



PCB Fræser: LPKF CircuitPro LPKF E44



| Bor type | Størrelser | Bruges til: |
|------------------|--|-------------------------------------|
| Micro Cutter | 0,1 mm | Milling |
| Universal Cutter | 0,2 mm | Milling |
| Endmill | 1 mm 2 mm | Milling |
| Spiral Drill | 0,7 mm 0,8 mm 0,9 mm 1 mm 1,2 mm 1,5 mm 2 mm 3 mm | DrillingPlated/ DrillingUnplated |
| Contour Router | 1 mm 2 mm | ContourRouting |

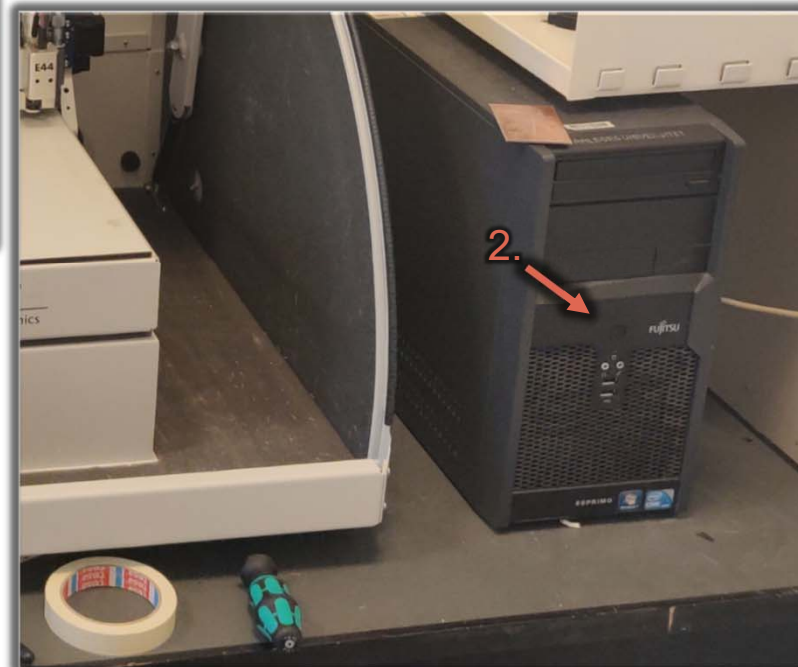
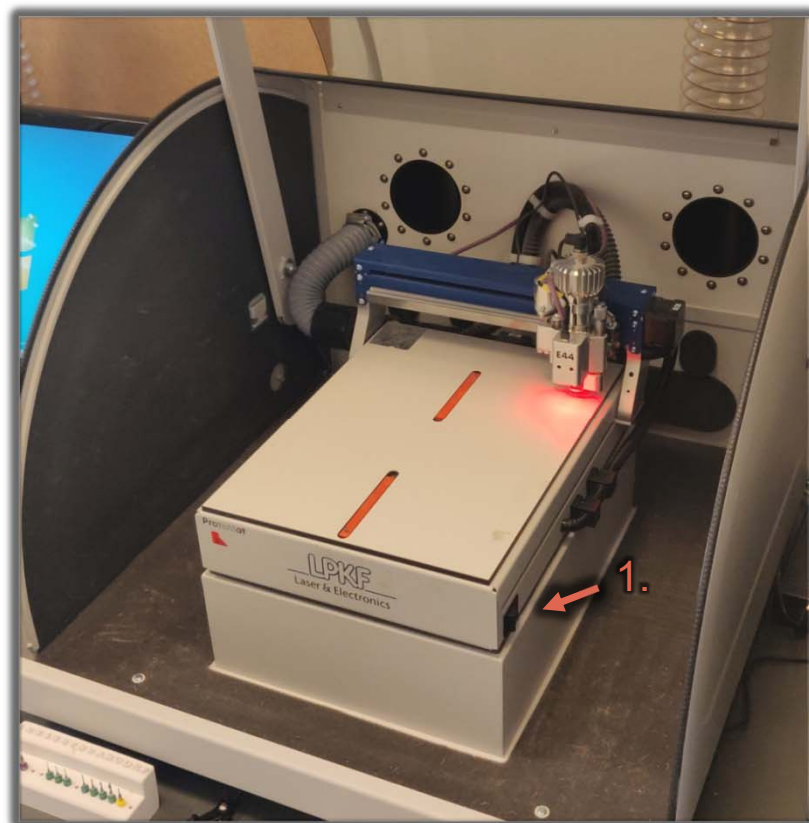
Borstørrelser til PCB-fræsere

Inden du gør i gang, bør du sørge for at du bruger de bor-størrelser der er til fræsere, dvs:
Contour router skal være over 1 mm. og huller skal passe med størrelserne på "Spiral Drills"



Opstart

1. Tænd Fræser
2. Tænd computeren

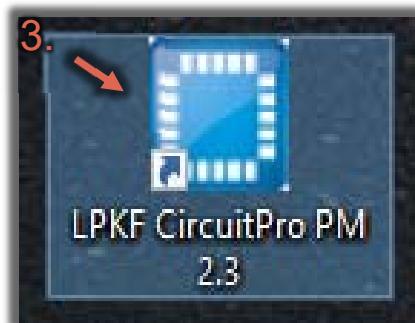




Opstart CurcuitPro

1. Start PC
2. Log på brugeren „PCB fræser“
kodeordet ”1234”
3. Åben Programmet „LPKF CurcuitPro
PM 2.X”

Noter:

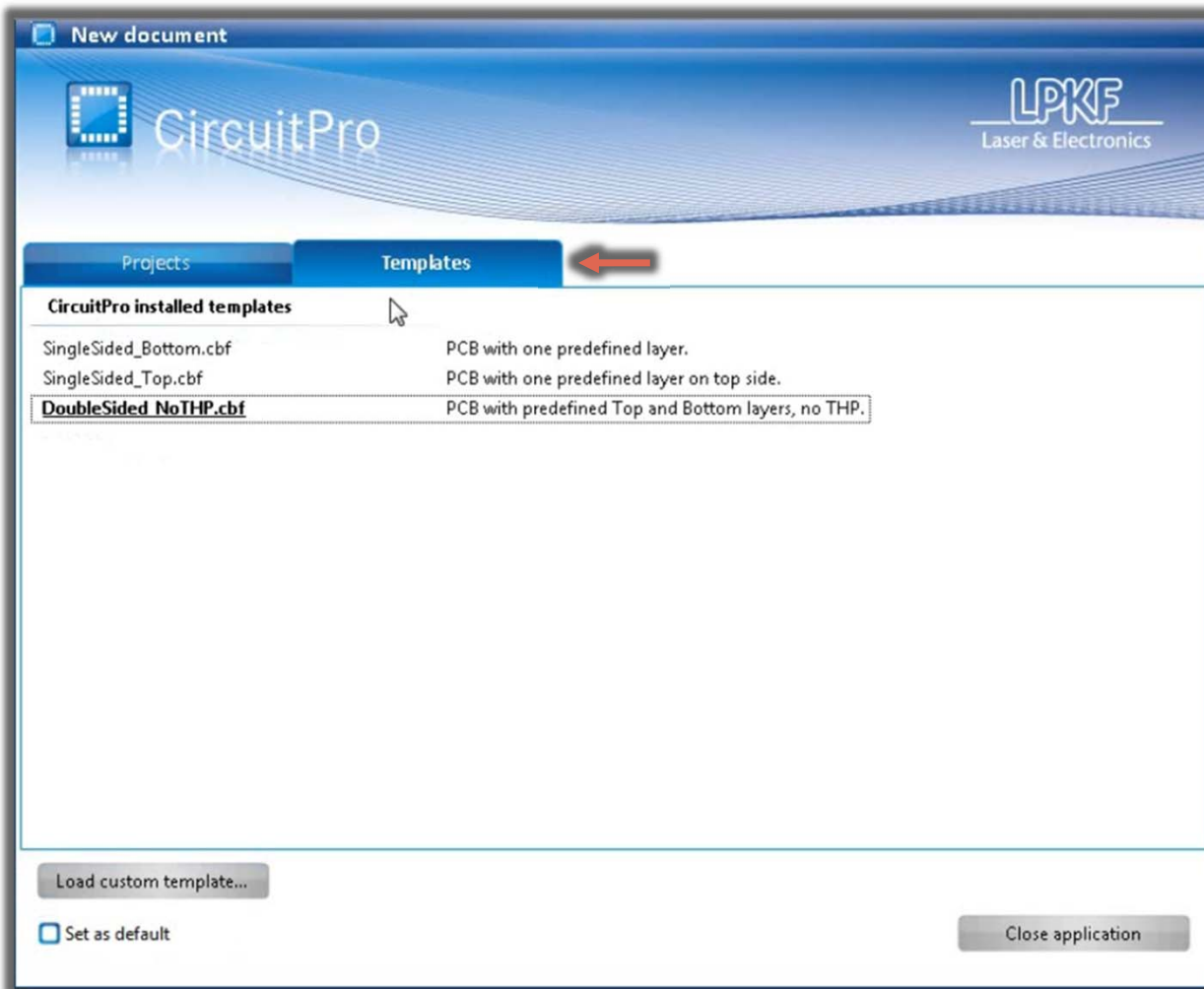


Connection steps

- ✓ Connecting the machine.
- ✓ Checking the machine, machine type, firmware.
- ✓ Reading settings from the machine.
- ✓ Synchronizing the settings.
- ✓ Checking if there was an abnormal termination and fixing it.
- ✓ Referencing the machine.
- ✓ Moving to the startup position.
- ✓ Connecting the camera.

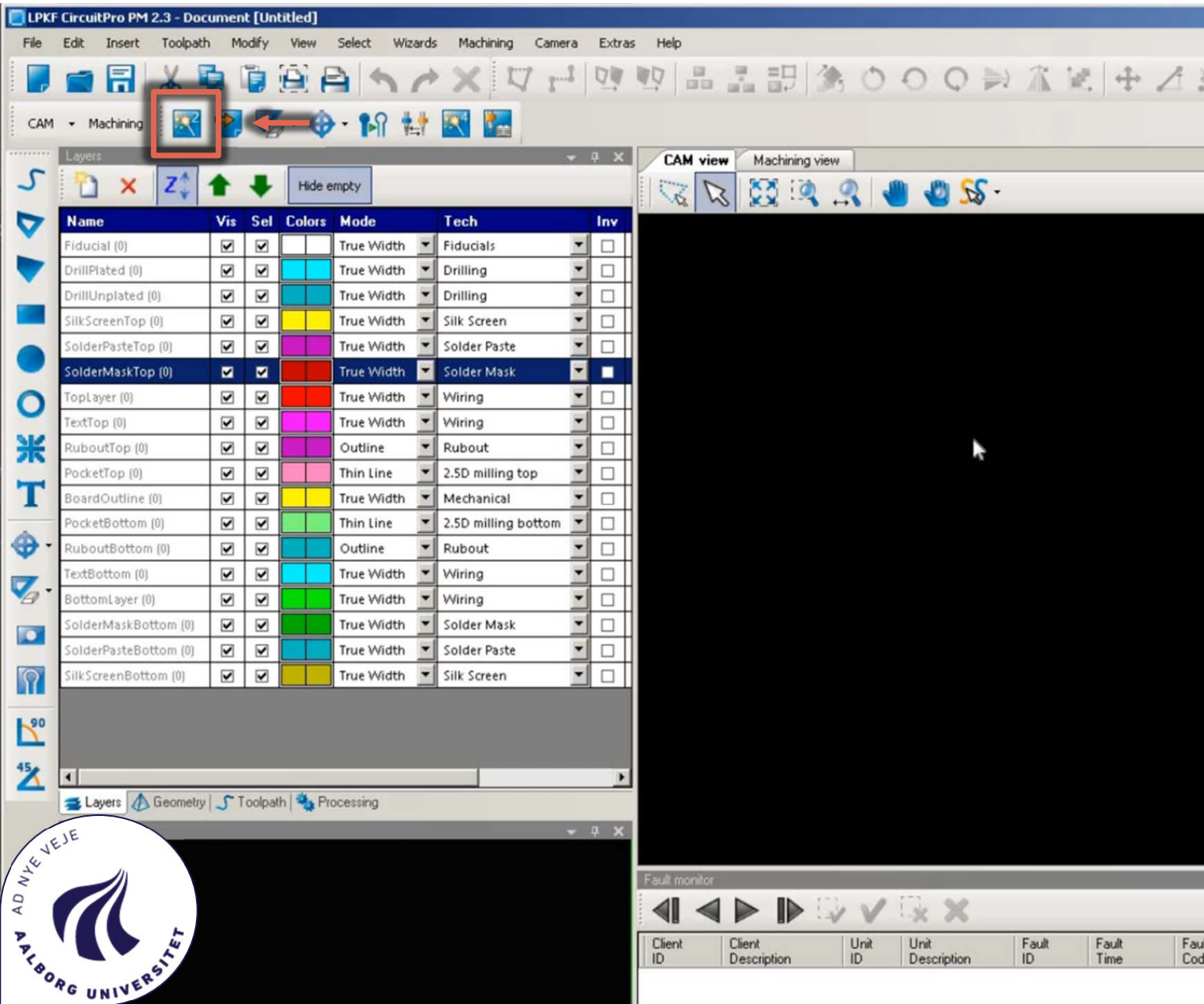
Initialisering

1. Lad CurcuitPro få forbindelse til fræser



Opret nyt dokument

- Vælg PCB typen
 - Bottom
 - Top
 - Double sided



Start " Process Planning Wizard"



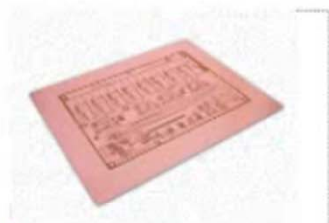


Vælg "Process PCBs"

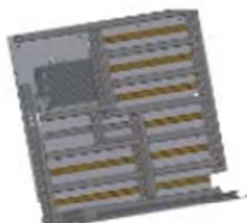
Please select the type of the process.

Overview

- Process type
- Number of Layers
- Substrate
- Through-hole plating
- Surface finishing
- Summary



Process PCBs





Process 2.5D elements


Next



Process planning wizard



How many layers is the board going to have?



