



Wah Lee Industrial Corp
Material Pioneer · Technology Navigator

WAHLEE Group

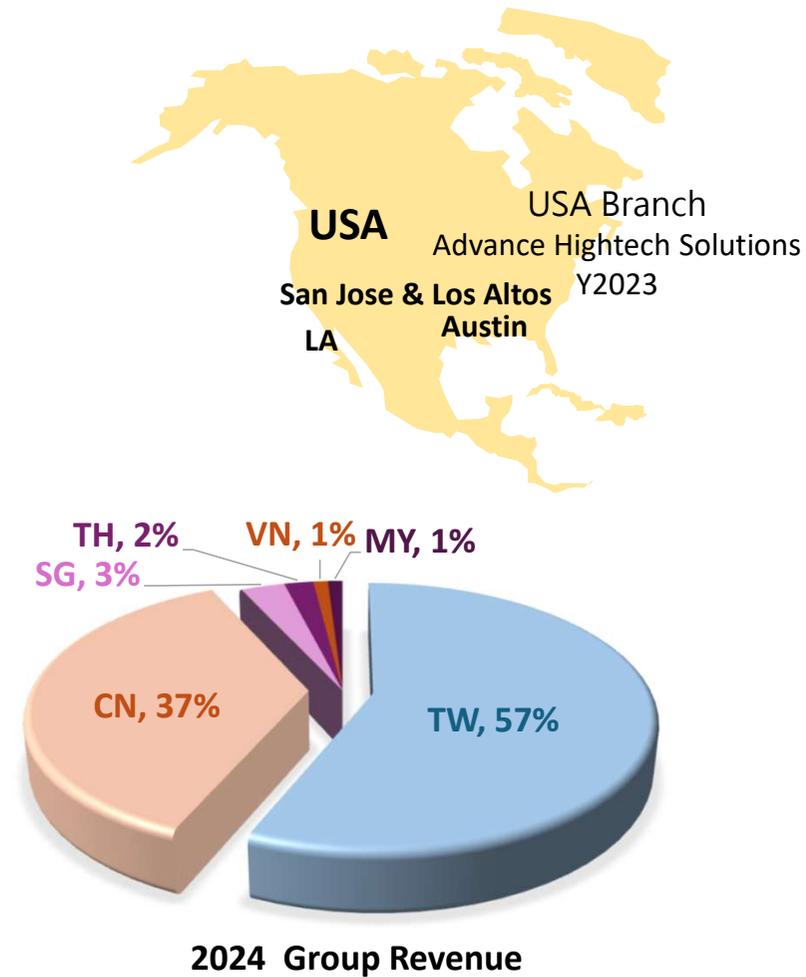


Company Outlook

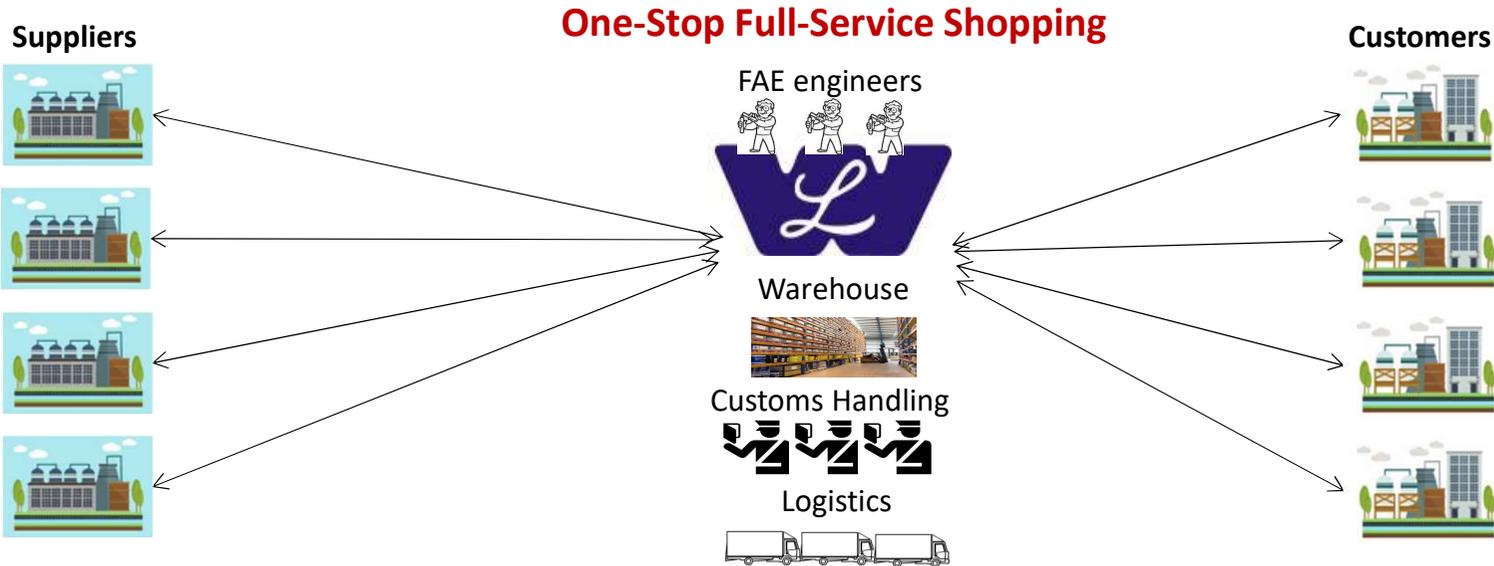


Established:	10/1/1968
Listing:	7/22/2002 on TSE (Taiwan Stock Exchange)
Capital:	NT\$ 2,594,368,170 (~ USD 84.9 million)
FY2024 Revenue:	NT\$80,031 million (USD 2,434 million)
Market Cap:	~ USD 955 million
Mission:	To provide leading materials and total solutions integration for the high-tech manufacturing
Long Term Growth Drivers:	Hi-end semiconductor manufacturing processes, PCB high frequency substrates, AI, next generation electronic products, and 5G, biomedical, Electric Vehicles, and energy storage system

Sales Offices



WahLee's Value Proposition



VALUE WAH LEE PROVIDES

Suppliers' Perspective

- Strategic alliance of supply chain
- New application approach
- Reduction in marketing, sales, and FAE cost
- Focusing on R&D and manufacturing

Customers' Perspective

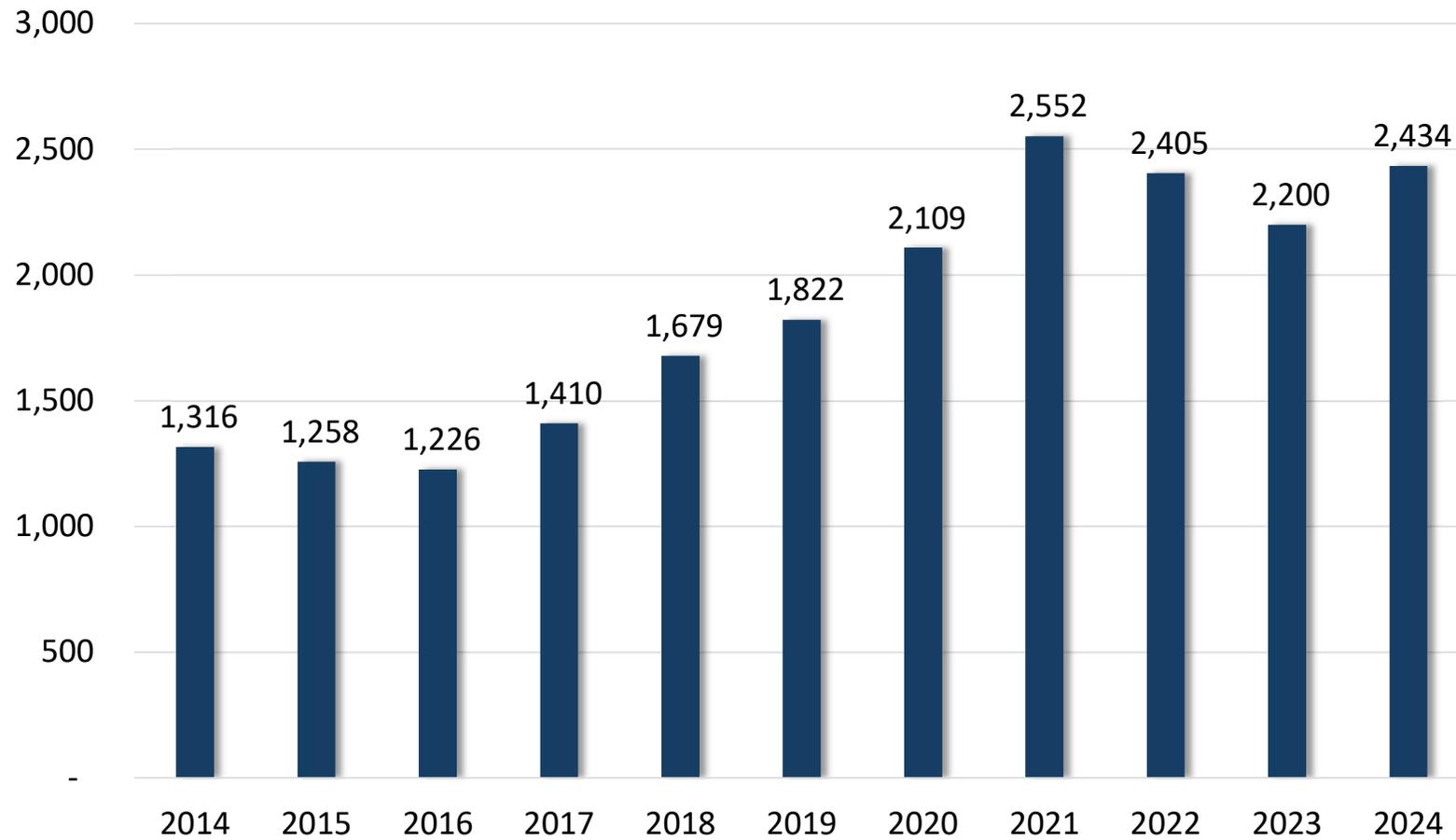
- New materials, technologies, and components
- Total solution provision
- International marketing network
- Development of new applications and customers
- International cash flow, logistics services
- JIT, on site tech support

