Cutting table Brandeis





User manual

Especially for those, who do not remember (including author)



Application

User aplication, as seen in the picture, consists of three main windows:

Machine window, where most important information and user tools are positioned,

Job windows, where open jobs can be seen in different modes,

Camera window, for operations with registration camera takes place and information are displayed.

Optionally user can also display two other useful windows, but these should not be necessary for operator:

Motor view with information about avaliable controllers,

Message window with different types of messages

Connection to the machine

User connects to the machine via TCP IP protocol.

Switch on the machine with main switch.

Clicking on icon with plotter picture opens ports for communication to the machine and starts the process of hardware setup.

Machine has to be switched on before clicking icon.



Status line

where a second s	and the second s		and a second		the second
conected	initialized	servo ON	tools OK	Air 0.54 Bar	Vac 0 mBar

In the bottom of the aplication there is main information about machine status end errors:

Left is configuration of the machine. After connecting to the machine complete harware must be found specified in configuration file. Name of configuration file is displayed. If unknown is displayed, it means one or more controllers was not found on the bus and this problem must be solved before continuation.

On the right, lights are displayed:

connected - green means machine was connected to the aplication

initialized - green means motors found its zero position

servo ON - blue means machine servos are powered and ready for operation

tool OK - green means all tools necessary for active job are present in the machine

Air - if green, higher than minimum pressure is present, minimum pressure is specified in machine setup

Vacuum - if green, higher than minimum vacuum is measured, minimun is specified in machine setup

Importing file



Import file is the most common way of getting cuttting data to the machine software. User can select Import type in Import Configuration. Pressing the Import button opens a file dialog where user can select a file.

Import formats available now are DXF and CFF2. In CFF2 format we can use import engine for Flexo plates, which converts the data from Kodak Tiff Asembler Plus to cutting order needed for succesful cutting of most plate types and arrangements.

Every import format has a setup in Import Configuration Page in Machine setup. Read the Import setup chapter later in this manual for details.

Import of file creates a new job and displays the job window in the apple cation window. In machine setup, user can select, if previous job should by closed when new job is opened.	Options Regiter jobs Bar

File window

If user opened a file or imported a file, a new window opens in the application. If multiple windows are opened, user can select current file by clicking into the window. Multiple files can be too complex, so user can select a single file mode as discribed in previous chapter.

Three view modes of job file are avaliable. When file is open, preview mode is displayed. In Preview we can see overview of shape, complexity and line colors. By pressing right mouse button we can get menu. In the menu, we can select two other modes. Properties is a tree of job properties. We can find import settings, size of the job, offset, number of lines, matrix information, cut mark information and more in the future.





Code mode is a text of code machine uses to run in order to create the job. By clicking on the line of code, corresponding line is displayed yellow in Main machine window. User can also edit and change code. Be careful, be sure to know what you are doing

Safety



!!! Machine uses knifes that are extremely sharp and can cause a serious injury. **!!!**

!!! Machine has moving parts that can start movement without notice. **!!!**

!!! If multiple people work on the machine, operator is responsible for all colleagues. **!!!**

In case of emergency: Press **stop button** or **break the light curtain**

Before operating the machine, read carefully safety instructions:

Before starting the machine, locate th**emergency button** main **switch** and **safety curtain**. Observe position of **knife** blades, its length and shape. Check all limit positions of the carriage and positions of knife at these positions.

Designers of the machine did their best to design machine, that is as safe as possible and still practical for operation. Safety devices on the machine are designed not to obstruct the view on the tool or other parts during operation. Covers are minimized for lowest space requirements. Do not run machine with any cover removed or any of safety device unoperational. All covers and safety devices are really necessary for your safety.

According to material height and type, safety hazards can change dramatically. When cutting material ten or more milimeters thick, **there is no way to position safety curtain for hand safety.**

Do not put hads or other parts of body to the cutting area. Stop the machine in case of any problem or use safe tools, preparations, pieces of material to hold small pieces on the table during machine operation.

Try to keep idiots as far from the machine as possible. Serious hazards of nervousness increase probability of injury, mistakes and other problems moreso.

Operator panel



Operator panel is designed to be positioned on the machine or near the machine depending on customer preference and type of work. Be careful on the cable to be positioned safe.

Most of basic operation can be handled from the panel. During production of multiple products, user can do all the operations from this panel. For file operations, adjustments of machine settings and tool settings and other sophisticated function, machine application is necessary.



Shift and Num functions are changing function of most of the buttons. Must be held same way as shift on compter. Shift functions are marked green on the top of the button. Num is used for entering numeric values. Setting of IP adress is entered by pressing Shift and Num together with M4 button



Vacuum ON / OFF switch activates Pump and displays status of the pump with LED



Tool UP / DOWN is used during tool setup for proper height setting



Play button starts the job process. Pressing the button most likely starts movement of the machine traverse and head. Double check that all people are in safe distance and no obstacles are on the machine and in the neigbourhood.



