

DIXIE CUP TEST



EXHIBIT "A"



EXHIBIT "B"

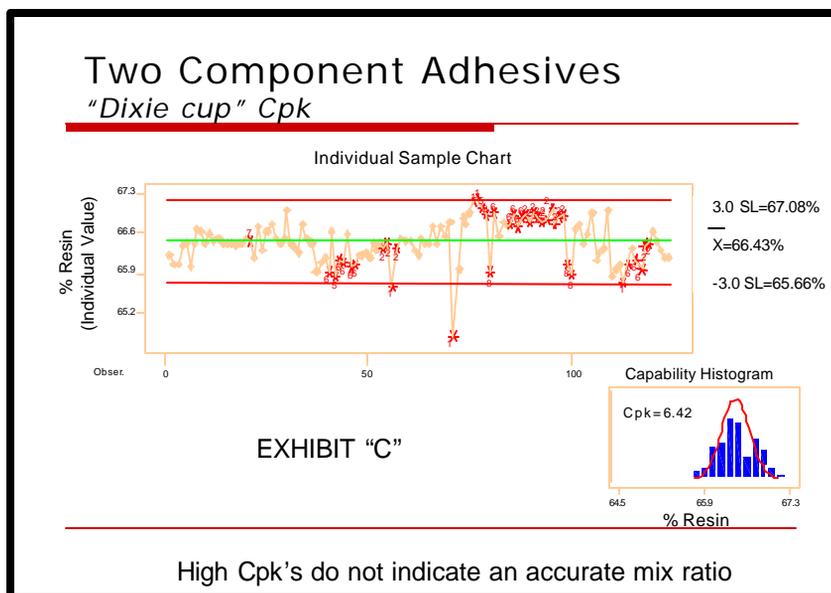


WHAT IS THE DIXIE CUP TEST? Two component adhesives such as resin, catalyst have relied on the "Dixie Cup Test" since dispensing first began. Once a shift, an operator turns off the dispensing equipment for about 15 minutes, removes the mixing tube, and starts the "Dixie Cup Test". The intent is to confirm the dispensing equipment is providing the correct mix ratio. The components are dispensed prior to being mixed. As the mixing head hangs in air a dixie cup is awkwardly squeezed under each outlet hoping to avoid spillage (Refer to Exhibit "A"). A second operator enters a manual dispense mode filling the dixie cups. The two cups are weighed and the mix ratios are "calculated" (Refer to exhibit "B"). But what is being measured? How does weighing materials equate to the accuracy of a mixture? It doesn't!

PROBLEMS WITH THE DIXIE CUP TEST!

- **NO BACK PRESSURE:** Removing the mixing tube relieves back pressure. With low pressure, leakage due to damaged tubing cannot be detected.
- **UNTESTED MIXING:** The procedure does not test mixing. The mixing tube has been removed.
- **MINIMAL TESTING:** The test is performed once a shift. A multitude of parts are assembled between test periods, leaving open the possibility of hundreds of below quality or un-useable parts.
- **FILLING AND EMPTYING A CYLINDER:** The volume of a cylinder is in proportion to the mix ratio. The reasoning is if you can fill a cylinder and then empty it you should have accurate mixing. However, the actual cycle uses only a portion of the cylinder under pressure. Turning on and off the pressure influences the fluid's dynamics. The long hoses between the cylinder and dispensing tube influences the quality of the mixture. When adding pressure into the equation the complexity increases several times. The physics, dynamics and rheology of the application of pressure are not taken into account. Results simply reveal that a cylinder was filled and emptied.
- **RELYING ON FLOW RATE AND TIMERS:** Adjusting the flow rate to ensure a correct ratio is dispensed in a given time without pressure is inaccurate. The "Dixie Cup Test" cannot account for viscosity, pressure and the complete rheology of the adhesive.
- **TWO OR THREE OUNCES OF MATERIAL:** The "Dixie Cup Test" holds only a few ounces of material which does not represent the dispensing system over an eight hour shift. Even if the weighing of each component is correct, it does not measure the accuracy of the mixing components.
- **VARIATIONS WITHIN A CYCLE ARE NOT ACCOUNTED FOR:** Variations within a cycle are not taken into account. The physics of turning on and off highly pressured material change from beginning to end of the dispensing cycle. The "Dixie Cup Test" only tells us the average weight of an ounce of material dispensed, with no resemblance to the actual dispensing system used. Dispensed material cannot be accurately measure when turning valves on and off.
- **ANOMOLIES:** The "Dixie Cup Test" cannot detect occasional air bubbles, stuck valves or similar disturbances which can create off ratio adhesives, resulting in failed parts.
- **PARTIAL FAILURE:** Parts have a cycle which is partially off ratio. This is undetectable by the "Dixie Cup Test" because the complete dispensing cycle is not being monitored.

Are you accepting dispensing systems based solely on a "Dixie Cup Test" ?



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FALLACY OF THE DIXIE CUP TEST! Statistics imply high quality mixing when Cpk's or capability exceeds 6.2. However, there is little relation between Cpk and the accuracy of the mixing (Refer to Exhibit "C"). The Dixie Cup method simply tests if a cylinder is emptied repeatedly or if the flow rate of a two component adhesive is set correctly. This is only a preliminary step and does not measure the accuracy of the mixture during a cycle. More importantly, it disregards the effect of leaks, air bubbles and slow or stuck valves which causes off ratio mixing. A thorough test is required to continuously analyze the mix ratio throughout the entire dispensing cycle. The results of "Dixie Cup Test" are a fallacy.

ARE YOU WASTING MONEY? Hundreds of thousands of dollars are invested in robotics and dispensing equipment annually. Ultimately, Dixie Cups are used to determine whether the equipment is working satisfactory. This is a delusion of quality control. This test tells you very little about the accuracy of the final adhesive. The "Dixie Cup" graph shows Cpk's=6.2 implying accurate mixing. Truth is, inferior parts are being manufactured because half a million dollar systems are relying on the "Dixie Cup Test."

YOUR SOLUTION: FMT3000

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