Group Annual Revenue



In Million USD

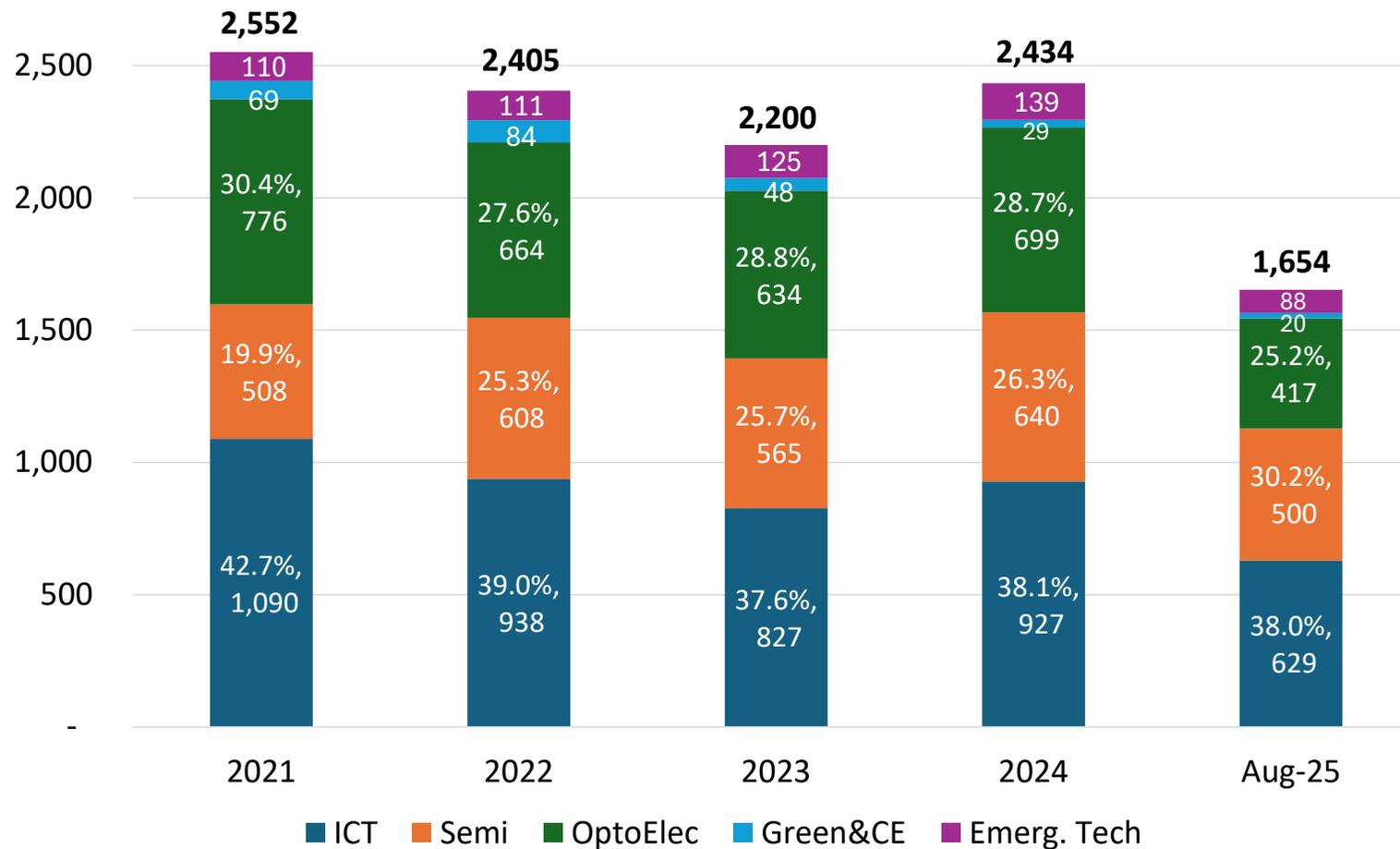
Annual Sales



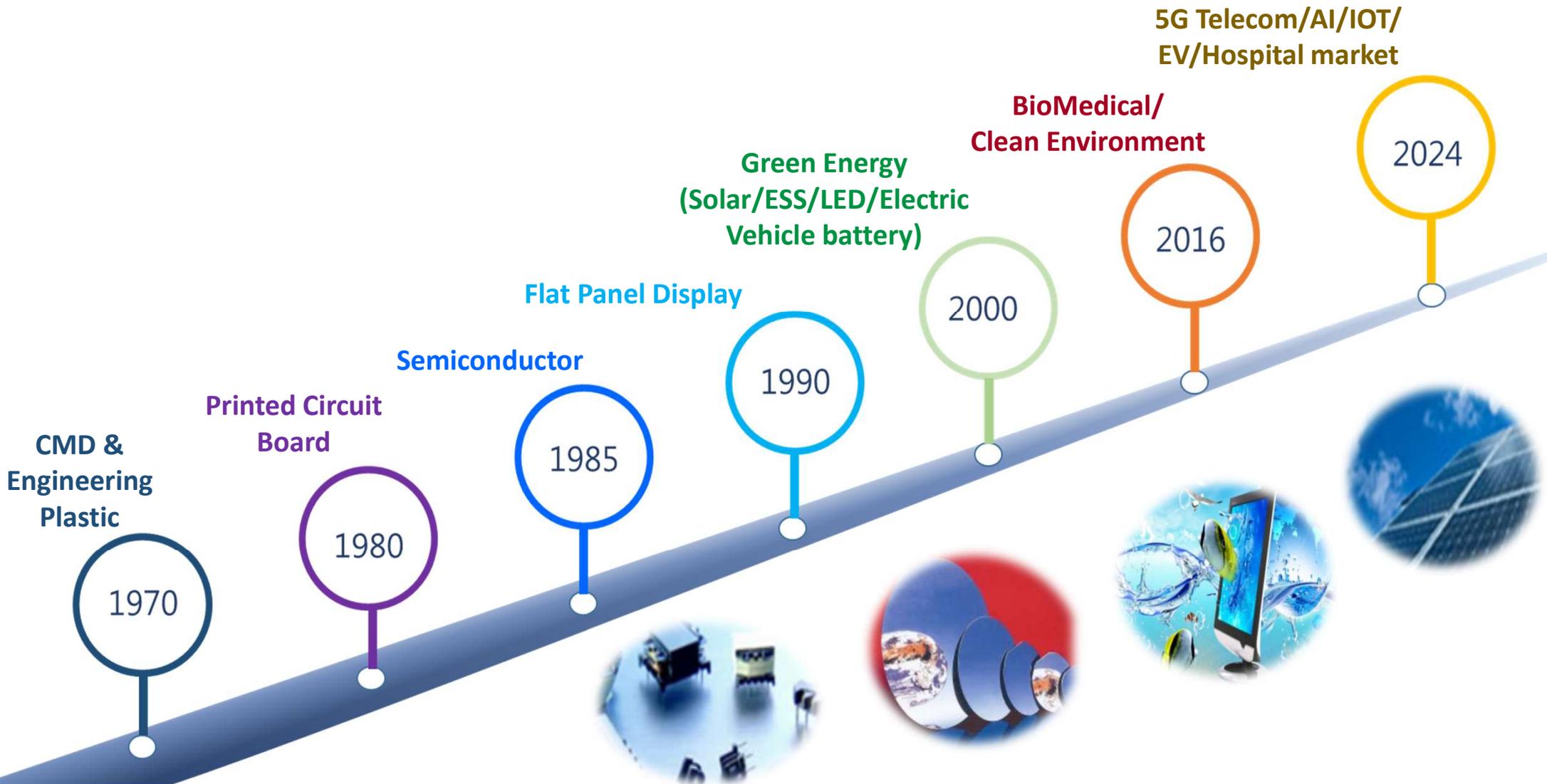
Revenue Breakdown By Segmentations



In Million USD 3,000



Evolving with Growth Industries



High-End Engineering Plastics



Growth engines on ICT and Auto

- Optical grade plastics provided to world-leading camera module maker. Demands are from smartphones, ADAS/DMS, surveillance systems
- On-line education and e-commerce created huge demands for PC, NB, servers, and 5G smartphones which all require high-temperature Nylon
- Weight reduction and high-intensity plastics are widely adopted by Auto parts and EVs and EV charging poles
- PCR (Post Consumer Recycle) plastics are **ESG** highlights



Car connectors

PCB Total Solutions



PCB raw materials and equipment supplier

- 5G era leading to cloud servers, switches, routers, antenna modules, and communication equipment demands
- CCL (Copper Clad Laminate) with low Dk, low Df is the first choice for 5G high-end PCB
- DI grad Dry Film has an oligopoly market position



Semi front-end process materials



Total solutions for Semi front-end legacy and advanced node materials

- 5G, IoT, HPC, EV, WFH: drivers for Semi front-end materials
- Partnership with world-class Semi suppliers and customers for critical raw materials
- Photoresist, PR Stripper, Bulk Chemicals, CMP Slurry, Specialty Gases, and Spare Parts



Flat Panel Display



Optoelectronics materials and system supplies

- The rise of the stay-at-home economy has spurred demand for TVs, NBs, PCs, and monitors, leading to a tight supply of various IC chips
- Entering the overseas market of interactive electronic whiteboards has yielded fruitful results, expanding into smart home appliances, automotive, and smart health-related products and system solutions
- The zero-contact business opportunities have led to full capacity utilization in panel production, with significant increases in sales of materials related to flat-panel displays, such as photoresists
- Venturing into the LCD equipment sector, move towards automation equipment and Micro/Mini LED devices



Green Energy



Renewable energy is eco-friendly to the Earth

- By the end of 2022, solar power stations with a total capacity of approximately 51MW were operational, contributing to a reduction of 35,000 tons of carbon emissions. By the end of 2023, the capacity had increased to 65MW
- Provide customers with green energy certificates in the future, meeting the requirements of international customers for carbon neutrality in carbon trading
- Gain >10% ROI by cooperating with international funds, and then attract more ESG funds
- Promote ESS (Energy Storage System) to complement renewable energy systems



Intelligent Integration



Comprehensive solutions centered around AI

- Deeply integrating AI, intelligent services, and automation technologies to provide cutting-edge solutions for enterprises, driving digital transformation in the retail, manufacturing, and healthcare industries
- The scope of intelligent integration services includes:



- IIoT planning and deployment
- Focuses on robotics and automation integration by combining cutting-edge robotic technology with seamless automation systems
- Digital Twin
- WMS & MES planning and integration
- Cloud and On-Premises Information Integration Services
- AI Server Sales & Support Services
- On-Premises AI Deployment Solutions
- Generative AI Implementation & Optimization Services



Strengthen the core competencies of distributorship

- Invest to set up a southern logistics center to meet the demands of newly established Semi and Optoelectronic plants in southern Taiwan
- The center covers an area of about 40,000 m² and comprises a total of 7 warehouses, office buildings, and machinery rooms
- Further strengthen the leading position of Wah Lee's logistics and increase the value-add of services to customers



WL's Investment Roadmap



WL Core Business

Semiconductor Industry/ICT
Engineering Plastic Material/PCB
Material and Machinery/Photoelectric
Material/Green Energy

- Resource injection
- Product expansion
- Area expansion
- Industry expansion
- Trusted professional team
- Long-term stable growth
- Customer expansion
- Credit, legal strengthening
- Cash flow, logistics service
- Common market development
- Supply chain integration

New Market

Wuhan 、
Shenzhen

WL Japan

Korea

Indonesia

Vietnam

Philippines

Biotechnology
Tai-Gene

Med. & Env. Protection
Gini

Water Treatment
Darco & Kaidi

Semiconductor
Forcera

Gas Purification
High-Tech Gas

Photo Electric
Wise Chip OLED

PV Solar Plant Storage
King Stone

Wind Power
Tien Li

Plastic
NWP



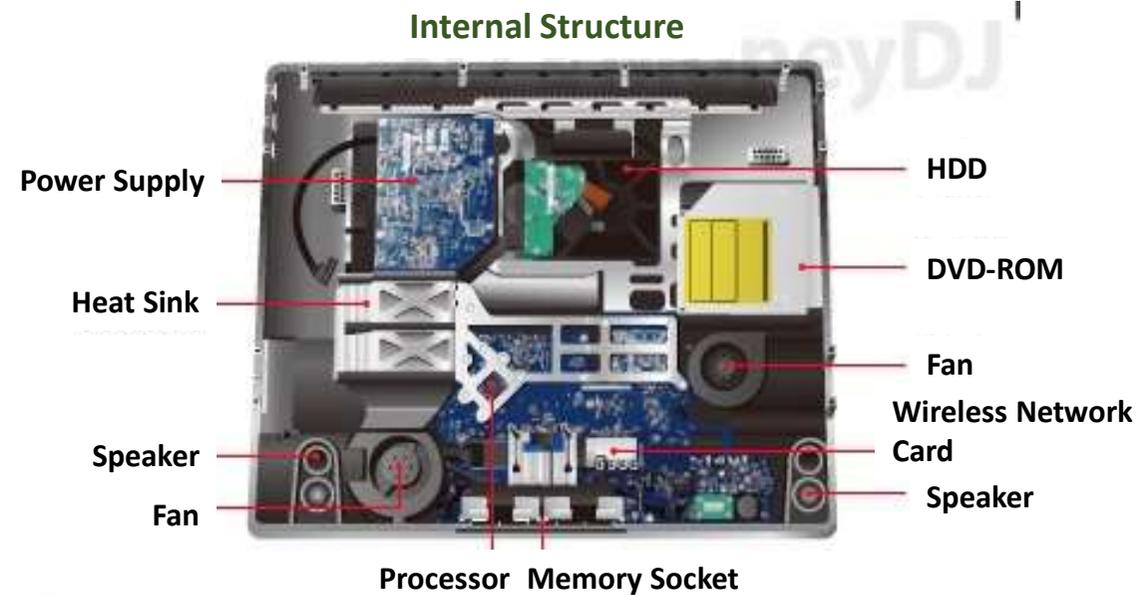
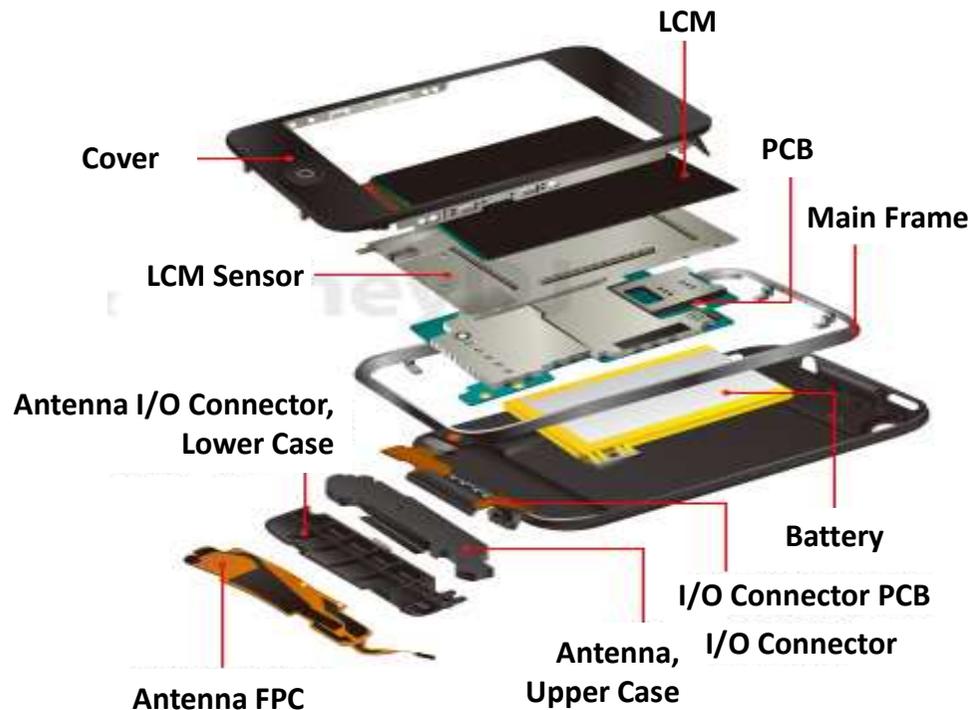
Business Units & Product Overview

Engineering Plastics BD (1/2)



High-Performance Engineering Plastics: Information and Communication Products

1. Case: Carbon Fiber, CFRP, PA
2. Lens: OKPA4, ARTON, HARD COATED SHEET
3. Insulating Strip, Battery Label: PET FILM, PC FILM, PBT FILM
4. Speaker: PET FILM
5. Charging Station: Phenolic Moulding Compound
6. Connector: LCP, PA9T
7. Reflector: PA9T
8. Transformer / PFC: Phenolic Moulding Compound
9. Inverter Bobbin: LCP



Engineering Plastics BD (2/2)



Packaging Films

- Transparent and retortable high barrier PET Alox films.
- PVdC-based gas barrier film for lamination
- PP and PE-based co-ex MAP (preserve freshness)
- BOPE
- BOPP
- BOPET
- BOPA
- CPP
- LLDPE
- Capseal EPE
- PTP



Key Packaging Resins

- PA6
- EVOH
- Tie Resin
- Co-PET
- Polyolefins

Bio-Polymers

- Bio-based PBS, PBS and PBAT from natural resources
Adhesives Bio based / Green PA / Patented / Certified Recyclable and compostable / Composts naturally in ambient temperatures

Specialty Films for Packaging

- BIB & BWB
- PCR PO
- Special rPET, rPP, rPE...