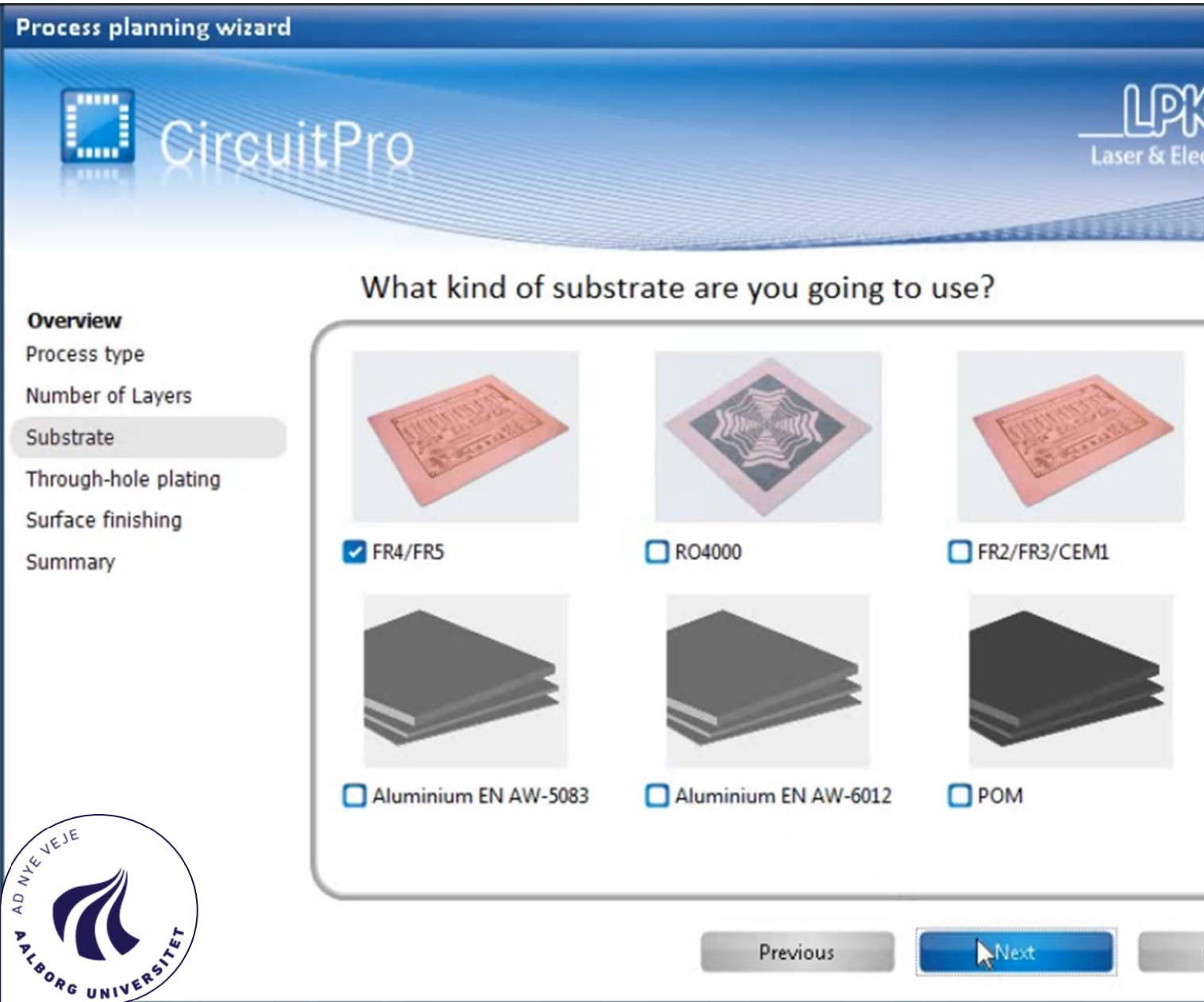
Single-sided bottom Single-sided top Double-sided

Previous Next

Overview
Process type
Number of Layers
Substrate
Through-hole plating
Surface finishing
Summary

Vælg PCB-typen



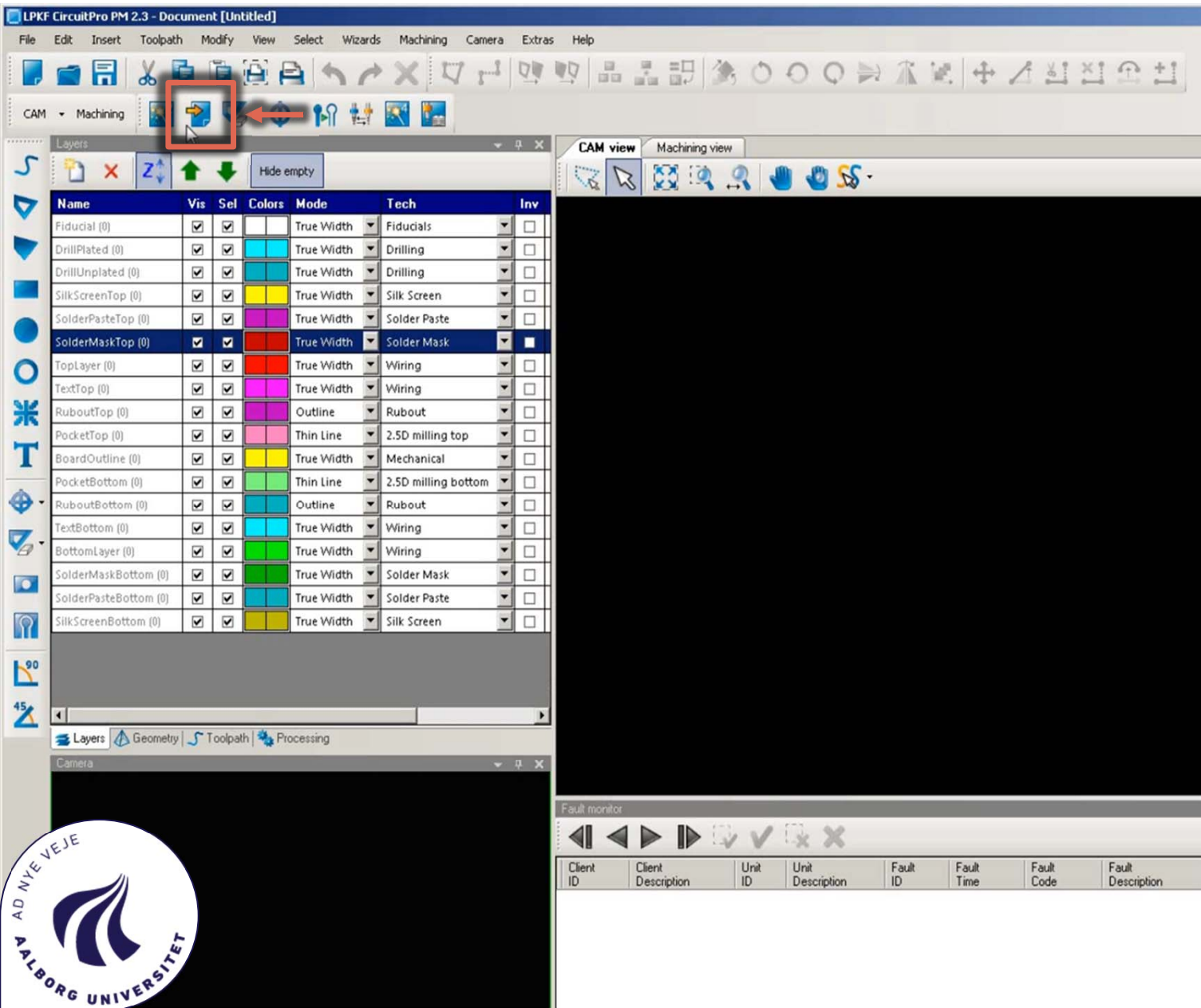


Vælg PCB-materialet

- Komponenten bruger FR4

Note:
FR står for Flame Retardants og kan laves af forskellige materialer:
FR1 = Phenolic resin + hard paper
FR2 = Phenolic resin + hard paper
FR3 = Epoxy resin + hard paper
FR4 = Epoxy resin + glass fibre fabric
FR5 = Epoxy resin + thermostable glass fibre fabric

