



Interpreting the Sensor Response from the 3M™ Adhesive Mix Monitor

Understanding the 3M™ Adhesive Mix Monitor and Sensor Response

The sensor response generated by the 3M™ Adhesive Mix Model can be interpreted to indicate two things: estimated mix ratio and adhesive cure. While actively dispensing adhesive, the sensor response indicates the estimated mix ratio. When you stop dispensing, the mixed adhesive will begin to cure, this will cause the sensor response to change based on the cure kinetics of the adhesive.

The mix ratio is expressed as a base part fraction, which indicates the proportion of Part B in the total mixture by volume. For instance, a 2:1 (B:A) mix ratio corresponds to a base part fraction (BPF) of 0.67. The formula for calculating the BPF for your mix ratio is as follows:

$$\text{Base Part Fraction (by volume)} = \frac{\text{Part B}}{(\text{Part B} + \text{Part A})}$$

Upon loading the adhesive model into the processing unit, the system manager displays the recommended mix ratio and sets default upper and lower limits. These upper and lower limits can be adjusted to best fit your dispensing process. For further guidance on adjusting the dispense zone upper and lower limits please refer to the white paper on considerations for setting the dispense zone.

What the Sensor Response can tell you about your dispensing process

Please refer to the 3M™ Adhesive Mix Monitor-Serial Data Standard for guidance on how to stream data via USB connection.

At the start of dispense

At the beginning of the dispensing process, the sensor response provides information on the current mix ratio, expressed as the base part fraction. This feedback is useful for determining the amount of adhesive that needs to be purged to achieve the correct mix ratio. Figure 1 illustrates a scenario where the material was initially off-ratio at the start of dispensing. In such cases, you should continue purging the adhesive until the desired mix ratio within their specified dispense zone.

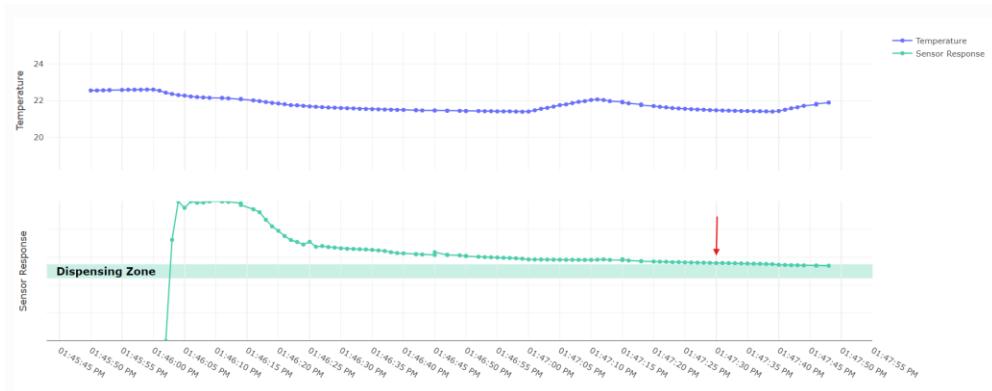


Figure 1: Indicates to a user how much adhesive they need to purge at the start of dispensing until the material is on mix ratio.*

During the dispensing process - a continuous dispensing cycle

Using the 3M Adhesive Mix Monitor during your dispensing process you can track the mix ratio of your adhesive throughout your dispensing cycle. The example in figure 2 is of a continuous dispense cycle. You can see that the sensor response is tracked, and the dispensed adhesive remains within the pre-determined dispense zone while dispensing.

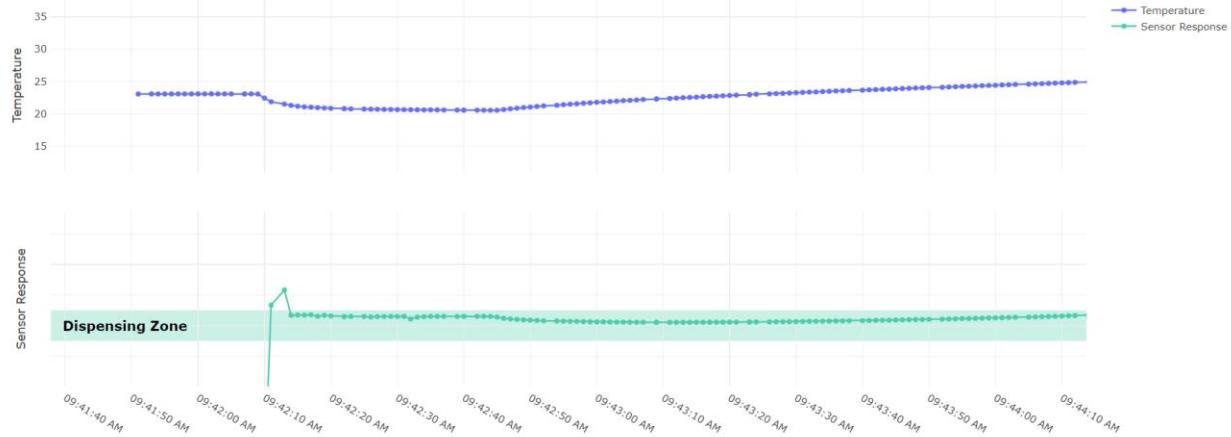


Figure 2: Indicates to a user that during a continuous dispense they can track the correct mix ratio in their predetermined dispense zone throughout their entire dispensing process.*