Bio-resins and Bio-Films

High-Performance Sealants (blown/cast film)

Extrusion Coating

BOPP Skin Layer

Approvals

- FDA
- Medical
- RoHS / REACH



Recent Developments in Engineering Plastics



NB 、 Smartphone



- Nano Molding Technology (NMT or NMT-like)
- High Stiffness Computer Case

LED



- LED Reflector

3C 、 Household E/E



- PE Masking

Medical



- Medical Liquid Bags

Solar



- Solar Junction Box

Auto 、 3C



- Pulley, Water Pump, Piston, Gasket
- LIB Separator Film

House and Living



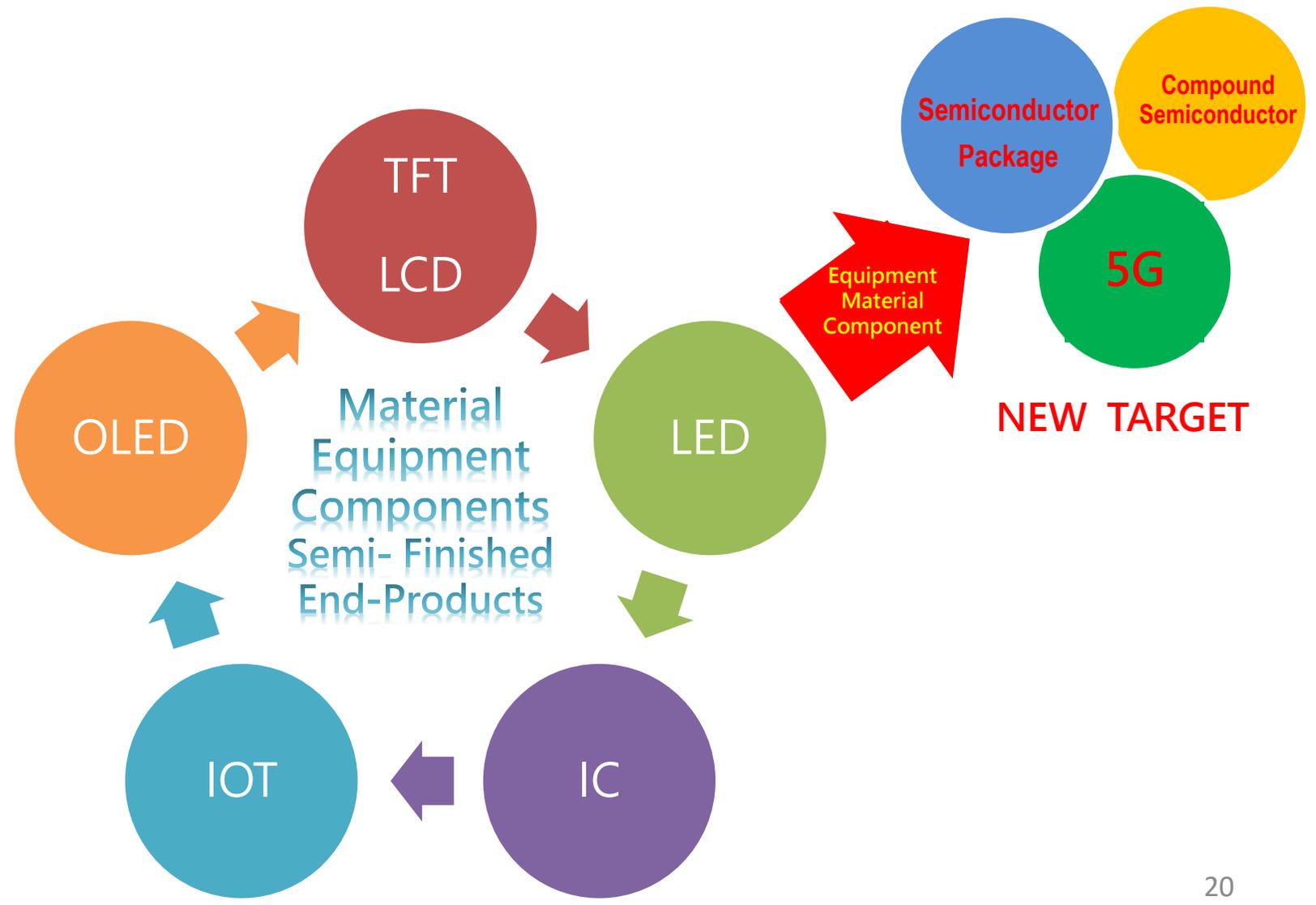
- Luggage

Packaging



- Food Packaging
- Cosmetics Packaging

Opto-Electronics BD: Products for Different Applications



Opto-Electronics BD: Products for TFT-LCD/LED Display/Mini LED/Micro LED



SEMI & ENE PRODUCT

PROCESS

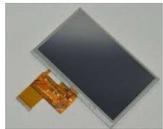
MANUFACTURING



Interactive Flat Panel



LED Display Module



TFT LCD Module/
Open Cell



TV Main Board/
Power Board/
Wifi Board/
Control Board/
T-Con Board



T-Con IC/Driver IC/
Control IC/Power IC/
Touch Controller/
Flash/SSD



Color Resist/
Insulation Resist



PGMEA



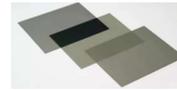
LED PKG/
LED Back Light



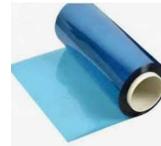
LED Phosphor



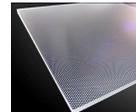
Solder Paste/
Conductive Silver Paste



Polarizer/
Alignment Film/
QD Film



Dry Film



PMMA for
Light Guide Plate



ITO Target



Robot Arm



Hot/Cool
Plate System



Laser Repair System

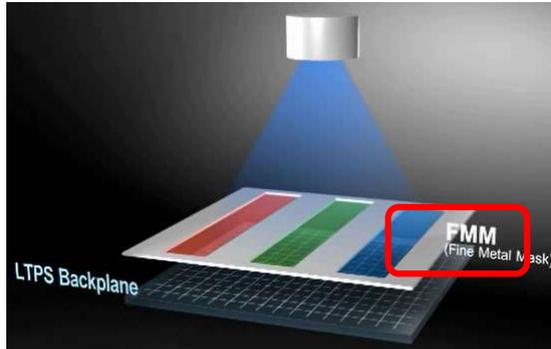


Laser Bonding System

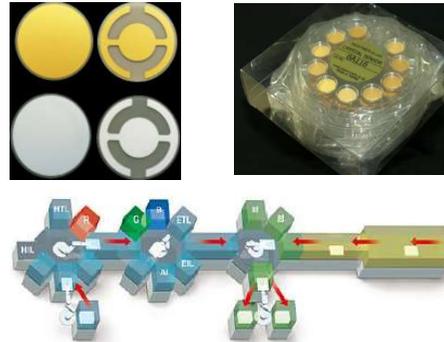
Opto-Electronics BD: OLED Related Products (1/2)



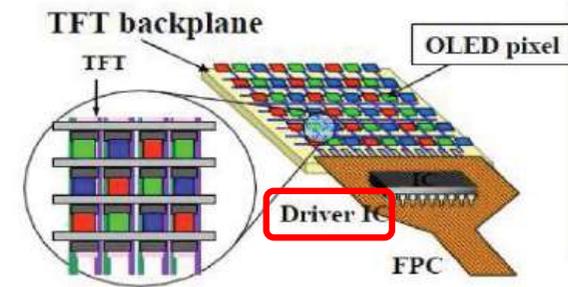
(1) D-company :
Fine Metal Mask



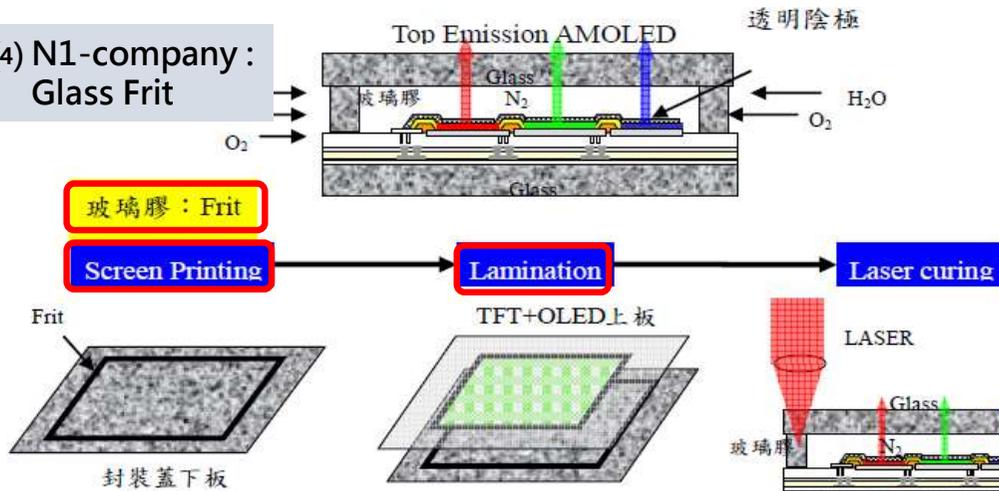
(2) P-company :
Quartz Crystal Monitors



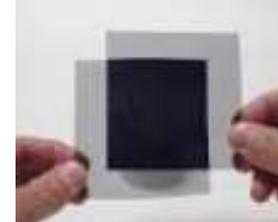
(3) R-company :
Driver IC



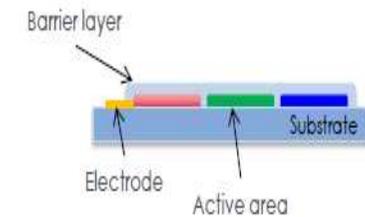
(4) N1-company :
Glass Frit



(5) S-company :
Polarizer



(6) M-company :
Buffer for TFE



(7) N2-company :
Screen Printer

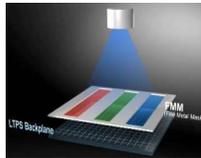
(8) L-company :
Laminator

Opto-Electronics BD: OLED Related Products (2/2)



PROCESS

MANUFACTURING



Fine Metal Mask



Organic Light-Emitting Material



Monitor Crystal



Driver IC/Power IC



Colorless PI/Yellow PI



Screen Printer



Vacuum Lamination System

Opto-Electronics BD: Machine Products



Clean Technology

Dehyd-Bake, Pre-Bake, Post-Bake machine



Dehyd-Bake machine(IR-CP)



