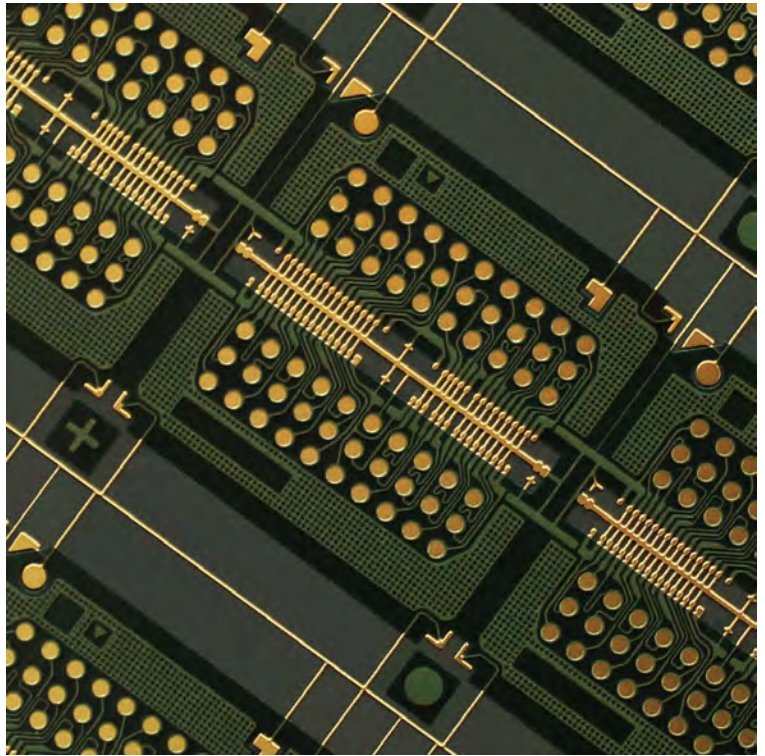
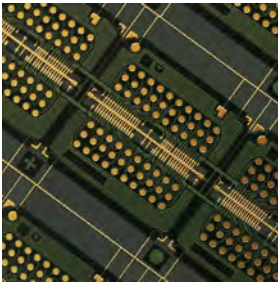


# TechniPad SMT ENIG & ENEPIG





# TechniPad SMT ENIG & ENEPIG

## Low Operating Cost

- Reduced gold usage
- Superior electroless nickel in-tank stability
- Long Pd catalyst bath life

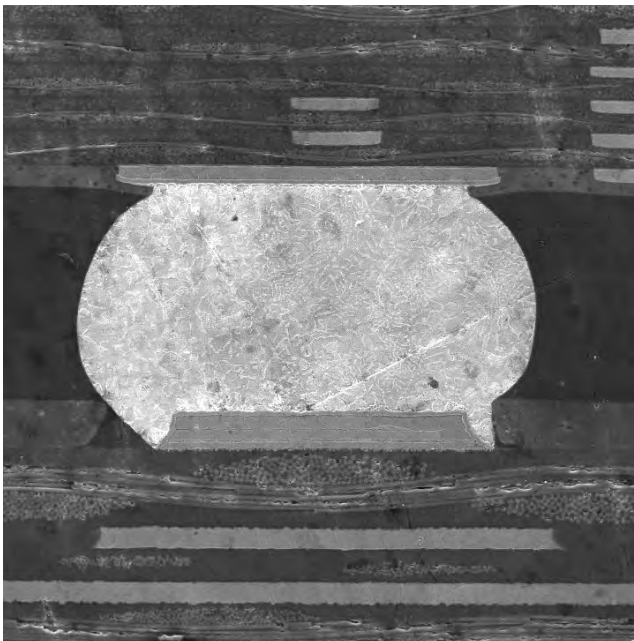
## Improved Solderability

- Flat nickel deposit
- No corrosion products/no black pad
- Uniform precious metal thickness

