

How Well do you Know your Local SMT and IC Package Services?

OVERVIEW: Demand for SMT and EMS assembly and IC packaging services in Silicon Valley is increasing dramatically, driven by the many start-ups developing hardware, firmware, and software products. These require low-volume but innovative, quick-turn, adaptable, and complex assembly capabilities. They are finding it hard to locate suppliers who are capable of meeting their needs, such as partnerships with higher volume suppliers as well as providing the necessary quality and cost-control solutions.

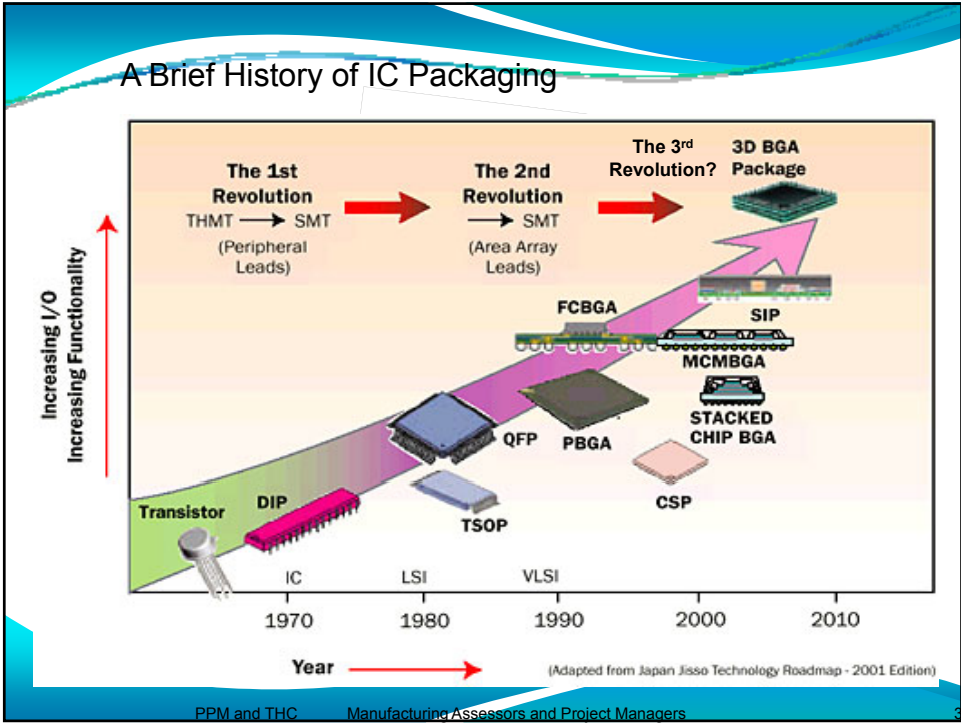
This presentation will identify and describe the capabilities and business structure of some local suppliers. We will also provide guidance to help assess the necessary capabilities, capacity, and quality systems when selecting a service provider.

This talk is structured to be beneficial for both beginners and experienced engineers and managers, to gain technical knowledge as well as business understanding.

Presenters: Tom Clifford (THC) and Phil Marcoux (PPM)

Agenda

- A Brief history,
- Industry participants
- Selection process
- Management-level overview
- Shop-floor appraisal
- Summary and Trends
- Q&A



A Sample List of CA-based ICP and Combo ICP/SMT Suppliers

Company	ICP and/or SMT	Location
Corwil	ICP	Milpitas
DPA Components Intl.	ICP	Simi
Emulation Technology	ICP	Camarillo
Fast Semiconductor	ICP	Anahiem
Golden Altos	ICP	San Jose
IDAX Labs	ICP	Anahiem
I2a (formerly IPAC, aka Semi-Pak)	ICP	Fremont
Silitronics	ICP and SMT	San Jose
Quik-Pak* (*Now Promex-Ind.)	ICP and SMT	San Diego
Amtech Microelectronics	ICP and SMT	San Jose
Azimuth Semiconductor	ICP and SMT	Union City
Interconnect Systems, Inc.	ICP and SMT	Simi/Camarillo
Pantronix	ICP and SMT	Fremont
Promex Industries	ICP and SMT	Santa Clara
STS (Micross Components, LLC)	ICP and SMT	Fremont
Teledyne Micro	ICP and SMT	Los Angeles

