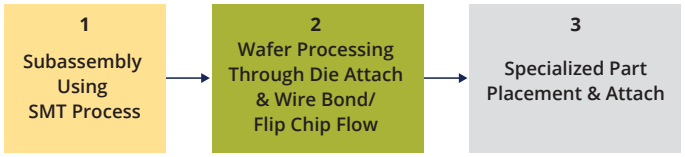
Heterogeneous Assembly

Promex
Microelectronics Assembly Technologies

Medical and biotech devices often include optical, chemical, RF and liquid elements. Some are combined with electronic devices to increase functionality or interaction with the environment. To produce these devices, multiple technologies are combined in a cost-effective way, ideally using a rapid process development cycle to minimize time to market.

Combining technologies, as well as combining components with electronics, requires improved design methods and software, involves more material properties, longer supply chains and a sophisticated manufacturing process known as heterogeneous assembly.



Heterogeneous assembly often starts with a conventional SMT process. The resulting subassembly can be used as a platform on which standard or custom die are attached and connected. If required, specialized parts are added.

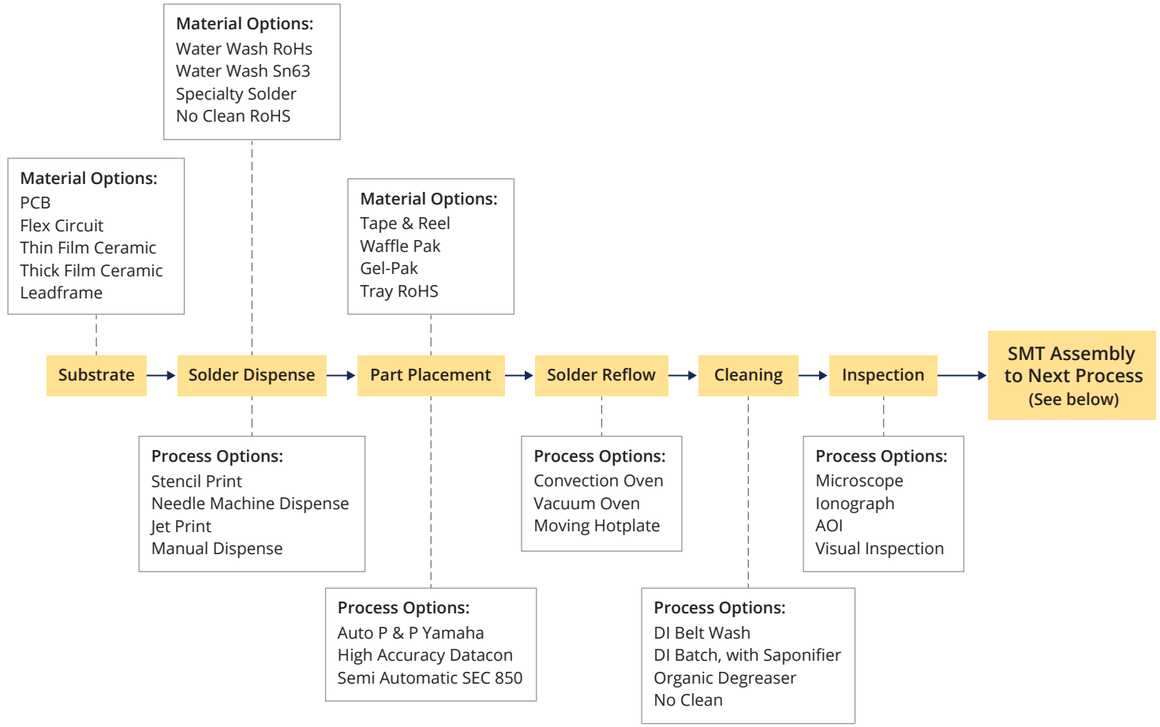
Here's how Promex meets your assembly requirements:

- Engineer a custom assembly process
- Utilize as many as 50 different assembly processes and a wide variety of components
- Source components from multiple vendors, maintain part traceability requirements and quality standards
- Modify equipment, fixtures and processes for economical builds – even for small runs
- Assemble parts such as optical components and lasers with micron accuracy
- Seal interfaces to prevent fluid leakage when fluids could harm the device/user/environment, or the sample for analysis is small
- Reduce maximum assembly temperature to below 240°C – sometimes to as low as 40°C
- Use information systems to track, monitor, gather, store and report data
- Complex packaging capabilities (stacking die, flip chip, SiP, etc.)
- Class 100 and Class 1000 Cleanrooms
- In collaboration, we develop the PFMEA, Quality Control Plan along with IQ, OQ, PQ quality documents

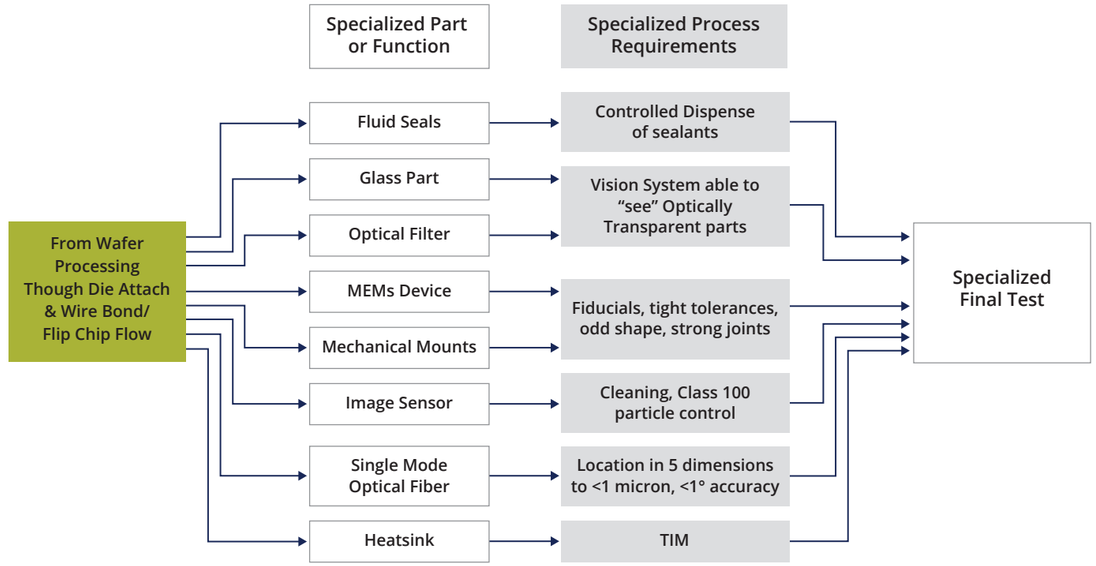
Assembly Solutions for Special Components

COMPONENT	CHALLENGE	SOLUTION
Multimode Optical Fiber	Alignment to ± 5.0 microns	Good fiducials, high-accuracy equipment, good joint design
Single-Mode Optical Fiber(s)	Alignment to ± 0.5 microns	Use high-accuracy parts and self-aligning joints
Megapixel Image Sensor	Minimize dust particles	Assemble in cleanroom
Temperature-Sensitive Part	CTE mismatch & warpage	Develop low-temperature joining processes
Fluid Channel	Sealing against leaks	Use well-designed joint and joining methods
Glass Component	Difficult for vision systems to recognize	Careful selection of equipment, optics and lighting
Indium Phosphide Die	Fragile die sensitive to the environment	Careful handling and sealing to prevent exposure to fluids and gases

