PCB 生 產 流 程
PCB Process Flow Chart

製表:2015/08/01

PCB Process Flow Chart

工程製前 Pre-Engineering → 發料 Material releasing → 內層線路 Inner Layer Trace → 自動光學檢測 A O I → 壓合 Lamination →

鑽孔 Drilling → 一次銅 PTH → 乾膜線路 Dry Film Image Transfer → 二次銅 Pattern Plating → 中檢&AOI Inspection →

防焊印刷 Solder Mask → 表面處理 Surface metalized → 文字 Silk Legend → 成型 Router → 測試 Test O/S →

成品檢驗 Final Inspection → 包裝 Packing → 出貨 Shipping

CIRCUITECH

工 程 製 前 生 產 流 程

"Pre-Engineering" Process Flow Chart

OP ：將客戶之原始資料,依廠內各製程能力,成本、效率、良率、之考量轉換成工單作為製造之標準.
CAM: ：將客戶的資料轉換成工廠可生產的資料；同時製作生產 所需之工具。
OP ：Checking Gerber of customer under PCB processes capability and create suitable processes flow chart with spec for production line following.
CAM: Uses Gerber file of customer to edit working panel tools for PCB processes, including artwork film and NC program.

流程介紹 Detail processes flow

OP

客 戶 原 稿 Original Gerber checking → OP 設 計 Create OP → 阻抗設計與排版 → CAM 製 作 CAM edition → 工單問題詢問 Release DFM →

鑽 孔 檢 查 NC drilling checking → 測試程式製作 Net list program → 檢修程式製作 VRS program

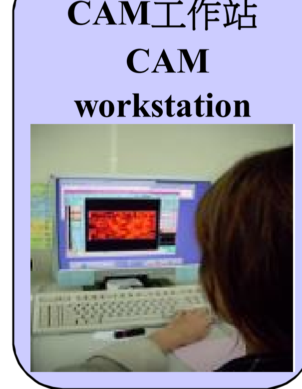
CAM

客戶原稿 Original Gerber → CAM製作 CAM edition → 出鑽孔程式 Create NC drilling program → CNC程式製作 Create CNC routing program → 成型圖製作 Create outline drawing →

V-CUT圖製作 Create V-cut drawing → 底片繪製與壓膜 → 底片檢查與原稿校對 → 底片scan檢修 Artwork scanning → 底片量測 Artwork inspection

單元介紹 Key Stage

CAM工作站 CAM workstation



壓 膜 機 Protective film lamination

沖 片 機 Artwork developer

繪 片 機 Plotter

底片檢查機 Film inspector

八目檢查機 Artwork inspector

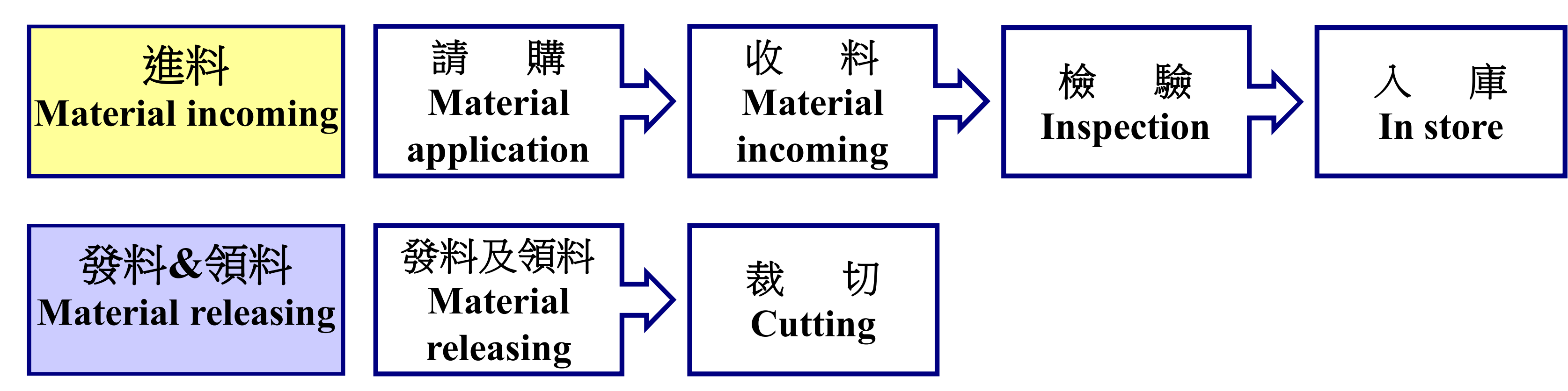
物 管 課 生 產 流 程

"Material Management" Process Flow Chart

物管：依工程設計基板規格及排版圖裁切生產工作尺寸。

Material Management: As OP instruction, cut material into suitable working panel size and release to Inner layer or drilling process.

