SMTA International 2018
Conference: October 14-18, 2018
Donald E. Stephens Convention Center

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Keywords: surface finish, solder paste, solder paste printing, wetting, solder balling, graping, voiding

Title: How Does Surface Finish Affect Solder Paste Performance?

The surface finishes commonly used on printed circuit boards (PCBs) have an effect on solder paste performance in the surface mount process. Some surface finishes are non-planar like hot air solder level (HASL) which can lead to inconsistencies in solder paste printing. Other surface finishes are difficult to wet during reflow like organic solderability preservative (OSP). What is the overall effect of surface finish on solder paste performance? Which solder paste is best for each surface finish? It is the goal of this paper to answer these questions.

In this work, several different surface finishes were tested in the surface mount process including: HASL, OSP, electroless nickel immersion gold (ENIG), immersion tin, and immersion silver. Several different types of solder pastes were tested along with each surface finish including: lead-free no-clean and water soluble, and leaded no-clean and water soluble solder pastes. Each combination of surface finish and solder paste were evaluated for print performance, wetting, solder balling, graping, and voiding. The results of this testing were quantified and summarized. Recommendations pairing the optimal solder paste with each surface finish were given.