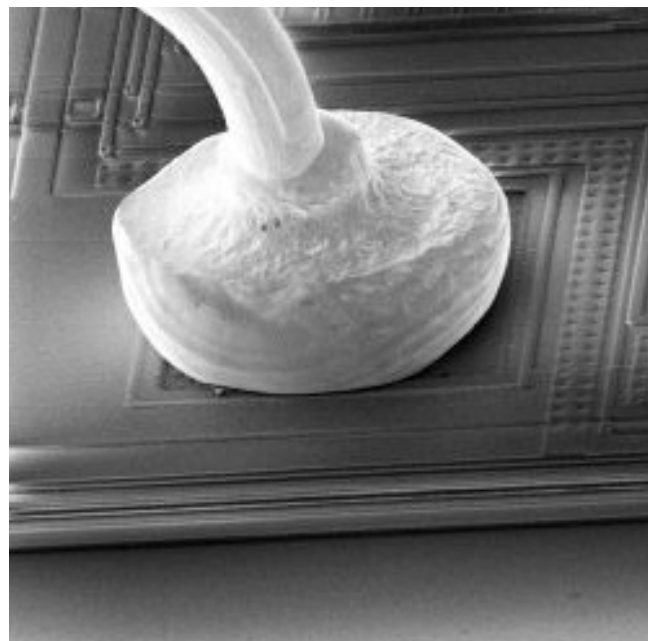
## Higher Throughput

- Significantly less electroless nickel maintenance
- Shorter process cycles
- Operates at 0.01 to 1.5 sq ft/gal of copper area

The TechniPad SMT System is an advanced electroless nickel/immersion gold (ENIG) process that, with the addition of electroless palladium (ENEPIG), can provide a gold wire bondable surface and improve solderability of lead free assemblies. The process has been specifically developed to meet the challenges of selective plating of printed circuit board features. The TechniPad SMT System incorporates a mid-phosphorous electroless nickel (8–10% w/w) with a replenishable, non-porous immersion gold and a low phosphorus electroless palladium. The TechniPad SMT System meets all the requirements for solderability and wire bondability applicable with a 2-3 $\mu$ ” gold deposit on electroless nickel or on palladium.



BGA solder joint



Gold ball bond

Meets or exceeds IPC 4552, IPC 4556, IPC S-Std-052, IPC J-Std-003 Category 2, Mil-Std-202 Method 208, Mil-Std-26074B, and AMS 2405. The process utilizes a unique combination of chemistry that provides benefits to both the fabricator and assembler.

## The Chemical Process

At the PCB fabrication level, the TechniPad SMT system has been specifically developed to improve first pass yields and reduce costs through lower gold usage and less maintenance. Both of these benefits come from a significant improvement in the electroless nickel deposit. This is possible due to our proprietary electroless nickel formula in conjunction with our specialized activation, electroless palladium and immersion gold chemistries. The end result is a superior final finish for soldering, wire bonding and touch contacts.

*Our full range of chemistries is described below:*

### TechniCatalyst AT 4000

Sulfate based catalyst system that operates at low levels of Pd and has a high tolerance for metallic contamination. The result is cost savings through low drag out cost and long bath life. The catalyst is selective for copper surfaces eliminating potential for extraneous plating.

### Technic EN AT 5600

The first electroless nickel that provides lateral growth on copper, yielding a flatter surface with less pronounced grain boundaries instead of the typical nodular, “cauliflower-like” structure from older formulas. This is important, because the grain boundaries are where corrosion products initiate and under worse case conditions become black pad

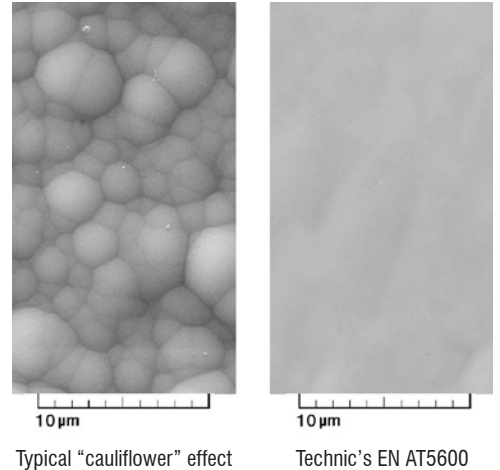
Technic EN AT 5600 also features a unique additive system that produces excellent solution stability throughout its bath life, eliminating the need for any break-in period. This provides significant overall cost savings by preventing plate out, increasing bath life and eliminating the use of dummy plating required by other systems. Technic EN AT 5600 has been engineered to provide a cost effective solution while improving soldering and eliminating defects.

### Techni EL Palladium D-715

Stable electroless palladium process with a long bath life that produces a deposit with 2-3% phosphorus. As a true electroless process, it can deposit a thickness of 2-5 microinches for soldering and 5 to 15 microinches for wire bonding. Typically used for more advanced products where solder joint strength is critical or gold wire bonding is required.