流程介紹 Detail processes flow



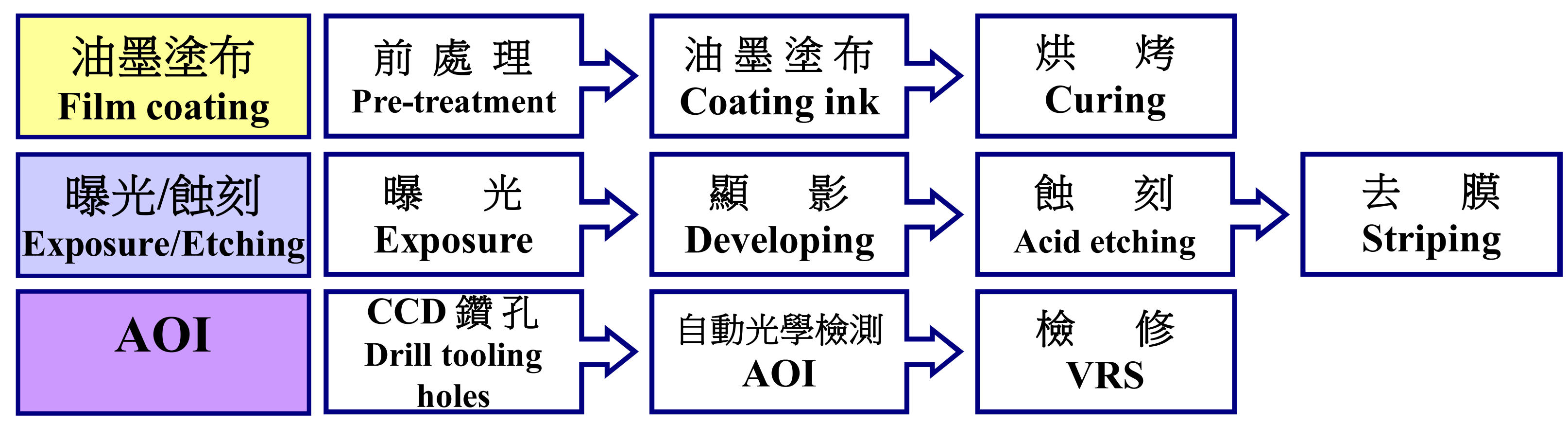
單元介紹 Key Stage

“Inner Layer” Process Flow Chart

內層：在基板表面塗布感光油墨，利用影像轉移的方式將線路圖形轉移到基板表面油墨上，再通過顯影、蝕刻和去膜的製成製作內層板。

Inner Layer：Coating the film of photosensitive ink by roller on the CCL surface, transfer the pattern on CCL with UV light through artwork film, like photo; then have the development, etching and striping stage to finish whole process.