Stop button is used for non emergency break of the process. When play is pressed, job should continue from the point where it stopped. Stop is not immediate. Tool is moved to the safe level and default tool (laser) is selected. use emergency button in case of Emergency problem. With shift, this button rewinds the job to start from begining.



Sets start point of the job. LED lids for second to display system accepted operators comand. With shift this sets Z axis reference. Do not use this function exept for milling.



Servo voltage ON / OFF. Switch servo off if you plan not to use it for a while. With shift this sends machine to reference.



Arrows moves tools in X and Y axis. When Num (slow) is pressed lower speed is selected. With Num pressed, user can select axis (X,Y,Z) and use a jog button. LED will display selected axis. If Z is selected X arrows moves also Z axis

Referencing

After connection to the machine that was previously switched OFF, user has to find initial positions of machine movement by referencing the machine.

For machine reference start, press Shift and servo button on operator panel.



Macro file for referencing is processed. Machine should find Z axis reference first and after defining safe Z position also other axes and tools are inicialized. When inicialization is finished a default tool is selected and machine moves to starting point.

If motor window is opened user can see these messages in Motion cotroller window



Tools are in safe height (yellow)

Material file

Material setup line	dialog tool	along [mm+%]	across [mm+%]	spd mm/s	acc mm/ss	R <mark>PM</mark> r/min		×
1 -	/ Flexo_tool 💌	100%	100%	70	200		more	
2 🗸	Flexo_tool	100%	100%	20	200		more	
3 -	X > none < 💌	0.00	0.00		0		more	
4 -	X > none < 💌	0.00	0.00	Tool Extras				×
5 🔹	X > none < 💌	0.00	0.00]				32.X 1
6 -	X > none < 💌	0.00	0.00]				
7 -	X > none < 💌	0.00	0.00]	0	7	-	
8 -	X > none < 💌	0.00	0.00		nt up angle	1'		
9 -	X > none < 💌	0.00	0.00					
10 -	X > none < 💌	0.00	0.00					
							ок	Cancel
	Camera si	ettings 2 · FSC	•	-Vacuum I m	Bar C Hz	Γ	300 Level	
Active	Material Setup : C:	Honzberg\Settin	ngs\materials	\DPN.mat		anasi I	OF	r
			Save	Upen		ancel	UK]

When importing the file from CAD application, import filter uses symbolic tool numbers. These symbolic tools can be seen in the code mode as T line1, 2 etc. Symbolic tools are displayed by colors selected in the color setup dialog. In example in our picture, tool 1 is displayed red, tool 2 is displayed black, three pink etc. By applying Material file symbolic tools are converted to physical tools.

One physical tool can do two or more logical lines with different speed, height or other values. By applying different material files, same file can be processed with different speeds, tools and height of tools, also different vacuum levels can be used. Different camera settings for registration applied.

In more dialog, there are settings specific for some tools. At the current moment there are not many. Lift up angle is a number of degrees that knife can be turned inside the material without bringing it to the level above the material.

When something is changed in the Material file, use a Save button for saving it under same or different name. List of all avaliable material file is avaliable in selection box in Machine view window. In some import modules, automatic material selection can be used.

I Machine View		
a v D v default	• 2*	mm 3.700

Tools

position 1	position 2	position 3	position 4
<u> </u>	Flexo_tool	<u> </u>	I
Setup	Setup	Setup	Setup
position 5	position 6	position 7	position 8
Setup	Setup	Setup	Setup
position 9	position 10		Identify

When clicking on Toolhead button, see in the picture, list of avaliable tools is displayed. Smart T_{To}

tools are detected automatically, some other tools are built in machine and set as fixed. Each tool can be selected one by one and set up. Setting of these main values is imperative to succesful operation of the cutting table:

Height of the tool - by clicking on the roll button user can move up and down tool by 0,2mm respectively 0,025mm. Right cutting depth should precisely set by performing the test cut.

Lag - is the distance from tool rotation center to tip of the tool in direction of cut. Usually macro with squares is used for adjustment. System cuts several squares and user selects the one cut right.

Center Offset - is the distance in direction perpendicular to tool movement. Which means to fit cuts done in opposite direction. Wizard is normally used as in previous case.

ad 1 posittion 2:	Tool Macro Group
exo_tool 1 · knife 💌	Tool Caxix Behavior
delete tool	Rill - 180 deg mirror 💌
1	lift up angle 5 (deg)
Smart tool detected in posittion 1	Basic Tool Properties
tool ID type: 0 serial: 104	height 11.2 height height
max speed: 500	lag 5 lag wizzard
quality speed: 300	
knife length: 20	offset 0.3 offset wizzard
safe level: 20	A A ande
C speed: 720	angle -1 wizzard
L acceleration: 1440	
These values are stored in tool and are	
innication of tool bendviol.	1001A 1-0.0
Any change to these values must be done in controller configuration in technician mode	tool Y -2.2 find tool offset

Machine View

Angle - is the compensation of tool rotation to fit to tool movement direction. Also wizard is available for this setting. Correct setting of this parameter is not easy on every material.

