

A Chinese PCB manufacturer full of Japanese PCB Company experience

Sihui Fuji Electronics Technology Co., Ltd.

*Specialized in manufacturing high-reliability PCBs with long-term Quality Assurance especially in the field of **Automotive** and **Industrial** (FA, Electric Power & Motion Control etc.)*



Company Profile



Founded	August 28, 2009
Registered Capital	CNY 56.63 Million (USD 8.3 Million)
Floor Area	42,786 m ²
Building Area	22,376 m ² (Phase 1~3) 26,784 m ² (Phase 4 is scheduled in year 2021)
Personnel	1030 Employees (Aug.2020)
Productivity	80,000 m ² /month (Phase 1 ~ 3) 125,000 m ² /month (With Phase 4 in year 2021)

Geographic Location



Factory: No.2 Electronics Industrial Zone, Xiamao Town, Sihui, Guangdong, China



【Worldwide transition of PCB production base】

- 1960s USA
- 1980s Japan
- 1990s Taiwan China
- 2000s South China (Shenzhen, Dongguan)
- 2010s Inland China (Jiangxi & Hunan province)

Fuji's geographic advantage:

1. Efficient supply chain supports (e.g.: laminate)
2. Sufficient resources (water & electricity)
3. Comfortable environment around
4. Less cost impact compared with Shenzhen
5. Full range of human resource selection
6. Convenient to reach different ports (air & sea)



Depart from Fuji → To Guangzhou airport 1 hour → To Shenzhen airport 3 hours → To Hong Kong airport 4.5 hours

Ample Resources

- Water**
- Power**
- Waste Water Treatment**
- Personnel**

Jianggu Water Reservoir

Transformer substation nearby (1 km)

1,100 tons/day (more supply is possible)

1. 70% of employees are from local area
2. Average 3 years' working experience
3. Employees turnover rate: 5%



Water Reservoir



Waste Water Treatment



Local employee

Current & Future Milestones



2021: Phase 4 (+45K m² to 125K m²)

Y 2020:
Phase 3 (+30K m² to 80K m²), in July become listed Co.

Y 2019:
Sales revenue exceeded 450 Million RMB

Y 2017:
Sales Revenue exceeded 300 Million RMB

Y 2016:
Sales Revenue exceeded 200 Million RMB

Y 2015:
Phase 2 started mass production

Y 2013:
Sales Revenue exceeded 100 Million RMB

Y 2011:
TS16949, ISO14001



Founded on August 28, 2009

Organizational Chart



A system that aims to ensure top quality for customers as Japanese company does

Dong / Jason / Mark

Yamada / GD. Liu

JP. Liu / Ando / CJ. Zhu / SY. Li

EF. Zhao / JQ Du



Marketing

Customer service

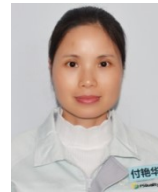
QCD (Production/QE/Equipment)

QA

Most with experience in Japanese company

Working Experience	Percentage
> 5 years	10%
3~5years	40%
1~3years	30%
< 1 year	20%

30 of them have been working here Since Fuji founded



SYSTEM
(YH. Fu)

Assistant to
President
(Nozawa)



30 years working experience in QA department of Japanese motor factory



G M
(Tan Dan)



President
(Liu Tianming)

5 years' study in Japan , 20 years working experience in Japanese PCB shop with Japanese managing philosophy

Customer service window :

- Sales department : 1 Japanese ,13 member can speak Japanese and 7 member can speak English.
- QA department: 2 Japanese, 2 member can speak Japanese and 1 member can speak English.

Company Philosophy

1. Fuji's Culture (Talent-oriented)

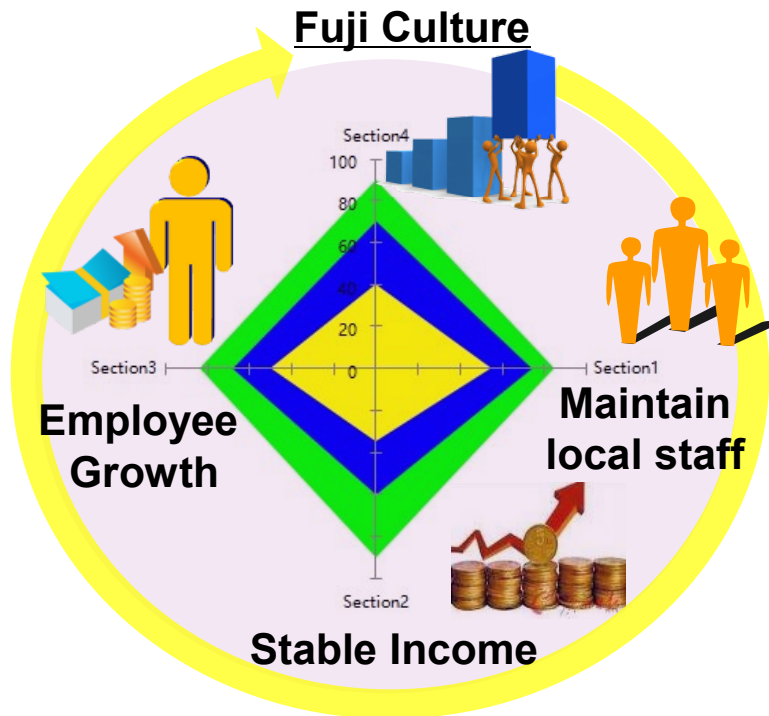
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2. Stable Talents

+

3. Employee Empowerment

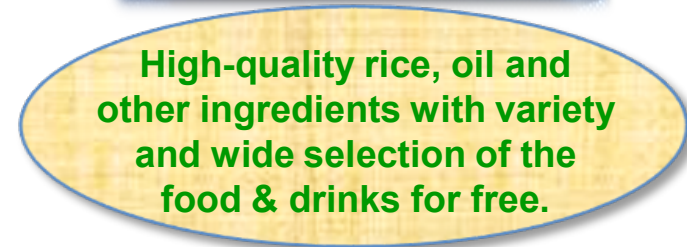
⇒ Excellent Quality ⇒ Customer Satisfaction



Talent Orientated:

1. Employ local staff as 1st priority
2. Free accommodation
3. Encourage couples to work together
4. Good quality of cooking: oil, rice and ingredients
5. No penalty like other PCB shops, but only rewards
6. Monthly face-to-face forum with employees
7. On-site improvement system (proposing rate: 90%)
8. Sound training system

Talent First



Manufacturing & Product Feature



High reliability with long term assurance (especially for Automotive PCBs)

Strong capability of producing multilayers (Max 24 Layers)