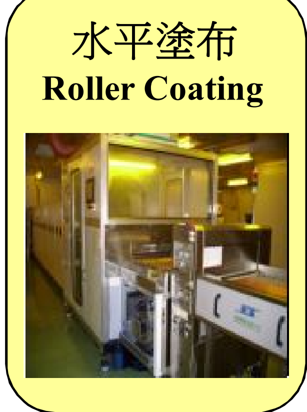
流程介紹 Detail processes flow



單元介紹 Key Stage

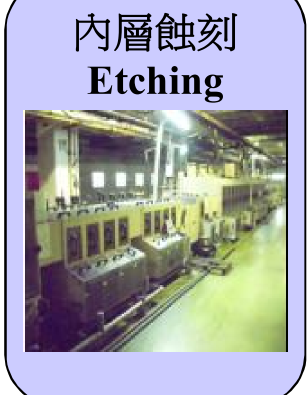
內層前處理
Pre-treatment

水平塗布
Roller Coating

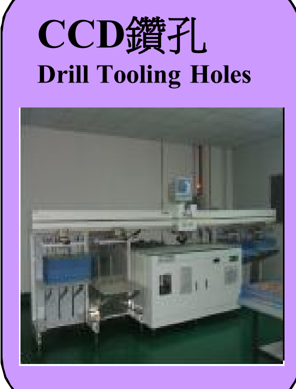


曝 光
Exposure

內層蝕刻
Etching



CCD鑽孔
Drill Tooling Holes



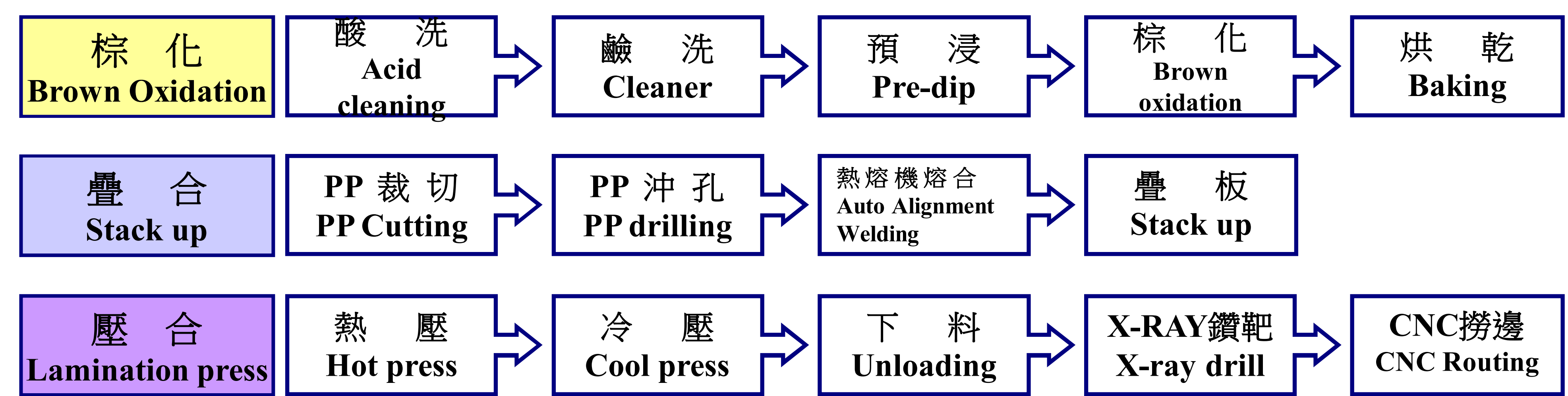
自動光學檢測 **AOI**

壓 合 課 生 產 流 程
“Lamination” Process Flow Chart

壓合：利用熱壓合的方式將經表面處理過的內層板、銅箔和與之相對應的半固化膠片進行熱壓、固化成一個整體(亦即後續生產中的覆銅板)。

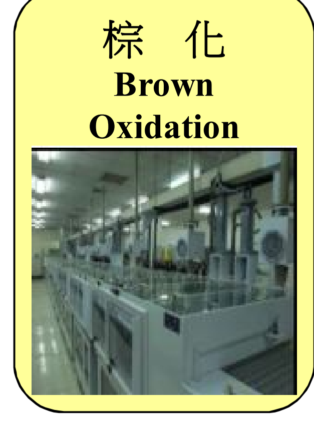
Lamination Press：Put inner layer, prepreg and copper foil together as stack up construction, then press them through high temperature and pressure to becoming CCL .