Tool offset is the offset between tools. Different methods can be used. On systems with camera, fit to camera picture is used. This must be done manually at a time Systems with laser use wizard, where system cuts cross and user sends laser to center of cross and presses OK button

Color setup

In user interface colors are aused to display different types of lines. User can select the preferable way of color displaying lines of operations.

achine Settings	
Colors Speeds Point + Paper Controllers II	⁹ config Import G code Machine Setup Dialog
11100 2 11100 2 11100 2 11100 2 11100 2 11100 2 11100 2	11/10 8 11/10 8 11/10 10 11/10 11 11/10 12 11/10 12 11/10 13 11/10 16
LineName	Assigned Color
Current Tool Number 0 Color Number	Color Palette
☐ display tool traverses ✓ display finished lines	Display directions size % 100

For cutting and creasing it is usualy more useful to use line type display. For milling and some other cases it is probably useful to see operations types. You can select selector by selecting Lines or Operations.



User can select color to display the line or operation. Select the circle on the top and then select the color square with the mouse. By left clicking of the square, user can edit also the color palette for creating any color.

Displaying by lines

Each line in the job was imported with its number (logical tool). Sometimes referred to as pen number. Lines are displayed by these numbers. User later sets tool number and its properties, for this line number in material setup. You can run two different lines (2 and 3) with one tool (knife) only with different height, speed or one lines have to be cut first.

Displaying by operations

When displaying by operations system displays the traverses (G00), that use full speed in different color than straight lines (G01) and circles CW/CCW (G02, G03) also with different colors. We can not identify which tool or line type is the operation without switching to Line type display.

Last type is color of selected line in all modes. On the picture set to yellow.

Displaying finished lines

When display finished lines is set and file is in code mode, user can see which lines are cut when machine will process active line. By clicking on G01 code lines we can observe order of line processing. This is helpful in cutting materials, where order of cutting is extremely important, like Flexo plates. Non finished lines are shown with lower brightness.



Displaying directions

Set this check box to see arrows that show directions of cut. Size of arrow can be changed from 20% to 500% for your convenience. On some complicated jobs there will be too many arrows.

Speed settings

User can set basic speeds according to his preferences. Key speeds and acceleration are speeds of machine movement when operated by Operator panel direction arrows. Slow motion is a speed when num is pressed together with arrow. Jog increments are used for Jog wheel on the operator panel.

Default speed and accelerations are speeds for tool traverses, when there is no cutting operation. All these speeds cannot exceed limit maximum values for the machine, defined in the machine setup and tool configuration.

Cutting speeds of tools are normally defined in material file if symbolic tool numbers are used.

Values are to be sent to machine immediately when pressing OK, and saved to system .ini config when application is closed

				Honzberg Se	ttings		
Colors	Speeds	Point + Paper	Controllers	IP config Import	Machine Setup	Dialog	
		Key speeds [nm/s]	Acceleration	Jog Increme	nts [mm]	
	1	Slow	Fast	[mm/s2]	Slow	Fast	
	X/Y	51	800	2000	0.1	0.5	
	z	1	10	300	0.2	2	
	с	10	100	100	0.5	5	
	- Default O s	ts speed F sp 500	eed 400	Acceleration O	mega [deg/s] 720		
				ОК	Stor	no Použit	Nápověda

Flexo plates automation

Perpetis Flexo was designed for easier work during flexo plate production. Machine is capable of registering the design on plate with some volume of automation. It checks right positioning, selects righ parameters for cutting acording to plate type and thickness, optimizes cutting order and directions. As an option, it can mark plates, based on customer needs.

Machine software is trying to use basic outputs of standart aplications used and necessary for imaging flexo plates on imagesetters from Kodak (Miraclon) a Esko graphics. It is not necessary to invest in expensive aditional software.

For higher efectivity and higher level of automation in production process it is possible to use XML files. XML files can be created using information systéms or automation system as Automation Engine from Esko. Machine can be usefull for smaller companies with lower productin volume or can be integrated in to huge systems with multiple imagesetters from Kodak and Esko.

Workflow based on XML is considered in company Brandeis technologies as perspective and will be further improved for future increase of automation of producion, control and quality control. In the future it should be possible to check if plate was prepared or cutted. Salesman should have access to measured data, pictures of test wedges, registration inaccuraties and possibly some more informations.



Kodak and CFF2



Tiff Asembler Plus is a plate mounting tool. User can create a file sized of plate material for imaging on imagesetter. It is part of software equipment that comes with Kodak Flexcel equipment.

For later cutting to original job sizes, it supports output to ACM file format (Esko Artios Cad Manufacturing) or CFF2 (Common File Fofmat). CFF2 is open structured format. It allows further data processing. We do not recoment usage of ACM format for flexo plates processing. Import of ACM is however possible. Most flexo optins are not supported at the moment.