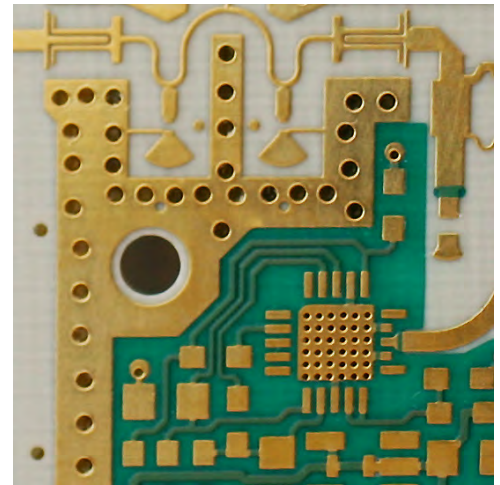
### Techni IM Gold AT 6000

Replenishable PGC based immersion gold chemistry. It will deposit 2-4 microinches of gold on electroless nickel in 10 minutes. Techni IM Gold AT 6000 has a high tolerance for metallic contamination, yielding a longer bath life which lowers operating cost. The deposit is self-limiting and provides at least a 12-month shelf life for eutectic and lead free soldering.

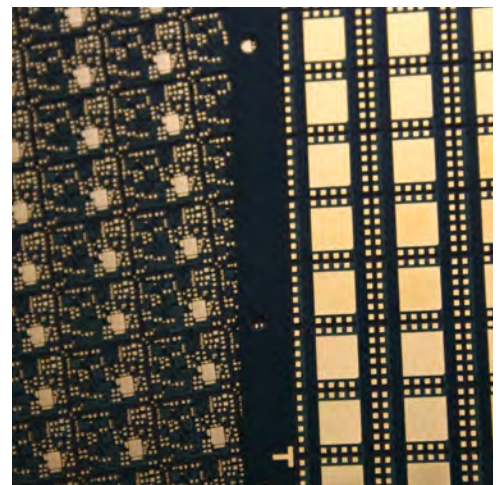


Typical “cauliflower” effect

Technic's EN AT5600



TechniPad SMT on Teflon® PCB



TechniPad SMT on fine pitch flexible PCB



## Deposit Performance

For today's electronics market, performance of any final finish on a PCB is measured by solderability, ability to wire bond, and contact resistance.

## Soldering

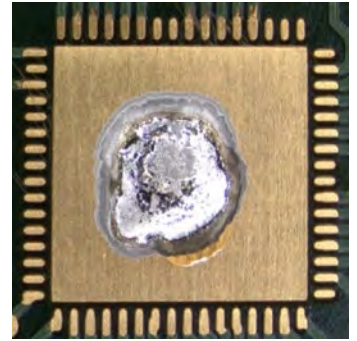
The TechniPad SMT process provides excellent solderability for eutectic and lead free soldering. The combination of corrosion free electroless nickel and protection from a pore free immersion gold improves solder wetting over typical ENIG finishes. Solder spread and ball shear testing was performed by an outside lab to compare Technipad SMT to a typical ENIG.

### Solder spread test:

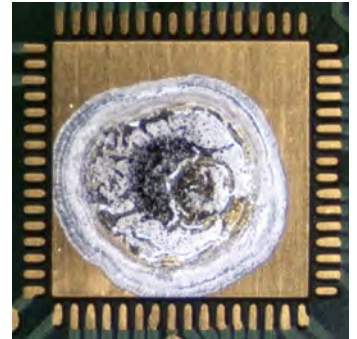
- IPC TM-650 Method 2.4.46
- 51 mil diameter SAC305 solder ball on a 8x8 mm pad
- Aged with 2 SAC air reflow profiles

TechniPad SMT had 2x the wetting area with 28.7 sq mm versus a typical ENIG deposit at 14.1 sq mm. In production, TechniPad SMT allows for almost flux free hand soldering as well as complete wetting of SMT pads & through holes.