The 3M™ Adhesive Mix Monitor can also give you insights to optimize your dispensing process. When using a fast-curing adhesive and continuously dispensing one might see a steady increase or decrease in sensor response while dispensing at lower flow rates. This may indicate that the adhesive is curing in the static mixer, to incorporate more consistency in the dispensing process one might choose to increase their flow rate.

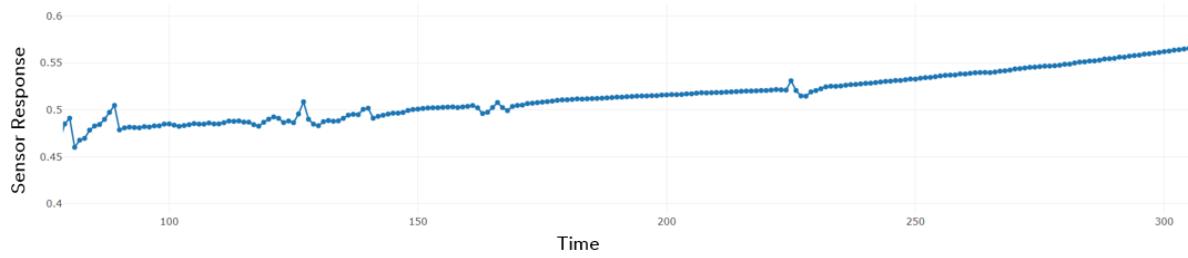


Figure 3: Indicates to a user that during a continuous dispense they are dispensing too slow, and the adhesive is slowly curing as they are dispensing.

During the dispensing processing – start/stop dispensing cycle

The 3M™ Adhesive Mix Monitor can also be beneficial in a scenario where you experience multiple starts and stops during the dispensing process while working with a fast-curing adhesive. In this example, you can correlate each dispensing initiation with the peaks observed in the data, facilitating traceability by linking these peaks to the specific parts produced.

When you stop dispensing an increase or decrease in sensor response can be seen. In figure 4 the fast-curing nature of the adhesive resulted in a decrease in the sensor response and an increase in temperature, signaling the onset of the curing process. This data can be used for purge guidance if needed. The zoomed in portion of figure 4 illustrates a prolonged wait time before dispensing adhesive on the next part, which could lead to inconsistencies in the adhesive application compared to earlier parts. In such cases, you could have purged the adhesive until the sensor response aligned with prior data, ensuring consistency before proceeding with the dispensing process.

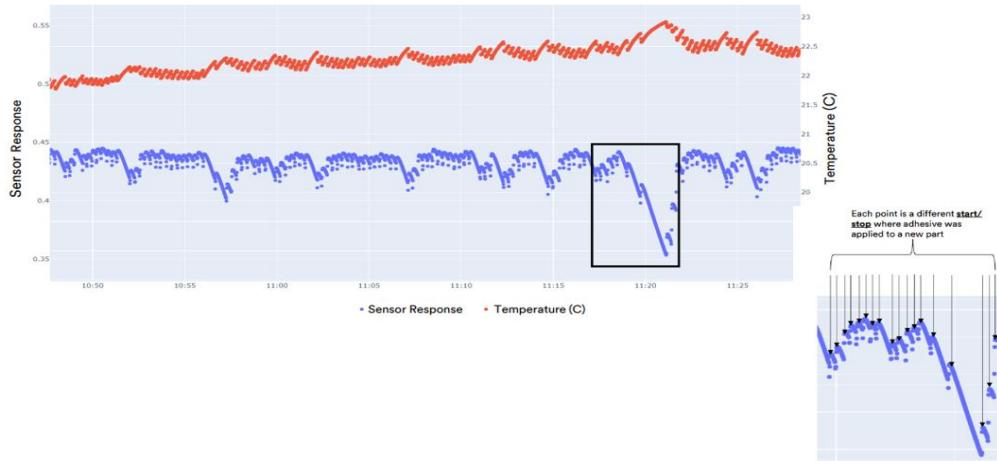


Figure 4: Indicates multiple starts and stops in the dispensing process. The zoomed in portion illustrates a prolonged wait time before dispensing on the subsequent part, leading to inconsistencies of the dispensed adhesive.*

*The images provided are generated solely for visualization purposes. No visualization software is sold or provided to customers. Customers will receive only the raw data stream from the device.

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