For cutting process CFF2 file is all we need. There is "main" function at the begining of file. In main, there is name of file in time of export from TAP software. Import module reads there a file thickness and plate type. Acording to plate type, system selects cutting speed and acceleration. Camera regmark recognition settings are also part of "material file".

Machine also loads picture data. When working with TAP, preview is generated from assembled TIFF, used for imaging. This is a high resolution tif, which resolution varies if Digicap is selected or not. Tiff is reduced in resolution and changed to greyscale during import and placed on table surface. For correct import, tiff file need to have same file name as CFF2 and should be in the CFF2 directory. Folder with tiffs can be also different, but must be specified.

Tiffs are used for operator orientation. One can see, if plate laying on the table is not identical with the one seen on the screen. Machine can find areas where no image is present and Inkjet printer can be used for marking the plates, for plate thickness measurement and other functions. We do recomend using previews.

lark file	Left [mm]	2	
	Right [mm]	2	
Output Mark diameter 6	Top [mm]	2	
	Bottom [mm]	2	
Job Info Directory D:\ZAKAZKY\TIFY			
		ОК	

Esko a CDI

Merge is software for ptate assembly. It creates file for complete plate size imaging on Imagesetter. It is a basic and necessary software, part of CDI imagesetter from Esko Graphics. CDI file is primarily produced for plate imaging. It contains all data needed for cutting the plates, and also names of Tiff files used in assembly.



During assembly, we need to add **registration marks.** They must to be **circle shaped**. System recognizes circles of any, but defined diameter. Manual positioning of regmarks in to available space is recomended. Random positioning can be usefull, if operator swaps plates or files. System calculates real and teoretical distances of marks. When mismatch of plates happens, too high errors in registration mark distances can save time and valuable material costs.

Brandeis software allows usage of **complete funkcionality of Merge software**. Plates can be rotated, mirrored, cut or duplicated. For the same functionality as in TAP it is necessary to localize original one bit tiffs. For this we need to use names of files and XML files or folder structure.



For cutting the plate the only necessary file is CDI file. In CDI file we find plate type and thickness as specified in plate editor. First three letters from plate name are used as plate type. For example DFN, ACT and so on. Under this name, system expects material file in material file folder. Material file is used for selection speed, and acceleration of cutting. Part of material size is also settings of camera recognition system.



When using CDI workflow, original Tiffs are imported from original folders. Images from multiple jobs, or even for multiple customers, are quite often used on single plate. High resolution tiffs can be in the same dirrectory as CDI, in folder of the perticular job, or in the folder specified in XML file of perticular job. Tiff is reduced during import to a grey level preview and placed on table surface.

For right functionality of system it is esential to **mark files with job number**. Number digits at the begining of file name represents job number. We can use any number of digits, but without nondigit character inbetween. Files used with CDI **must not contain spaces**. Merge is replacing them for underscores for unknown reason.

Under job number, system tries to find XML with necessary data. If not succesfull system tries to find folder with expected tiff. Customer can select one of described workflows acording to prefered level of automation. Picture on previous page shows expected folder structure with tiffs. System is esy to adopt. When using XML, all XML files will reside in a single folder an placing of the rest is specified in XML. XML structure and tag names have to be as specified.

Tifs are used for operator overview. One can see, if plate laying on the table is not identical with the one seen on the screen. Machine can find areas where no image is present and Inkjet printer can be used for marking the plates, for plate thickness measurement and other functions. We do recomend using previews.

For plate marking we can use any text string specified in XML under tag "description". In case of folder workflow, text must be placed in file name and separated with special character. See settings.

Shape cutting in CDI

In **Merge** no shape cutting is supported. Therefore to solve this issue we need another cutting file. The easiest way, independent from vendor of **R**aster Image **P**rocessor used, is to use another Tiff separation. Here we specify shape for cutting. During import, rectangle of Imageg tiff, is replaced by cutting vector. Vector is generated by Brandeis software vector engine around black shape in tiff. When importing CDI file, select check box "Aply Shape Cut"



When check box is selected, one more dialog will be created before import takes place. In this dialog, user can specify shapes to separation relationship. One shape can be selected for more, or all separations.

Cut Shape Assignment			×
Please assign the cut shape			
Image TIFF	Cut TIFF		
31609_00_cut_TEST.p1_PMS_3005	- None -		
31609_00_cut_TEST.p1_PMS_661_C	- None -		
31609_00_cut_TEST.p1_PMS_152_C	STG\31609_00_cut_TEST.p1_OREZ_PLOTR.TIF		
31609_00_cut_TEST.p1_M.TIF	- None -		
31609_00_cut_TEST.p1_K.TIF	- None -		
31609_00_cut_TEST.p1_C.TIF	- None -		<u>l</u> e
31609_00_cut_TEST.p1_Y.TIF	-None -		
31609_00_cut_TEST.p1_White.TIF	- None -		
		ОК	Cancel

Select shape for each separation, if separation shoud be applied. Press OK when ready.

Shape can be also specified using XML workflow. Then process goes automatically without this dialog. More shape options will be avaliable soon.



