Milling Circuit Boards with CircuitPro and S63 LPKF Machine

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June 17, 2018

Introduction to CircuitPro

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The tool magazine CAD systems

Machine Setup



Figure: Hardware configuration

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The tool magazine CAD systems

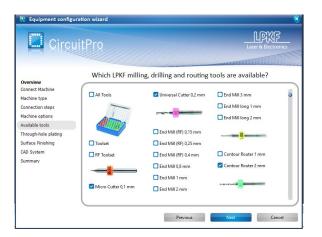


Figure: Tool selection window

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The tool magazine CAD systems

Milling and Drilling Tools



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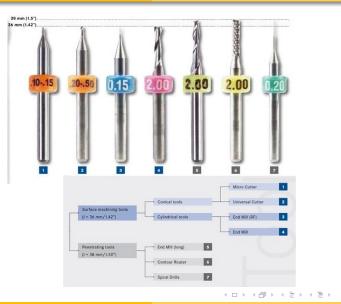
The tool magazine CAD systems



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The tool magazine CAD systems



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The tool magazine CAD systems

🔣 Equipment configu	iration wizard	8
Circu	litPro	Laser & Electronics
Overview Connect Machine Machine type Machine options Available tools Through-hole plating Surface Finishing CAD System Summary	Which CAD system are you using? Esgle Alturn Designer Target C CR-5000 I do not know	
	Previous	Nex Cancel

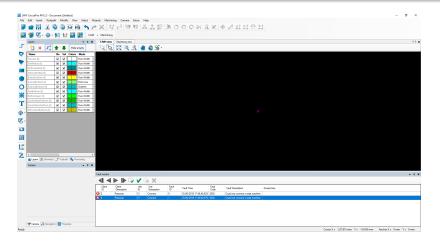
Figure: CAD Software Selection

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GUI



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Project stages

Once the machine has been configured, most of the PCBs follow the next process:

- Load a template project (Single Side, Double Side, ...)
- Import the Gerber files
- Create the tool-paths and link the tools
- Board Production

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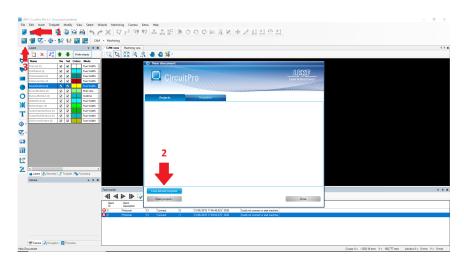


Figure: Load default template , A B , A B , A B , A B , A

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Process planning wizard				×
Gircu	itPro		Laser & Electronics	
Overview	How many layers	is the board going	to have?	
Number of Layers				
Substrate Through-hole plating Surface finishing Summary	Single-sided bottom	Single-sided top	Double-sided	
			Net Cancel	

Figure: Layers on board selection $(\square) (\square)$

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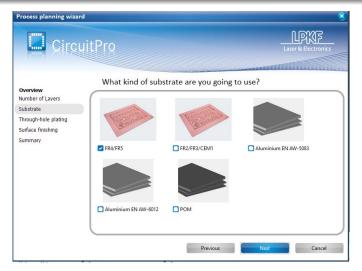


Figure: Material selection

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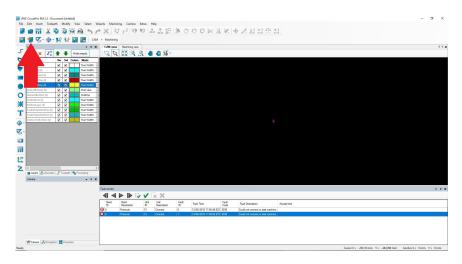


Figure: Layer files importing $\Box \rightarrow A = A = A = A$

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Allowed files

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Red	ি Emau. <	Util.dll	23/04/2018 9:07	Extensi ¥
	Nombre:	Folder Selection	~	Abrir
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		Cattled with CAM files (r.cam) Getter/Getter/Kifes (*.gbr,*.gbx) Excellon files (*.nd) LIND files (*.nd) DXF files (*.ch) Sieb & Moyer files (*.am?,*.dr) OB ++- files (*.jbb)		

Figure: Supported files $(\square) (\square$

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The file extension depends on the CAD software used. For Altium, the layers generated are the KeepOut, Botton Layer and Top Layer, respectively (*.GKO, *.GBL y *.GTL).