UV machine



Semi. Equipment

Substrate Handling Robot



Wafer Handling Robot



Vacuum Robot



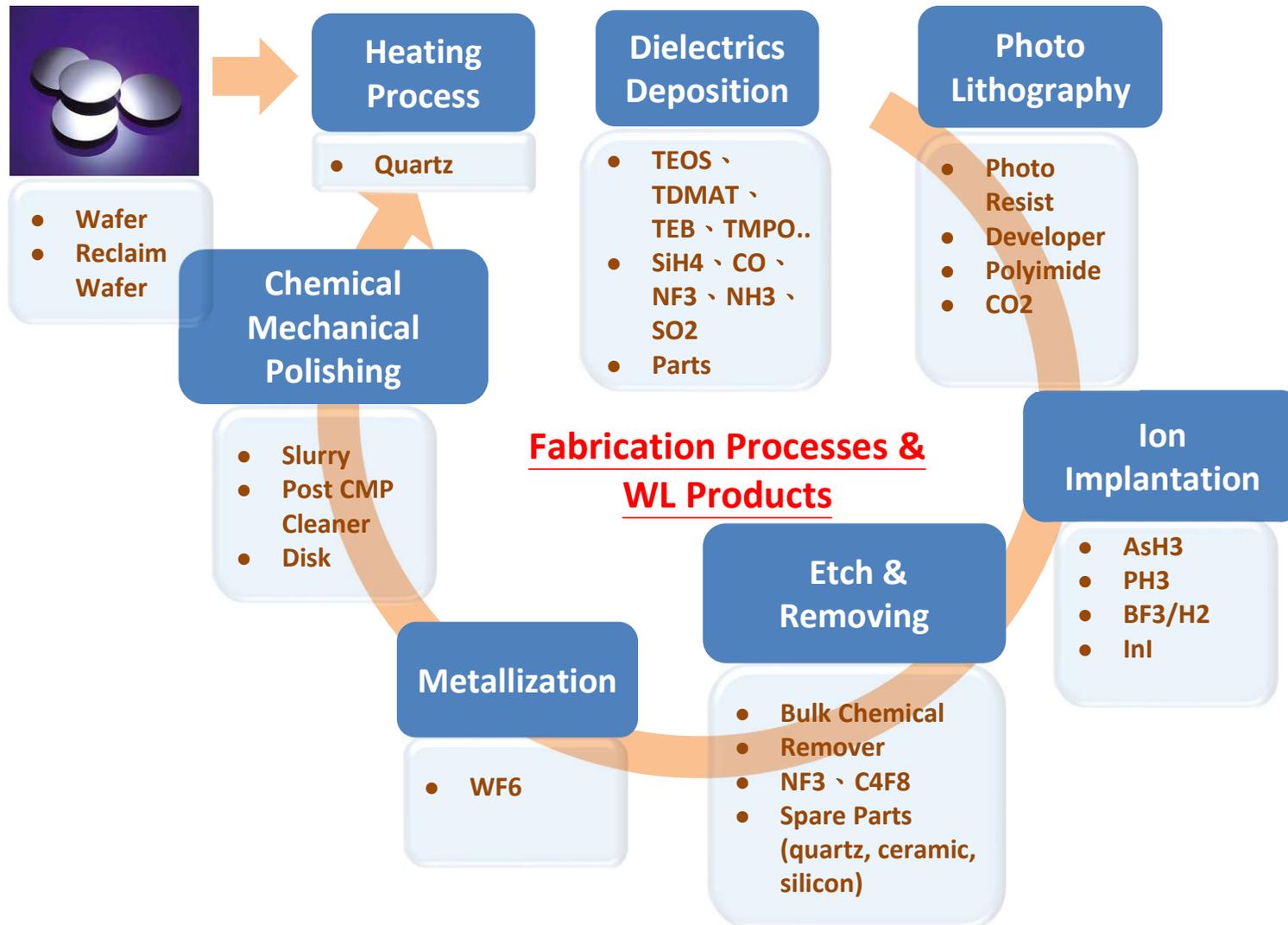
Loader System



After Service Business



Semiconductor Material BD

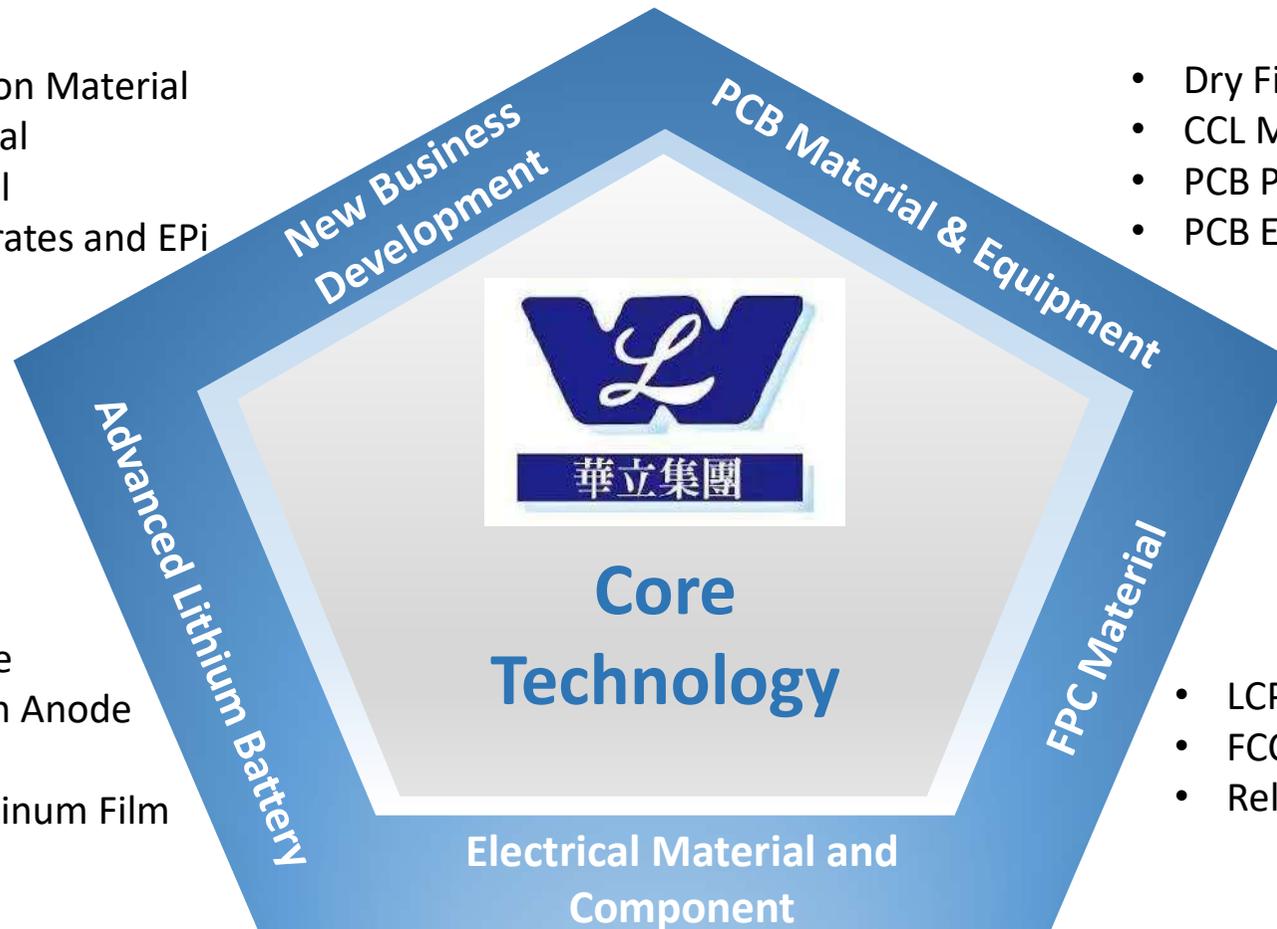


Electro-Mechanical BD



- EV/Charging Station Material
- Rare Earth Material
- Magnetic Material
- SiC, GaN/Si Substrates and EPI

- Dry Film
- CCL Materials
- PCB Process Materials
- PCB Equipment



- LiFePO4 Cathode
- Graphite/Carbon Anode
- Separator Film
- Laminated Aluminum Film

- LCP Film
- FCCL Material
- Release Film for FPC

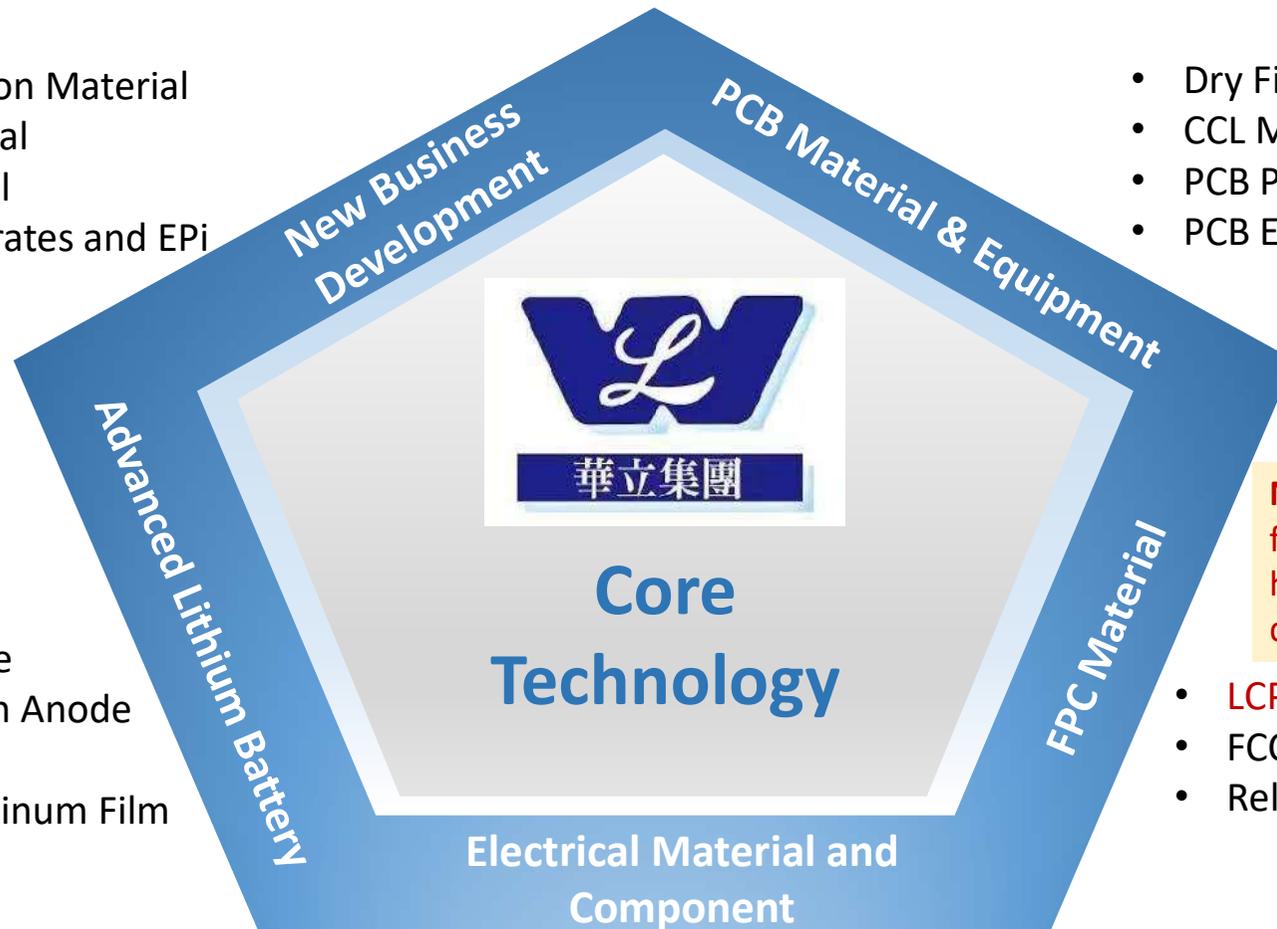
- Power Component from SiC/GaN
- WiFi Chipset and Modules
- PMIC, PWM Power IC and Integrated modules

Electro-Mechanical BD



- EV/Charging Station Material
- Rare Earth Material
- Magnetic Material
- SiC, GaN/Si Substrates and EPI

- Dry Film
- CCL Materials
- PCB Process Materials
- PCB Equipment



Next Generation Material
for high-speed circuits and
high-frequency electronic
devices in the 5G era

- LiFePO4 Cathode
- Graphite/Carbon Anode
- Separator Film
- Laminated Aluminum Film

- LCP Film
- FCCL Material
- Release Film for FPC

- Power Component from SiC/GaN
- WiFi Chipset and Modules
- PMIC, PWM Power IC and Integrated modules

Electro-Mechanical BD: PCB Material & Equipment

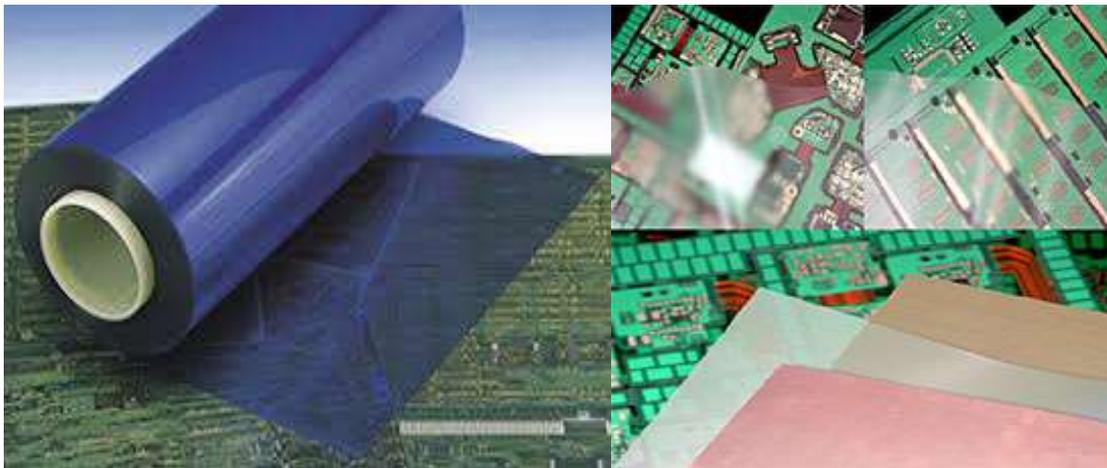


• PCB Process Material

- High resolution photo resist dry film
- Solder mask
- Release film
- Multi-layer AI-entry board for CNC drilling use
- Ultra thin copper foil

• CCL Material

- Halogen-free copper clad laminate for high frequency use
- HDI CCL
- IC substrate



• PCB Process Equipment

- V-Cut
- Shear/Beveler
- Diamond Saw
- Driller
- Router
- CCD Punch System
- FPC Auto Guide Hole Puncher
- FPC Auto Coverlay bonder
- FPC Auto Stiffener Bonder
- X-Ray Drilling Machine

• PCB Inspection Equipment

- Auto Visual Inspection
- 2D/3D Inspection

SHODA TECHTRON CORP

PVD-650A 超高速V槽切割機
 加工尺寸：最大：550mmx550mm(寬x長) 最小：50mmx70mm(寬x長)
 加工厚度：0.4~2.4mm
 精 度：位置：±0.05mm(不含成型誤差) 厚度：±0.05mm

MVG-630C 光學對位式V槽切割機
 加工尺寸：最大：430mmx430mm(寬x長) 最小：100mmx100mm(寬x長)
 精 度：位置：0.03mm 厚度：±0.03mm
 加工厚度：0.3~3.2mm

KURABO

BBMaster-8000 PCB 外觀檢查機
 改良後的觀察攝送結構使得效率大幅提升！
 雙面Photo-覆配項目！
 ▶ 異物檢、異物除塵裝置
 ▶ 獨立相機台數
 ▶ 新安裝機
 全彩色監視系統實現控制虛軸的穩定精度！
 自動收料！

OPTI-VIZ 3D Bump檢查機
 適用產品：FCCSP
 規格尺寸：148x25mm - 255x85mm, 厚度0.1 - 1mm.
 特點：
 1. 自動投收板 全自動化檢查。
 2. Laser 3D檢查 Bump高度 共平面 缺陷等項目 精度 2 um。
 3. Bump 2D檢查(選配) Bump管理、污染、剝離等項目 精度 5 um。