流程介紹 Detail processes flow

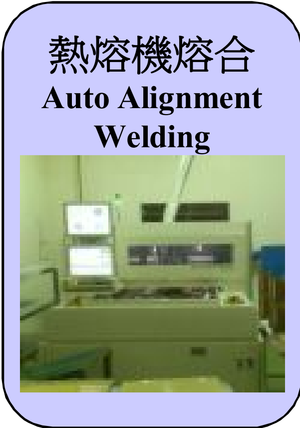


單元介紹 Key Stage

棕 化
Brown Oxidation

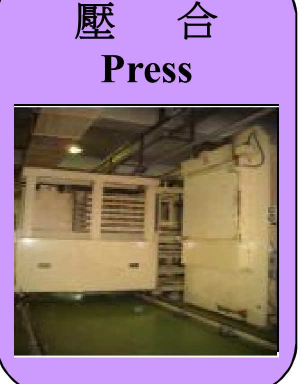


熱熔機熔合
Auto Alignment Welding



疊 合
Stack Up

壓 合
Press



X-RAY鑽靶
X-RAY drill

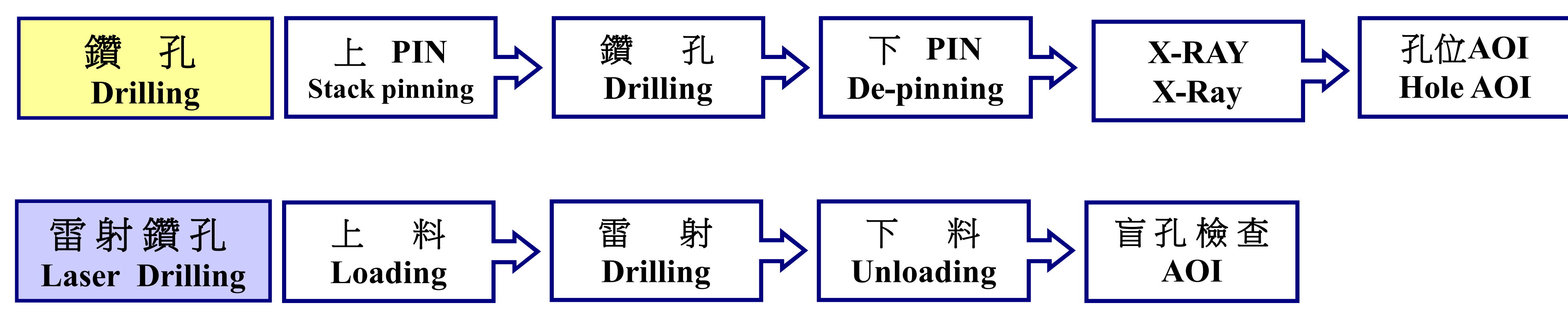
CNC撈邊
CNC Routing

鑽孔課生產流程
“Drilling” Process Flow Chart

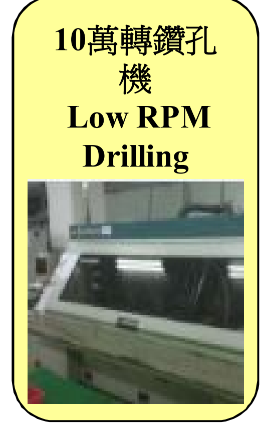
鑽孔：根據製前工程的鑽孔資料，在覆銅板的既定位置鑽出所需要的孔。

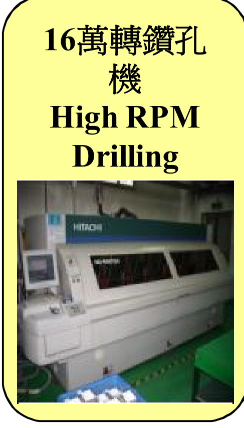
Drilling：As NC program in the Gerber file, drill all holes for through holes copper plating purpose to connect each layers as customer’s design.

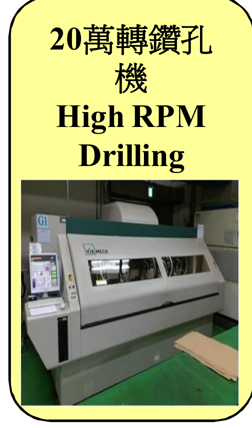
流程介紹 Detail processes flow

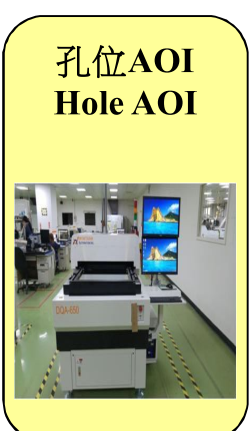


單元介紹 Key Stage









CIRCUITECH 一 銅 課 生 產 流 程

"Panel Plating" Process Flow Chart

一次銅：首先用化學反應的方式將通孔內膠渣去除，再利用化學沉銅的方法在不導電的通孔壁沉積上可導電的化學銅，然後還用電鍍方法在化學銅表面鍍上金屬銅。

Panel Plating：De-smear first to remove resin residues on holes wall by chemical, following by electricless for copper metal deposition then doing electric copper plating again to get around 0.2 mils of copper conductive thickness; purpose is to let each layer connection.

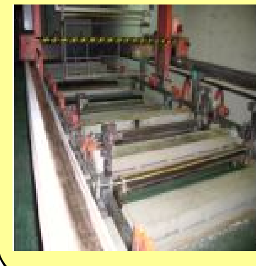
流程介紹 Detail processes flow

去膠渣/化學鍍銅 De-burr /Immersion Copper	膨　鬆 Fluffy →	高錳酸鉀 Permanganate →	中　和 Counteraction →	整　孔 Conditional →	微　蝕 Micro-etching →
	預　浸 Pre-dip →	活　化 Activation →	速　化 Rapid →	化學銅 Electroless copper	
一次銅 Panel plating	酸　浸 Acid dip →	化學銅 PTH →	一銅 VCP →	電鍍填孔 Hole plating	
自動調壓磨刷機 Automatic grinding machine	放　板 Loading →	磨　刷 Brushing →	水　洗 Rinse →	烘　烤 Air-blowing	

