Getting the printer back in action after an unscheduled interruption.

We’re so often focused on “the next big thing” – particularly when it comes to product development and new technologies – that we often lose sight of established, useful tools and techniques. In fact, many technologies developed some years ago have relevance – perhaps even more so – in today’s manufacturing environments.

Those who read my column regularly know that I often discuss optimizing the print process for miniaturization. Smaller devices, super-tight aperture dimensions, thinner boards and more challenging component geometries have become reality for most assemblers. And while there are a gracious plenty of new technologies to help improve yield – many of which I’ve written about – there is also a less well-known and not-so-new printing machine feature that is very handy, particularly as aperture dimensions continue to shrink.

This feature comes into play when there is the dreaded “unscheduled downtime” or when the printer is working at a faster pace than the equipment down the line. While no one wants to admit to unexpected line stoppages the fact is that they happen fairly often. In high-volume operations, it’s not unlikely to have two or three incidents per shift. But, there is a hidden gem that may just make that unscheduled downtime a little less painful. Known within our organization as Hold at Print Height (HAPH), this handy tool helps minimize the less-than-positive result of unplanned downtime: material drying and degradation inside the apertures. What traditionally happens when there is a line issue is that the most recently printed board holds steady, while the stencil returns to home position and just sits there. With no activity and the stencil hanging in air, any paste left inside the aperture begins to degrade and change characteristics. This then impacts the next board scheduled to be printed. It’s possible the stencil may clear itself, but, depending on the length of the downtime, there’s a high probability it won’t. With dried or less cohesive material in the apertures, challenges with transfer efficiency and missing deposits are quite likely.

With the HAPH feature, the printer software adjusts to conditions down the line. The machine knows it should have released the board, but the decision engine cued by the downline FMEA data tells the machine to hold the board at print height and not release it. The result? The paste stays in the apertures and prevents dried or degraded solder paste from impacting the next print. In fact, internal testing of this feature illustrates the effectiveness of HAPH. The charts show both paste volume and standard deviation results over time with various components. Per the evaluation results, even if the board is left at print height for 30 or even 60 min., the process recovers as if it’s been running sequentially **(Figure 1)**. However, if you leave the board for 15 min. without the HAPH, the process doesn’t ever quite get going again without some kind of intervention **(Figure 2)**. It simply avalanches down to insufficients. Without HAPH, not only does the average volume collapse, but, as is seen within Figure 2, the standard deviation on the smaller, more challenging devices

increases with respect to Figure 1 (with HAPH). This indicates that the process is unstable.

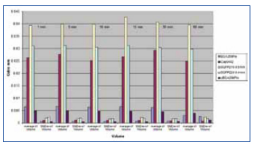

FIGURE 1. Deposited volume with HAPH engaged maintains consistency after 60 min. of downtime.

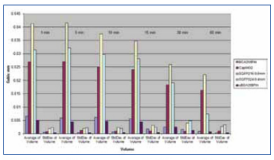

FIGURE 2. Deposited volume without HAPH engaged: Inconsistent volumes as time increases.

As is so often the case, sometimes it’s the tool in the shed that we’ve forgotten about that’s just what we need to solve the problem. And, while there has been much made about the “simplicity” advantage of machines these days, I contend that the more features you have at your fingertips, the better. Just because a feature exists in the software doesn’t mean your print platform is more complex. In fact, the deeper the options, the more likely you are to find that tool in the shed that is precisely what’s required. Who knows? HAPH might be just the remedy for your downtime dilemma.

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