Flexibility for medium & small batches (1-500 sqm)
(>3,000 parts/month are being produced)

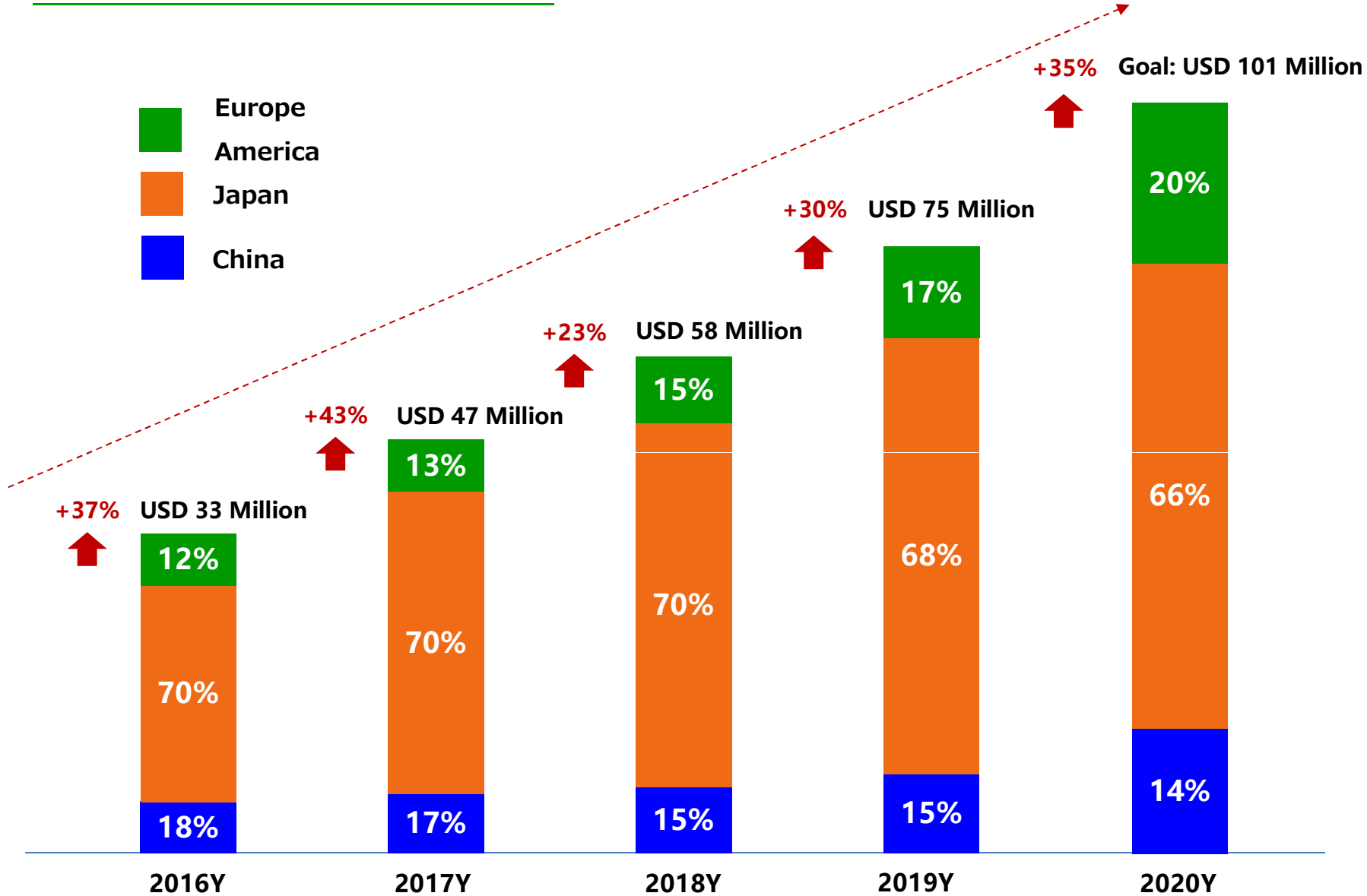
Below lead-time is base on small batch and after raw materials prepared, Batch(urgent) and Fast Run need extra charge.

Layer	Batch (Normal)	Batch (Urgent)	Normal sample	Fast Run
2 L	10 days	3 days	5 days	2 days
4 ~ 6 L	15 days	6 days	8 days	3 days
8 L	20 days	8 days	10 days	3 days
≥10 L	25 days	15 days	15 days	5 days
HDI	30 days	20 days	20 days	8 days

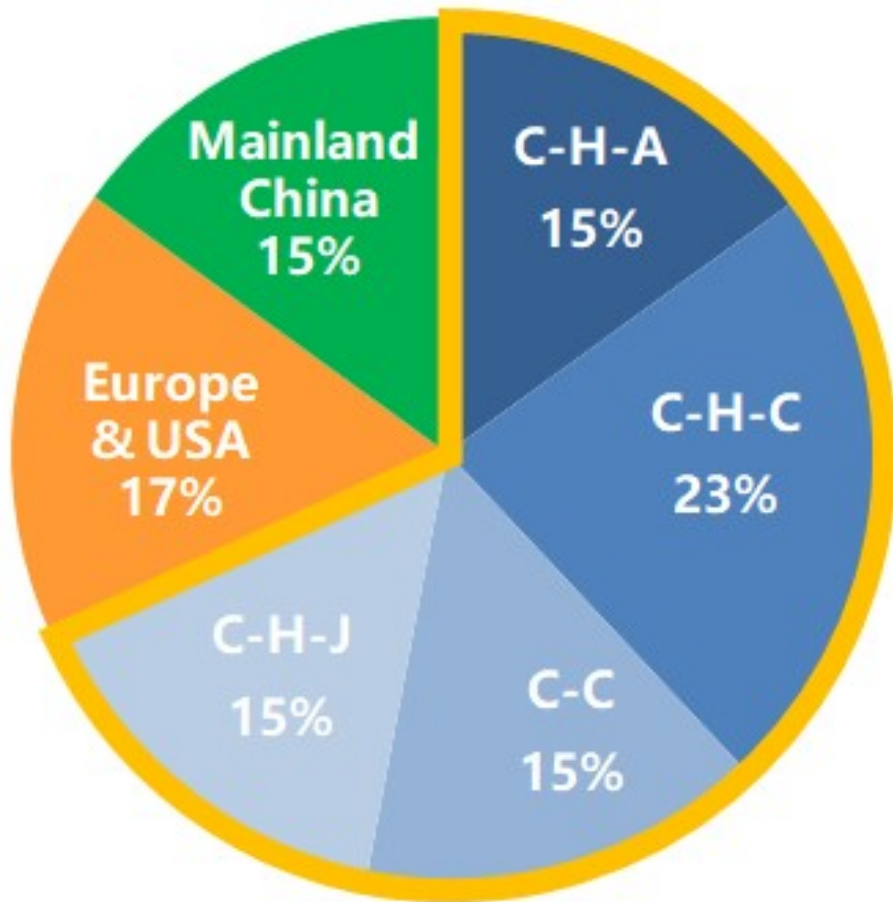
- Surface Treatment:

OSP, LF HASL (Sn-Ag-Cu/Sn-Ni-Cu), **Immersion Gold, Immersion Tin**

Annual Sales Revenue



Sales % classified by region



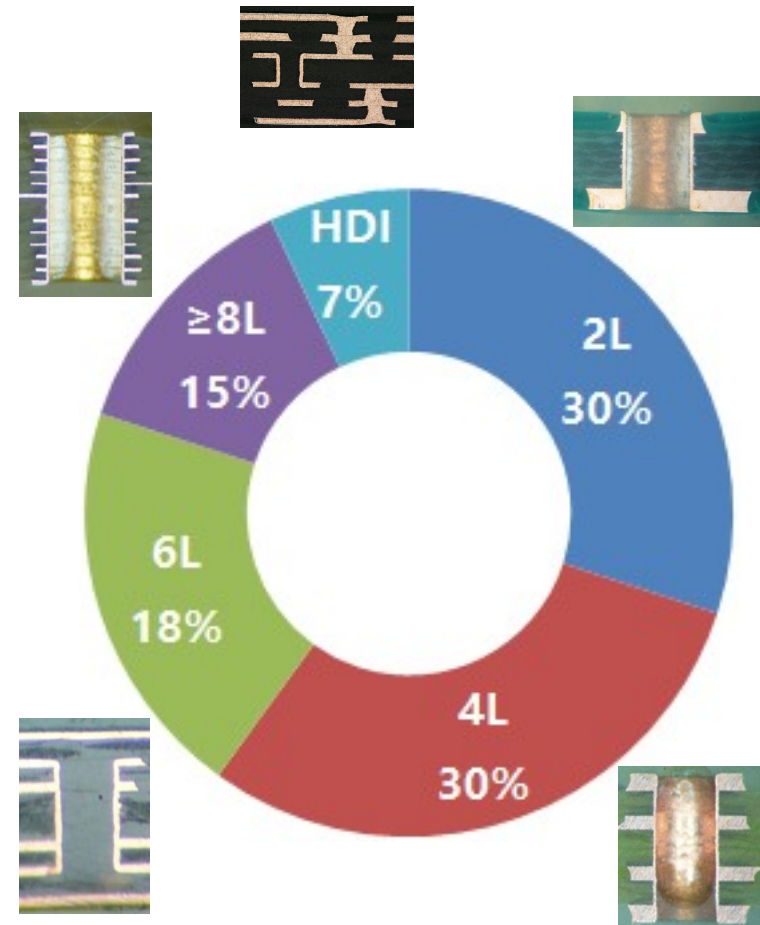
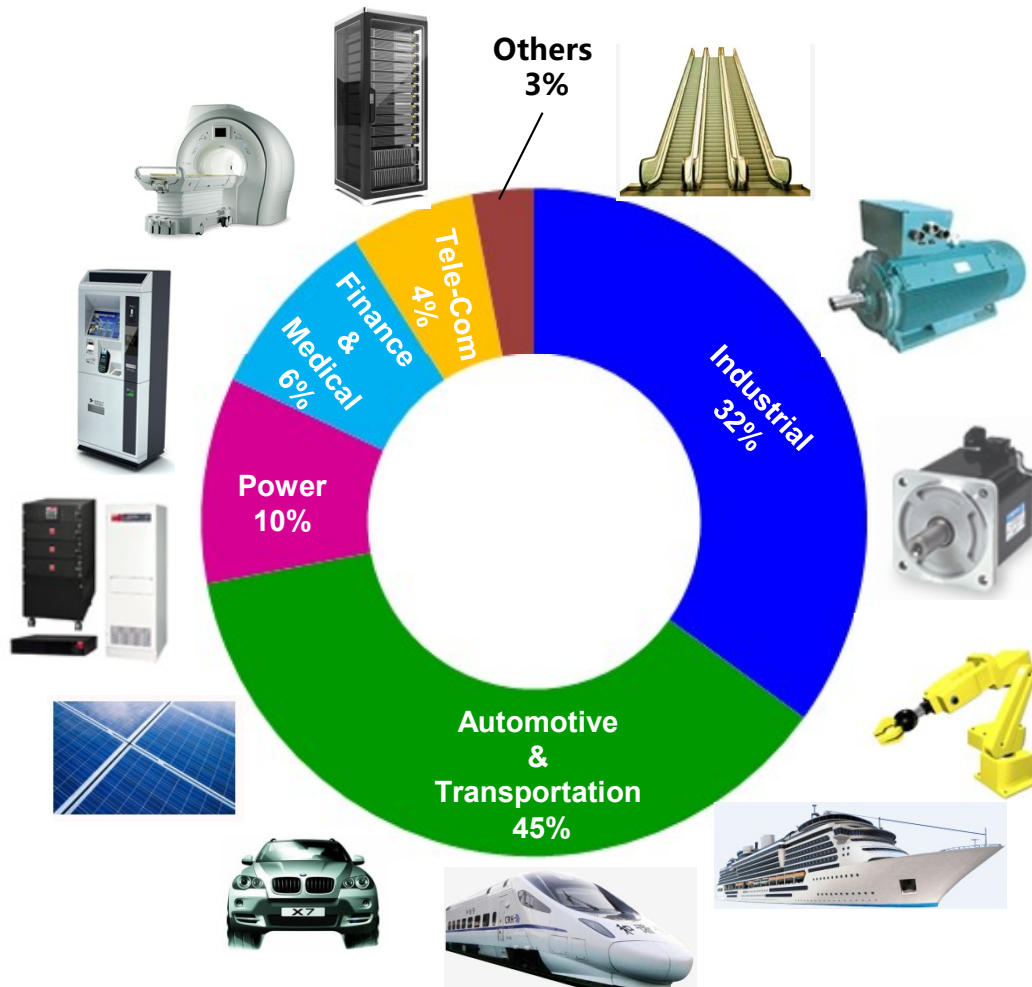
Current: Japan Market (68%)
Future: Europe Market (17% → 40%)

- C-H-A: to Asia Other area (via HK)**
- C-H-C: to Mainland China (via HK)**
- C-C: to Mainland China directly**
- C-H-J: to Japan (via HK)**