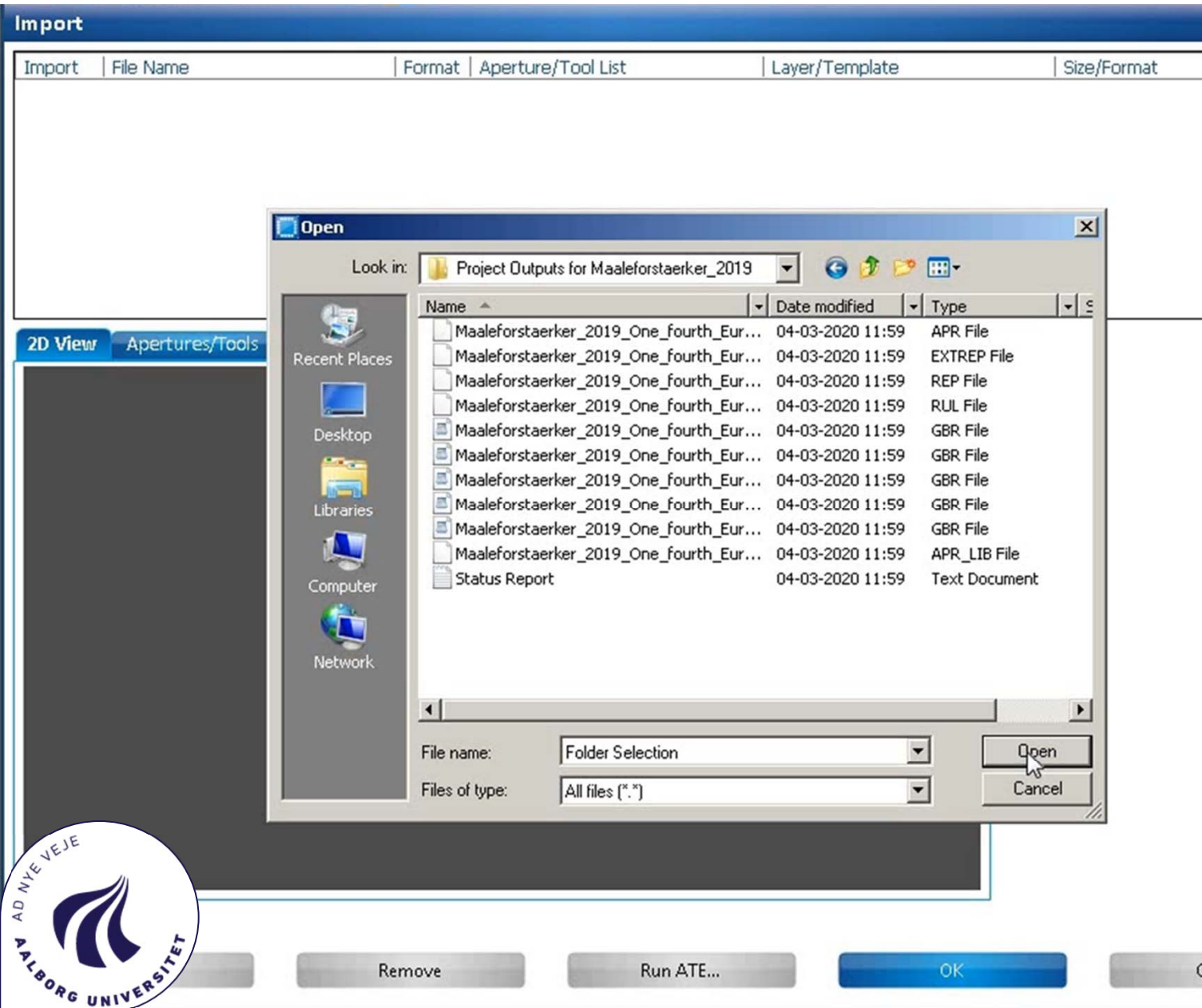




Importer gerber-filer



Åben mapper med Gerber-filer



Vælg "Layer" til Gerber-filerne i Importmanageren

- Giv Gerber-filerne de rigtige "Layer/Template"
- Der skal minimum eksistere:
 - Top/bottom layer
 - BoardOutline
 - DrillPlated/DrillUnplated

| Import | File Name | Format | Aperture/Tool List | Layer/Template | Size/Format |
|-------------------------------------|---|---------------|--|-------------------------------------|---------------------------------------|
| <input checked="" type="checkbox"/> | Maaleforstaerker_2019_One_fourth_Eurocard_Done_Routing.apr | Aperture List | Maaleforstaerker_2019_One_fourth_Eurocard_Done_Routing.apr | Protel x apt Ger mil Inch23AbsTrail | Gerber, inch, 2,3, Absolute, Trailing |
| <input checked="" type="checkbox"/> | Maaleforstaerker_2019_One_fourth_Eurocard_Done_Routing_Copper_Sign... | GerberX2 | Copper,L2,Bot,Signal | BottomLayer | 80 x 50 mm |
| <input checked="" type="checkbox"/> | Maaleforstaerker_2019_One_fourth_Eurocard_Done_Routing_Copper_Sign... | GerberX2 | Copper,L1,Top,Signal | TopLayer | 80 x 50 mm |
| <input checked="" type="checkbox"/> | Maaleforstaerker_2019_One_fourth_Eurocard_Done_Routing_Legend_Top... | GerberX2 | Legend,Top | SilkScreenTop | 74,839 x 47,325 mm |
| <input checked="" type="checkbox"/> | Maaleforstaerker_2019_One_fourth_Eurocard_Done_Routing_Profile.gbr | GerberX2 | Profile,NP | BoardOutline | 80,025 x 50,025 mm |
| <input checked="" type="checkbox"/> | Maaleforstaerker_2019_One_fourth_Eurocard_Done_Routing_PTH_Drill.gbr | GerberX2 | Plated,1,2,PTH,Drill | DrillPlated | 73,029 x 42,92 mm |
| <input type="checkbox"/> | Maaleforstaerker_2019_One_fourth_Eurocard_Done_Routing.EXTREP | Undefined | | | |
| <input type="checkbox"/> | Maaleforstaerker_2019_One_fourth_Eurocard_Done_Routing.REP | Undefined | | | |
| <input type="checkbox"/> | Maaleforstaerker_2019_One_fourth_Eurocard_Done_Routing.RUL | Undefined | | | |
| <input type="checkbox"/> | Maaleforstaerker_2019_One_fourth_Eurocard_Done_Routing-macro.APR_LIB | Undefined | | | |
| <input type="checkbox"/> | Status Report.Txt | Undefined | | | |

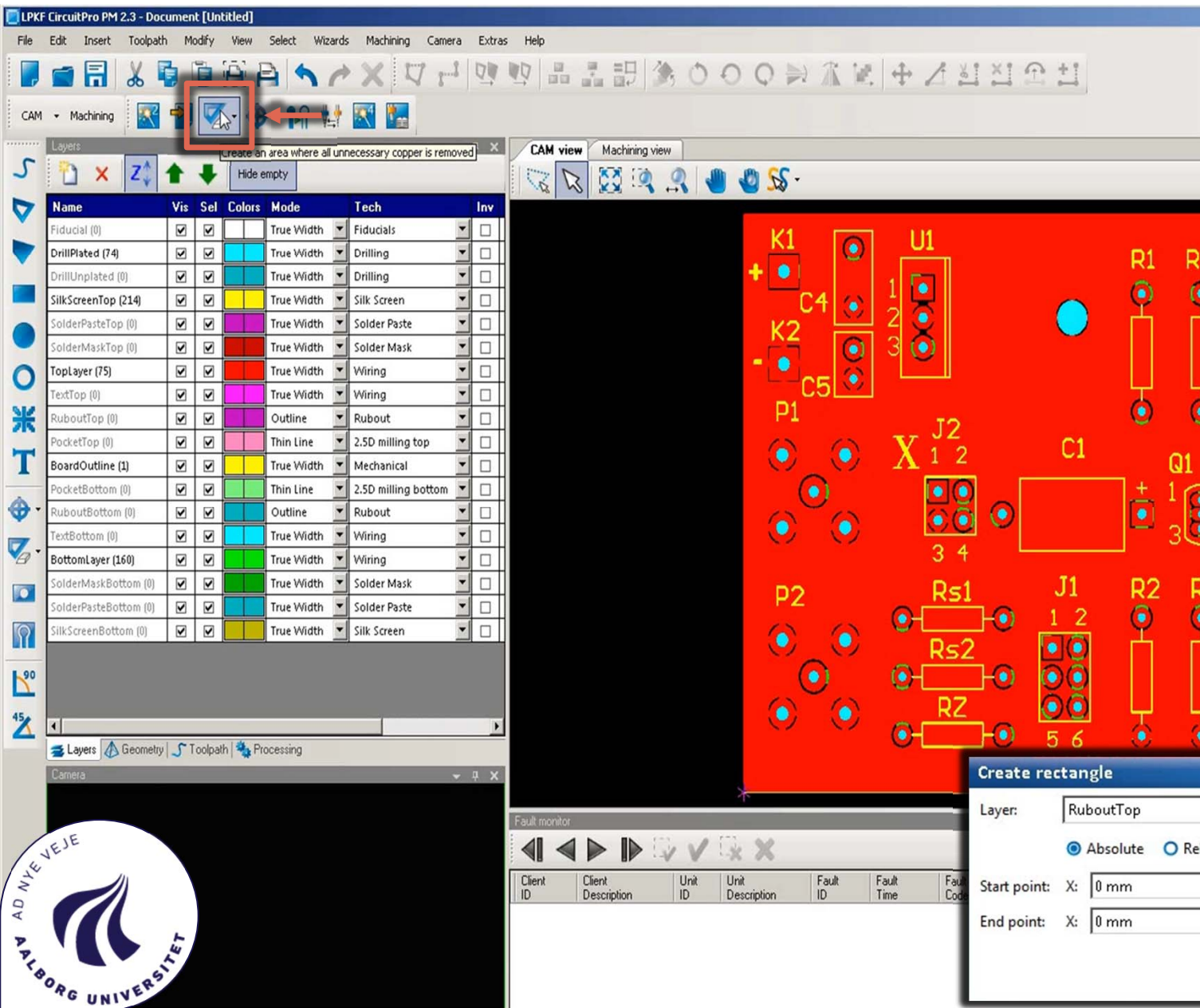
2D View Apertures/Tools Text View Message View