SAC Solder Spread Test Results After 2 SMT Reflows

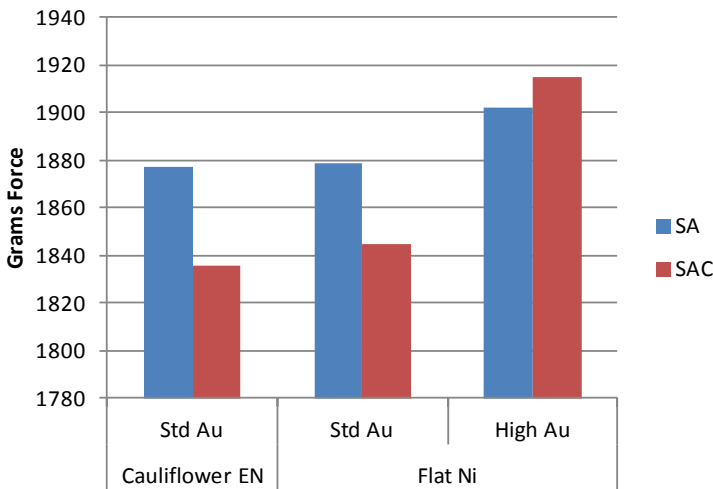


Typical ENIG



TechniPad SMT

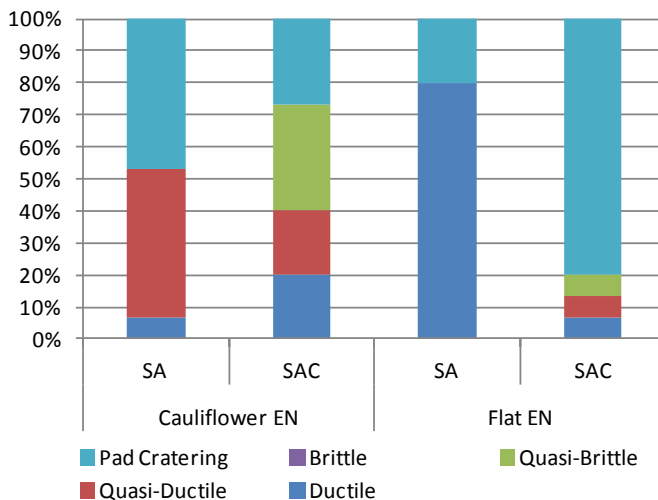
### Ball Shear Data AT5600 Vs Old EN



### Ball Shear Test:

- JEDEC JESD22-B117
- Kester Tacky Flux TSF-6502
- 30 mil diameter SAC305 & SA (96.5/3.5) bumps
- Dage 4000 Plus Bondtester
- Shear speed: 700 microns/sec
- Shear Height: 75 micron

### Ball Shear Failure Mode AT5600 Vs Old EN

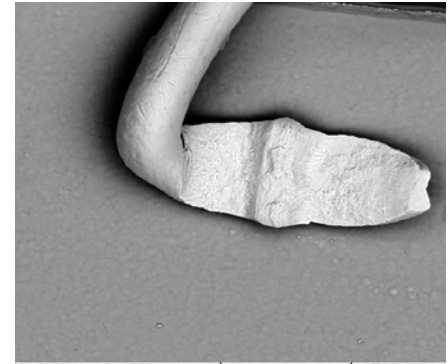
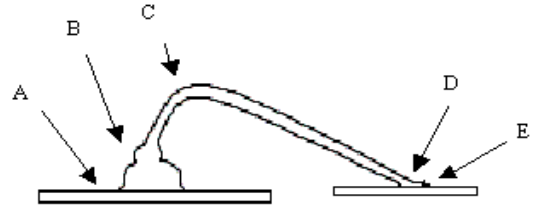


For this test, ball shear parameters were set up specifically to stress the intermetallic. There was minimal difference in average ball shear force between the two electroless nickels at normal gold thickness. Higher gold thickness did increase the ball shear value on the flat nickel. In previous studies, higher gold thickness on cauliflower nickel always decreases solder spread & solder joint strength.

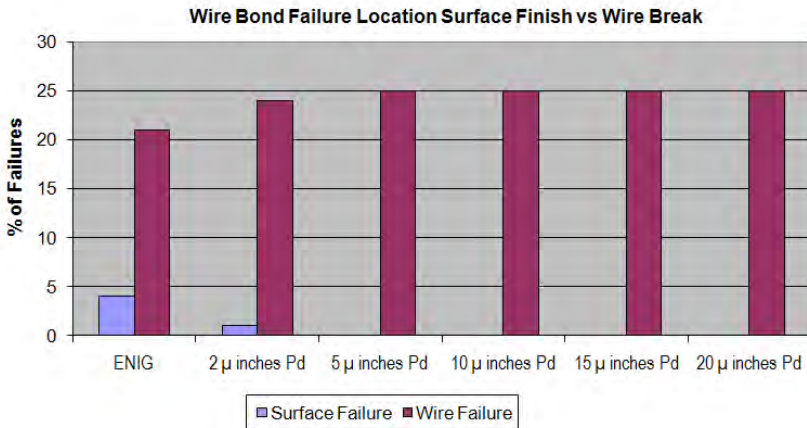
However, in evaluating the failure mode, the flat EN, AT5600, produced no brittle fractures (fractures at the solder-EN interface) with SA and very few with SAC alloy. This means the solder bond to the AT5600 is stronger than a typical cauliflower EN deposit.

