



Success Story: Chemsultants Engaged as An Extension of a Manufacturer's R&D Department to Shorten Development & Testing Timeframes

“Working with Chemsultants’ experts was very easy; they quickly became key members of our development team, making significant contributions that moved the project forward!”

- Product Development Engineer of a well-known manufacturing company*

Background:

A leading worldwide manufacturer of heat activated film adhesives approached Chemsultants International with a very specific need. They wanted to quickly bring a lab project to scale up, using a technology that they currently did not possess in their own research and development department. This need to develop a product using a technology that they had no experience in or knowledge using, promptly brought them to the realization that they needed to engage a partner.

According to one of their employees, “Chemsultants had both the lab and pilot-scale process capabilities we were looking for in an R&D partner.”

Mission:

To develop a thermoset adhesive which would provide good thermal resistance after the adhesive is cured on the adhered surface.

Chemsultants Process:

Step 1. Understand the Must/Wants List of the customer: Chemsultants representatives met with members of the manufacturer to fully understand their complex needs and requirements, most of which were absolute necessity, the remainder being highly desirable. The Chemsultants team developed a custom project plan to meet the unique needs of the customers. It was critical that members of both teams worked together.

Step 2. Determine the Approach: Through the combined experience of the Chemsultants chemists and technicians, a series of five potential approaches was prepared and ranked by theoretical successful outcome. As the project moved forward, the combined team of experts decided to move forward with the top three approaches that Chemsultants recommended.

Step 3. Sample Preparation: Master batches were prepared ahead for further use. The solutions were mixed with varying components, based on theories that had been developed earlier by the combined team. This allowed the potential approaches to be tested and vetted.

Step 4. Testing: Working side by side with the customer at the Chemsultants lab, the Chemsultants representatives took the lead in developing and performing test methods using their years of industry experience.

The following standard, but critical, test methods were utilized:

1. *Fourier Transform Infrared Analysis.*



Measurements were recorded using Perkin-Elmer FT-IR Spectrum One with ATR.

2. Peel Adhesion.

The next test performed was peel adhesion. Peel adhesion was tested according to a modified ASTM D 3330 method. Tests were performed on a ChemInstruments AR-1000 Adhesion Release Tester in conjunction with the EZ Lab software program. Samples were applied to the substrate and heated. The



Fig. 1

sample was later heat sealed for a longer duration. The initial temperature was used to provide a small amount of tack for the adhesive to adhere to the substrate. The secondary temperature was used to heat seal the adhesive between the two substrates. The tape was then peeled from the substrate at an 180° angle. The force required for removal was measured, averaged, and the mode of failure noted. Three replicates of each sample were tested.

To measure the heat resistance, the samples were pre-heated, and then peeled immediately using a heated panel holder. Fig. 1 shows the setup of the peel adhesion.

3. SAFT.

The Shear Adhesion Failure Temperature was determined using a modified ASTM D 4498 Procedure. The adhesive was tacked to the substrate and heated. The adhesive was later heat sealed to an additional substrate and a clip was attached to the first substrate. The sample was then placed in a ChemInstruments HT-8 shear stand in an oven at room temperature. A 500 gram weight was attached to the clip and a clock started. The temperature of the oven was increased at a constant rate. When the sample separated from the panel, the clock stopped. The temperature at which the sample failed was calculated and the mode of failure was noted and recorded. Two replicates of each sample were tested and data recorded.

Step 5: Pilot Coating Trials: After multiple trials and age testing were performed, the teams found two formulations that aged very well. These two formulations moved forward in the process, which ultimately resulted in pilot coating trials on Chemsultants' 24" solvent coating line. Different thicknesses, along with various release liners were utilized in the trials. The trial samples continued to show good results.

Results:

The product is now in full scale development thanks to the combined efforts of the manufacturers' R&D team and the Chemsultants' coating and adhesive experts. An employee at the manufacturer described the experience, "Working with Chemsultants, we were able to develop a technology new to our business much more rapidly than we could have done on our own."

For more information

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