50.00
25.00
-0.00

mm -0.00 26.67 53.33 80.00

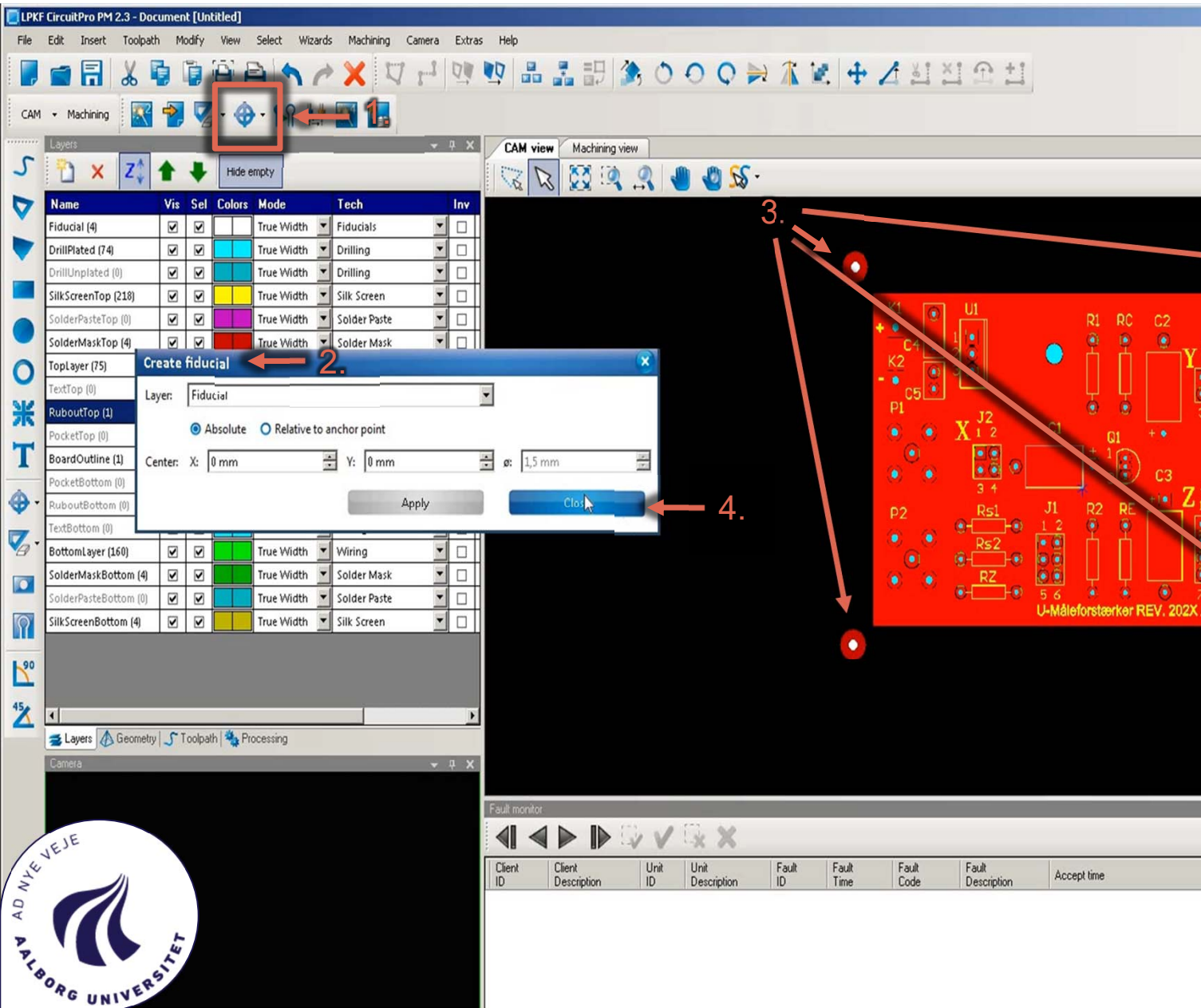
AD NYE VEJE
AALBORG UNIVERSITET

Run ATE... Ok



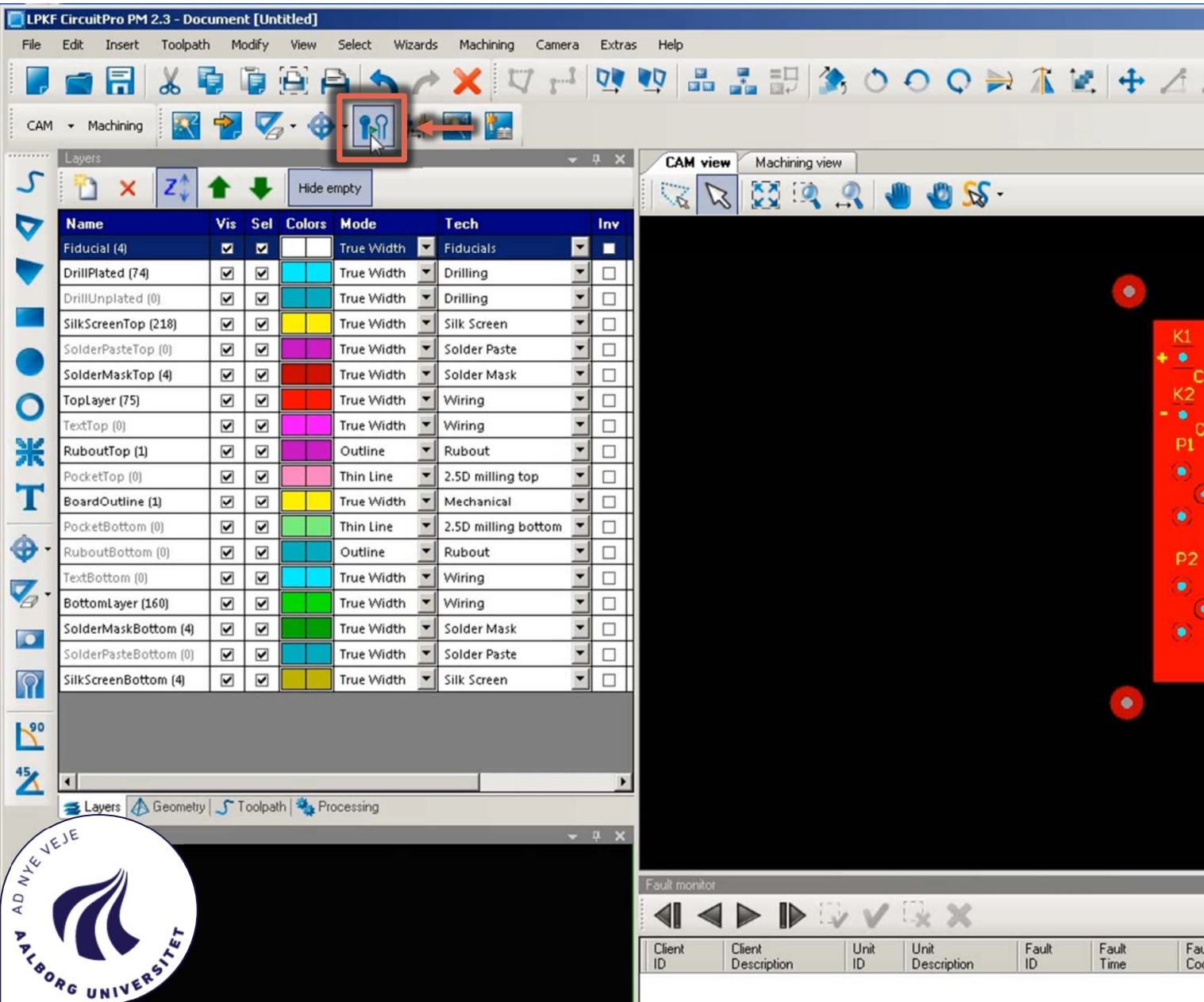
Rubout – fjern et felt af kobber fra printet