## Wire Bonding

Good wire bonds are more than grams of pull. The failure point of the wire bond indicates if the issue is due to the surface (point A or E) or breakage of the wire (point B, C, or D). TechniPad SMT ENEPIG will provide a gold wire bondable surface with over 6 grams of pull even with 0.7mil gold wire. Based on testing, a minimum of 5 microinches of electroless Palladium is recommended.



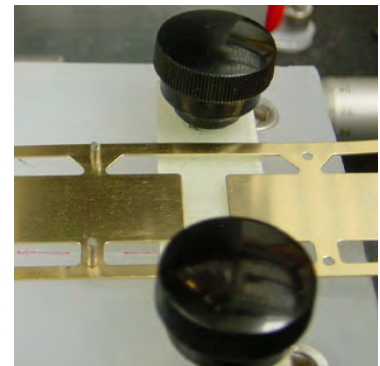
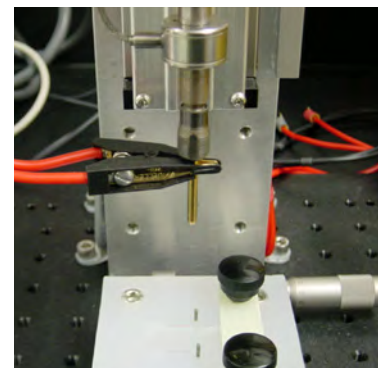
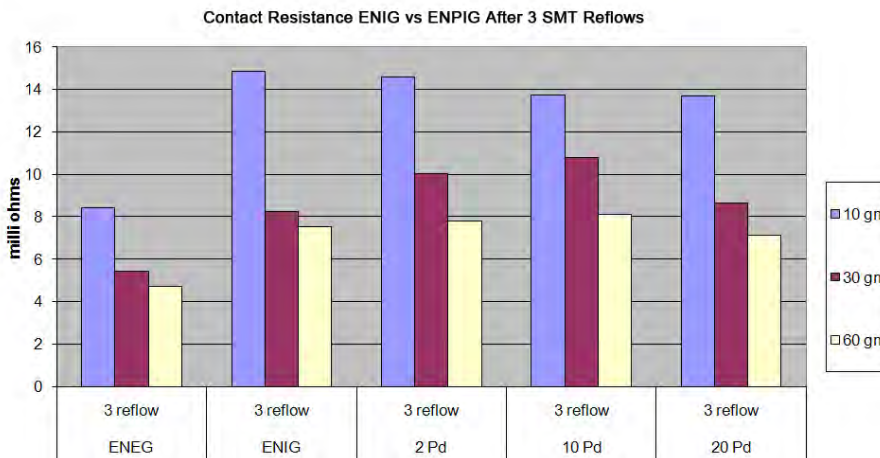
Stitch Bond on TechniPad SMT



## Contact Resistance

Maintaining low contact resistance over the life of an electronic device is critical for most mobile electronics. TechniPad SMT, due to a pore free immersion gold deposit, provides excellent low contact resistance.

Testing done with a 4 point contact resistance device showed very low contact resistance (<15 milliohms) even with very low spring pressure (10 gm). While electrolytic nickel electrolytic gold produced the lowest readings, all readings were well within acceptable ranges and there was little difference between TechniPad SMT ENIG and TechniPad SMT ENEPIG. Either process will produce acceptable contact resistance for all electronic applications.





Technic Corporate Headquarters, Cranston, RI USA

## About Technic

Since its inception in 1943, Technic Inc. has remained a financially strong private corporation and has established a global reputation for technical excellence in the electro-deposition of precious metals. Following the expansion of our product lines through organic growth, strategic partnerships, and acquisitions, Technic has grown to be a global leader in:

- Specialty Chemicals
- Surface Finishing Equipment
- Engineered Powder and Flake
- Analytical Control Tools

Our primary end use markets include:

- Semiconductors
- Electronic Connectors
- Photovoltaic Cell Manufacturing
- Electronic Components
- Printed Circuit Boards
- Industrial Finishing
- Decorative Applications

Technic currently operates over 20 global facilities in 14 countries within North America, Asia, and Europe. Our Advanced Engineered Solutions approach to customer projects allows Technic to add substantial and differentiated value to the markets and customers we serve. We look forward to helping you realize the maximum potential from your new product development goals.



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