單元介紹 Key Stage

去毛頭機 De-burr

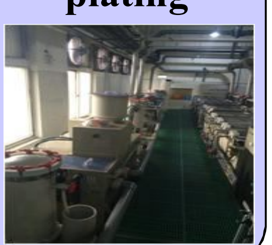
除膠渣 De-smear



化學銅 PTH

一次銅 VCP

電鍍填孔 Hole plating



驗孔機 Hole Inspector

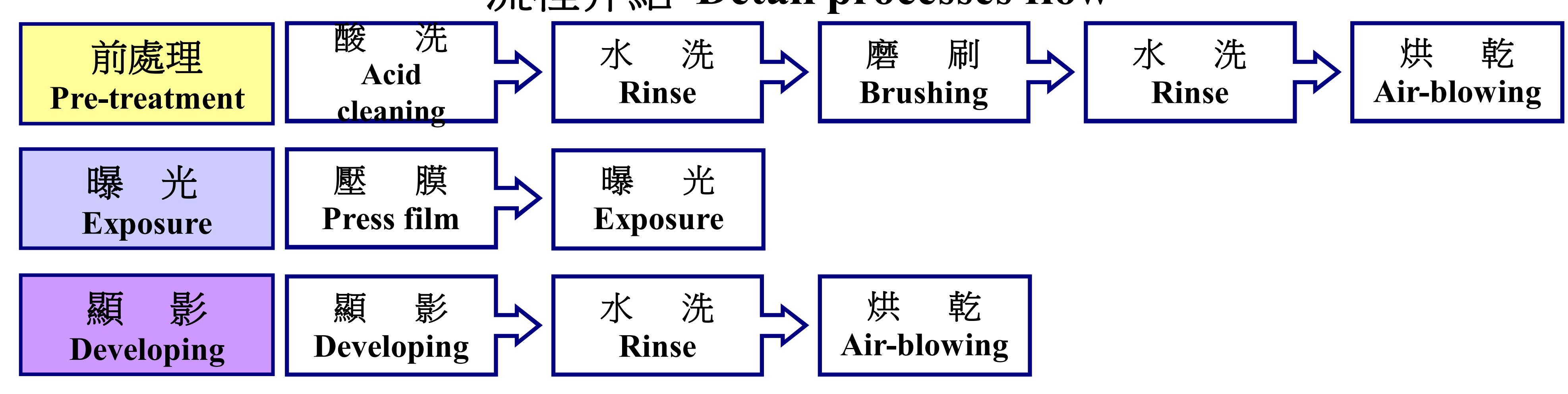
自動調壓磨刷機 Automatic

乾 膜 課 生 產 流 程
“Dry Film” Process Flow Chart

乾膜：利用影像轉移的方式將外層線路部份的圖像轉移到貼附於PC板上的感光乾膜上，然後用碳酸鈉溶液將覆蓋在線路上的膜溶解，使銅面顯影出來，方便後續二次銅電鍍作業。

Dry Film：Press dry film (a sensitive material) on multilayer CCL. Make external layer pattern by UV light through artwork, similar inner layer process; next developed by alkaline solution to remove dry film for copper pattern plating.

流程介紹 Detail processes flow



單元介紹 Key Stage

外層前處理 Pre-treatment

壓 膜 Press film

曝 光 LDI

曝 光 Exposure

顯 影 Developing

自動光學檢測AOI

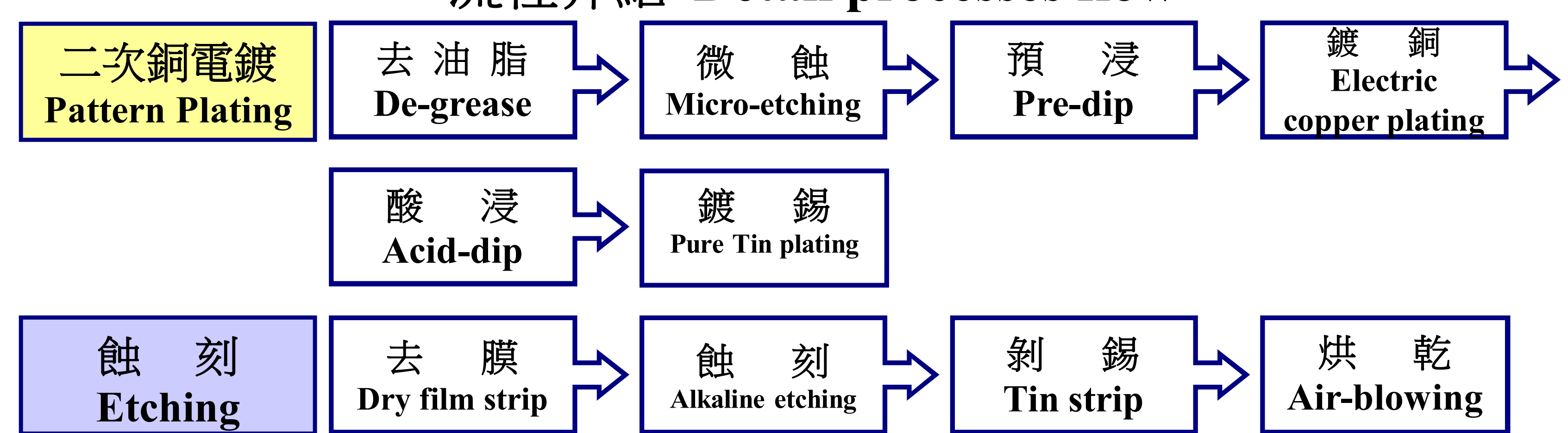
二 銅 課 生 產 流 程

“Pattern Plating” Process Flow Chart

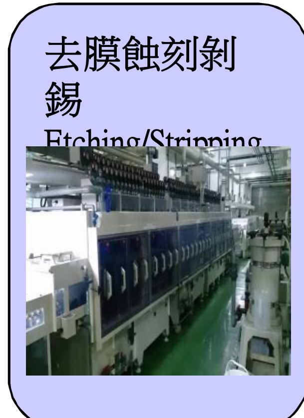
二次銅：通過電鍍的方式將乾膜後的半成品PC板之導通孔的銅厚度增加到客戶需求的厚度，再經過去膜蝕刻去除不需要的表面銅，保留需要的線路。

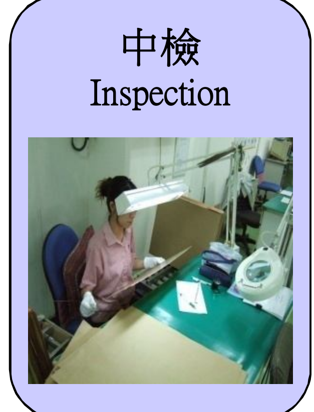
Pattern Plating：Increasing external layer pattern conductive thickness through electric copper plating, up to the spec as customer’s design and request.