Electro-Mechanical BD: Electrical Material and Component

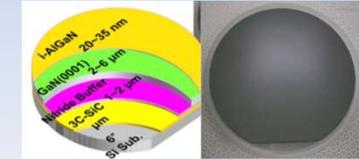


Wide Band Gap materials

- SiC epi wafer



- GaN on SiC/Si epi wafer



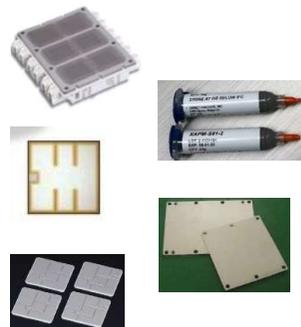
Rare earth material

- Rare earth metal
- Rare earth oxides
- Rare earth Magnetic Material



Power module

- IGBT bare die
- SiC bare die
- AMB(Active Metal Brazing)
- AlSiC baseplate
- TIM(Thermal interface material)
- Sintering Cu
- IMS(Insulating Metal Sheet)



Package material

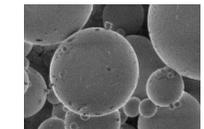
- ETFE film
- ETFE base attach film
- Silicone Hotmelt film



Fluorite

Additive for CCL/FCCL

- Fluorine base resin
- SiO₂



Active/ Passive component

- TWS SoC
- SiC MOSFET
- SiC Schottky diode



Equipment

- Laser cutting equipment



(*) Agency authorization confirmation

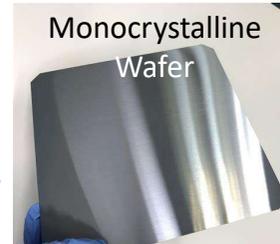
Green Energy & Industrial Material BD (1/2)



Related Products

1. Materials for Solar Industry, OEM Consignment, Finished Products and Equipment

Polysilicon, Diamond Wire, Normal/Steel Wire, Mono/Multi crystalline Wafer (OEM), Texturing Solution, POCL₃, NH₃, SiH₄, Silver/Aluminum Paste, Ribbon, Silicon Rubber Diaphragm, Solar Cell (OEM), Back sheet, Module (OEM), Automation & Robotics and Quartz Crucible



Monocrystalline Wafer



Multicrystalline Wafer



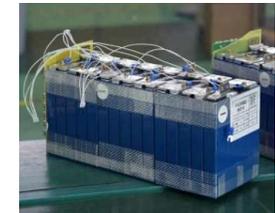
Quartz Crucible



Backplate



Module



LFP Battery

2. Electric Vehicle & Storage Battery

Li Battery, Power Charging Station, Energy Storage, Charge Station, Smart swat station, Energy Storage Battery, and Power Battery

3. Power Generation, Local Power System, Environmental Protection Energy, and Power Saving System

Solar power system and solar plant, Equipment for local power system, Smart meter, Gas generator sets



Rooftop Solar Equipment



Flat-Panel Solar Power Plant

4. Water Treatment

Design and Engineering of industrial wastewater treatment and water recovery (ZLD), Modification of industrial wastewater treatment, Recovery solution UF with multi-components mixed, Membrane including MF, UF, NF, and RO, Carrier in MBR biological wastewater treatment system, Sludge dryer



Fractionating Column Distillation Equipment



Sludge Dryer

Green Energy & Industrial Material BD (2/2)



Industrial Materials

1. Composite Materials

Glass Fiber, Prepreg, Core Materials, Aramid Honeycomb, Polyester Resin and Release Agent

2. Marine Equipment

Engine, Diesel Engine, Generator Set, Motor, Power Battery, Water Jet Propulsor, VETUS System Equipment, Propeller, DP System

3. Bullet Resistant Materials 、 Carbon Fibers 、 High Performance Fiber

Bullet proof helmet/vest/shield UHMPE Fiber, Carbon Chopped Strand / Roving / Fabric, Aramid Fiber, Polyarylate Super Fiber, Inherently Flame-Retardant Materials and Oxidized Pan Staple Fiber, Static Electricity Conductive Fiber, Rockwool, Aramid Pulp, Phenolic Resin and Ceramic Fiber

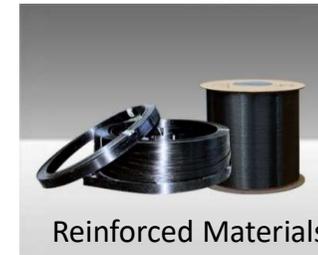
4. Eco-Friendly Refrigerants

HC, HCFC, HFC and HFO Refrigerants and Foaming Agents

5. Fine Chemical

Synthetic Silica, Anti-Static Agent, Electrostatic Dissipative Coating Formulation, Thermoplastic Elastomer (TPE), Cresol Novolac, Acrylic Polymer, Benzoguanamine, CPE, PVDF, Paint Driers, UV Ink, Halogen-Free Flame Retardants, Fluorocarbon Resin and Polymer Additives, Prepreg Resin, Anti-Hydrolysis Agent

6. Precision Machining Materials



Reinforced Materials



Diesel Engine



Bulletproof Helmet/Vest/Shield



Refrigerant



Antistatic Agent/Silica



End Mill with
Rainbow Diamond Coating



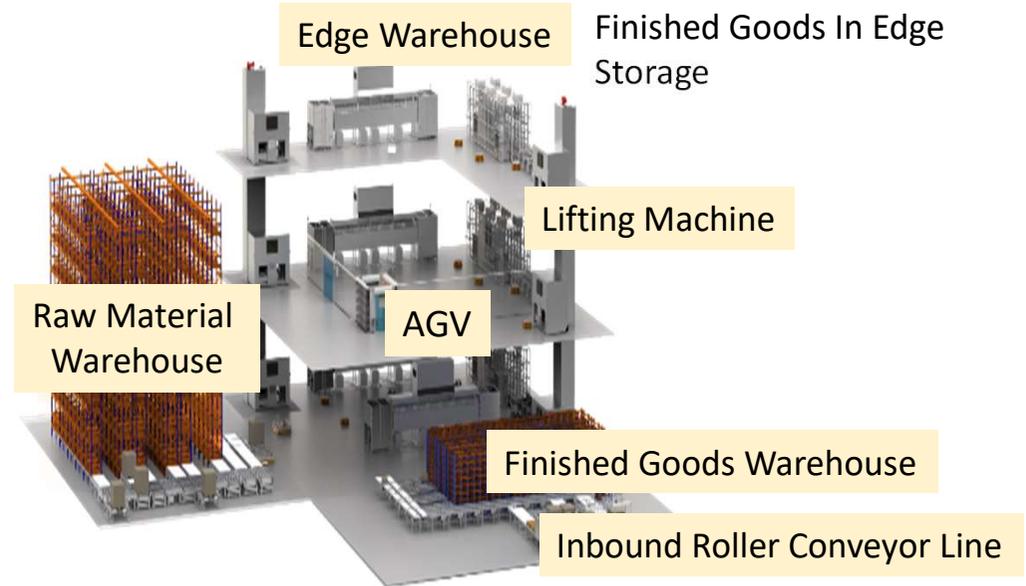
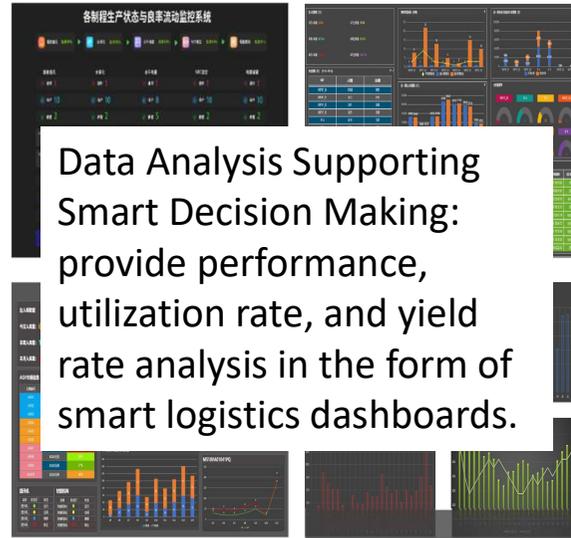
End Mill for Aero

Intelligent Manufacturing application BD: Factory Intelligent Logistics & SMT Factory Solution



Factory Intelligent Logistics

Intelligent Raw Material Warehouse
+
Intelligent Logistics for Production Line
+
Intelligent Finished Goods Warehouse



SMT Dark Factory Solution

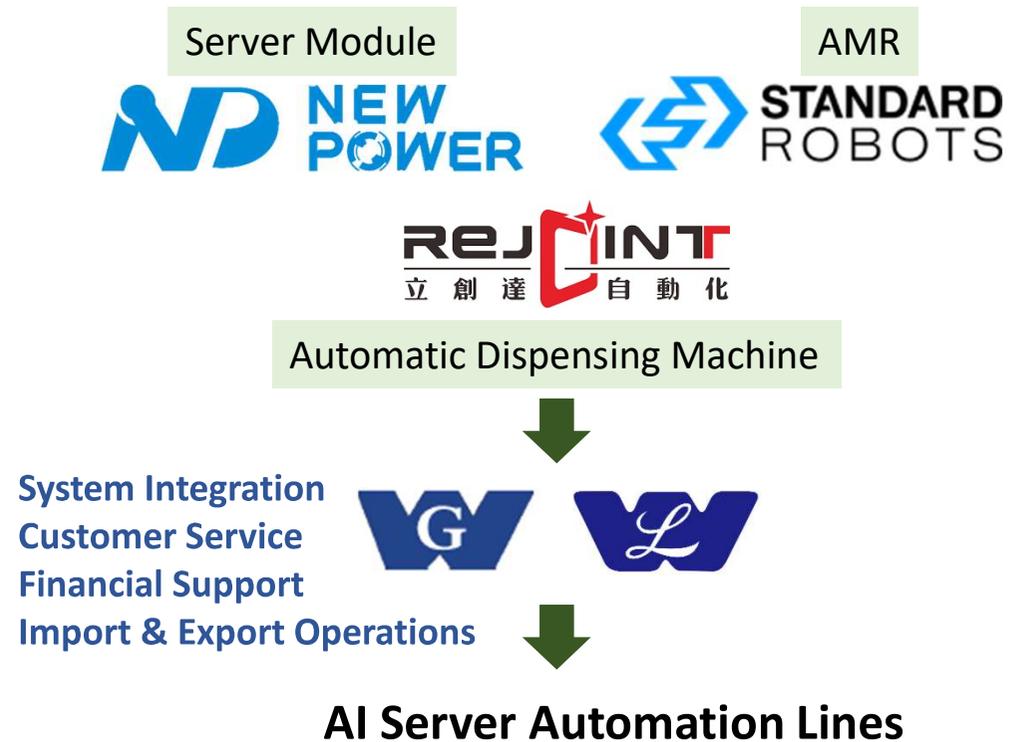
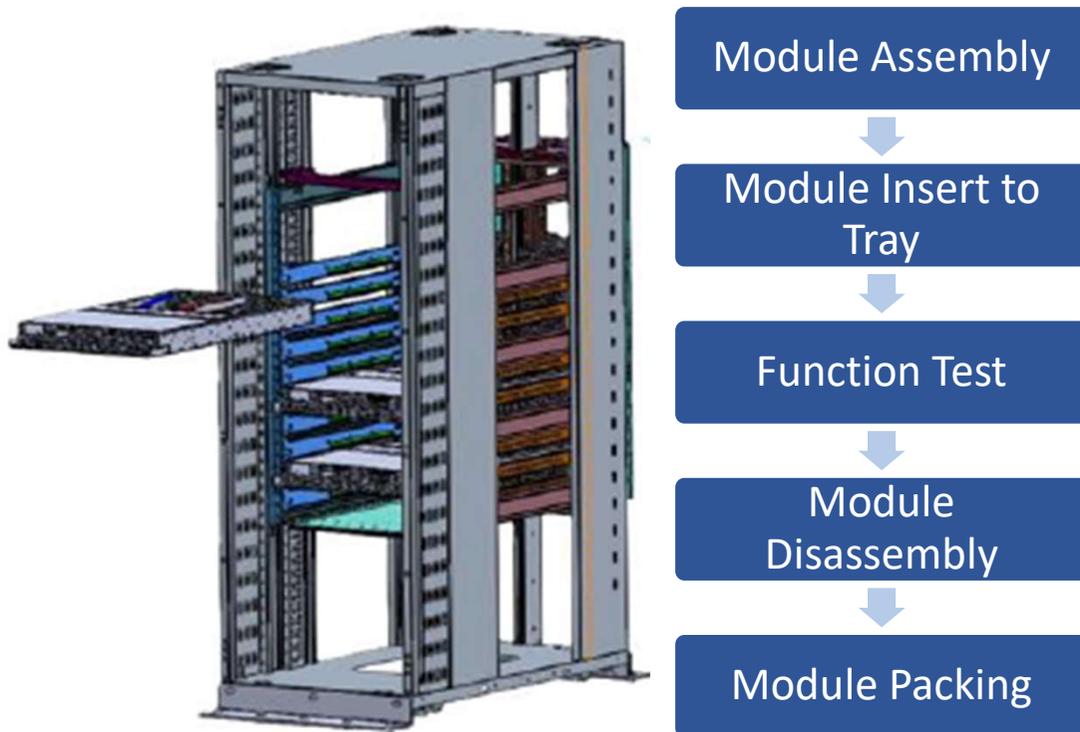


- Main sales in PCB Industry: MCS/WMS/RCS systems, AMR/edge-side storage/conveyor lifts, and other automated handling equipment
- Main sales in SMT Industry: Soldering/storage/scanning/transportation/visual/cleaning/placement and other automated production equipment

Intelligent Manufacturing application BD: AI Server Product Assembly/Testing Automation Line



