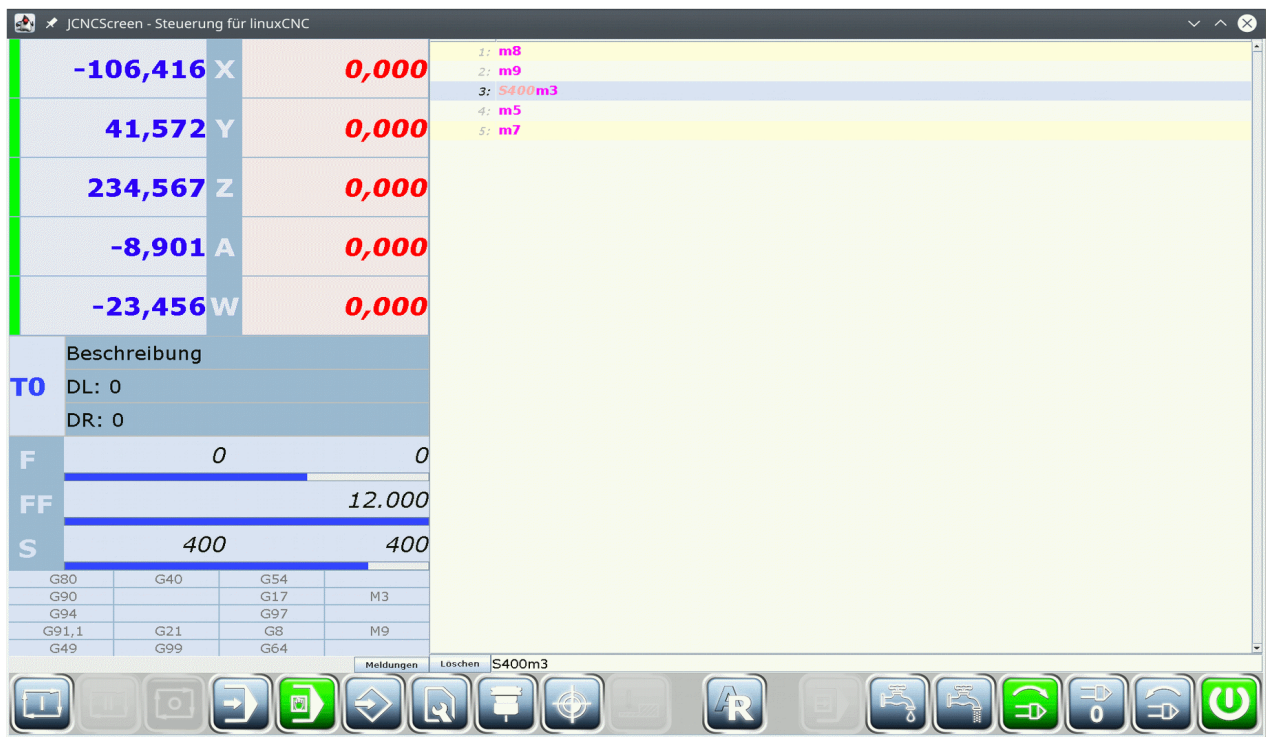
By pressing „Start“ the execution of the commands from the loaded file begins. File in the list advances automaticall, so that the current command is always highlighted and visible.

With „single-step“ activated only one motion command will be executed. Then linuxcnc backend waits for the next press of the „start“ button.



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## Manual command input (MDI)



In the edit-line (to the right of the „delete“ button) you can enter single commands, or commands that can work together in one line.

Pressing „Start“ will execute that commands and save them into the list. The command history will be saved at shutting down the application, so you can use them again on next startup.

Moving the cursor in the list of command will copy the highlighted command into the edit-line. So you can execute it again.

If the list contains too many commands, you can remove entries from the list by pressing „delete“-button.

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## Edit gcode-file:



Usually gcode-files will be created by using a CAM or editor. But – sometimes small changes are required just in time ...

For not having to swith to another application, a small editor is integrated.