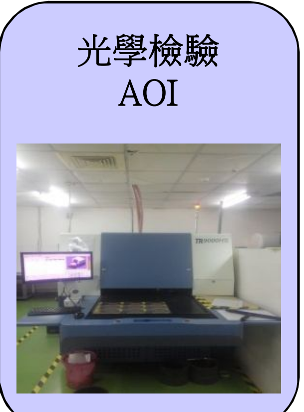
流程介紹 Detail processes flow



單元介紹 Key Stage







CIRCUITECH

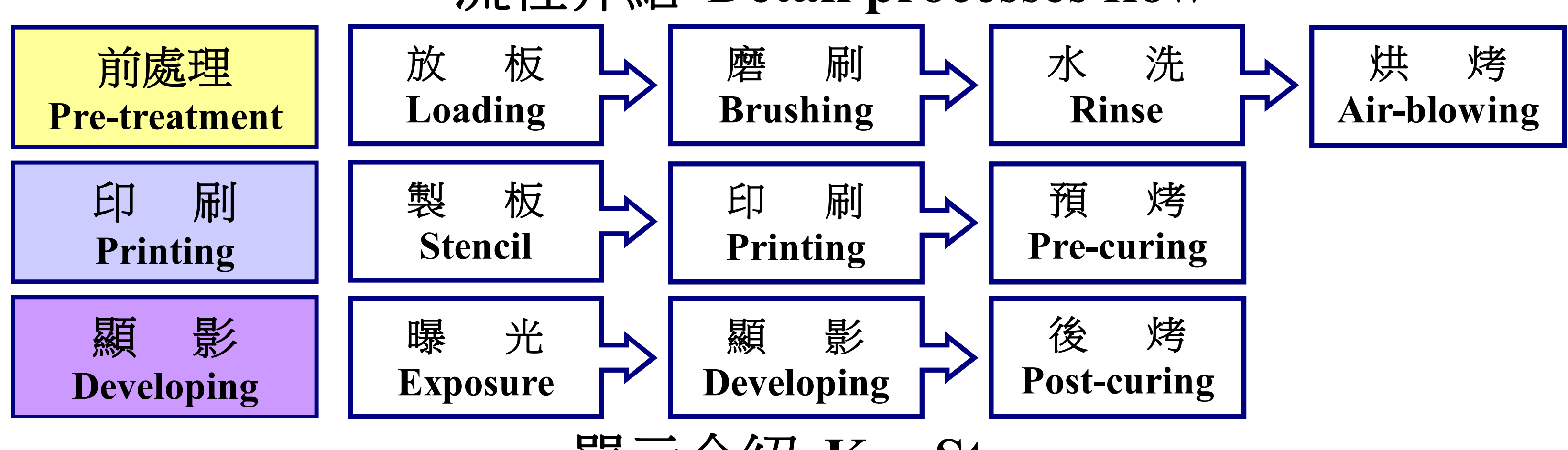
防 焊 課 生 產 流 程

“Solder Mask” Process Flow Chart

防焊：在半成品PCB表面表面塗布感光阻焊油墨，利用影像轉移方式將各式圖形轉移至PCB板上，再通過顯影及烘烤方式使油墨附著故化，以達到絕緣阻焊之目的。

Solder Mask：Coating solder mask by silkscreen printing on bare PCB; solder mask is one kind of sensitive ink, will form a sensitive film after low temperature pre-curing. Next by photo method with high power UV light to do initial curing, except partial selective pads or holes designed for assembly and solder mask on those selective pads or holes will be removed by alkaline solution under developing, following baking again to do final curing for hardness increasing to protect the pattern.