- Vælg i drop-down menuen om rubout skal laves på:
 - Rubout all alyers
 - RuboutBottom
 - RuboutTop
- Vinduet "Create rectangle" kommer frem
- Ved indsætning af Rubout, Tryk først på udgangspunktet for Rubout området og tryk igen. Når det markerede felt er det ønskede rubout område.
- Luk vinduet "Create rectangle"



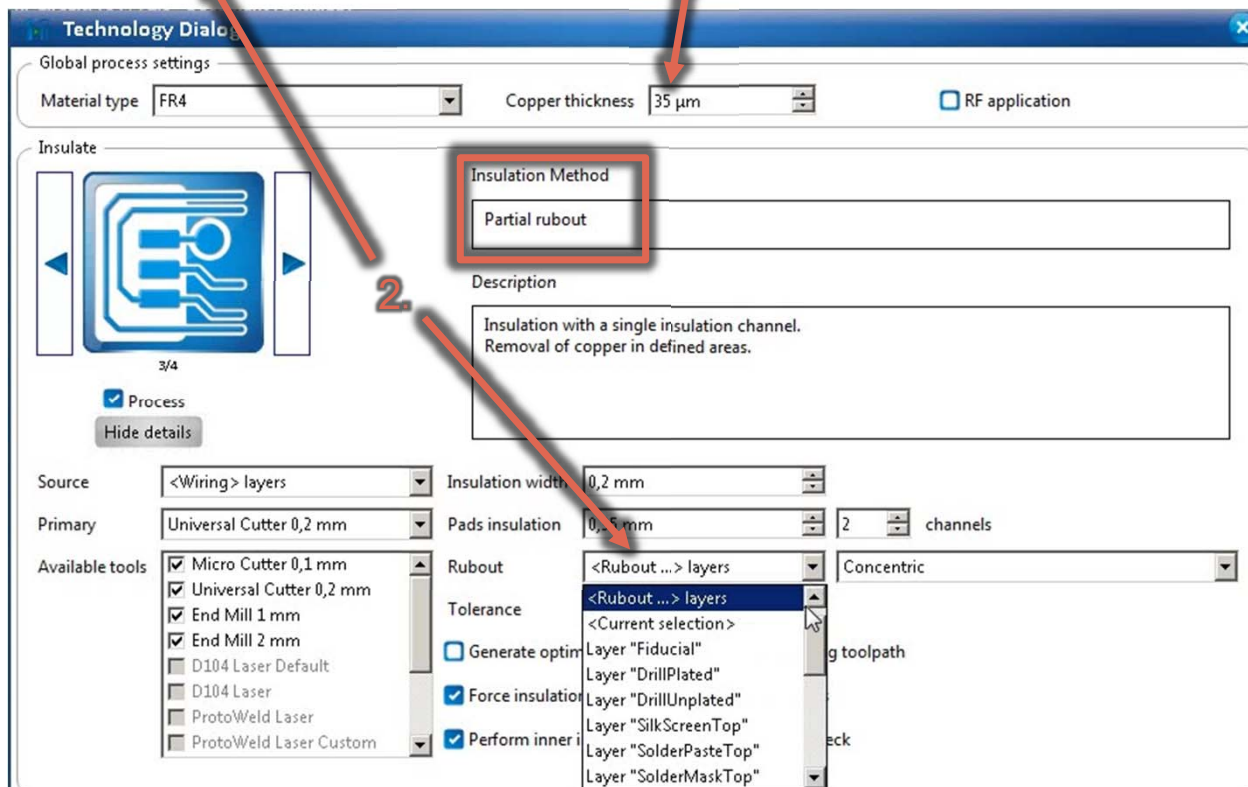
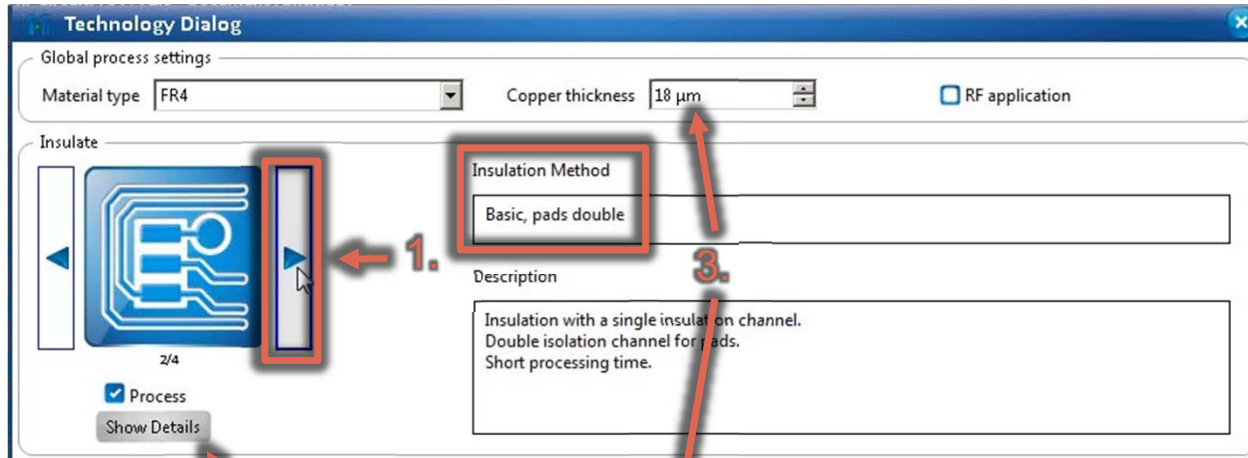
Indsæt Fiducials

1. Vælg "Create fiducial in the CAM view"
2. Vinduet "Create fiducial" kommer frem
3. Indsæt da fiducials: (tryk med musen)
 - Indsæt mindst 3 fiducials
 - Sæt som udgangspunkt 1 fiducial pr. hjørne på PCB'et
 - Sæt fiducial ca. 1 cm ud fra PCB'ets hjørner
4. Luk vinduet "Create fiducial"