Main Applications

Fuji's top priority → European market

1. Industrial (FA & Power) -- Current: 42%
2. Automotive (with safety part) -- Current: 45%



Application example for FA field

Customer	application	Ref. picture	Customer	application	Ref. picture
	PLC			Flow meter	
	Inverter			AMP	
	Encoder			Servo Motor	
	Power			Equipment Touch panel	

Application example for Vehicle & Transportation



Customer	application	Ref. picture	Customer	application	Ref. picture
	Lamp			Junction Box	
	Steering controller			T-Box	
	Air condition controller			Central control screen	
	Door lock system			Antenna	
	Ship navigation			Brake and Traction system	

Application example for Healthcare Field



Maker	Application	Ref. Picture	Maker	Applicaton	Ref. Picture
	CT			X-Ray perspective	
	Infrared thermometer			Medical Ventilator	
	High frequency Massage Device			High pass organization Dewatering machine	
3DISC	Intraoral Scanner		STERIS	Sterilizer	

Other Customers



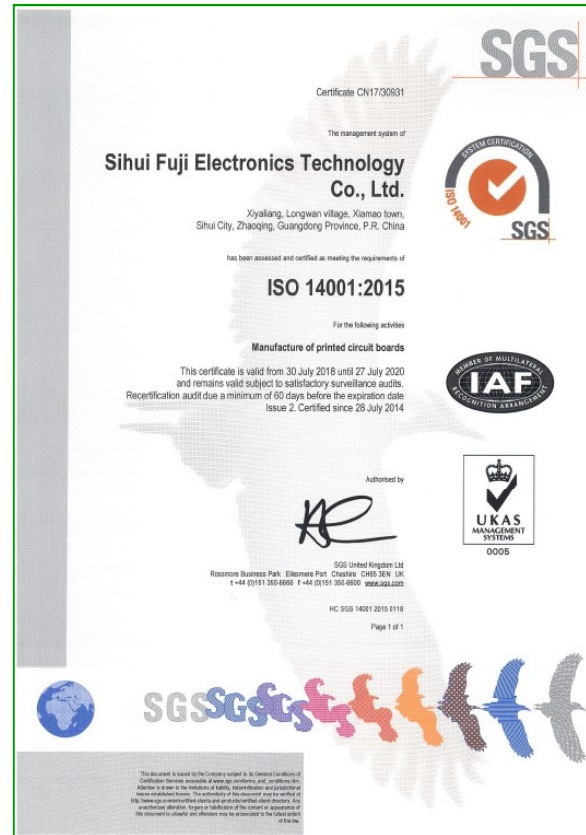
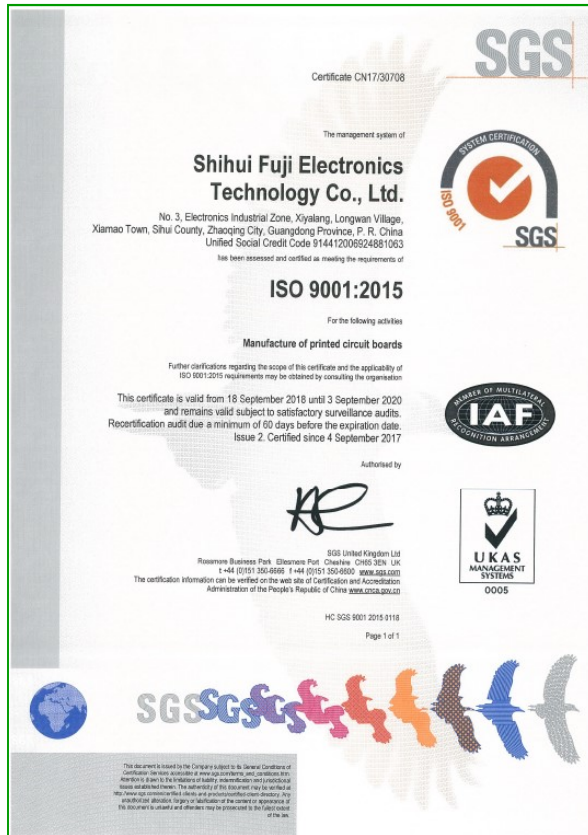
Applications: Power, Finance and Tele-Communication, Others



EMS (PCBA) Customers



ISO & UL Certificates



File E336308

Heavy copper UL approved with **15oz** for 2 layer and **13oz** for multi layer.

Main Equipment List



Process	Equipment	Qty	Process	Equipment	Qty
Inner-layer pattern	D/F	1	Legend	Silk screen	9
	W/F	2		Ink Jet	3
	LDI Exposure	3	Surface finish	ENIG	2
	Develop- Etching	2		HASL	2
Inner layer AOI	On-line AOI	1	Shaping	OSP / Immersion tin	1/1
	Verify	4		V-Cutter	5
Multi layer lamination	Brown oxidation	2	E-test	Router	42
	Lamination	10		Punching	3
	X-Ray guide hole drilling	2		Flying probe	12
Drilling	Drilling 79 + laser 2	81	FQC	Specify jig test machine	8
	Drill bit sharpener	4		Universal jig test machine	4
Copper plating	Plasma treatment	1	Quality Analysis	AVI	6
	Horizontal chemical Cu	1		Impedance measure	2
	Desmear + Chemical Cu	3		2-demensional measure	3
	Electro Cu plating	1		Code-Thermal shock	1
	VCP Cu plating	5		Reflow-test line	1
Outer layer pattern	D/F	3	Quality Analysis	X-ray thickness measure	2
	LDI exposure	7		Constant temp. / SEM	1/1
	Develop- Etching	3		Accelerated aging test (PCT)	1
	On- line AOI	3		Absorption photometer	2
Outer layer AOI	AOI	3	Quality Analysis	Ductility test of copper foil	1
	Verify	12		Electro microscope(Keyence)	1
Solder mask	Screen printing	21	Quality Analysis	CTI tester	1
	Spraying	3		Contamination tester	1
	Exposure machine(4 full auto)	10		RoHS 2.0 analysis	1