At the top right a filemanager can be started to load and/or create a file. As already mentioned, the filemanager is restricted to the directory from the ini-file of linuxcnc.

To organize Gcode files, you can create directories from the filemanager. Start the filemanager and when the tree is active (cursor motion moves highlighted entry in tree, not in list) you can press INSERT-key and a dialog pops up, where you can enter the new name.

TAB changes between tree and list. Even if the filelist is empty (on new created directories), pressing INSERT will create a new file. As with directories a dialog pops up, where you can enter the new name.

Any file from list can be loaded into editor by pressing ENTER or with double-click of a mouse.

The editor is a line-editor, which means, moving the cursor copies the highlighted line into the edit-line, where it can be changed.

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Hitting „replace“ replaces the highlighted line with the content from edit line.  
Hitting „insert“ adds the edit-line to the file.

To ease editing of bigger files, you can search for text. Enter the search pattern into the edit line and press „search“.

When you change a file, its filename turns into a brighter color (above the list).  
Beside the filemanager button there's a button to save a changed file. After loading a file, this button is disabled. It will be enabled on the first change.

## Tooltable (of linuxcnc):

The screenshot displays the JCNCScreen interface for linuxCNC. The main window is titled "JCNCScreen - Steuerung für linuxCNC". On the left, there are coordinate readouts for X, Y, Z, A, and W, each with a value and a unit (e.g., -106,416 X, 0,000). Below these are fields for tool description (TO), feed rate (F), feed per revolution (FF), and spindle speed (S). The tool table itself is a list of tools with columns for Wkz. (Workpiece), Platz (Position), Länge (Length), Durchme... (Diameter), and Beschreibung (Description). The table is sorted by length, with the longest tool (12,00mm 4 schneiden fräser) highlighted in green. Below the tool table, there are fields for tool length (L: 50,000) and tool diameter (D: 12,000), and a "save" button. At the bottom, there is a row of icons for various functions like file management, tool selection, and machine control.

Wkz.	Platz	Länge	Durchme...	Beschreibung
3	2	0	33.00mm	2 flute endmill
30	21	10,16	12 12,0mm	reibahle 12h7
2	1	20	22.00mm	4 schneiden fräser
6	3	30	66.00mm	4 schneiden fräser
39	10	35	20,590°	kegelsenker
42	40	35	2020,9mm	querlochsener
21	5	40	88,00mm	4 schneiden fräser
15	30	40	1212,0mm	nc-anbohrer 90°
23	7	50	1010,00mm	4 schneiden fräser
24	8	50	1212,00mm	4 schneiden fräser
36	35	50	8m8	gewindebohrer
11	22	55	1,51,5mm	spiralbohrer extra lang
12	15	61	66,0mm	reibahle 6h7
38	37	65	13,3g1/4"	gewindebohrer
37	36	75	12m12	gewindebohrer
28	19	79	1010,0mm	reibahle 10h7
31	25	105	10,210,2mm	spiralbohrer
32	26	115	11,511,5mm	spiralbohrer
7	9	123	4,56845 deg	v cutter
20	23	153	5,25,2mm	spiralbohrer extra lang

Displays a list of tools, known to linuxcnc. (tool-table file is taken from ini-file of linuxcnc). You can sort the tooltable by clicking at the column-header.

If you need to change length or diameter of a tool, select the tool from list.  
That will copy tool-properties to the little tool-editor below the list. Length is „L:“ and „D:“ stands for diameter.

Pressing „Save“ sends the new properties to backend of linuxcnc.

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## **Tool-Manager:**

If you have a spindle with toolchanger collets, you might want to manage your tools from outside the machine too. That's the purpose of tool-manager.

Any tool mounted in a collet keeps its properties even after unmounting the tool from spindle.

Tool-manager works the same way as the file-manager:

From the tree pressing INSERT will create a new tool category. TAB toggles between tree and list. Pressing INSERT from the list, creates a new tool-entry.

Below the tool list you'll find the tool-editor.