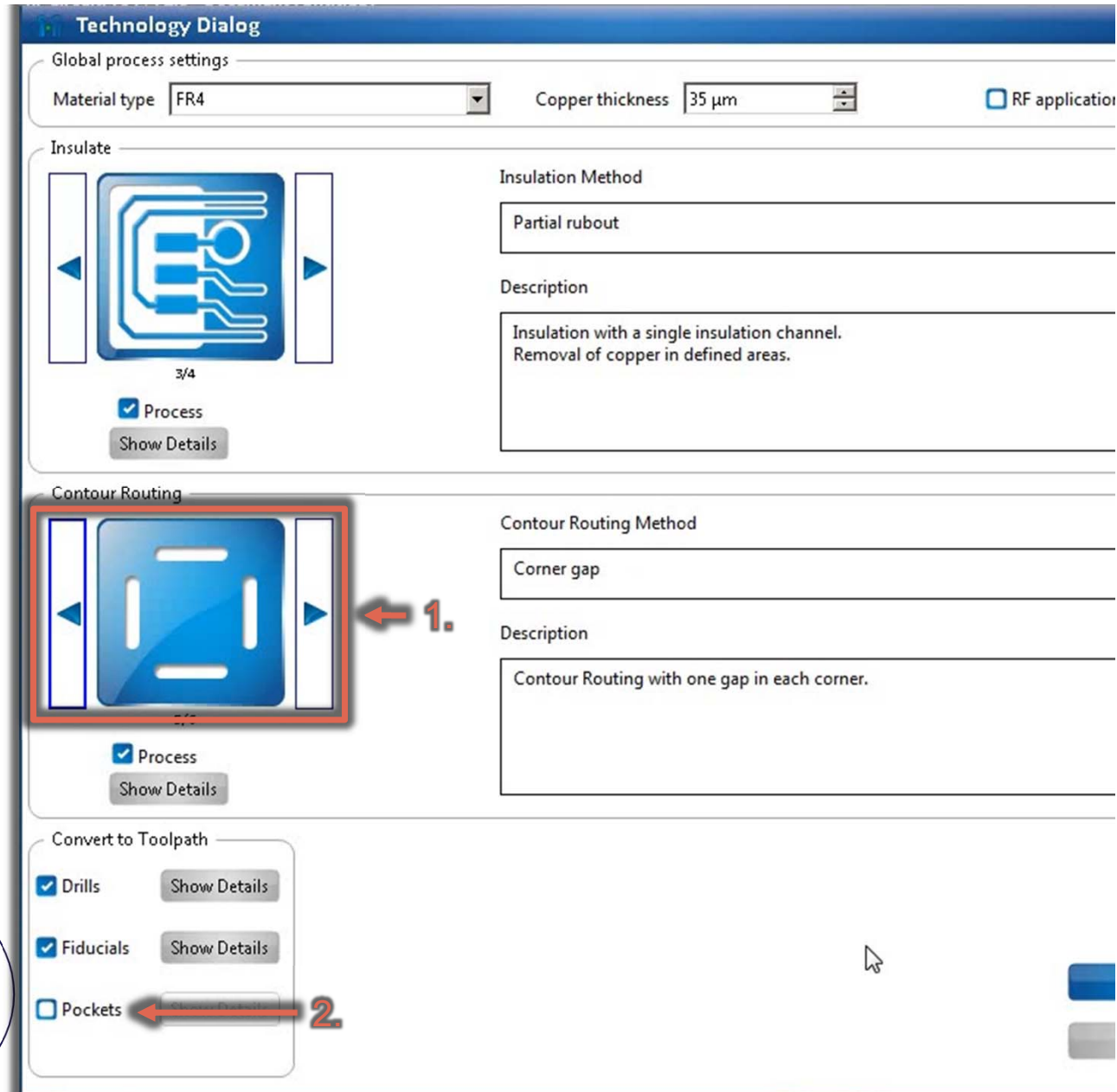
Generate Insulate and contour routing toolpath





Vælg Insulate

1. Vælg Insulate:
 - Hvis du ikke har Rubout brug da "Basic, pads double"
 - Hvis du har Rubout, brug da: "Partial rubout"
2. (Hvis du har rubout)
 - Tryk "show details"
 - Vælg hvilket lag der skal lavet rubout på
3. Ændre "Copper Thickness" til 35 µm



Vælg Contour Routing

1. Vælg Contour Routing:
 - Vælg hvad der passer dig, men "Corner gap" er at foretrække
 - Undgå at bruge "no gaps"
2. Uncheck "Pockets"

Computation Results

Required Tools

Conical Tools:
 1x Universal Cutter 0,2 mm (3325,4 mm)
 1x Micro Cutter 0,1 mm (53,8 mm)

Drilling Tools:
 1x Spiral Drill 2 mm(5 strokes)
 1x Spiral Drill 0,9 mm(31 strokes)
 1x Spiral Drill 0,8 mm(22 strokes)
 1x Spiral Drill 0,7 mm(3 strokes)
 1x Spiral Drill 1 mm(3 strokes)
 1x Spiral Drill 1,2 mm(14 strokes)
 1x Spiral Drill 1,5 mm(4 strokes)

Contour Router:
 1x Contour Router 2 mm (257,4 mm)

Close
Save...
Print...

Show more

<none>

Micro Cutter 0,1 mm
 Universal Cutter 0,2 mm
 End Mill 1 mm
 End Mill 2 mm
 Contour Router 1 mm
 Contour Router 2 mm
 Spiral Drill 0,7 mm
 Spiral Drill 0,8 mm
 Spiral Drill 0,9 mm
 Spiral Drill 1 mm
 Spiral Drill 1,2 mm
 Spiral Drill 1,5 mm
 Spiral Drill 2 mm
 D104 Laser Default
 D104 Laser Precut
 D104 Laser
 D104 Laser Precut default
 ProtoWeld Laser
 ProtoWeld Laser Custom
 Dispenser Tool 0,40 mm

Hide in 2D
 Display in 3D
 Cut
 Copy
 Transform...
 Export...
 Deactivate toolpath
 Assign to Phase
 Assign Tool
 Move up
 Move down
 Process Toolpath
 Delete

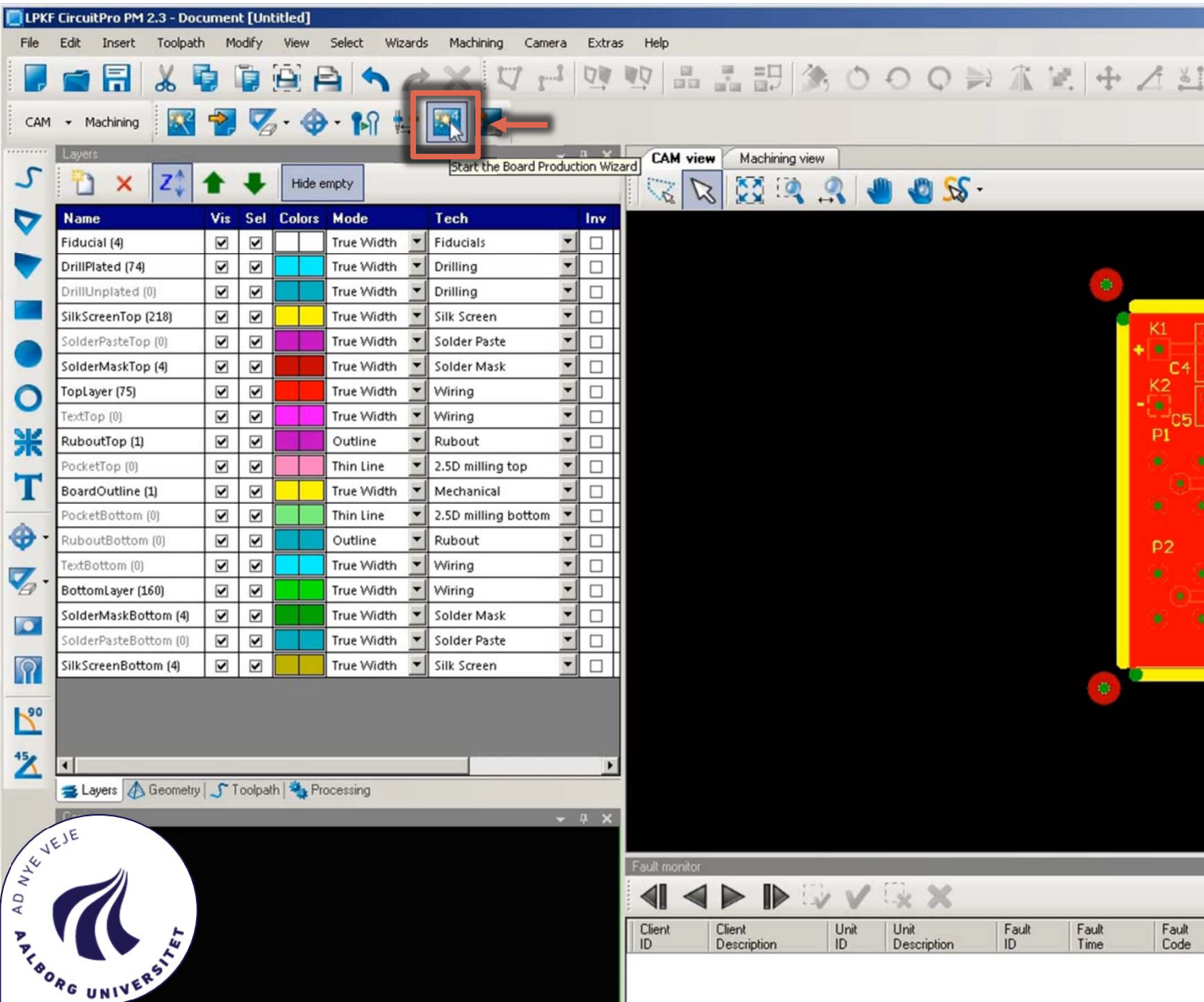
Computation Results:

- Der skulle helst ikke være nogle errors
- Hvis der er vil det typisk være fordi der er valgt bor størrelser til printet, der ikke defineret.