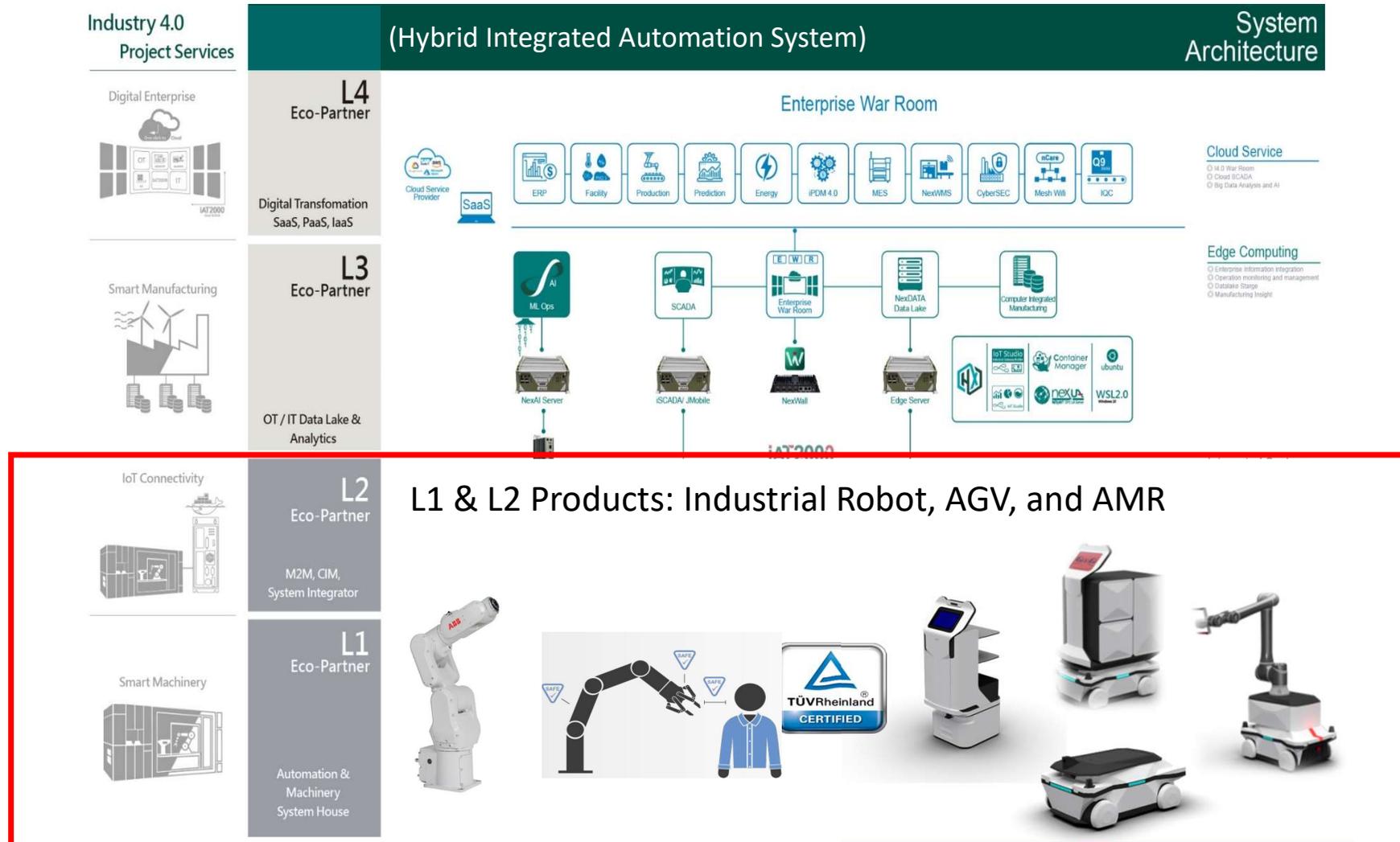
- Providing automated production services for AI Server products, including module assembly, functional testing, module unloading, and product packaging for factories.



Intelligent Integration BD



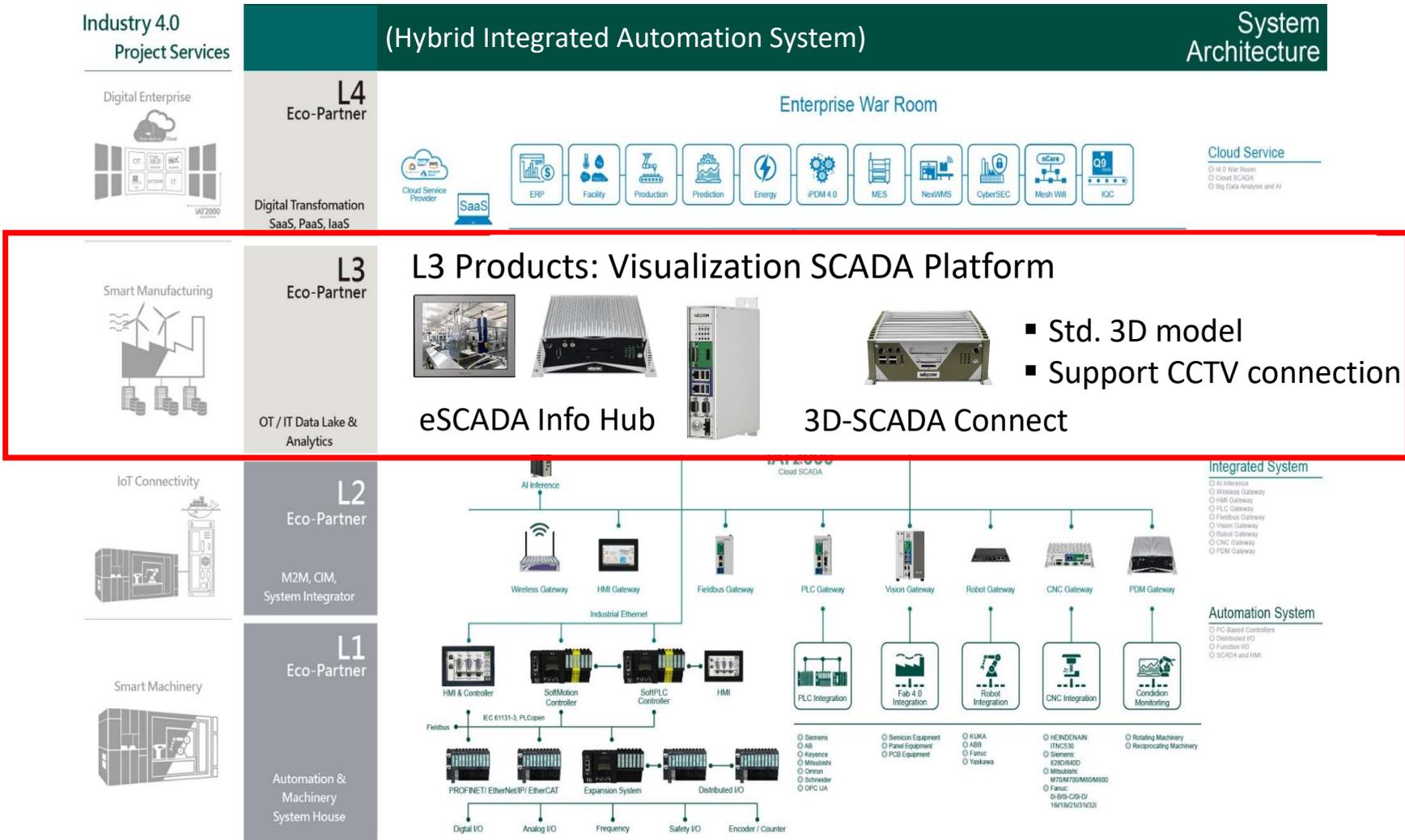
Smart Manufacturing Solutions from L1 to L4



Intelligent Integration BD



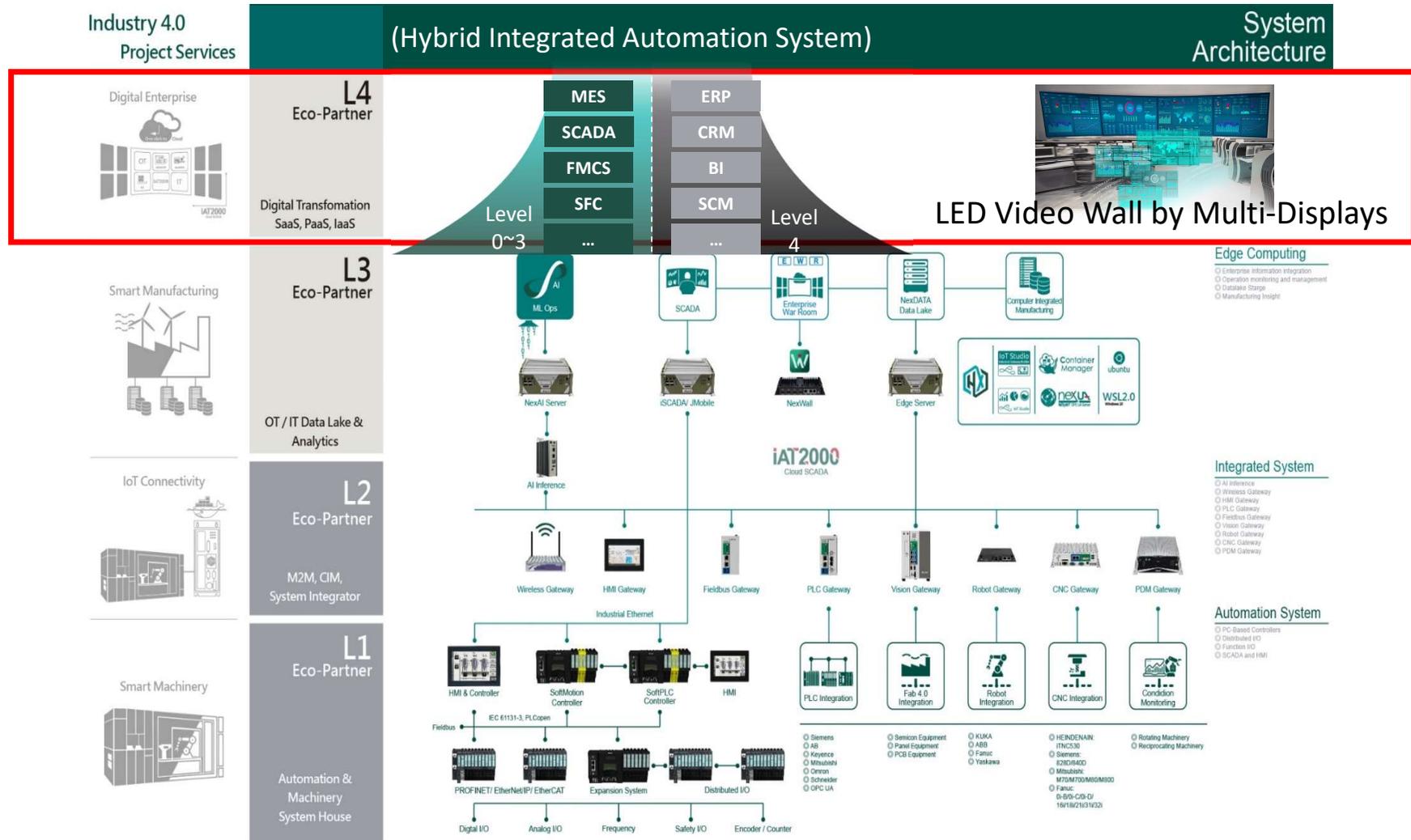
Smart Manufacturing Solutions from L1 to L4



Intelligent Integration BD



Smart Manufacturing Solutions from L1 to L4



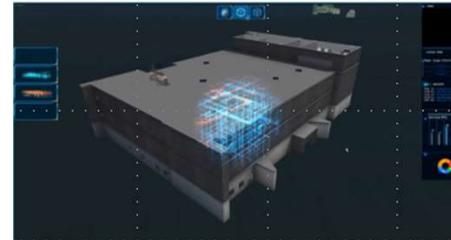
Intelligent Integration BD: Smart Integrated Display



