RapiTrim™ Solutions

The RapiTrim-P Probe Card System

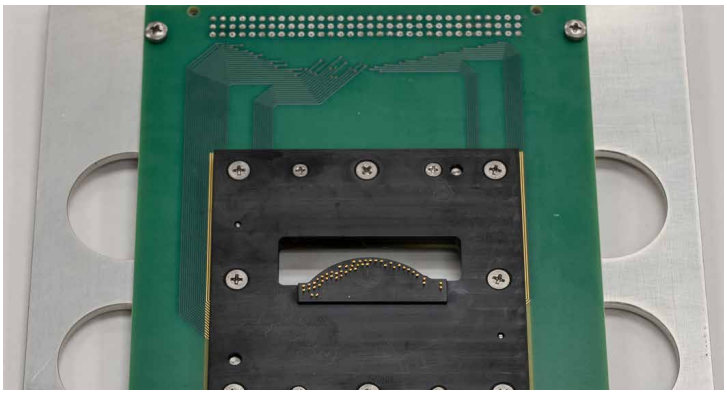
RapiTrim-P, The Modern Probe Card Resistor Trimmer

Since the early days of laser resistor trimming probe cards have been the primary method of connecting the resistors to be trimmed to the measurement system. Despite some inherent limitations, probe cards have benefit in the manufacture of today's components and circuits. Typical situations might be simple circuit production (low resistor density) that can be trimmed in a single probe card pass, high volume repetitive component trim or simply a desire to continue with a known process and existing library of probe cards. The use of flying probes was compared to probe cards in a previous RapiTrim Solutions article (see the web page https://www.ppisystems.com/resources/case-studies-and-solutions/ for a full listing of available articles). Both probing techniques can prove beneficial depending on the application.

If you are looking to replace an aging trimmer or expand capacity with a new probe card system, the RapiTrim family of trimmers from PPI offer a significant leap forward in technology, leading to improved productivity and user convenience. You don't need to suffer the shortcomings of the older systems.

Let's look at how some of the pain points for customers with old-technology probe card systems have been alleviated with the RapiTrim-P series.

Traditional cantilever style probe card needles.



More robust pogo-pin style probe card fits in the same mount.

Probe Card Planarization and Alignment

Older designs require manual planarization and alignment of the probe cards every time they are installed in the trimmer.

With the RapiTrim-P, simply insert the new probe card and press the Calibrate key. The system corrects for XY offsets and rotation as well as automating the planarization process, adjusting roll and pitch and finding the Z-height for touchdown (allowing for precise, consistent overtravel). If the card has a supported EEPROM chip to identify it, this information can be stored so that the alignment and planarization information is recalled when this probe card is used again, reducing the recalibration time.

PPI has also introduced the pogo style of probe card (shown above) when the application allows, providing a more robust card style with lower maintenance cost.

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Job Creation

With early trimmers customers had to have high-salary software experts to program the jobs in line after line of C / C++ code, or pay another company to do this for them. PPI has removed this expensive burden.

All RapiTrim systems can import DXFs to speed job creation, with additional entry directly via the user interface if needed. Programming is not required in most cases, and the touchscreen interface is as easy to use as a tablet. Scripting directly within the job editor is available if required for custom sequencing or other tasks.

Laser Power Adjustment

Old designs of resistor trimmers depend on mechanical rotation of an optical element to adjust the laser power. This is a relatively slow process.

With RapiTrim systems, fast electronics and optical switches permit on-the-fly changes to laser power, again facilitating great control over approach to target.

The Trim / Measure Process

Most systems still use a comparator to signal when the bridge arms are balanced so that the laser should stop firing. Then a final resistance measurement is made. This is awkward, is there not a better way?

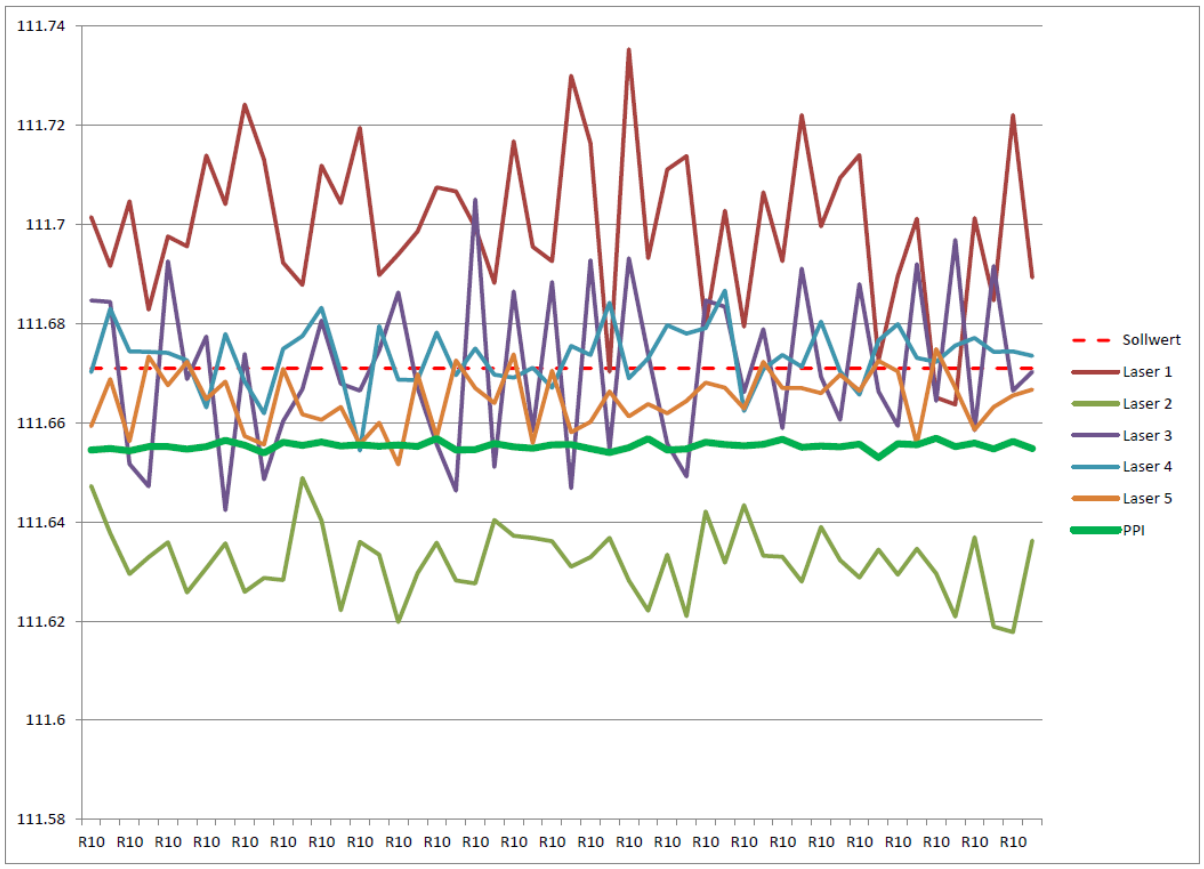
The RapiTrim systems employ PPI's proprietary high speed, real-time measurement technology. Bridge nulling followed by a resistance measurement is a thing of the past. The RapiTrim systems can even output the Trim Profile, a plot of resistance change with each laser pulse, a huge benefit to process development. This feature, along with the real-time measurement and precision laser output, allows unprecendented control over the approach to target. Real-time measurement is a powerful tool, essential in any modern trimmer system.