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Botton layer

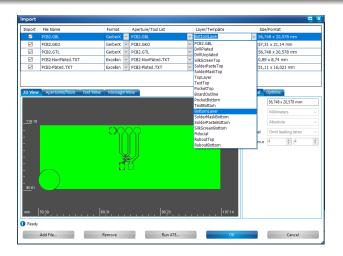


Figure: Botton layer file (□) (♂) (≥) (≥) (≥) (≥) (⊂)

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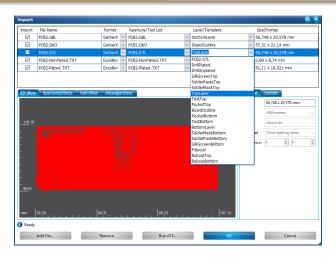


Figure: Top layer file

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The Drill Layers

	PCB2.GBL	GerberX	$\overline{\mathbf{v}}$	PCB2.GBI				
				PUB2.0BL	\sim	BottomLayer	\sim	56,748 x 20,578 mm
	PCB2.GKO	GerberX	$\mathbf{\mathbf{v}}$	PCB2.GKO	~	BoardOutline	\sim	57,31 x 21,14 mm
	PCB2.GTL	GerberX	~	PCB2.GTL	~	TopLayer	~	56,748 x 20,578 mm
	PCB2-NonPlated.TXT	Excellon	~	PCB2-NonPlated.TXT	~	DrilUnplated	~	0,89 x 8,74 mm
	PCB2-Plated.TXT	Excellon	~	PCB2-Plated.TXT	~	DrilPlated	~	51,11 x 16,021 mm
2D View		Messag				Onitipated Onitipated SilkCenerTop SilkCenerTop SilkCenerTop TopLayer TextTop PocketTop BeadSultmen TextBothom BeadSultmen TextBothom SolderFastedotom RoboutTop RuboutTop RuboutTop RuboutTop		1 S1,11 x 16,021 mm Millimaters Absolute Conit trailing zeros Conit trailing zeros mm 4 (2) 7 (2) 1 (2) (2) (2) (2) (2) (2) (2) (2) (2) (2)

Figure: Drill layer importing 다 네가 네가 제공 가 문 가 문 가 있다.

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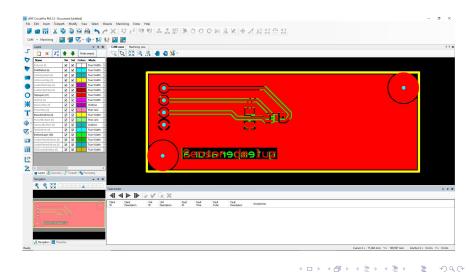
import	File Name	Format		Aperture/Tool List		Layer/Template		Size	/Format			
\checkmark	PCB2.GBL	GerberX	\sim	PCB2.GBL	~	BottomLayer	~	56,7	48 x 20,5	78 mm	1	
			×		~	BoardOutline	~					
\checkmark	PCB2.GTL	GerberX	~	PCB2.GTL	~	PCB2.GKO		56,7	48 x 20,5	78 mm	1	
M	PCB2-NonPlated.TXT	Excellon	~	PCB2-NonPlated.TXT	~	DrillPlated DrillUnplated		0,89	x 8,74 m	m		
	PCB2-Plated.TXT	Excellon	~	PCB2-Plated.TXT	~	SilkScreenTop		51,1	1 x 16,02	1 mm		
2D View	Apertures/Tools Text View	w Messag	e V	lew		SolderMaskTop TopLayer TextTop PocketTop		al	Options			_
						BoardOutline PocketBottom			<u> </u>		n	_
						TextBottom BottomLayer			Millimete	ers		
						SolderMaskBottom			Absolute			
						SolderPasteBottom SilkScreenBottom		al	Omit lea	ding ze	ros	
						Fiducial		m.n	4	0 4		0
						RuboutTop RuboutBottom						
	50.06	69.17				167.37						
Ready												_

