

## The 'Selective Stamp' Nozzle

Written by Alan Cable

Tuesday, 01 January 2013 19:34 - Last Updated Tuesday, 08 January 2013 10:35

---

Custom nozzles can reduce processing time and improve selective soldering machine flexibility.

Somewhere between the polar opposites of point-to-point selective soldering and mass solder dipping lies a unique happy medium known as stamp soldering. Stamp soldering in fact is a rather broad term, but what I'm talking about here is something of a middle ground between the two: an offbeat type of stamp soldering that can be achieved with a conventional selective soldering machine and that saves a tremendous amount of processing time while actually extending or expanding the flexibility of the conventional selective soldering machine.

The basics of conventional selective soldering are known to most. A single nozzle mounted on a solder pot and fountain travels around the underside of a PCB, soldering specific sites according to an individual sequential program created for that board. This method is very flexible and permits rapid changeover between products. However, the time it takes (TAKT) to process that board in its entirety, and each successive one, is a direct function of the number of solder sites on that board and the dimensions of the board itself. For example, a single board, as large as 18" square with 500 solder points might take as long as 5 to 7 min. to process, since each point must be soldered individually.

At the opposite end of the spectrum is the mass solder-dipping technology (conventional wave), which isn't actually dipping at all but involves the use of custom fixtures and various forms of masking over a solder fountain source; the fixture has apertures to match the solder points on the PCB, which again could be as large as 18" square. All the solder sites on that board are replicated in a large solder wave. Expensive robotics position the board and fixture over the fountain/wave for a preset dwell time, after fluxing and preheating, and the PCB is soldered all at once. This latter method is suitable for very high-volume soldering and speed, for a fast TAKT time; that 18" square PCB might take only 10 sec. to process versus 5 to 7 min. the conventional way. However, the setup is dedicated to just one product and is quite difficult to change to a different product. The equipment is costly, as are the individual custom soldering fixtures. This method is also known as stamp soldering, but it is different from the "middle ground" that we discuss here.

Our middle ground stamp soldering can be accomplished using a conventional selective soldering machine fitted with a special stamp soldering nozzle. Granted, it's a much smaller fixture than the one needed to mass solder a large board; in fact, the one shown in **Figure 1** has only four apertures or nozzles mounted on it. It is a custom fixture designed for a specific board. The rectangular or longitudinal aperture is for a connector; the larger round aperture is for a round cluster of pins, and the two miniature twin nozzles are for soldering adjacent LED components. In a panelized PCB scenario, the custom nozzle indexes around from board to

## The 'Selective Stamp' Nozzle

Written by Alan Cable

Tuesday, 01 January 2013 19:34 - Last Updated Tuesday, 08 January 2013 10:35

---

board and stamp solders that small pattern on each PCB. The nozzle can also be removed and exchanged simply with a standard nozzle for ordinary selective soldering routines.



FIGURE 1. The custom selective stamp soldering nozzle is a cross between a mass solder dip and conventional selective soldering machine.

The advantage of this nozzle is that it processes every board in the panel in exactly the same fashion vs. the mass technique that strikes all solder joints at once. So, the “selective stamp nozzle” is somewhere between the mass solder dip machine, which is very expensive and highly dedicated, and a conventional selective soldering machine, which is flexible and non-dedicated. This is actually a hybrid, with the only dedicated part being a small custom multi-port nozzle. When aperture sizes vary, to maintain uniformity of pressure and flow in all the apertures, threaded set screws are installed for each aperture so that the flow can be restricted or constricted in order to achieve balance.

In process, a dropjet fluxer applies flux only where it is needed, and if necessary, the board is preheated. The board is positioned, checked with fiducials to make sure it's in place, and then the solder pot, with its pumped aperture, comes up and contacts all the solder sites at once, effectively making the solder joints, and then drops out of the way under programmed control.

This pattern could, of course, be sequentially soldered using a single nozzle, with the time needed to solder the entire pattern estimated at about 40 sec. Using the custom stamping fixture in a step and repeat sequence, all points might be soldered in 6 to 7 sec. If several hundred identical boards are to be soldered, the cumulative time savings become readily apparent. Perhaps the most significant aspect of this higher throughput rate is that it can be achieved using a run-of-the-mill, affordable selective soldering machine without any costly adaptation.

**Alan Cable** is president of A.C.E. Production Technologies ([ace-protech.com](http://ace-protech.com)); [acable@ace-protech.com](mailto:acable@ace-protech.com)