CFF2 import setup

Import settings of CFF2 is available in the Import page of machine settings. See on the next page. If flexo importer is not used, there are no more settings yet. Units of measure are normally specified in the file header by UM / UI commands according to inch / milimeters used. CFF2 is a float format, so no other troubles are normally with the units. Import supports lines, arcs functions and their calls.

Flexo Optimizer	Text Processing		Car	mera Mark			
Process as Plate	String for no cut NoCut		Look For M	Marks			
Resolution [mm] 0.15	Process Text			min, size	[mm]	5]
Border Size [mm] 250	Start String%]		max. size	[mm]	18]
Short Line up to [mm] 60	End String %_]					
gnore cuts shorter than [mm] 0.05	Text from Cut [mm] 1])	File	name Pref	ixes	TICE	
Automatic Board Size	Text Size 12 pts + 0	x Thickness	A	90CWM		90CWM	~
	Allow Size Reduction 100	%	в	180M		180M	~
Bridges to cuted line	Font Myriad Pro V	-	с	0	~	180M	~
Leave uncut Oposite dir.			D	0	~	0	~
	Num of '_' for mat autoset 2		E	0	~	0	~
Critical T Bridges Length [mm] 3 Leave uncut	Import TIFF if avaliable 🗹			[] Invers	se Bo	unding Box	
Mark file						Save S	ettir
Output Mark File							
Output Mark diameter 6							
Tiff Preview Directory							
Job Info Directory DUZAKAZKYJach	dr/C						

When selecting Flexo import,

Resolution - is a minimum distance of lines. any two lines closer to this value are handled as one line during line equation processes and optimalization. Double cuts are removed if detected on lines closer to specifid value. Two points are replaced by one if closer than specified value.

Border size - is the distance from board side to where special care is needed for cutting lines. No cuts fromhis region is handled towards center of the plate if possible.

Short line - Short lines are cut first. Short line is line shorter than specified value.

Bridge to cuted line length - if cutting direction is needed, due to plate border and start of cut is at the cut line, bridge is generated. Its length can be defied in milimeters.

Leave uncut - brige can be left uncut if reasonable length is set, or cut in next cut operation.



same direction

opposite direction

left uncut

Opposite direction - direction of cutting can be set. See pictures left is same direction.

Critical T bridge length when end of cut is on next plate side, there is a risk, that mark of knife will cause demage of plate during plate manipulation. We call it critical T. This problem is solved by finishing cut with separate mini line followed after main cut in oposite direction. Length of this cut can be adjusted here acording to knife properties.

Leave uncut - finishing line (or bridge) can be left uncut. See next pictures





extra cut in critical T, see extra arrow when line ends at T junction T - end left uncut and next plate is present in cutting direction

Ouput Mark file and Diameter is option for test purposes only. It generates a file with regmarks of specified diameter, that can be cut and used for camera recognition in development stage

Look for marks means handle squares that fit better than resolution in x/y size and between min and max size as regmarks

Text Processing is for future use at the moment. Text printer is planned for next year

Automatic board size plate size, thickness and material type by main text.

Digits after "_" is the thickness in mills Next characters is the material type. Small letters are converted to capitals.

LL in next example defines lower left corner, RR specifies upper right corner of the plate. Vacuum zone will be automatically selected if option is ON.

ORDER I,Exported from TIFF Assembler Plus V4.1.0.425 END MAIN,B8_170FSC_25.04.18_15.50.18_Layout.cf2 UM LL,0,0, UR,1255.0,2030.0, SCALE,1,1, UM

CDI Import setup

Import settings of CDI is available in the Import page of machine settings. See onpicture. When selecting Flexo import,

Flexo Optimizer	Text Processing		Car	nera Marl				
Process as Plate	String for no cut NoCut		Look For Marks					
Resolution [mm] 0.15	Process Text			min <mark>, siz</mark> e	[mm]	5		
Border Size [mm] 250	Start String%			max. size	[mm]	18		
Short Line up to [mm] 60	End String %		File	name Pre	fixes			
	Text from Cut [mm] 2			Cut F	le	TIFF		
Automatic Board Size	Text Size 8 pts + 0	x Thickness	A	0	~	0	~	
Bridges to cuted line	Allow Size Reduction 100	%	в	90CW	~	180M	~	
Length [mm] 2	Font Myriad Pro 🗸		С	0	~	180M	~	
Leave uncut Oposite dir.			D	0	~	0	~	
Critical T Bridges	Num of '_' for mat autoset 2		E	0	~	0	×	
Length [mm] 3	Import TIFF if avaliable			🗌 Inve	rse Boi	unding <mark>B</mark> ox	¢	
Leave uncut	Cut Margins							
Mark file	Left [mm]	2				Save :	Settin	
Output Mark File	Right [mm]	2						
Output Mark diameter 6	Top [mm]	2						
	Bottom [mm]	2						
Job Tofo Directory	0							

Resolution - is a minimum distance of lines. any two lines closer to this value are handled as one line during line equation processes and optimalization. Double cuts are removed if detected on lines closer to specifid value. Two points are replaced by one if closer than specified value.

