

RapiTrim Case Study #3

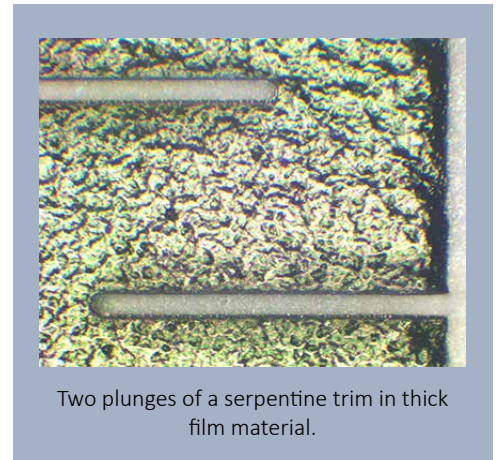
Benefit Analysis of Flying Probes

The Setup

To assess a new capital purchase for additional resistor trimming capacity, engineers at Infineon Technologies performed a comparison of their existing probe card system to the PPI RapiTrim with flying probes. Thanks to the staff at Infineon for allowing us to share this information for the benefit of everyone.

The Resistors

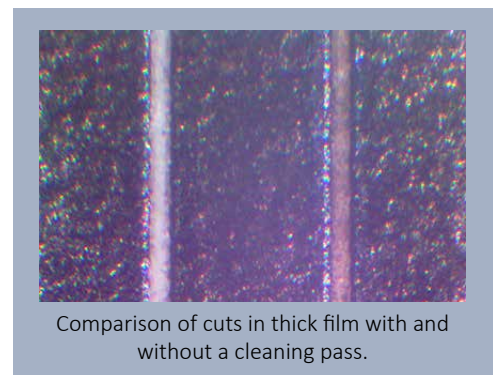
The following is the analysis of time consumed and cost for each high-level step in their thick-film trimming process with a traditional probe card system and the modern RapiTrim fixtureless system. The RapiTrim design uses four flying probes to access anywhere in the 50x50mm process field of the laser. Assignment of probes to test pads is performed automatically by the software, avoiding any shadowing of a resistor by the probe arms.



Issue	Probe Card System	PPI RapiTrim
Probe card layout	1 hour	n/a
Build probe card(s)	4 hours / pass (most of product requires three passes, so up to 12 hours total)	n/a
Probe card cost	\$80	n/a
Probe tips	\$8/tip x up to 32 / card	\$40/tip (annual usage about 40 tips)
Setup	1h45m (depends on number of passes and requirement for marking and serialization)	45m total
Trimming / loading / unloading	24 hours for a lot of 300 substrates with three passes.	Total of 10 hours for a lot of 300 substrates, including marking and serialization. Single pass.

Customer Comments

- The number of passes is determined by the number of resistors, the layout of the resistors, and the number of resistors that require 4-wire (Kelvin) measurements.
- Most of our Thick Film substrates have an average of 70 resistors. In most cases, 1- 5 resistors will require 4-wire measurement.
- On PPI’s RapiTrim, all resistors, marking and serializing is done in one pass.



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Customer Comments (continued)

- On the probe card system, a single unit is loaded and unloaded, while on the RapiTrim system with the custom fixturing we could load and process 48 substrates in a single load cycle.
- Infineon have a high mix of low quantity lots, with 5-7 different products per week.
- Types of cut used: Single- and Double-Plunge cuts, Scan cuts, L-cut, and L-cuts with back plunge.
- Average probe tip usage with the RapiTrim is 40/year. The lifetime per tip is 45,000 to 50,000 hits with the amount of overtravel used to ensure good contact.
- There was a resistance to change, from the old probe card system to the new fixtureless RapiTrim system, as the two systems are totally different. There is definitely a learning curve that needs to be overcome. Once overcome however, the difference between the two systems is very clear when it comes to efficiency and cost effectiveness.

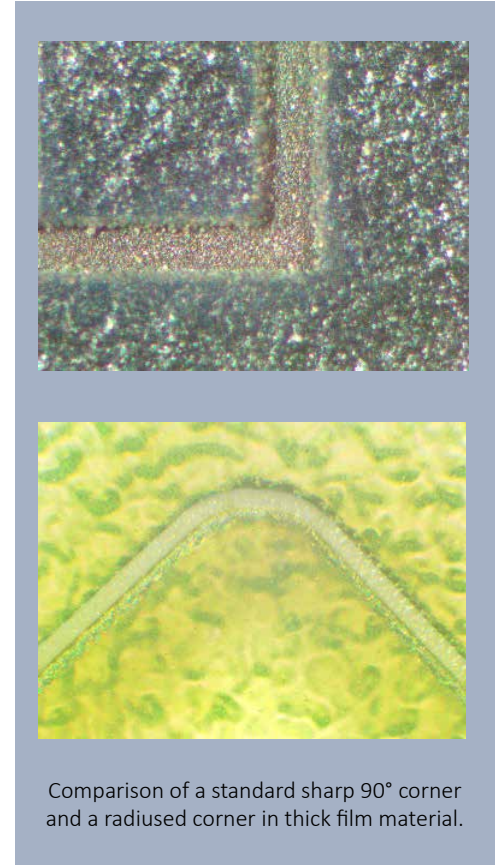
PPI Comments

Probe tips in the RapiTrim are usually replaced together, so the noted annual usage of 40 tips is replacement 10 times, or about every 5 weeks. For the cost of the annual usage of probe tips (\$1600 in this example) a customer could only build two sets of cards for new designs (each at \$256 x 3 passes = \$768 + \$80 for the probe card). More new designs than that and the RapiTrim is saving the customer money.

There is also a time cost for probe cards. For the scenario of a 3-pass circuit requirement, the probe cards will take up to 13 hours of time not needed by the RapiTrim. Again the flying probes available with the RapiTrim save money.

Setup and actual process times also favour flying probes, saving 1 hour on setup and 14 hours on processing for each job similar to the one analyzed above. While the flying probes might take a bit longer for a single pass, the flexibility provides a sizable advantage for these complex scenarios. Over the course of a year this is a huge saving in time (easily >1000 hours in this example), allowing either lower cost of operation for the same output as a probe card system, or more output (revenue) for the same machine time. The flying probe design is obviously a big advantage in this situation of dense resistor count.

PPI provides turnkey solutions for all trimming needs, from standard component and circuit trim to complex active trim scenarios with custom fixturing.



RapiTrim
The Future of Resistor Trimming