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Global Process Settings

🙀 Technology Dialog		×
Global process settings		
Material type FR4	Copper thickness 18 µm	
Protects	Insulation Method Excic pads double Decorption Troutation with a single insulation channel. Double soldium channel for pads. Double soldium channel for pads.	
Contour Routing		2
	Contour Routing Method No gaps Description Contour Routing without gaps.	
Process Show Details		J
Convert to Toolpath		
Drills Show Details		
Fiducials Show Details Pockets Show Details	Start Close	
	CIVA	

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Computation Results	
Warnings Drilling	Calculate
Attention, no appropriate tools available	to process
1.3 mm (2 objects have been ignored)	
Assign these toolpaths to	Juve
Spiral Drill 0,7 mm 🗸 🗸	Print
Attention, no appropriate tools available	
0.55 mm (1 objects have been ignore	d)
Assign these toolpaths to	
<please select="" tool=""> ~</please>	
Attention, no appropriate tools available	to process
1.016 mm (29 objects have been igno	ored)
Assign these toolpaths to	
<please select="" tool=""> ~</please>	
Attention, no appropriate tools available	to process
1.194 mm (4 objects have been ignor	ed)
Assign these toolpaths to	
<please select="" tool=""> \sim</please>	
k.	~
	>

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Until this point, every parameter on the PCB design was configured. Thus, the next step is to prepare the board production with the board production wizard from CircuitPro. This will guide through the production process and its necessary steps.

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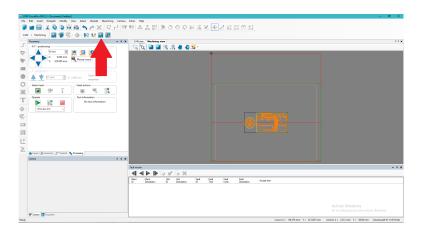


Figure: Board Production Wizard

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PCB				
Properties				
Material Type	FR4			
Copper Thickness [µm]	18.0			
Material thickness	0.46 mm			
Underlay plate thickness	2 mm			
associated position.	rea to move the active head to the in front left and right rear corner of		Current head	
Click into the machine a associated position. Use the buttons to set th the material. Please make sure that th machine head does not		X:	0 mm	
Click into the machine a associated position. Use the buttons to set th the material. Please make sure that th	e front left and right rear corner of e working-depth limiter of the	X: Y:		
Click into the machine a associated position. Use the buttons to set th the material. Please make sure that th machine head does not	e front left and right rear corner of e working-depth limiter of the		0 mm	
Click into the machine a associated position. Use the buttons to set th the material. Please make sure that th machine head does not material.	e front left and right rear corner of e working-depth limiter of the	Y	0 mm 325 mm	
Click into the machine a associated position. Use the buttons to set th the material. Please make sure that th machine head does not material. Material width	e front left and right rear corner of e working-depth limiter of the touch the tape used to fix the	Y	0 mm 325 mm	

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 How to create a new project
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Placement	
Relative translation[mm]	
dX: -13.64 mm 😧 dV: 275.209 mm	
Set center	
Rotation	
Angle D*	
Step and Repeat	
Number of copies	
X: 1 Y: 1	
Spacing between copies[mm]	
χ: 0 mm 😨 Υ: 0 mm	
Reset	
Continue Apply Material settings Abort	=

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Processing	→ # X
Z/Y - positioning	
💧 10 mm 🗧 😭	
Y: 0.000 mm	Mouse cursor
	Depth limiter
A V 0.1 mm 🔮 Z: 0.000	mm mounted
Select head	Head actions
	🖳 🦷 🖾
Operate	fool information
	No tool information
<process all=""></process>	
MarkingDrills ^	
DrillingPlated	
DrillingUnplated	
MillingTextBottom MillingBottom	
MillingPocketBottom	
FlipMaterial	
ReadFiducialsTop v	
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