流程介紹 Detail processes flow



單元介紹 Key Stage

防焊前處理
Pre-treatment

製網板
Stencil

印 刷
Printing

曝 光
Exposure

顯 影
Developing

後 烤
Post-Curing

加 工 課 生 產 流 程

“Hot Air Solder Leveling” Process Flow Chart

表面處理：噴錫 / 無鉛噴錫 / 化金 / 鍍金

Surface metalized ：HASL / Lead Free HASL / Chemical Gold / ImmersionGold

流程介紹 Detail processes flow

表面處理
Surface metalized

進 料
Loading

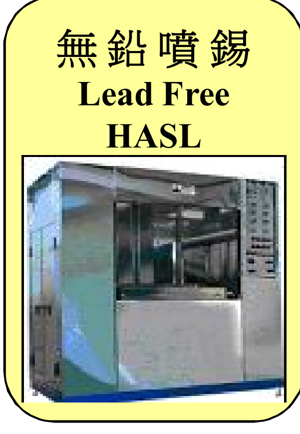
表 面 處 理
Surface metalized

外 觀 檢 驗
Visual inspection

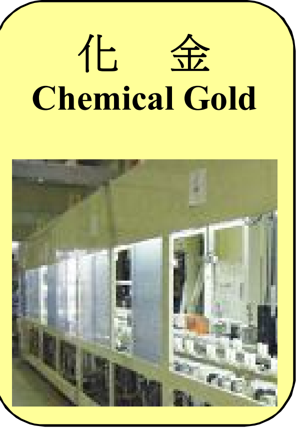
單元介紹 Key Stage

噴 錫
HASL

無 鉛 噴 錫
Lead Free HASL



化 金
Chemical Gold



鍍 金
Immersion Gold

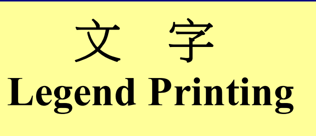
文 字 課 生 產 流 程

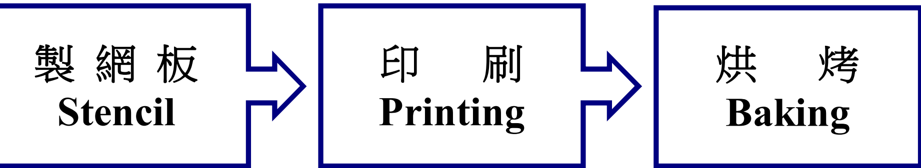
“Legend Printing” Process Flow Chart

文字：利用網板之文字， 標示圖案， 以客戶指定之油墨， 準確印製於 PCB板板面， 以利客戶裝配零件合維修之辨識。

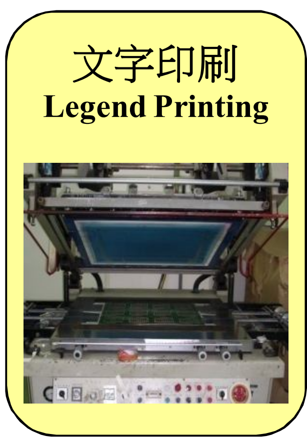
Legend Printing：Print component marks including certain serial numbers on PCB by screen, as customer’s design.

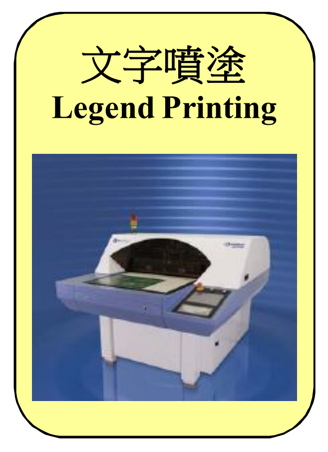
流程介紹 Detail processes flow

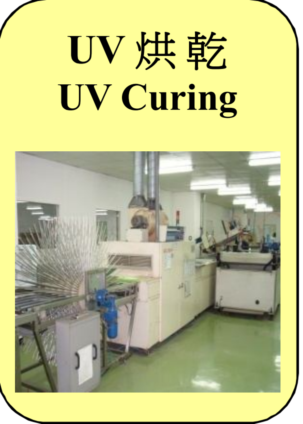




單元介紹 Key Stage







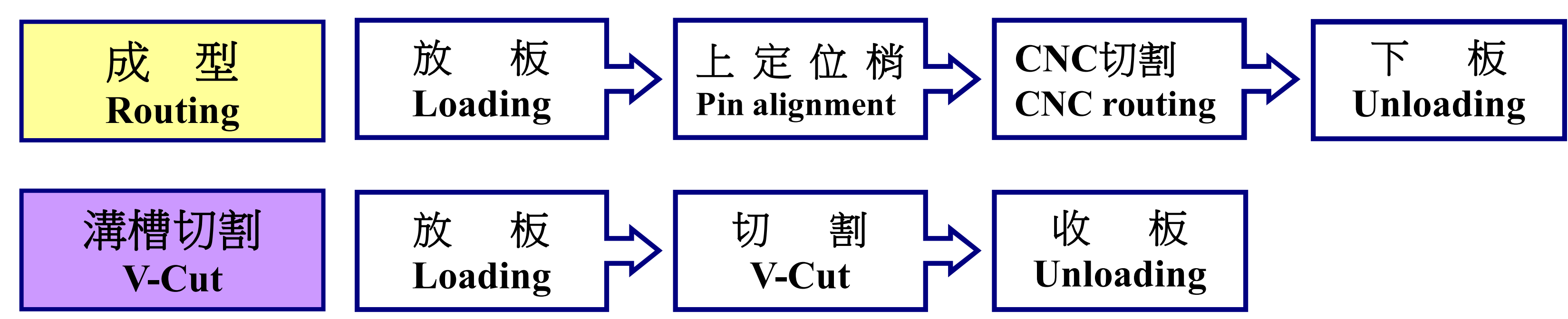
CIRCUITECH

成 型 課 生 產 流 程

“Routing” Process Flow Chart

成型：成型是針對PCB進行切削作業，依製作規範要求切削成客戶需要的尺寸形狀。
V-CUT ：V-CUT是針對PCB折斷邊進行切割作業，依製作規範要求切割成符合客戶要求深度的溝槽。
CNC Routing：Cut out the outline dimension of PCB by NC router machine with router bit or punch machine with punch die, as per customer’s design or request.
V-CUT ：Pre-cut a line on both sides of PCB, between piece to piece or piece to breakaway tab, for separation from panel after customer implement assembly. The spec is usually given by customer or PCB vendors propose for customer confirming.