Border size - is the distance from board side to where special care is needed for cutting lines. No cuts fromhis region is handled towards center of the plate if possible.

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Leave uncut - brige can be left uncut if reasonable length is set, or cut in next cut operation.

Dashed cutting



If for some reason line is too close to border or other risky factor occurs, line can be split to smaller parts. These are to be cut from end to start partially. Cut part length can be set in G code settings. Select line selection tool and right click the line in machine window. Next right clicking restores the previous status. See generated command lines in job window.

DXF import setup

Units	• mm C inc	ch C	Optimize import	V		
	color	layer	lin	e type		
1 -	all 🔻	- all -	- ce	nterx2	•	
2 🗸	all 🔻	- all -	• CO	ntinuous	•	CFF2 Setup
3 🔻	all 🔻	- all -	▼ ph	antom	•	
4 🔻	4 🕶	- all -	- a	ill -	•	
5 🔹	5 🔹	- all -	▼ - a	dl -	-	
6 🗸	6 🔹	- all -	▼ - a	dl -	•	Edit Layers
7 •	7 🔹	- all -	- a	ill -	•	Edit line types
8 -	8 -	- all -	▼ - a	ill -	•	
9 🗸	9 🗸	- all -	• - a	ill -	•	Save
15 🔻	all 🔻	- all -	▼ - a	dl -	•	Open
					-	

For import of DXF files right setup is necessary according to creators habits. User can use several differ- ent sets of settings, save and open them. Important is to set right units. Inch is 25.4mm. 25 times larger or smaller design will be cut if wrong units are set.

Origin in lower left corner brings the design to the lowest X and Y posittion. This is useful if design is created without notice of coordinate system. For example several kilometers from zero point.

In DXF file format three attributes are defined for each line: color, line type and layer. In machine we use only line number for line specification. For right conversion of line attributes to line number, filter is used.

If we follow the picture above:

- all lines of any color, any layer that are type centerx2 will be converted to line 1 (displayed in red) - all other lines of any color, any layer that are type continuous will be converted to line 2 (black) - all other lines of any color, any layer that are type cphantom will be converted to line 3 (violet) - all other lines of color 4, any layer, any type will be converted to line 4 (displayed in pink)

See only line numbers. Color of line is defined in color setup dialog

Import DXF



Drawing eXchange Format is an open format defined by Autodesk for exchange of data between different CAD systems. Format has several description parts. We use only Entities part of file for creating data for generating machine operations.

In DXF file format three attributes are defined for each line: color, line type and layer. For proper conversion of these atributes in to line numbers proper settings must be made in DXF import setup dialog in Machine Settings. However in Import Dialog user can discover color numbers, line types and layers of all lines in selected file. List of lines is displayed below the preview.



Matrix operations

System uses matrix functions when processing the job simalar to your graphic card. One or multiple matrix is stored in the job (document). System processes job by applying first matrix to last available matrix.

Matrix system is used for right positioning with camera system, for rotation, movement, scaling and multiplication of the same job multiple times on cutting area. This system will be improved. Plan is to allow positioning of multiple job types on cutting area, to save and open such an arrangements.

Multiplication

Is the easiest way of positioning multiple products on the cutting area. Select tools, Mutiply in main menu. Dialog needs probably no coment. Matrix of each of product can be later edited with transformation tool, rotation tool and movement tool.



Transformation

For rotation, scaling, mirror or for checking results of Camera positioning select in main menu: Tools, transform. Dialog appears. On the right side, there is result matrix, used for transformation. On the left side siple operations for blond haired are positioned.

Same dialog should be called if transformation edit tool from Open GI window is selected and user clicks one of the product.



Transformation tools



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Selects product, if multiple products are positioned on the area

By picking this tool user can drag product within the cutting area

Rotation tool rotates product 90 deg clockwise, for other rotations use Transformation tool

This tool picks product, creates copy and drags the product on the area

Transformation tool opens the transformation dialog, where user can do other or more precise transformations



Delete tool deletes product by clicking in to its bouding box

Vacuum zones



In the picture you can see vacuum zone tool selected. By clicking on the green / grey zones on the machine picture user can select zone. Displaying and hiding zones is possible by right clicking vacuum tool.

Zone configuration is kept in vacuum .ini file. Any kind of zone configuration is desribed by simple text and is displayed on the table and operational. If automatic vacuum zones are to be used according to board size definition, see board size definition dialog on the next page.

Vacuum pump is switched ON and OFF from main operator panel or automatically by applying the macro system. Vacuum is driven by pump speed or vacuum level. Mode, speed, level is usually used from material setting file. If no material is used, default is set in machine config.



There are some circumstances, where fixed start point is to be used. Selector with all available starting points is in left top corner below connect icon. Select the start point, and job is rewinded and displayed from that point. Start point is displayed by magenta pyramid.