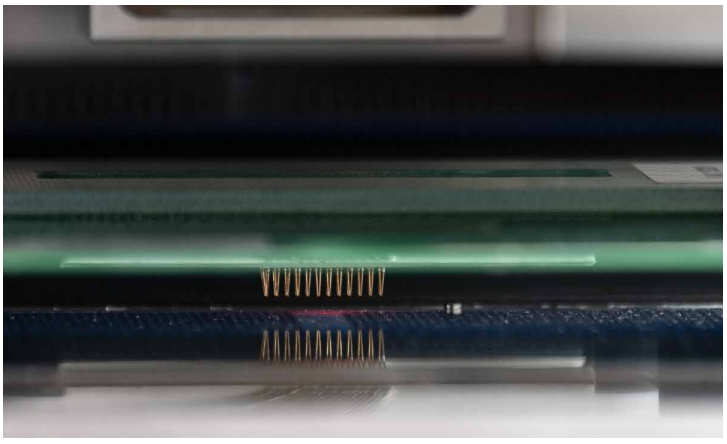
The RapiTrim system includes four independent Kelvin source-measure units, or alternatively signals can be directed by the switch matrix to external instruments for unique measurements. PPI can integrate control of these instruments into the ProSys user interface.

Measurement Repeatability

Old resistor trimmer system designs offer relatively poor system measurement repeatability. It's difficult to achieve 0.02% trim tolerance if your measurement repeatability is closer to 0.04%.

Here is a customer's comparison of repetitive measurements on five older systems in production compared to their modern PPI RapiTrim-P. One resistor is being measured 50 times with the same probes and measurement units. Which level of repeatability do you want in your system?





RapiTrim-P can do it all.

Enjoy the convenience of simplified process development, then let the system provide high-accuracy, consistent results at high speed in volume production.

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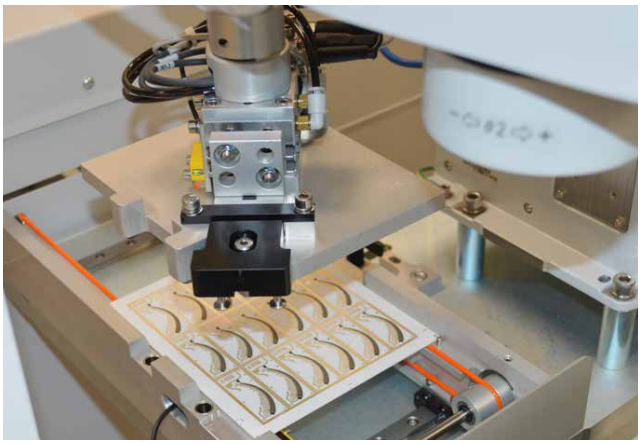
Automation options.

Substrates can be loaded manually onto the standard flat vacuum chuck or a multi-up fixture. For longer uninterrupted periods of processing, automatic load and unload is offered in two formats.

PPI's stack loader sits completely within the standard machine enclosure. There are two vacuum pickup heads, one each for load and unload. The load head picks up an unprocessed substrate from one stack and places it on the vacuum chuck while the unload head removes the processed substrate and places it on the second stack location. The system will run unattended for hours and finish processing the stack.

The two heads of the stack loader.

If substrates are handled in magazines throughout the manufacturing process, the RapiTrim can be integrated with magazine handlers using the SMEMA interface. Internal to the machine one robot picks a substrate from the load conveyor and places it on the vacuum chuck, and a second robot performs the unload task. This arrangement provides hours of uninterrupted processing, requiring only the addition of fresh magazines on the load side and removal of processed magazines on the unload side. Excluding the magazine loaders allows this design to be compatible with conveyorized integration.



Substrate on conveyor at the load position.

PPI has your solution for a modern probe card system.

RapiTrim

The Future of Resistor Trimming™