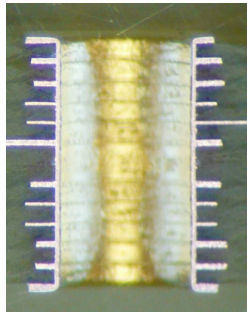
Technical Capacity



<u>Classification:</u>	2020	2021	<u>Classification:</u>	2020	2021
Max Board Thickness	6 mm	6.5 mm	Min Insulation Annular Ring	Drill + 0.20 mm	Drill + 0.15 mm
Min Board Thickness	0.2 mm	0.1 mm	Deviation between Different Layers	0.05 mm	0.05 mm
Min Inner Layer Thickness	0.05 mm	0.04 mm	Pattern/Soldermask Accuracy	+/- 0.05 mm	+/- 0.05 mm
Max Copper Thickness	15 OZ	20 OZ	Impedance Control	+/- 7%	+/- 5%
Min Copper Thickness	1/3 OZ	1/4 OZ	Working Panels	720 mm x 630 mm	720 mm x 630 mm
Max Number of Layers	24 Layers	30 Layers	Delivery Panels	690 mm x 600 mm	690 mm x 600 mm
Min Mechanical Drill Hole	0.15 mm	0.10 mm	Distance (hole-to-hole)	0.35 mm	0.3 mm
Drill diameter Tolerance	+/- 0.02 mm	+/- 0.02 mm	Warpage and Twist	0.7 %	0.5 %
Hole Position Tolerance	+/- 0.05 mm	+/-0.05 mm	<u>Below are for HDI PCBs:</u>		
Board Thickness/ Hole diameter	12 : 1	13 : 1	Min Laser Drill Hole	0.1 mm	0.08 mm
Conductor Width/Spacing (Inner Layer)	0.075 mm/ 0.075 mm	0.05 mm/ 0.05 mm	Max Laser Drill Depth	0.1 mm	0.12 mm
Conductor Width/Spacing (Outer Layer)	0.075 mm/ 0.075 mm	0.05 mm/ 0.05 mm	Min Laser Drill Depth	0.06 mm	0.05 mm
Conductor Width Tolerance	+/- 0.015 mm	+/- 0.010 mm	Layer Structure	2+N+2	3+N+3
Min Pad (Inner Layer)	Drill + 0.20 mm	Drill + 0.15 mm	Pad's Diameter of Laser Drill	Drill + 0.25 mm	Drill + 0.175 mm
Min Pad (Outer Layer)	Drill + 0.20 mm	Drill + 0.15 mm			

PCB Types

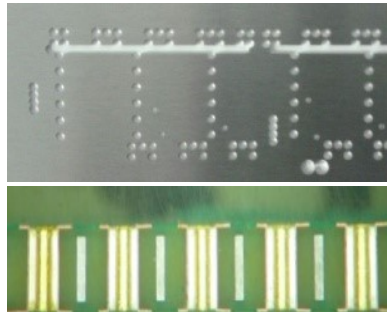
Multi-layers



Spec.

Layer: 12
Cu foil: 18 μm
Thickness: 2.0 mm
Finishing: ENIG
L/S: 0.1 mm

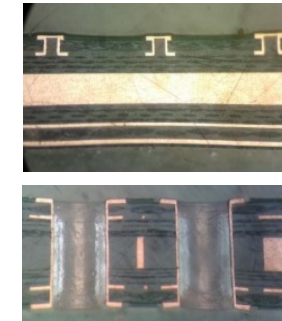
Al core



Spec.

Layer: 2
Cu foil: 18 μm
Thickness: 1.5 mm
Finishing: HASL
Al core: 1 mm

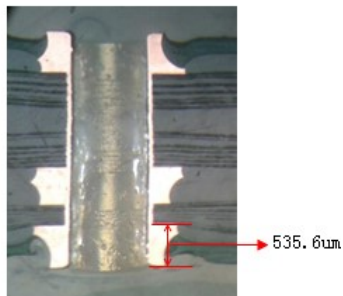
Cu core



Spec.

Layer: 4
Cu foil: 18 μm
Thickness: 1.6 mm
Finishing: OSP
Cu core: 0.5 mm

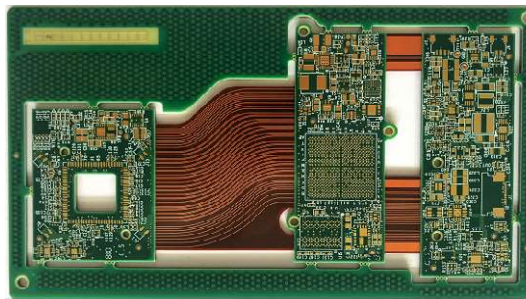
Heavy copper



Spec.

Layer: 3
Material: S1000-2M
Cu Thickness: 15 oz (525 μm)
Finishing: ENIG

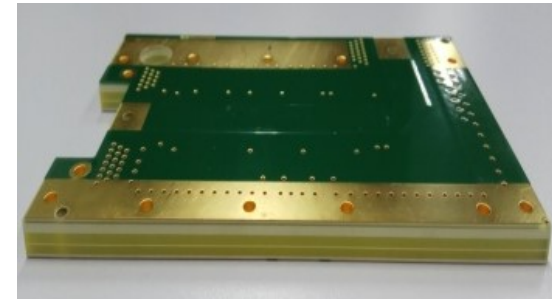
Rigid and Flex



Spec.

Layer: 12 (Rigid area)
Material: S1000-2M
Cu Thickness: 18 μm
Finishing: ENIG
Line W/S: 80 μm /80 μm

High Frequency

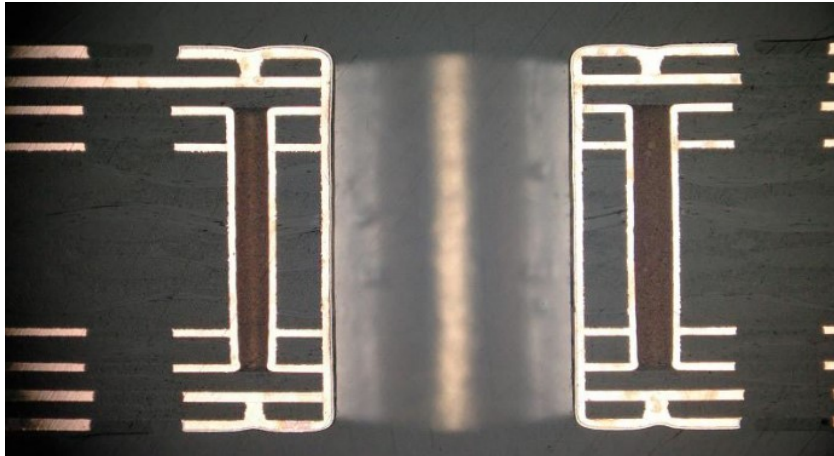


Spec.