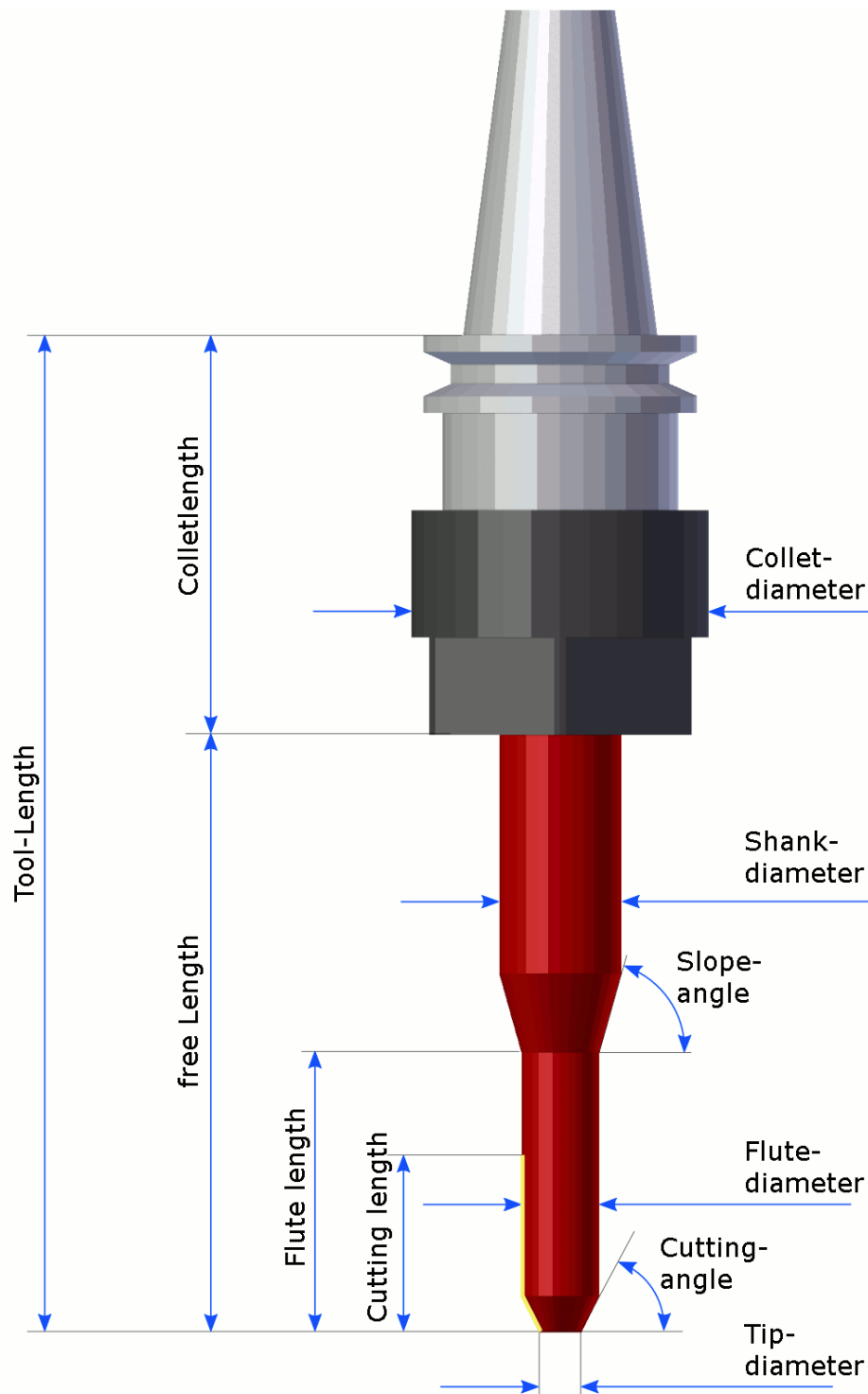
You start the tool editing by pressing ENTER on an existing tool, or by INSERT from the tool list. In tool edit mode, TAB is limited to the entryfields from tool-editor. You need to explicitly end the tool editing.

