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NO LONGER IN TREATMENT:

SHIN-ETSU SILICONES KE2090-40 SERIES SELECT-HESIVE™ LIMS SOLVES PRE-TREATMENT, BOND ISSUES FOR INDUSTRIAL OVEN THERMO-CONTROLLER APPLICATION.



Akron, OH—

Shin-Etsu Silicones of America (U.S. subsidiary of Shin-Etsu Chemical Co. Ltd., Japan) recently provided a primer-less solution to resolve production issues in overmold bonding for a client who was producing a next-generation industrial thermo-controller for a leading manufacturer. Custom injection molding manufacturer Amerimold, Tech. Inc. (Marlboro, NJ) contacted Shin-Etsu and identified the key production issue originating from an existing material's inability to bond (without pre-treatment) to the front cover of the product's overmolded polycarbonate chassis, cover and pushbutton keypad.

Whereas multi-material molding is designed to take economical advantage of two or more materials with uniquely different properties by incorporating them into a single molded component, the injection molded substrate bonding issue, if not resolved, would result in major tooling, scrap, time, and ultimately cost constraints to complete the final part.

Implementing Shin-Etsu's KE2090-40 Select-Hesive™ LIMS (Liquid Injection Molding System) product, which is engineered to provide primer-less adhesion to a variety of thermoplastic substrates, all parties were able to streamline an effective bonding solution based on the ensuing parameters to overcome bonding barriers including:

PRE-TREATMENT PRODUCTION CHALLENGE:

Amerimold's client had an existing loyalty to a self-bonding material that was already specified in the production of the thermo-controller component. The self-bonding material supplied, however wasn't sufficiently able to overmold to the polycarbonate housing without a pre-treatment. This would have required additional equipment and an additional cost for the material to function. The client also pursued overseas material solution providers which, after testing, resulted in too much waste in rejected parts and a 60% scrap rate as the self-bonding silicone didn't adhere properly to the keypad.

A final alternative solution was tested that would have involved the purchase of additional variable frequency light pumping (VFLP) equipment to enhance and engage the surface substrate bonds—at an estimated expense of \$17,000. The VFLP equipment process was tested as the silicone overmold was shot and treated with light—and still failed.

PRIMERLESS SOLUTION:

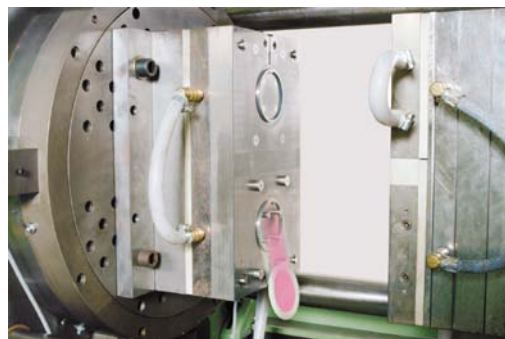
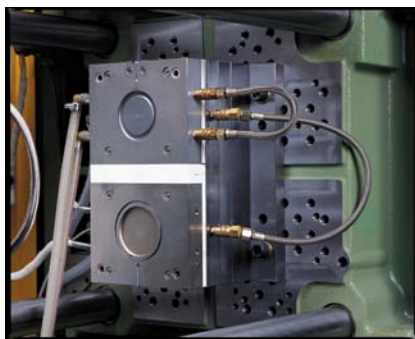
Having already invested upwards of \$70,000 on tooling for the 2-cavity LSR (Liquid Silicone Rubber) mold, Amerimold was faced with the expensive option of adding even more equipment to resolve the self-bonding production dilemma. Recognizing the need to streamline an efficient solution swiftly to avoid incurring more costs on equipment, pre-treatment, and ultimately waste—Amerimold President Michael Schon contacted Shin-Etsu to overnight a 5-gallon sample pail of their KE2090-40 LIMST[™] product to test run with the LSR mold.

Approximately 3-4 tests were conducted on the 2-stage molding system utilizing KE2090-40; without pre-treating the substrate. Conducting an initial physical inspection of the bond to see if it peeled back, Schon noted that the KE2090-40 parts bonding passed the test. According to Schon, “Incredibly, the sample run was successful on the first shot, creating a perfect bond with no UV light treatment required and more importantly—no rejects.”

Additional tests were expedited by the client and they passed immediately, resulting in a go-ahead on an initial 25,000 piece production run. Of note, the production efficiency in the KE2090-40 product allowed for the increased initial run beyond the original 10,000 piece production schedule slated with the previous self-bonding material.

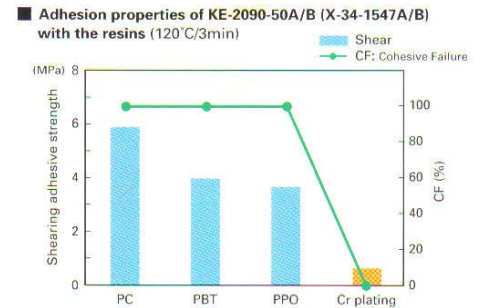
KE2090-40 SERIES PROPERTIES:

According to Eric Bishop, Shin-Etsu’s North American Marketing Manager, “The KE2090 Select-Hesive[™] LIMS Series boasts fast cure and outstanding bonding to various engineering thermoplastics that can withstand high heat, humidity, and thermal cycling.” In reference to the Amerimold case, Bishop noted “The key is that the substrate does not need to be modified or pre-treated to use the KE2090 self-adhesive materials.”



The KE2090 Select-Hesive™ LIMS products provide primer-less adhesion which is optimal for multi-component silicone-to-plastic molding, and delivers the following performance benefits and physical properties:

- Short curing time yields a chemical bond; producing a firmly integrated composite part
- No primer/pre-treatment of the substrate is required
- Outstanding bonding strength under extreme conditions including:
 - High temperature (120° C)
 - High humidity (85° C / 85% RH)
 - Thermal Cycling (-40° C to 120° C)
- Bonds to PC, PBT, PPO PEEK, and PPSU engineering thermoplastics
- Compliant with USP Class VI, and ISO 10993-1 regulatory standards for biocompatibility
- Hardness ranges from 10-to-70, Shore-A



CONCLUSION:

Overmolding of rigid plastic substrates with liquid silicone rubber (LSR) can provide a soft feel, improve grip, weather seal, dampen vibration and protect against impact. A wide range of colors, textures and durometers are available as they are increasingly being adopted in applications ranging from Automotive, Consumer Products, Electrical/Electronic, Industrial and Healthcare.

According to Eric Bishop, “With the continued growth of 2-shot molding, our Select-Hesive™ LIMS products save time and the cost of pre-treatment which is often required in an overmolding system. This series provides designers and molders an efficient means to manufacture a bi-material component in a fully automated manner by eliminating the need for hazardous priming, pre-treatments, and costly secondary assembly operations.”



CORPORATE PROFILE: A U.S. subsidiary of Shin-Etsu Chemical Co. Ltd., Japan, Shin-Etsu Silicones of America Inc. offers vast technical and capital resources to formulate solutions as a major supplier of silicone materials to North America's medical, automotive, electronics, aerospace, and manufacturing industries. Shin-Etsu's premium silicone compounds incorporate leading-edge technology, staff expertise, and value-added service; offering customers the highest levels of quality and consistency in specialty silicone materials.



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