

Accelerating PCB Manufacturing: Creation Technologies' Use of Formula1B for Conformal Coating Caps Production

creation
TECHNOLOGIES



AT A GLANCE

Challenge

01 

- Tedious & time consuming process of masking off components

Solution

02 

- Use **Formula1B** resin that is compatible with a range of vat photopolymerization machines for conformal coating caps fabrication

Results

03 

- Secure fit to PCB components
- Ability to clean and re-use
- Resistance against soaking in IPA & **HumiSeal S1072**

Impact

04 

- **88%** time savings when using fabricated caps over masking tape

“

Using Formula1B to print our conformal coating caps is helping tremendously. On our typical runs of 550 boards, we are seeing time savings 88% (137 hours) over masking with tape,” said Darren Otterwell, Process Engineer at Creation Tech. “Applying these savings across multiple runs will significantly increase Creation Tech’s cost advantage, while freeing up scheduling to fulfill more orders, thus increasing company revenues.”



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**INDUSTRY****TECHNOLOGY****MATERIAL****PCB Manufacturing****Vat Photopolymerization****Formula1B**

Customer Profile

Creation Technologies (Creation Tech) is a worldwide provider of electronics manufacturing services, offering original equipment manufacturers comprehensive manufacturing and integration solutions. Creation Tech services encompass design and engineering, rapid prototyping, supply chain partnerships, fulfillment and logistics, and aftermarket services.

Challenge

Prior to applying conformal coating, PCB components must be carefully masked off to prevent coating material from contacting unintended surfaces, such as connector contacts, header pins, plugs and sockets. This process involves the application of special chemically resistant tapes (*see Figure 1*), which are then removed after coating application. While utilizing off-the-shelf caps and covers can save time for boards with standard-sized components, non-standard components, or geometries, such as those used by Creation Tech, require a meticulous masking operation to ensure proper protection. This labor-intensive process necessitates close attention to detail and careful application to achieve desired results.



Figure 1: PCB components masked off with tape manually prior to application of conformal coating, which is labor-intensive & time-consuming.

Considering the identified challenges and the imperative to reduce labor costs while boosting throughput, Creation Tech initiated a project to redefine the production process for conformal coating caps. The focus was on developing custom caps in-house that met specific criteria, including:

- Electrostatic Discharge (ESD) safe
- Secure fit to safeguard components
- Offer resistance to chemicals.

The current Additive Manufacturing (AM) process utilized by Creation Tech, specifically Fused Filament Fabrication (FFF), could not meet the necessary surface finish standards to ensure a snug fit that prevents conformal coating flowing under the caps.



Solution

Recognizing the potential of AM, Creation Tech made the strategic decision to incorporate a desktop digital light processing (DLP) machine into their operations. By utilizing DLP hardware in conjunction with Mechnano's Formula1B, Creation Tech found the ideal solution for producing conformal coating caps (*see Figure 2*). This combination allowed Creation Tech to overcome the limitations of traditional masking techniques, offering a quicker and more cost-effective method for applying conformal coating to PCBs. The precision of DLP, paired with Formula1B's nano-uniform electrostatic discharge (ESD) and solvent resistance, provided the versatile solution Creation Tech required to fabricate conformal coating caps for their customized PCB components.



Figure 2: Conformal coating caps fabricated using Formula1B provide snug fit ensuring protection of PCB components.

Benefits

Formula1B successfully demonstrated its ability to offer Creation Tech with accuracy, efficiency, and cost-efficiency in producing ESD conformal coating caps.

Precision: By leveraging the high-resolution capabilities of Vat Photopolymerization, Creation Tech achieves exceptional precision in the customization of conformal coating caps. This process guarantees that each cap is produced with tight tolerances, meeting the unique requirements for effectively covering electronic components (*see Figure 3*). Such a level of customization not only improves performance but also mitigates the potential for waste commonly associated with universal cap solutions.

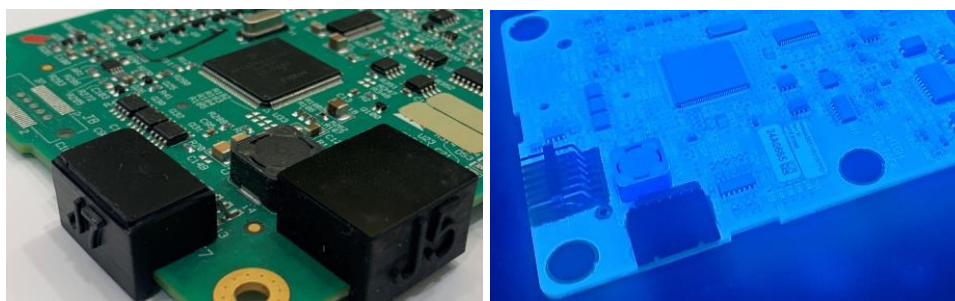


Figure 3: Conformal coating caps made with Formula1B ensure a secure fit to protect PCB components during application of conformal coating.

Speed: Traditional methods of creating conformal coating caps include mold design, production, and injection molding of the caps, resulting in extended production cycles. By leveraging Formula1B, production times are significantly reduced, enabling quick turnaround and flexibility in meeting changing design requirements. Moreover, the application of



personalized Formula1B caps directly onto boards, as opposed to using tape, speeds up the entire manufacturing process while maintaining high quality standards.

Reusability: Mechnano's Formula1B demonstrates exceptional chemical resistance, meeting Creation Tech's requirement for reusable caps that can withstand multiple uses and cleanings. The Formula1B's resistance to chemicals is impressive, as evidenced by its ability to withstand soaking in isopropyl alcohol (IPA) for ten days without any adverse effects, as well as being submerged in HumiSeal's S1072 urethane stripper for the same duration without any impact (see Figure 4). This feature offers a cost-effective solution for Creation Tech, allowing for the printing of custom reusable caps as needed to reduce masking waste, eliminate the need for expensive molds, and streamline the conformal coat process overall. These benefits translate into significant cost savings for Creation Tech.



Figure 4: Conformal coating caps soaked in HumiSeal S1072 for 10 days. Formula1B (left) not affected by urethane stripper, unlike caps made with competitor ESD resin (right).

Impact

Creation Tech has enhanced their ESD protection and increased efficiency by using Formula1B to fabricate conformal coating caps. This has led to a reduction in masking labor time on each board, resulting in improved throughput.



Time Savings

137 hours

88%

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Mechnano's Formula1B ESD resin, in combination with the precision offered by Vat Photopolymerization AM processes, presents an innovative method for producing bespoke conformal coating caps. This technological synergy not only enables enhanced customization but also introduces new opportunities for increased efficiency and cost-effectiveness across ESD carriers, tooling, jigs, fixtures, and SMT nozzles. In the ever-evolving landscape of electronic manufacturing industries, the adoption of advanced solutions like Formula1B for custom conformal coating caps and other ESD media is no longer just a preference but a strategic necessity to maintain a competitive edge. For further information on Formula1B and to explore its potential for your ESD applications, contact Mechnano at info@mechnano.com

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