Dashboard



3D Situation Visualization



Cloud service



Data Platform



AI Agent
AI Fine tuning



IOT Hub / Edge computing / PLC /
DDC / DCS ... data connect

Robot, conveyer



PLC, elevators,
rack storage

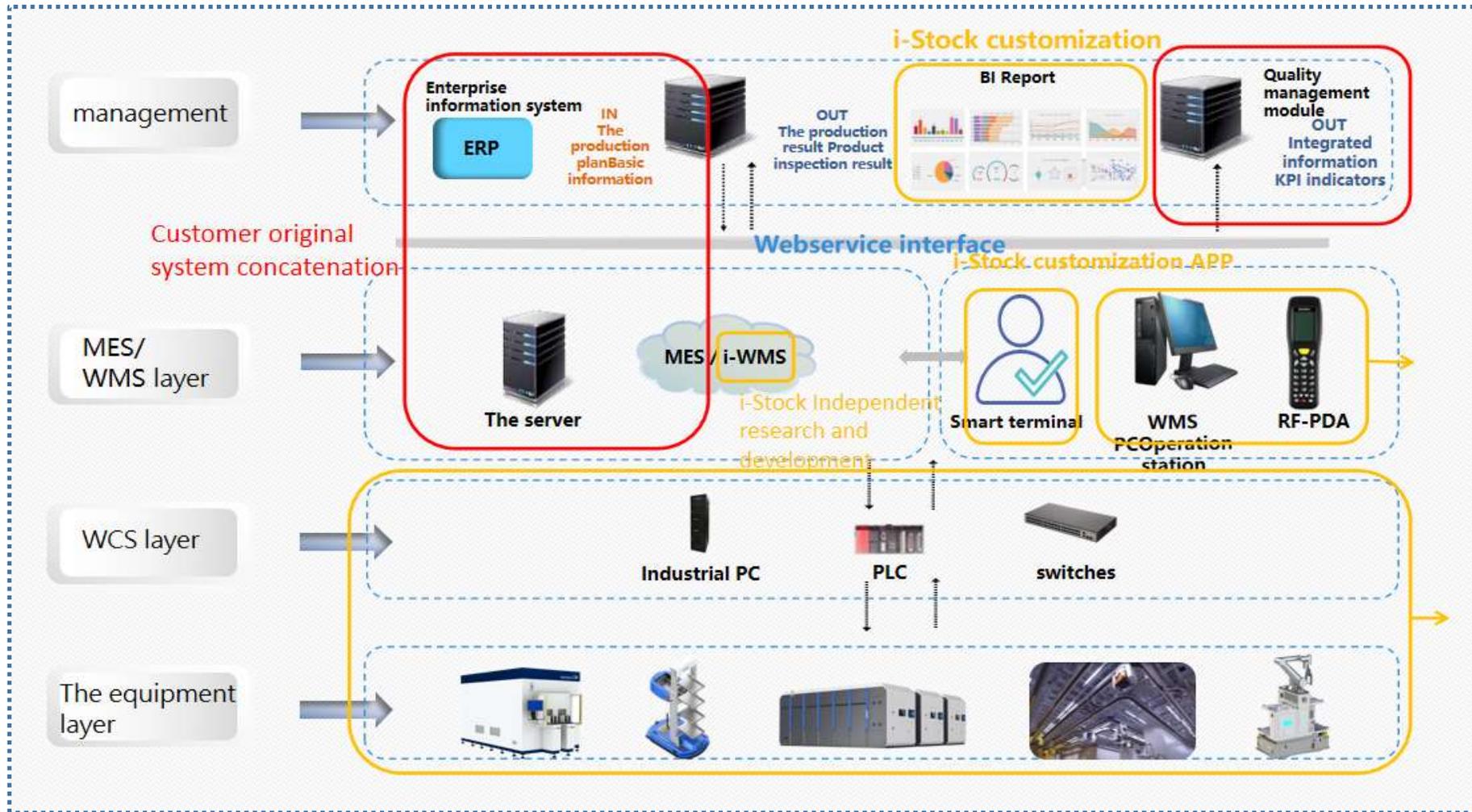


Existing
System



On-Prem
server &
storage

Intelligent Integration BD: Intelligent Workshop 4.0 Platform Architecture

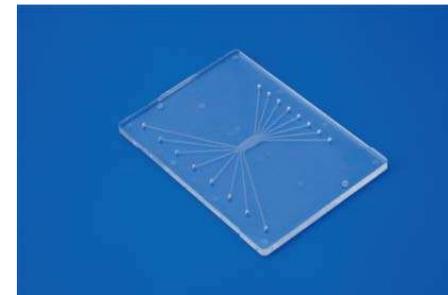


Advanced Development BD



New products/services

1. Excipient for Drug and Food Additive (Food and Pharmaceutical Grade Gel Silica Powder)
2. Regents and equipment for regenerative medicine, drug discovery, Glycobiology, Chemical Research and Bio-tech Industry
3. Medical Devices for Endoscopic Treatment and other surgical instruments
4. Total solution for blood purification, CRRT
5. Dental Implant System and related products



South-East Asia Arrangement



• Plastic Materials

- PC, PC/ABS
- PA6, PA66
- PBT
- PPO
- POM
- PEI, PPS, LCP, PA6T, PA9T, PEEK
- ABS, PS, PMMA, AS, PP
- TPE/SBS, SBBS/TPU/TPV/TPO
- BMC, Thermosetting Plastic

• Chemical Materials

- Epoxy Resin, Acrylic Resin
- Vinyl ester, UP, ISO Resin
- Fiber Glass
- Silicone Rubber/Silicon RTV
- PC Film, PET Film, PE Film, PVB Film
- Concrete Chemical Admixture (PCE)
- Sizing Agent, Dry Strength Agent

• Advanced Materials

- PCB Related Materials
- Dry Film
- PCB Machinery
- Solar Power System
- Wind Mill Power System

• Automation and AI

- WMS
- MES
- Automation
- Robotics
- AI Server sell and service



Wah Lee Industrial Corp
Material Pioneer · Technology Navigator

Thank You!





Appendix—Other Products and Information

Electro-Mechanical BD: Inner Layer of PCB & IC Substrate Process's Material & Equipment



Panasonic
ideas for life



Package Type	CSP	FC CSP	FC BGA
	 • Single-chip • Stacked-chip • NAND-Flash etc.	 • PoP-Bottom over mold • PoP-Bottom TM ² • Flip-Chip etc.	 • Flip-Chip etc.
	R-G545E,L / R-G645E, L Low DK, Df		
Product	★ R-G515E / R-G515S Low CTE High Modulus Ultra thin		★ R-1515K / R-1515V Low CTE High Elongation R-G535E / R-G535S Low CTE High modulus
	R1515E / R-1410E Ultra Thin Material		R-1515W Low CTE High modulus R-1515A Low CTE

ORC(Japan)
DI exposure equipment

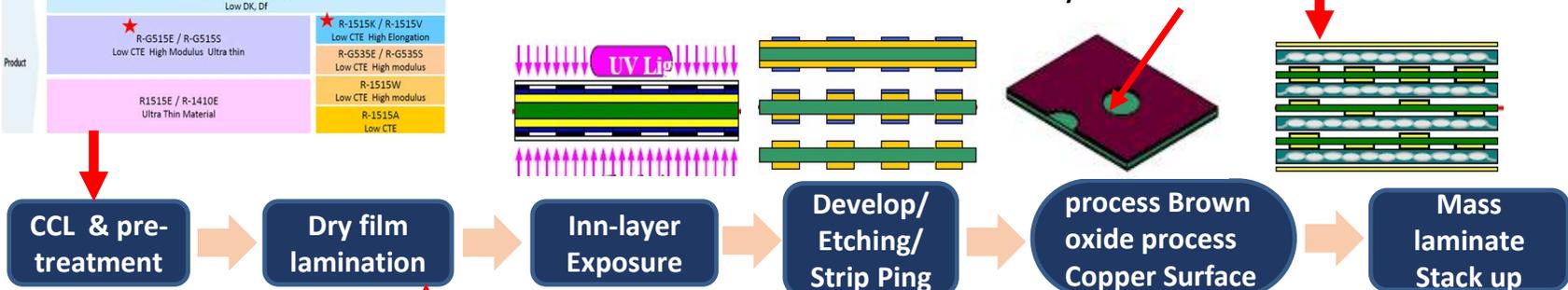
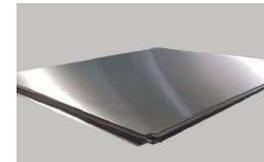


uvat



Laser Via Plasma
De Scum Dry cleaner

Core-less process thin steel sheet & lamination steel plate J630H – High-performance low-carbon precipitation-hardened martensitic stainless steel

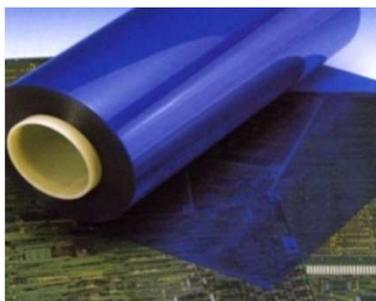


SHODA TECHTRON CORP.

SHODA (Japan) CCL Cutting Machine

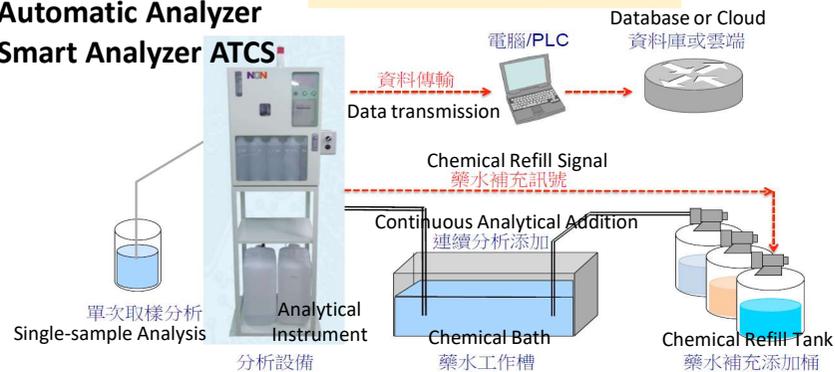


ASAHI KASEI
Photo Resist Dry Film



High-precision On-line Automatic Analyzer
Smart Analyzer ATCS⁺

Industry 4.0 Concept



Electro-Mechanical BD: Outer Layer of PCB & IC Substrate Process's Material & Equipment



廣州明毅電子機械
Guangzhou GREAT Chieftain
Electronics Machinery Co., Ltd.



Vertical Copper plating
VCP (Plating Equipment)

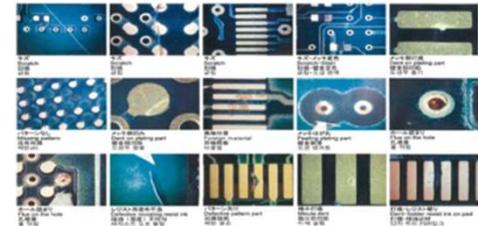
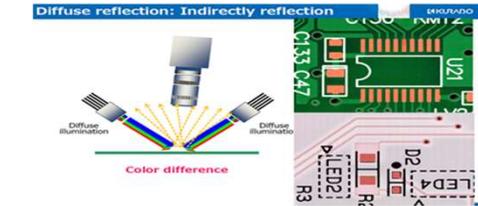


Copper plating
raw material

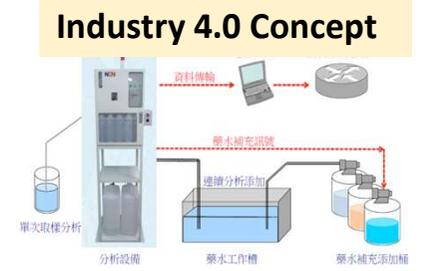
KIKURABO 倉敷紡績株式会社 KURABO INDUSTRIES



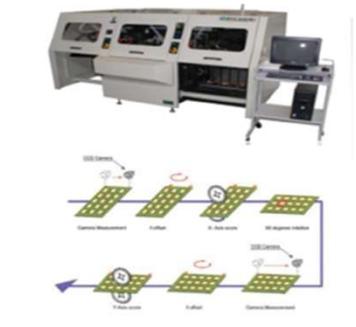
基板外觀検査装置 ビーマスター
新型自動両面検査タイプ



JTN High-precision On-line Automatic Analyzer
AI Smart Analyzer ATCS



SHODA TECHTRON CORP.



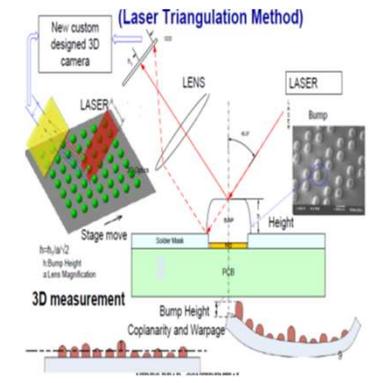
詳維科技(Optivz) 2D CCD + 3D laser
for IC substrate warpage & bump inspection

OptiViz

Opti-9000

System Configuration : 3D Laser + 2D CCD + Fully automatic handler

- Laser 3D technology
 - High Speed
 - High Precision
- AOI 2D CCD Capability
 - Optics Design
 - Defect detection Software
- Fully Automatic Handler
 - Precision Alignment
 - Reliable handling



Electro-Mechanical BD: PCB Material Line Cards



日本触媒 

 JSR Corporation

 DESIGNER
MOLECULES INC.