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Company	ICP or SMT	Location
ABC Assembly	SMT	San Jose
General Electronics Assembly	SMT	San Jose
Group7	SMT	San Jose
Lenthor	SMT	San Jose
Nexlogic	SMT	San Jose
Oncore Manufacturing	SMT	Fremont
Quality Circuit Assy	SMT	San Jose
Shasta EMS	SMT	San Jose
Sicon	SMT	San Jose
Suba Technology	SMT	San Jose
Surface Mount Solutions	SMT	Santa Clara
Valleytek	SMT	San Jose

Supported IC Packages and Services							
Company	QFN/DFNs	QFPs	BGAs	SO/ SSOPs	Legacy Pkgs.	Wafer Dicing	Open Cavity
Corwil							
DPA Comp. Intl.							
Emulation Tech.							
Fast Semiconductor							
Golden Altos							
IDAX Labs							
I2a (AKA Semipak)							
Silitronics							
Quik-Pak*							
Amtech Micro	*	*All	Open	Cavity	Only		*
Azimuth Semi							
Interconnect Sys, Inc.							
Pantronix							
Promex Industries							
STS (now Micross)							
Teledyne Micro							

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Common IC Packaging Equipment	
IC Assembly Equipment	
Plasma clean	Tepla plasma system
Die Bonder	Dataseon die bonder, FSGG die bonder
Wire bonder	K&S wire bonder (Au wire), ASM wire bonder (Au wire)
Bond tester	Dage multi-purpose bond tester
Pick & Place (bonding)	Semi auto pick & place equipment
Dispense system	Asymtek semi auto dispense system
Saw singulation	Disco saw singulation machine
Swigging	Semi auto swigging equipment
Ultrasonic clean	Multi frequency (40, 80, 100 kHz)
DI water system	>10 MOhm
X-ray	Nicolet X-ray system
Bake	Hi-temp N2 purge oven
UV exposure	USI UV system

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Common IC Packaging Equipment	
Facility	
Clean Room	Clean Room 10k Class (Or Less)
EOL (End of Line) equipment	
Injection Molding System	Sodick Injection molding machine 100 Tons
Tranfer Molding System	ASM semi auto mold system 120 Tons
Dehumidify Dryer	Top Star - dehumidy, dry and deliver?
Laser marking system	PowerTECH?
Post mold cure oven	Shenghong? high temperature oven?
Auto projector	GONGEN digital auto-control projector
Projector	EASSON digital optical projector
Deflash Line	PEL

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Typical SMT Equipment Capabilities List	
SMT	
Components	Passives, diodes, QFN, SOIC, BGA, LED, PTH, misc. hardware
Components (W x L)	Min (0.1 x 0.005mm) 01005 - Max.100 x 45mm (3.94 x 1.77")
Components (Height)	Min 0.005 – Max 2.00"
PCB Materials	Flex, rigid-flex, FR-4,-5, ceramic, metal, single to dense multi-layer
Solder Paste	Lead (62Sn/36Pb/2Ag) & Lead-Free (96.5%Sn/3.0%Ag/0.5%Cu)
Solder Paste Flux	VOC-free, Lead-free, water soluble, rosin, No-clean
PCB (W x L)	.100" x .100" min (Pallets) - 30" x 30" max
PCB Thickness	.010"(Fiber) (1mil Flex) min - .500" max
Paste Inspection	2D, Laser
Solder Processing	
Solder types	Reflow, Manual, Wave
Fluxing Applicators	Ultrasonic, spray, drop jet, foam
AOI "Automated Optical Inspection"	
Inspection Types	3D-X-Ray, AOI Automatic Optical Inspection
Magnification	255 time
Solder inspection	Color & X-ray
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Selecting the <i>Right</i> Contractor	
1) Meet with the contractor <u>management</u> ... Get overview of contractor capabilities vs your requirements	
2) Get a hosted <u>facility walk-around</u> ... If possible talk operational details with shop personnel	
3) Have a <u>wrap-up session</u> ... Discuss likes/dislikes, conclusions, follow-up plans.	
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Determine Contractor Suitability

During the Management Meeting determine:

- Their type of business full-service, or build-to-print, board-stuffing thru box or product build, ownership, etc.
- The size of facilities, locations, special capabilities, history
- The management
- The size and depth of expertise of the technical staff
- How do they handle new product/ process introductions
- How do they handle re-spins, revisions, matl incompatibility

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Determine Contractor Suitability (continued)

During the Management Meeting determine:

- The main industries served, markets, customers, IP control
- For production needs – what is their capacity for your product, supply chain, procurement, storage/isolation, ITAR
- What quality systems, certifications, and spec compliance
- If needed do they offer design, procurement, global pricing negotiations, other services
- What is their test capability; electrical, performance, accelerated aging, reliability tests, etc

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The Facility Tour

- Note the equipment and processes: maturity, capability, capacity.
- Observe and ask about the staffing: depth of engineering/assembler skills/experience.
- Innovation: new products, capacity expansion, processes
- Quality systems: ISO/equiv, SPC, customer specs.
- Shop practices: ESD, clean-room, access/IP control.