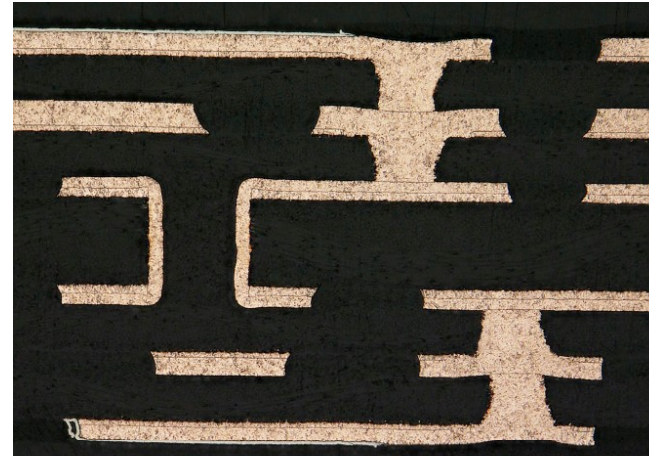
Layer: 4
Material: ROGERS R04350B
+S1000-2M
Thickness: 5 mm
Finishing: ENIG

HDI PCB

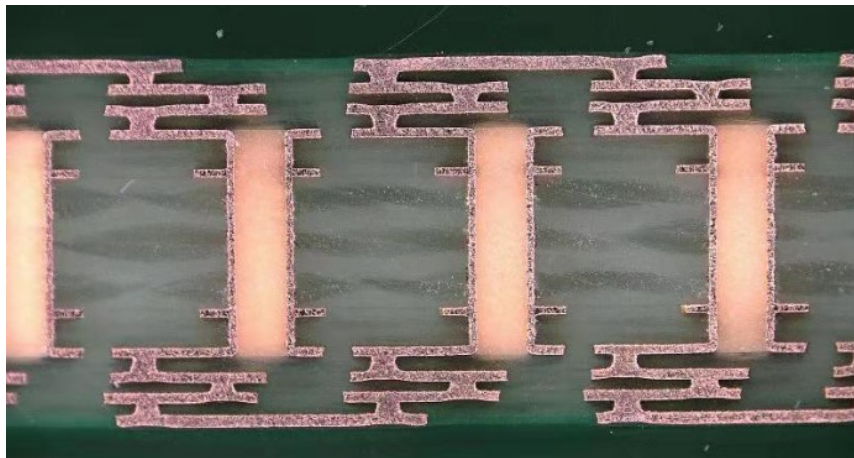
- 1+6+1 (1 stage / 8L)



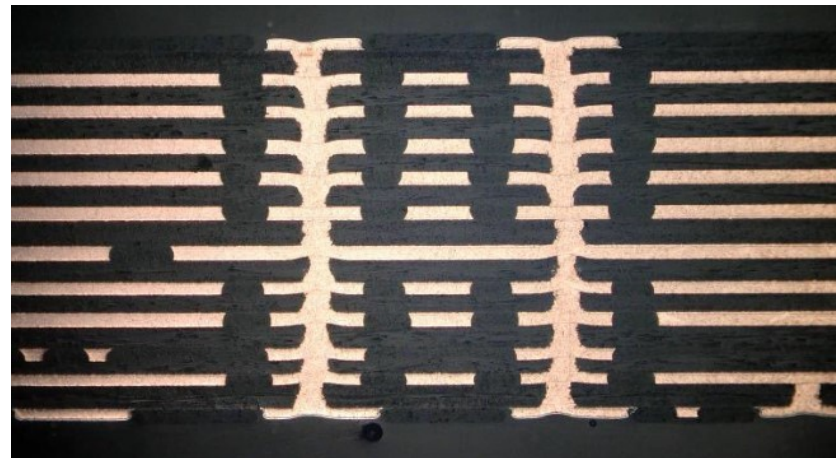
- 2+2+2(2 stage / 6L)



- 3+4+3(3 stage / 10L)



- Any lay connect (12L)



Main Continuous Quality Optimization Activities



- 1) Materials Management**
- 2) Equipment Management**
- 3) Enhance In-Line Inspection Facilities**
- 4) Conduct Lot Guarantee Testing**
- 5) On-site Change-Point Management**
- 6) Advanced SOPs**

1) Materials Management



Background: Adopt the mindset of Japan-made products with stable quality.

- Prevent any changes without notification of 4M (Man, Machine, Material & Method)
Approved by customers before changing.
- Using inferior material is not allowed even if the raw material cost is lower
Material Certification attached with each lot card
- Traceability is set in line and production's record must be documented.

Main Materials/Processes	Suppliers
Base Material	Shengyi, Nanya (Taiwan), Panasonic ※ Other materials are specified by the customer
Brown Oxidation	Atotech (BONDFILM EC)
Immersion Gold	Uyemura (NPR-8 series)
OSP	Shikoku Chemical (F2Lx PlusM)
Solder mask	Taiyo ink (PSR2000; PSR4000)
Plating	ATOTECH (VCE), DOW (ST-901), JCU(CS-VL for fill plating)

2) Equipment Management



Background: Use those equipment from the big brands, not the low cost ones.

Advantages of Equipment used in Fuji:

- Ensure the best capability of the equipment to support the finest accuracy.
- Stable equipment performance is ensured by offering less deviation
- Able to provide detailed manufacturing conditions

Fuji's Management methods:

- Daily checking & regular checking of the condition of the equipment
- Re-check & re-confirm before manufacturing
- At least implement monthly-base maintenance.

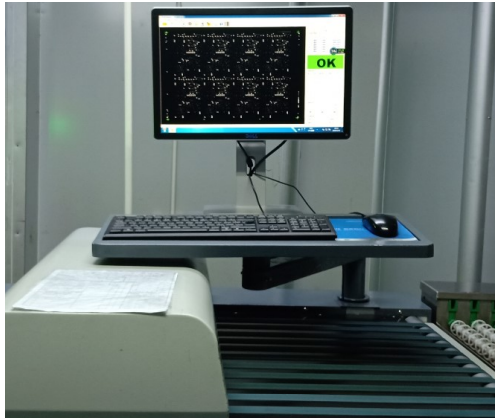
※ Main Equipment

Process	Maker (Brand)
Etching	Fujikikou, UCE
Multi layer press	Kitakawa, Vigor
Hole drilling	Schmoll, VEGA, Hans Laser
Solder Mask(Spray)	Yanagida, Jinyueyang

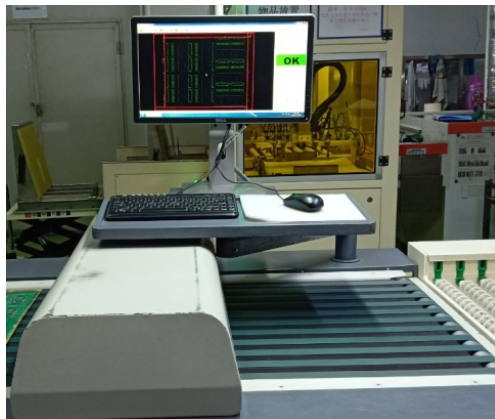
3) Enhance On-Line Inspection Facilities