In many cases user selects starting point by finding material corner with the laser and pressing button, select start point on operator panel. In that case selection is overwritten.

In Machine setup, in point and paper tab you can specify x/y coordinates of the point and its name. See below

Colors Speeds Point + Paper Controllers IP config Import	G code Machine Setup Dialog	
Start points ☐ 100x100 × 100.00 mm Y 100.00 mm 월 × 200.00 mm Y 200.00 mm ☐ 4 × 400.00 mm Y 400.00 mm ▲ 400.00 mm Y 400.00 mm ✓ 400.00 mm ✓ zonal × 610 mm Y 762 mm	Name b point position X 200 Y 200	
Zona2 × 800 mm Y 1067 mm Zona3 × 900 mm Y 1200 mm Zona4 × 1067 mm Y 1524 mm Zona5 × 1270 mm Y 2032 mm max × 1500 mm Y 2200 mm	Save laser point	

Board settings

Same dialog as above is used for Board settings. User can select name, size in x and y.

Selector move with start point moves the material square in the machine window with the starting point and user can see if lines fit material if set properly.

Start points 100x100 × 100.00 mm Y 100.00 mm ⇒ x 200.00 mm Y 200.00 mm ⇒ c × 300.00 mm Y 400.00 mm ⇒ d × 400.00 mm Y 400.00 mm → Material sizes ✓ zona1 × 610 mm Y 762 mm ✓ zona3 × 900 mm Y 1057 mm ✓ zona4 × 1087 mm Y 1524 mm ✓ zona5 × 1270 mm Y 2032 mm ✓ max × 1500 mm Y 2200 mm	Name zona2 material size x x 800 Y 1067 material position Image: material position
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"Start point to material corner" cancels active start point and moves the material to corner position.

Corner position is specified with x/y coordinates.

If automatic vacuum zone is selected, vacuum zone will be selected by selecting board. Value is binary. Which means bits set to one opens zones on bit positions. Number 0x03 on the picture opens zone 1 and 2. Number 0xF will open firt four zones.

Registration



Purpose of registration is to accurately fit relief on the flexo plate to cut path. Some tests and camera settings must be done prior to cutting a real job. Also light conditions that allow to work on flexo plate must be fulfilled.

There is a special system built in camera and its lighting, that removes most of relections from lighting and finds the relief of a circle. However light coming from the window under low angles are non solvable and dramatically lower the ability to find cirles especially on some materials. Ceiling lights usually do not represent much troubles.

Technology of finding the circles is still of top priority for software designers of the machine and there is potencial of improvement, however it works on most materials satisfactorily if set up right.

Running registraion wizard

Registration wizard is macro file that calls functions built in software. Behavior can be slightly modified. At the moment we use these steps:

Finding first circle with laser - move laser cross to regmark closest to table origin. Positioning does not have to be exact.



Start wizard by clicking on Register button or user button with same function in Machine window or on operator panel.



If camera is not successful in finding the circle, user can select circle by clicking in to the circle and click center button. If centered within several pixels, next button moves to next regmark. Usually each regmak needs two readings.

When all regmarks are taken, job matrix is calculated. Results are displayed in message window and written to log file. Errors in distance between first and other two regmarks are displayed in window green or red color depending on error status. User can observe, that regmarks were read fine and continue to cut- ting process. See result picture on previou page.

If registration is active (cancel is displayed in right button), invisible buttons are on all sides of the picture that causes machine to move for circle centering. Amount of movement is specified in Camera Setup.

Camera and registration setup



In order to get good results on wide range of plates from different vendors, some setup is to be made.

Go to setup in registration window. Dialog appears. One of the option is debug mode selection. When image is processed, similar window to one above is displayed. You can see the picture from camera upper left. We can zoom in by right click in to it. Picture must be sharp, righ bright and without too many reflections from windows lights etc. Right is the noise filtered picture. Amount of filtering is set by parameter window size. Bottom is a map of changes in the picture, that are used for circle recognition.

At the moment system looks for the circle of specified diameter, that has highest number of changes on its circumference.

First select right brightness, contrast and sharpness. Get picture button sends a new picture. These values are saved to one of settings. Name of settings can be changed by clicking on settings name. In material user can select one of camera and registration settings. See material settings. Flexo mode is usually used for flexo plates and takes four pictures. Reduces lighting reflection dramatically and can be most likely used also on other shiny materials. Resolution is fixed for the moment, AWB is not used at the moment.

Serial number of camera must be specified for correct comunication to camera.

mera Brightness	Circle recognition	Registration
Contrast -3	Median filter window size	Method No Registration 💌
• -4	Edge level 30 1-25	5
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	R max 60 [pixel	Rescan if deviation over [5 [Dixe]]
	pixels / mm 11 [pixel	Error if distance over 1 %
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esolution 640 x 480 💌 camera serial	Active set: 2: FSC	Click move [mm]
Mode Flexo 🔽 252	Debug display	
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9 15	Get Picture Process	Of Canad

Median Filter

First Median filter is applied on the incoming camera data. Median filter is used for noise reduction with limiter loss of picture details. Median Window size is important parameter for optimal filtering. Value must be odd number (1, 3, 5, 7..). Smaller number means more noise on the output and also more details in the picture. Higher numbers are cleaning bigger objects from the picture. Values 3 to 5 are recommended.