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Detailed Assessments - Equipment and Processes

When more than a casual walk-through is needed:

Identify processes, equipment, age
History, maturity, of new processes
Certified, calibrated, in operation?
Day shift operation, swing/grave?
Start-up or shift-change procedures
Who is qualified to operate it?
Preventive maintenance schedule
IP Ownership and Control

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For Detailed Assessments: Staffing

When more than a casual walk-through is needed:

- Process engineers ... all processes or dedicated?
- Maintenance techs ... specialized? trained?
- Operators' product experience?
- Operators' skills: manual? automated? complex processes?
- Training? Certifications? In-house or customer or IPC?
- Separate QC, or operator check with referee?
- See admin records, written procedures, check-sheets

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Detailed Assessments: Innovation, expansion

When more than a casual walk-through is needed:

Responsibility for development/introduction of new processes?
Special units dedicated to new processes? Release procedure?
Practice/responsibility for innovation? For expansion?
When/how are new materials, processes, products introduced?
Experimentation: designed or 1-FAT? who resp.? 1-FAT?
Examples of customers' novel requirements.
Ability to add more capacity: shifts? New cap equip? Staffing?
Willingness to accept customer participation and quality input.

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For Detailed Assessments: Quality systems

When more than a casual walk-through is needed:

Quality at each unit: golden boards, workmanship stds? How?
SPC for each process? Up-to date? Who is responsible?
Quality feedback real-time? Reportage later?
ISO9001, Mil 13485, QSR, customers' systems? internal?
Describe QC for typical start-ups, new products.
Describe key attributes at each station. Tests?
Describe QC training: new processes or products
Test equip: 'scopes, x-ray, sonic, laser, dims...NBS cals?
Describe F/A, root cause, process and examples

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For Detailed Assessments: Shop-floor Practices

When more than a casual walk-through is needed:

ESD controls, clean-room status, gloves, hoods?
Drawings, specs, QC docs in place at all units?
Isolation / identification of customers' materials?
Separation, identification: incoming, WIP, QC-hold, finished?
Personnel / vendor / other access, IP protection?
Communications: among ops, matl handlers, QC, mgmnt?
Facility status: haz-mats, OSHA-safe, environment?

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The Wrap-Up

Ask if they agree that your product is a fit.

Express your likes and dislikes of the facility, staff, procedures, etc.

If desired, tell to expect an RFQ, NDA, whatever else is needed to initiate a quote.

No matter what the outcome ---Thank them for their time and interest!

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Significant IC Packaging Trends Worth Noting

- Stealth Dicing
- Higher I/O Molded Array Packaging – aka QFNs
- Fan-in and Fan-out Pkging
- Stacked (3D) Multi-die pkging

Stealth Dicing

Internal processing

Dicing (between) - non-existent

Dicing (process) - non-existent

Cutting (step) - non-existent

Die

Lead

Die pad

EMC

(a)

Lead

Metal wire

Die

Die pad

(b)

Die

Die

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Thank You

Q & A

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www.oneppm3d.com

Appendix 1: A Sample List of CA-based ICP and SMT Suppliers

Company	ICP and/or SMT	Location	Website
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Emulation Technology	ICP	Camarillo	www.emulation.com
Fast Semiconductor	ICP	Anahiem	www.fastsemi.com
Golden Altos	ICP	San Jose	www.goldenaltos.com
IDAX Labs	ICP	Anahiem	www.idaxlabs.com
I2a (formerly IPAC, aka Semi-Pak)	ICP	Fremont	www.ipac.com
Silitronics	ICP and SMT	San Jose	www.silitronics.com/
Quik-Pak* (Now Promex Subsidiary)	ICP and SMT	San Diego	www.icproto.com
Amtech Microelectronics	ICP and SMT	San Jose	www.amtechmicro.com
Azimuth Semiconductor	ICP and SMT	Union City	www.azimuthsemi.com
Interconnect Systems, Inc.	ICP and SMT	Simi/Camarillo	www.isipkg.com
Pantronix	ICP and SMT	Fremont	www.pantronix.com
Promex Industries	ICP and SMT	Santa Clara	www.promex-ind.com
STS (Micross Components, LLC)	ICP and SMT	Fremont	www.sts-usa.com
Teledyne Micro	ICP and SMT	Los Angeles	www.teledynemicro.com

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