流程介紹 Detail processes flow



單元介紹 Key Stage

“O/S” Process Flow Chart

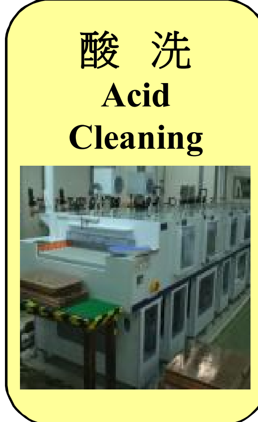
測試：OPEN/SHORT測試是指用電性原理來測試PCB的線路導通品質。

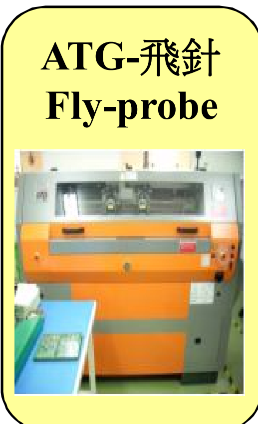
O/S Test：Create a net list program from Gerber file to do trace open/short checking, is a electricity function testing implement for customer; usually 100% implement request by both customer and PCB vendors.

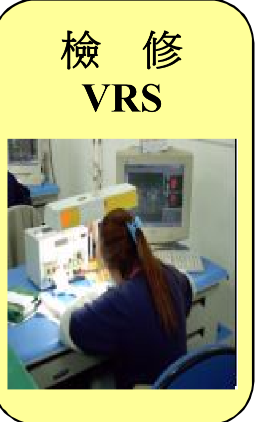
流程介紹 Detail processes flow

複 測
Re-testing

單元介紹 Key Stage







成 檢 課 生 產 流 程
“FQC” Process Flow Chart

外觀檢驗：對PCB產品外觀依客戶需求進行100%的目視檢驗。
OSP ：以無公害的有機物覆蓋於PCB裸露的銅表面，防止銅表面氧化。

FQC：Last implement 100% of PCB appearance inspection by QC visual to make sure good PCB to customers as request.
OSP ：One kind of copper surface treatment by organic chemical film coating to prevent oxidation and helpful soldering during assembly.

流程介紹 Detail processes flow

OQC
OQC

單元介紹 Key Stage

外觀檢驗
Visual Inspection

驗 孔
Hole Inspector

有機保焊
OSP

化 銀
Immersion Silver

化 錫
Immersion Tin

壓 烤
Oven

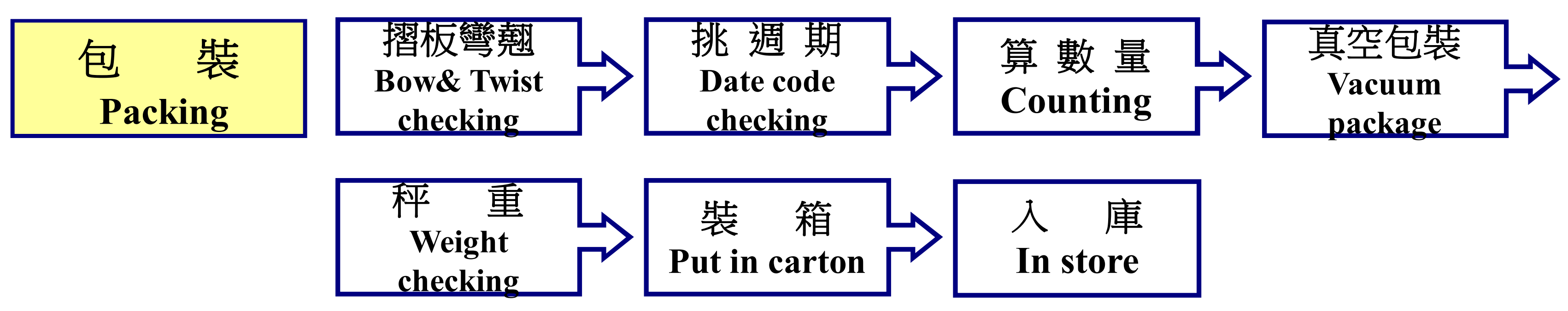
包 裝 課 生 產 流 程

“Packing” Process Flow Chart

包裝：將PCB產品外觀依客戶需求目視檢驗合格之PCB板進行整板分類包裝。

Packing: As customer’s request or internal spec to pack PCB and put in carton for shipment, and must prevent damage during transportation to customer

流程介紹 Detail processes flow



單元介紹 Key Stage