① Promotion on automation of process

- Hole check afer drilling
- In-line AOI(100% for inner and outer layer)



- Hole check after HASL
- Flying probe
- AVI for final inspection)



4-wire tester can test the low resistance



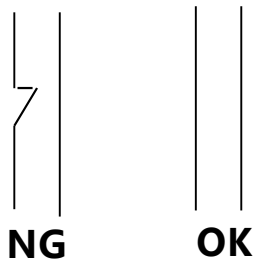
Enhance On-Line Inspection Facilities



② For safty parts (Item of the min drill $\leq 0.8\text{mm}$ PCB): **A** → **C** → **SM**

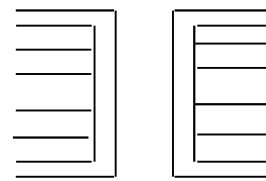
③ ≥ 2 Stage HDI board: **A** → **B** → **C** → **SM**

A Out layer AOI



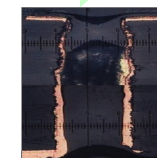
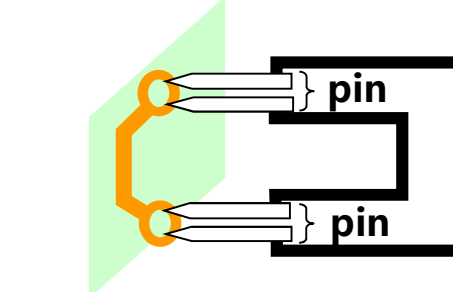
No repair for
line broken
and nick

B Reflow test

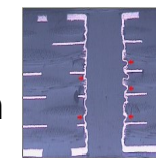


100°C ~ 240°C
8 chamber * 30
seconds/chamber

C Four wire test



Cu
thin



hole
wall
rough

4) Conduct Lot Guarantee Testing

Conduct thermal shock for each lot per each single shipment



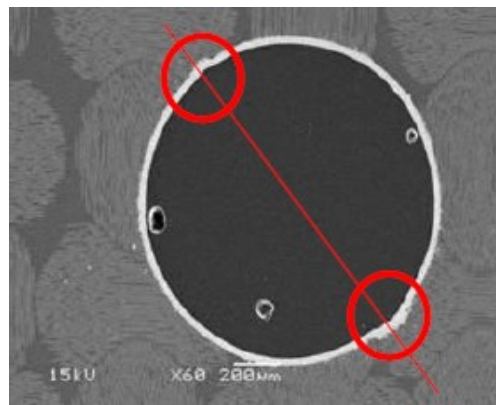
Sampling coupon

- **2 pcs/lot** ⇒ *For measurement*
- **4 pcs/lot** ⇒ *For storage for 10 years*



Oil dip coupon

- **260°C with 10 seconds ~ 20°C with 20 seconds**
- **10 cycles**



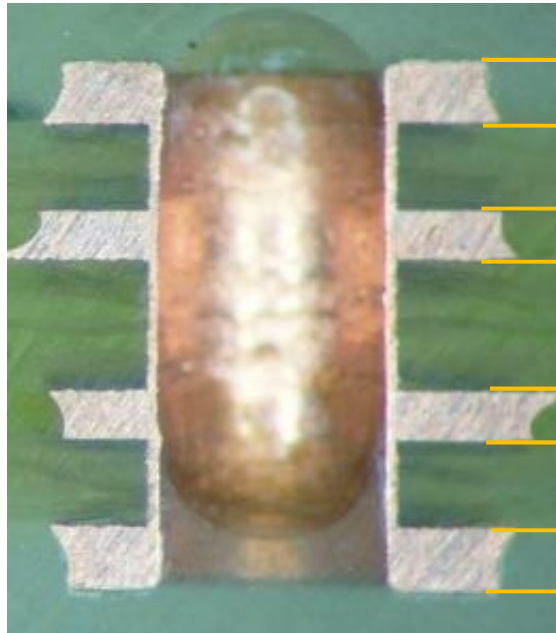
Cross sectioning

With very strict condition of 45 degree cross sectioning.

45 degree cross sectioning can find out such defect.

4) Conduct Lot Guarantee Testing

To verify the quality under microscope



250 μm (Cu)

350 μm (Dielectric)

200 μm (Cu)

530 μm (Dielectric)

200 μm (Cu)

350 μm (Dielectric)

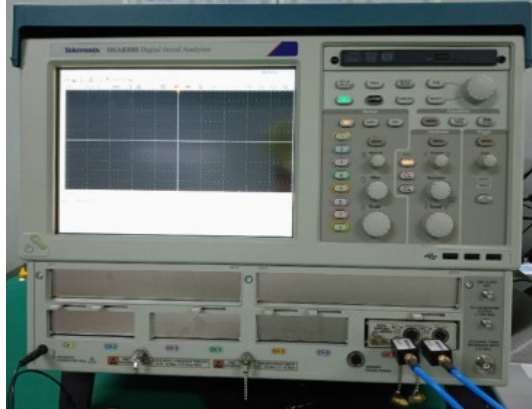
250 μm (铜厚)

- 2 Coupon/Lot
- Proceed Reliability testing

【Fuji's Acceptance Criteria】

- Roughness: $\leq 50 \mu\text{m}$
- Hole Cu: $\geq 20 \mu\text{m}$
- Nail head: \leq inner Cu thickness x 1.5
- Wicking: $\leq 80 \mu\text{m}$
- No smear
- No crack
- No layer delamination

Test Equipment



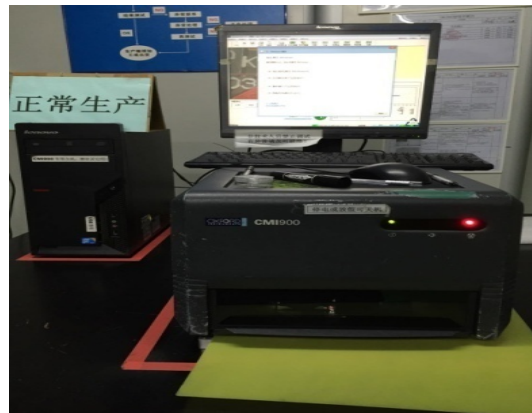
Impedance Tester



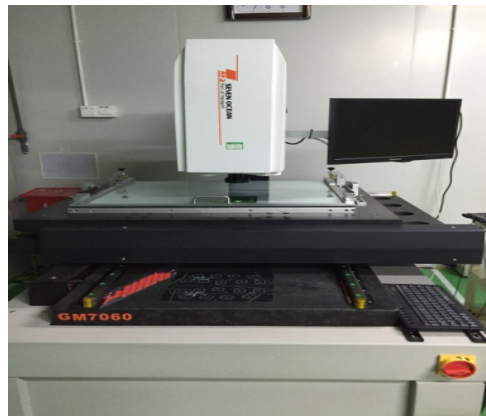
Constant Temperature Chamber



Cold-Thermal Shock Chamber



X-RAY Measurement



2-Dimension Measurement



SEM

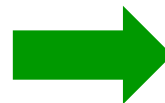
5) On-site Change-Point Management

To detect tiniest & potential quality risk by combining the 4M with 3H (initial / changes / permanent).