1. Subassembly Using SMT Process

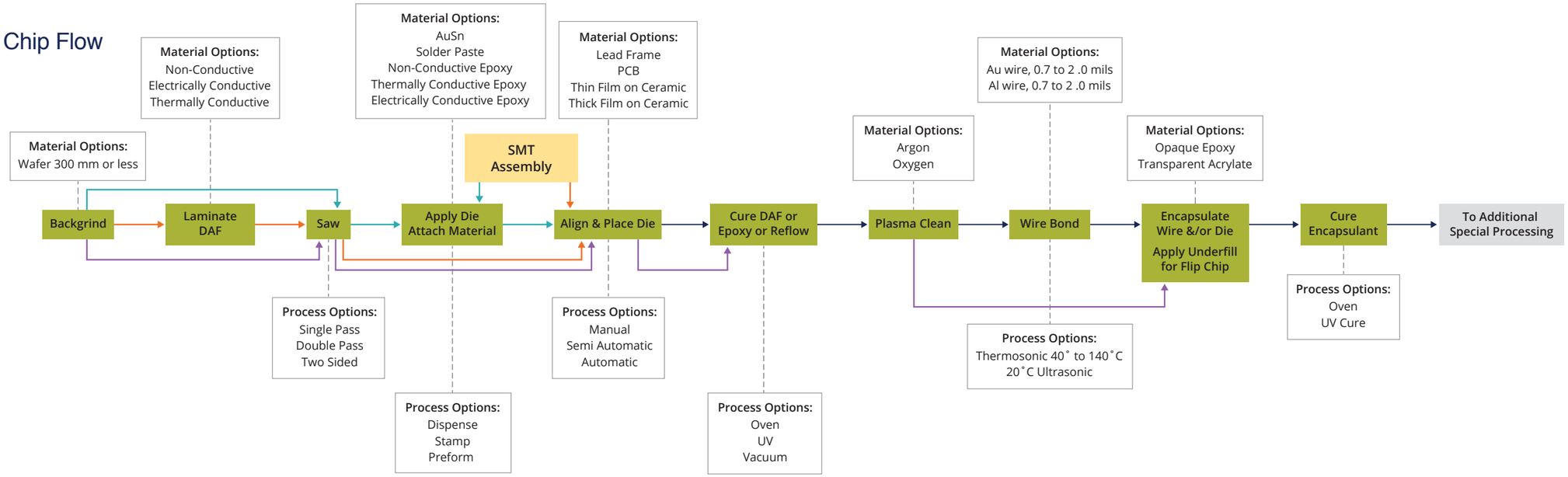


3. Specialized Part Placement & Attach



2. Wafer Processing Through Die Attach & Wire Bond/Flip Chip Flow

(Illustration of subassembly used as a platform on which die, processed from (often custom) semiconductor wafers, are attached and connected)



Assembly Processes

STANDARD	VARIATIONS[1]	SPECIALIZED[2]
SMT Placement	• Flexible and rigid-flex • "Odd" form factor • .01005 and smaller parts • CSPs • Panelization of singulated parts	• Place odd form factor parts • Place labels
Reflow	• Programmable temperature profile (belt & chamber oven) • Aqueous or no-clean flux/solder paste	• Vacuum reflow • Formic acid • Reducing gas environment
Backgrind	• Silicon wafers up to 300 mm • Mirror finish • Down to 30 µm • Molded packages / organic laminates	• Thick materials up to 5 mm • Individual dies / partial wafer
Saw	• Wafers up to 300 mm • Wafers with DAF • Dice before grind • Silicon, glass, ceramics, organics • Molded laminates	• Thick materials up to 5 mm • Individual dies / partial wafer • Multi-project wafer
Wire Bond	• Au wire, 0.6 to 2.0 mils • Al wire	• Low temp: 40° C (Au)
Die Attach	• Epoxy dispense (conductive & nonconductive) • DAF • AuSn eutectic • Solder paste	• Large die, > 225 mm • High aspect ratio die • Thin die (<100 µm) • Sintered Ag
Flip Chip	• Microbump flip chip, bond • Thermocompression bonding of thousands of IOs, bumps or pillars • Au stud bump	• Low temp underfill (<80° C)
Encapsulation & Adhesive Dispense	• Standard epoxies • UV epoxies • High-precision ultrafine geometries	• Low-temp cure epoxies (<80° C) • Transparent encapsulant • Precision, controlled location • Unique shapes
Marking (Part numbers & logos)	• Ink marking • Laser marking and serializing • Custom labels	

[1] Standard process sequences and materials with customized fixtures, temperatures and environments.

[2] Specialized processes, equipment, materials and assembly sequences.

Promex

Microelectronics Assembly Technologies

Promex specializes in innovative IC packaging and heterogeneous assembly solutions for medical device development, biotech microfluidic device design, and a wide range of semiconductor, industrial and commercial applications. Located in Silicon Valley since 1975, Promex provides onsite engineering development, RoHS-optimized SMT, wafer thinning, dicing, wirebond, flip chip, overmolding and Class 100/Class 1000 cleanrooms.

All manufacturing done in the USA

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