F10 saves your changes and leaves tool editing, F8 ends tool editing without saving your changes.

The tool-manager uses a database for storage, so you don't have to care about filenames and/or file location.

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See the known tool properties supported by the file-manager:



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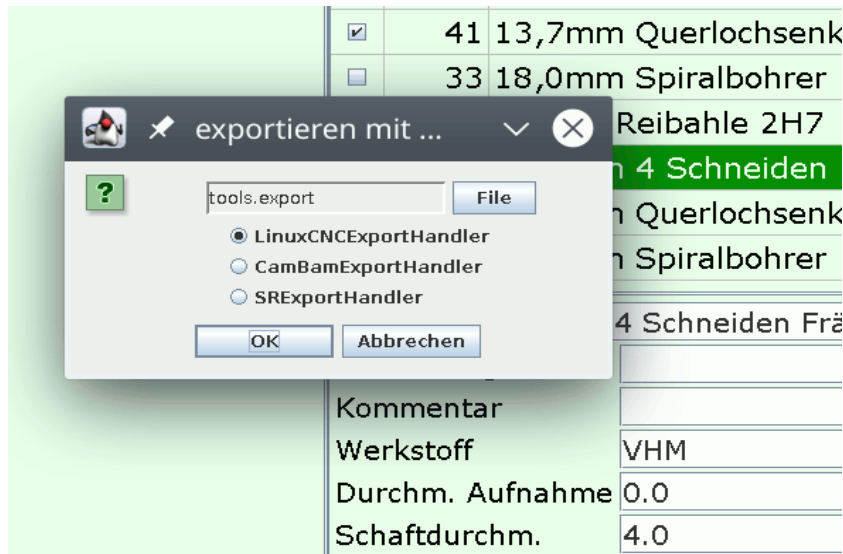
The tool-manager does not have a direct connecton to linuxcnc. To be able to share toollists between multiple applications, JCNCScreen uses plugins for the export of tool-data.

One plugin exports the tool-data in the format for linuxcnc, so the file can be used by the linuxcnc backend as tooltable. Another plugin exports the tooldata to CamBam and another plugin creates an XML-file with all supported properties. The latter can be used as a backup of the database too.

Of cause it is not very useful to export all tools at once. Therefor each tool-entry has a checkbox, where you can select a tool. When you move the cursor through tool-list, pressing Spacebar toggles tools selection state (select or deselect it).

When ready with selecting desired tools, press F12 to start the export.

Application looks at the plugin-directory for the installed plugins and offers a dialog to choose the export-plugin. Additionally the file name and location can be choosen.



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## Fixtures:

Axis	Value	Unit
X	-106,416	mm
Y	41,572	mm
Z	234,567	mm
A	-8,901	mm
W	-23,456	mm

G-code	X	Y	Z	A	W
Offset	0,000	0,000	0,000	0,000	0,000
G54	123,456	78,901	-234,567	8,901	23,456
G55	0,000	0,000	0,000	0,000	0,000
G56	0,000	0,000	0,000	0,000	0,000
G57	0,000	0,000	0,000	0,000	0,000
G58	0,000	0,000	0,000	0,000	0,000
G59	0,000	0,000	0,000	0,000	0,000
G59.1	0,000	0,000	0,000	0,000	0,000
G59.2	0,000	0,000	0,000	0,000	0,000

Parameter	Value	Unit
DL	0	mm
DR	0	mm
F	0	mm/min
FF	12.000	mm/min
S	400	rpm

G-code	Value	Unit
G80		
G90		
G94		
G91.1		
G49		
G40		
G54		
G17		
G97		
G8		
G64		
M3		
M9		

linuxcnc supports several coordinate system, or workpiece origins. I.e. you could measure origin of several workpieces and put each into different coordinate system.

G53 means that the machine position should be used (no active workpieces origin). G54 is the first workpiece origin, G55 the second, ...

Beside the workpiece origin a common offset can be entered. This will be useful to get rid of differences between measured origin and real milled path.