Change Point	Initial	Changes	Permanent	Instruction
Man	New (New or Temporary Employee)	Re-arrangement	Return to work	
Machine	New equipment (Equipment, Mould & Fixture)	Condition adjustment	Idle machine being restarted	
Material	New material has been used after they have just been purchased	Specification change, Material change, Manufacturer change, Condition change of the Manufacturer included its method, equipment, location.	Purchased materials that haven't been purchased for >6 months Material that have been stored for >6 months	
Method	First introduced (Manufacture, Check & Manage)	SOP change (Manufacture, Check & Manage)	Not been implemented for > 6 months.	



Display the changes in each workshop via Kanban method



Daily status and countermeasure records

6) Advanced SOPs

Purpose: To eliminate foreign materials, scratches and errors by visualizing the correct & incorrect procedures & behaviors via detailed flow chart.

Examples of standard operation (SOP)

Countermeasure against foreign material

清水除尘手順

作成: 刘天明

清扫“武器”:

操作步骤:

① 倒足够的水

② 将水刮向自己

③ 收集含有大量灰尘的水渍

④ 用毛巾吸地面的水，将毛巾拧干，将灰尘移入桶内

注意事项:

- ① 尽可能多的水;
- ② 刮水，将灰尘、头发等异物溶于水;
- ③ 最后用毛巾将水移入桶内;
- ④ 用海绵把地面擦干;
- ⑤ 整个行动过程不要间断，不要水残留，影响温湿度。

⑤ 用海绵把水吸干，大的异物扫进簸箕里

FQ3-2ZE02

Common mindset

工作方法一

眼睛跟着手走，还要用心，眼手心合一
眼手分开容易弄伤你的手和线路板

你人生的老板是你自己！
大胆去想去思考

跟你的团队一起行动起来
不要怕被训斥和不理解

错了也不必气馁
说“对不起！”，马上改善就可以了

对了，你可能会得到额外的奖励！

无论你是一次成功或是从多次失败中成功
最后都要按流程形成作业标准书！

FQ3-2ZE02

Countermeasure against scratches

工作方法二

作成: 刘天明

取板时必须将基板平行的“拿出”后才可以移动基板

取板时必须将基板平行的“拿起”后才可以移动基板

取板时必须将基板平行的“拿起”后才可以移动基板

不可在基板上做任何作业（对齐板、写字、刻印等）

FQ3-2ZE02

Interactions & Communications with Customers



Customers' Contact Windows in Fuji:

- Sales department : 1 Japanese ,13 member can speak Japanese and 7 member can speak English.
- QA department: 2 Japanese, 2 member can speak Japanese and 1 member can speak English.

No.	Inquiries from Customer	Description	Frequency
1	Business Inquiry (RFQ & Agreement)	1. Confirmation of quotation/delivery/condition regarding the new or changed design. 1. Business Terms & Agreements 3. Early-Supply-Involvement together with Technical Team	Anytime
2	Technical inquiry (EQ)	1. Confirmation of technical questions & responses regarding the new or changed design. 2. Early-Supply-Involvement together with Marketing Team	Anytime
3	Quality Inquiry (8D report etc..)	1 st reply: Conduct investigation on defective PCBs on WIP and stock and to check process record and change points etc. 2 nd reply: Reason of occurrence/outflow, and countermeasure against re-occurrence and outflow (and apply it to other products)	1 st reply: Within 24 hours 2 nd reply: Within 5 working days . or after receive the reject board within 5 days the countermeasure Report to be supplied

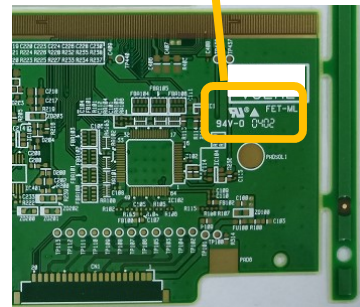
Traceability

Identify number (Purpose: for quality trace management)

Identify number to be printed for all boards

Such as 0 4 02

- ① "0" ⇒ stand for the year of 2020
- ② "4" ⇒ stand for the month of Apr. (1~9, a~c: respectively stand for Jan~Dec.)
- ③ "02" ⇒ stand for 2nd lot in the month for same P/N



Identify number location to be consulted with customer.

LOT 明細表 Rev.2 1/1

台車号	421	LOT号	F20-421-012	品名	KCR-410-10	客户图番	Y380176-001/001B04L4
数量		RoHS	■	产品类别	送单	打叉板	<input type="checkbox"/> 允许 <input checked="" type="checkbox"/> 不允许
工作尺寸	610×458	层数	4	20	2	60	1200
板宽		最小间距		TOP面	80 μm		

TOP面印刷: 识别号 0402

Lot card to be found out via identify number

Lot card with below content

Item	Main information	Application for
Spec.	① Thick, structure ② Min via, L/S ③ Finish, size	① New items ② Batch production ③ Prototype
Material	① P/N ② RoHS ③ Batch number	① CCL, P P ② Ink(SM, Legend) ③ Surface finish
Operation	① Operator ② Condition ③ Time, Machine	All process (Manufacture and inspect)
Quality	① Abnormal ② Record ③ Pass yield	All process (Manufacture and inspect)

Future Plan (short-term & long-term)

Direction: To develop new business from European markets

- 1. To expand production capacity 80K→125Km² / month**
- 2. To expand PCB variety: PCBs used in key & safety parts**
- 3. To be advanced in technical capability to support special PCBs**
- 4. To focus on high-automation manufacturing**
- 5. To adopt Ameba management**

#1~4 Plant Layout



#3 Plant advantage

Item	#1~2 Plant	#3 Plant
Work size	610×520mm	720×620mm
Line Speed	3m / Min	4m / Min
Automation	Part	Full auto
Stock	With stock	No stock
Total advantage		Productivity 10% up, Cost is competitive



#4 Plant specialize in safty parts, high precision, high density PCB, it started construction in July 2020, and start production from year 2021.

Thanks for your time