 JFE

 TOAGOSEI

Asahi**KASEI**


JMITOMO BAKELITE CO., LTD

AGC

kuraray
Possible starts here

Panasonic
ideas for life

**OPTI
VIZ**

ORC 株式会社 オーク製作所

uvat

 **ZACROS**

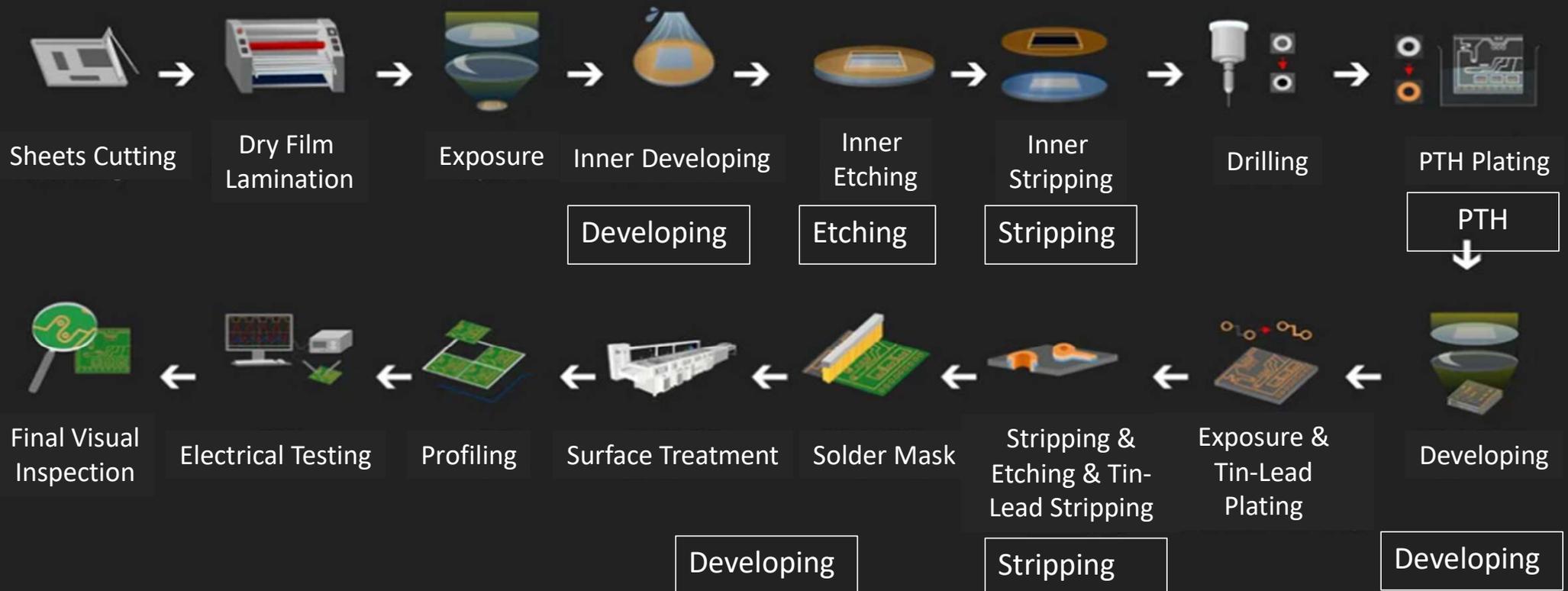
 **SHODA TECHTRON CORP.**

 **KURABO**

 **廣州明毅電子機械有限公司**
GuangZhou Great Chieftain Electronics Machinery CO., Ltd.



PCB Manufacturing Process



Electro-Mechanical BD: Electronic Component Products (TW)

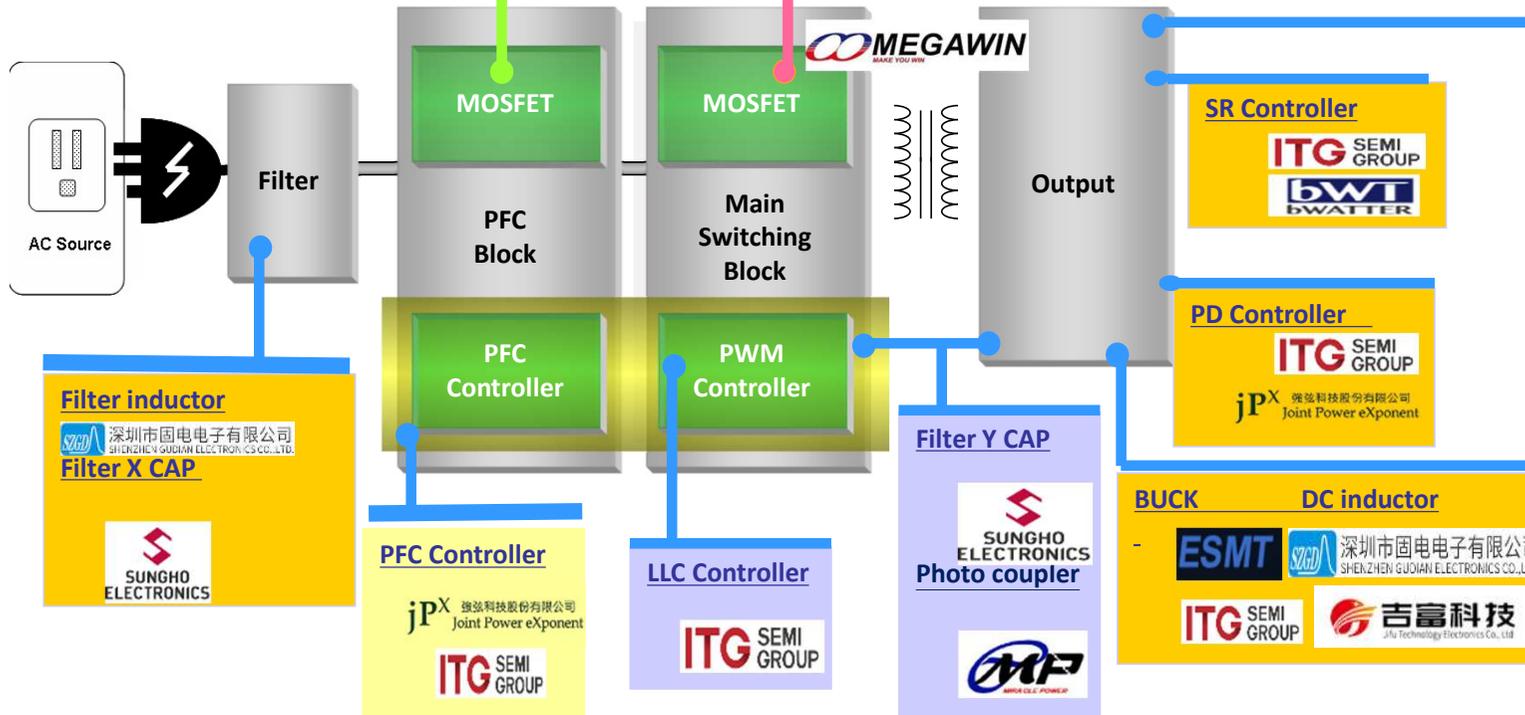


PFC MOS/SIC/GAN PFC DIODE

仙湖半导体 LAKESEMI
成为半导体行业全球领军企业之一

MOSFET/GaN/SiC

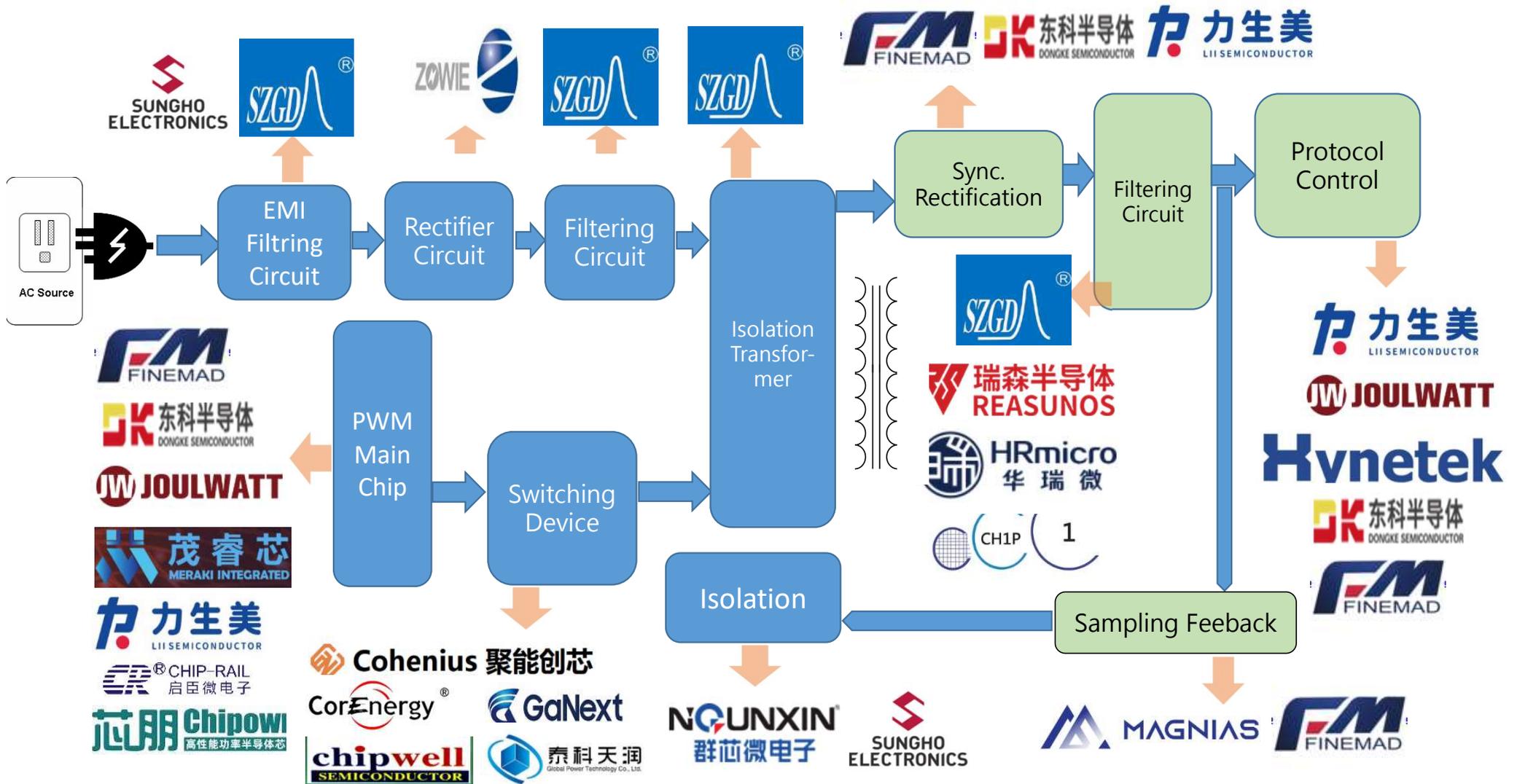
Schottky diode/MOSFET/LV GAN



LCM Peripherals



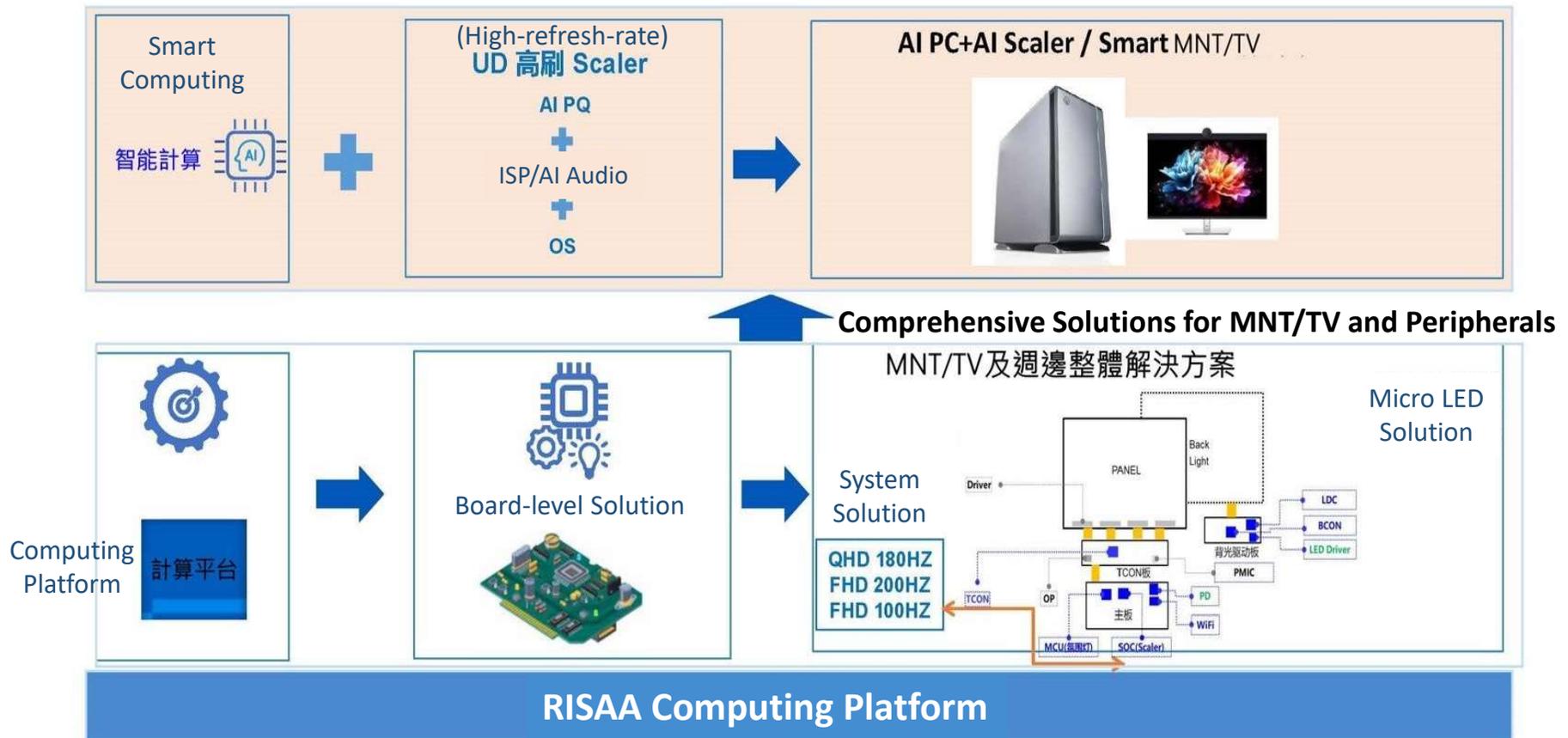
Electro-Mechanical BD: Electronic Component Products (CN)



Opto-Electronics BD: MNT/TV Total Solution



- RISAA computing platform serves as the foundation, with QHD 180Hz Scaler as the starting point. In the short term, Scaler and peripheral chips can be provided, while in the long term, it will support co-creation of innovative AI products.



Opto-Electronics BD: Fab Partners in TW & CN



FOXCONN[®]
SHARP
SDP



TIANMA

AUO

INNOLUX

TWD\$2500M / USD\$80M Annual Sales



Material: 40%



ICs: 50%



Equipment: 10%

The Only One-stop Shopping to Panel Fabs

Opto-Electronics BD: Established Business with ODMs



FOXCONN®

TPV



AmTRAN

Hisense



wistron®



VIZIO



英業達
Inventec

VESTEL