Note:

Hvis der er valgt borstørrelser der ikke passer på de definerede borstørrelser, marker da hullet i "CAM view", venstreklik, vælg "Assign Tool" og vælg det ønskede bor på listen





Start "Board Production Wizard"



Board Production Wizard

CircuitPro

LPK
Laser & Elec

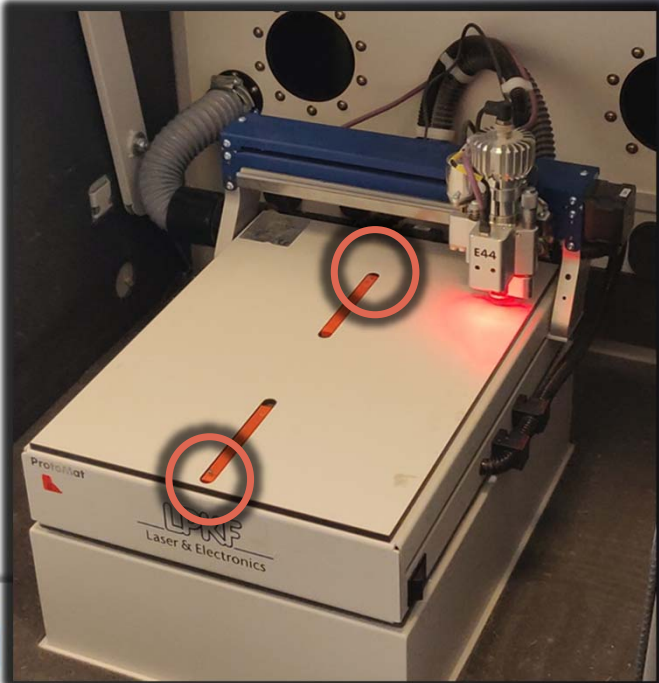
Mount material

Overview

- Mount material
- Material settings
- Placement
- Drill fiducial
- Marking drills
- Drilling plated
- Drilling unplated
- Milling layer 'TextBott...
- Milling bottom layer
- Bottom 2.5D milling i...
- Flip material
- Read fiducials on top ...

Mount the base material with underlay plate underneath on processing area and affix it with tape.

Start



Sæt materiale i fræser

- FR4 pladen skal sættes på de to "tapper" på fræseren (Vist på billedet under)
- Pladen tapes da fast i hjørnerne, for at den ikke hæver sig.



Material Settings

Application

PCB

Front panel/Engraving (2.5D)

Properties

Material Type: FR4

Copper Thickness [μm]: 35,0

Material thickness: 1,61 mm

Underlay plate thickness: 2 mm

Location

Click into the machine area to move the active head to the associated position.

Use the buttons to set the front left and right rear corner of the material.

Please make sure that the working-depth limiter of the machine head does not touch the tape used to fix the material.

Current head position

X: 12,998 mm

Y: 20,239 mm

Z: 0 mm

Material width: 229 mm

Material length: 305 mm

Surface level [{0}]: <undefined>

Material corners [mm]: (0,50 / 5,50) : (229,50 / 310,50)

Continue Close Abort

Material Settings:

- Definer området på FR4 pladen du vil bruge ved at i "Machining view" flyt fræseren til øverste højre hjørne eller nederste venstre hjørne af det område du ønsker at benytte, når du er i de givne positioner tryk da på ikonerne for hhv. nedre venstre og øvre højre hjørne.
- Eller tryk "Continue", hvis du bruger en ny plade.

Placement

Relative translation[mm]

dX: 139,682 mm dY: 96,515 mm

Set center

Rotation

Angle 180°

Step and Repeat

Number of copies

X: 1 Y: 1

Spacing between copies[mm]

X: 0 mm Y: 0 mm



Reset

Continue Apply Material settings Abort

Placement

- I Machining view kan printet nu placeres på pladen ved at trække det til den ønskede placering
- Hvis man ønsker flere ens print, kan man gøre det i vinduet under "Step and Repeat", sæt som minimum 3mm spacing mellem print, for at den ikke tager fejl af fiducials og ødelægger produktionen.


Board Production Wizard

 CircuitPro 

Overview

- Mount material
- Material settings
- Placement
- Drill fiducial**
- Marking drills
- Drilling plated
- Drilling unplated
- Milling layer 'TextBott...
- Milling bottom layer
- Bottom 2.5D milling i...
- Flip material
- Read fiducials on top ...

Drill fiducial



Current Step progress

Total production progress

Next

Fræsning påbegyndes

- Følg anvisningerne om skift af bor. Som vist nedenfor: Tryk først OK, når boret er skiftet.

i Tool Exchange

Please remove the loaded tool and insert the following tool: Spiral Drill 1,5 mm
Click OK to continue. Click Cancel to abort the production process.



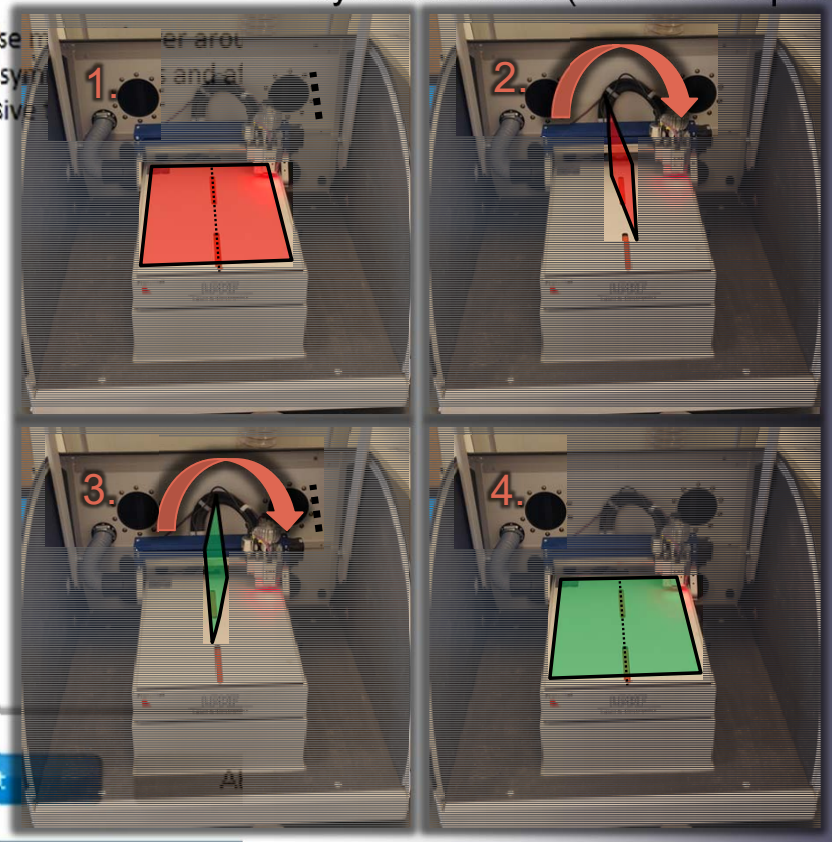


Flip material

- Overview
- Mount material
- Material settings
- Placement
- Drill fiducial
- Marking drills
- Drilling plated
- Drilling unplated
- Milling layer 'TextBott...
- Milling bottom layer
- Bottom 2.5D milling i...
- Flip material
- Read fiducials on top ...



Flip the base
machine's sym
with adhesive



Flip material

- Følg anvisningerne om at vende materialet om den længste symmetriakse. (Vist med stiplelinje)

Next