Offset-values are added to all workpiece origins at the same time.

Each workpiece origin can be transmitted separately to linuxcnc backend.

## Errorlog:

As errors are human, it would be nice to know, what was the situation or command sequence that led to the error?

For that purpose every action gets recorded by JCNCScreen, no matter whether its a user message, an error message or a user command.



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JCNCScreen - Steuerung für linuxCNC				Zeitpunkt	Typ	Meldung
-106,416 X		0,000		13.04.20, 07:48	CommandLog	Einzelschritt wird ausgeführt
				13.04.20, 07:48	OperatorDisplay	optional stop, i.e. for cleaning the workpiece, or other thinks
41,572 Y		0,000		13.04.20, 07:48	CommandLog	Einzelschritt wird ausgeführt
				13.04.20, 07:48	CommandLog	Einzelschritt wird ausgeführt
234,567 Z		0,000		13.04.20, 07:48	CommandLog	Einzelschritt wird ausgeführt
				13.04.20, 07:48	CommandLog	Einzelschritt wird ausgeführt
-8,901 A		0,000		13.04.20, 07:47	CommandLog	Einzelschritt wird ausgeführt
				13.04.20, 07:47	CommandLog	Einzelschritt wird ausgeführt
				13.04.20, 07:47	CommandLog	Einzelschritt wird ausgeführt
-23,456 W		0,000		13.04.20, 07:46	CommandLog	Einzelschritt wird ausgeführt
				13.04.20, 07:46	CommandLog	es wird auf automatische Verarbeitung umgeschaltet
				13.04.20, 07:46	OperatorError	EMC_TASK_PLAN_SYNCH kann im automatischen Modus nicht ausgeführt werden,...
				13.04.20, 07:46	CommandLog	es wird auf automatische Verarbeitung umgeschaltet
				13.04.20, 07:44	OperatorError	EMC_TASK_PLAN_SYNCH kann im automatischen Modus nicht ausgeführt werden,...
				13.04.20, 07:44	CommandLog	es wird auf automatische Verarbeitung umgeschaltet
				13.04.20, 07:44	OperatorError	EMC_TASK_PLAN_SYNCH kann im automatischen Modus nicht ausgeführt werden,...
				13.04.20, 07:42	CommandLog	es wird auf automatische Verarbeitung umgeschaltet
				13.04.20, 07:41	CommandLog	es wird auf Handbetrieb umgeschaltet
				13.04.20, 07:41	CommandLog	es wird auf automatische Verarbeitung umgeschaltet
				13.04.20, 07:34	CommandLog	es wird auf Handbetrieb umgeschaltet
				13.04.20, 07:34	CommandLog	es wird auf automatische Verarbeitung umgeschaltet
				13.04.20, 07:34	CommandLog	es wird auf Handbetrieb umgeschaltet
				13.04.20, 07:34	CommandLog	es wird auf automatische Verarbeitung umgeschaltet
				13.04.20, 07:23	CommandLog	es wird auf Handbetrieb umgeschaltet
				13.04.20, 07:19	CommandLog	es wird auf Handbetrieb umgeschaltet
				13.04.20, 07:19	CommandLog	es wird auf automatische Verarbeitung umgeschaltet
				13.04.20, 07:19	CommandLog	es wird auf Handbetrieb umgeschaltet
				13.04.20, 07:19	CommandLog	es wird auf automatische Verarbeitung umgeschaltet
				13.04.20, 07:19	CommandLog	es wird auf Handbetrieb umgeschaltet
				13.04.20, 07:19	CommandLog	es wird auf automatische Verarbeitung umgeschaltet
				13.04.20, 07:19	CommandLog	es wird auf Handbetrieb umgeschaltet
				13.04.20, 07:19	CommandLog	eine neue NC-Datei (/usr/local/src/linuxcnc-dev/nc_files/gmoccapy_2_tools_with_...

To display the messagelog, all application-actions will be disabled. First you have to close messagelog.

Messagelog will be saved at application shutdown, so you have the messages in the list on next startup.