Edge level

Map of edges is than created for circle pattern recognition process. Edge level is minimal difference between neighbour pixels for generating an edge. Higher value of edge level means lower output data and cleaning up objects with low density changes. Levels from 5 to 32 are recommended for flexo plates, Values from 16 to 200 for printed media.

R min, R max

Circle Hough Transform (CHT) circle recognition method is based on finding places with highest number of edges on the circle created for every pixel. For every circle diameter, one recognition process is needed. Higher difference between R min and R max is slowing down process and consuming more memory. Circle diameters out of range are not to be found.

pixel / mm

Is needed for correct center difference calculation.

Minimum object detect level

Minimum quality level of circle to be taken as circle. Multiple ojects can be found up to 16. User can select for the right one.

Auto recognize at levels higher than

Machine continues to next circle or cutting process without user approval if quality is higher than the number set.

Table map window



Table flatness is never perfect as needed for precise cutting. Electronic compensation is applied to correct for small variations in flatness. Measuring boot measures the table in defined spacing and controller is calculating Z correction for every point during movement. See the values and shape of errors measured.

Starting point and thickness

		Waterial Thicknes	S DLG	~
>	< 20	Thicknes	2.8448	
١	20			
Z	2 0	Cancel		OK

Staring point can be selected by laser or entered or checked numerically. Do not use Z offset for 2D operations. Correct tool offset instead. Both windows can be opened from Tools menu.

Thickness of material can be selected automatically from import (CFF2) or selected manually. Thickness is necessary for correct tool up position and tool down if % of material thickness are used.

Line information

For easier orientation in code lines, tool is avaliable to find out most of avaliable information about the code line. Dialog displayes all starting conditions when lines start to process and also informatin what type of command, speed and other information is avaliable. This is useful for code debuging and editing.

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N5 G00 X1231.660 Y762.080 (CO.000 TU									
N6 G01 X1239.530 Y762.080	D		_							
N7 G00 X1231.660 Y774.4E N8 G01 X1239.530 Y774.4E	Optimize	- 1	Line	Information						
N9 G00 X7.270 Y362.360 C	Set Active Line									-
N10 G01 X7.270 Y40.930 T	Set Ston Line		10	0 10	Ту	be 0	L	14.67 mm	C	0.00 s
N11 G00 X7.270 Y370.740	Set Stop Line			Begin		End		Length		
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N13 G00 X618.725 Y40.930	E PAR		~	7200.00		7201.00	0	10.00	-	0.00
N14 G01 X7.270 Y40.930 T	Edit Line			782.08 mm	T	794.46 mm	- T	12.38 mm	г.,	U.UU mm/
N15 G00 X618.725 Y40.930	Insert Line		Ζ	0.00 mm	Ζ	0.00 mm	Z	0.00 mm	0	0.00 mm/
N16 G01 X1230.180 Y40.93	Delete Line									
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N20 G01 X7.270 Y362.360	View	>						CC		offset

Macro Setun

Macros

ystem Message Handlers	
🗄 🚰 System Hanlers	
🗄 🚰 Machine Handlers	
🗄 🚰 Tool Handlers	
🕂 🚔 User Defined	

Designers of the machine understood, that this is a production machine. Working with the machine every day for many hours will be easier if some repeatedly used functions can be called from the right place. More operations grouped in to single button press, accessed without opening dialogs etc.

Macro system is verry complicated, not perfect yet, and is part of separate "programming manual". However many functions are avaliable. Buttons on Operator panel, in Machine window and on Radio remote controller are avaliable. User can connect macro file to handler of the button, or event of the operation.

User can modify what happens when machine starts, when job is started, finished etc. Ask your dealer for more information or refer to "Programing manual" if you wish to learn more and become a more sophisticated user.

These are all user buttons, its function and icon can be modified



Macro buttons on operating panel 4 buttons and 4 shift buttons available for operator defined functions

Machine IP Adress setting

First machine IP address must be set to any free static IP address from local network space. This is necessary to be able to connect Program to machine. Ask your network administrator for IP address. Then hold down Shift and Num and press M4:



Combination for IP adress access

First part of IP adress appears on display: IP1 192. Type in a new address via "num" key or press shift/select/ref several times to get to the part, you want to change. Adress will be saved to nonvolatile memory.

Ex: shift / num / M4, 192 168 010 018 - sets address to 192.168.10.18 shift / num / M4, shift / num / M4, shift / num / M4, 017 changes last part of address to 17

Connecting program to Machine



Smart tool v1

Meanings of LEDs are as follows.





Tool Bus



Tool LEDs

Tool status

Tool is busy

System Bus LEDs



That is all for user manual at the moment.

Thanks for reading and remembering.