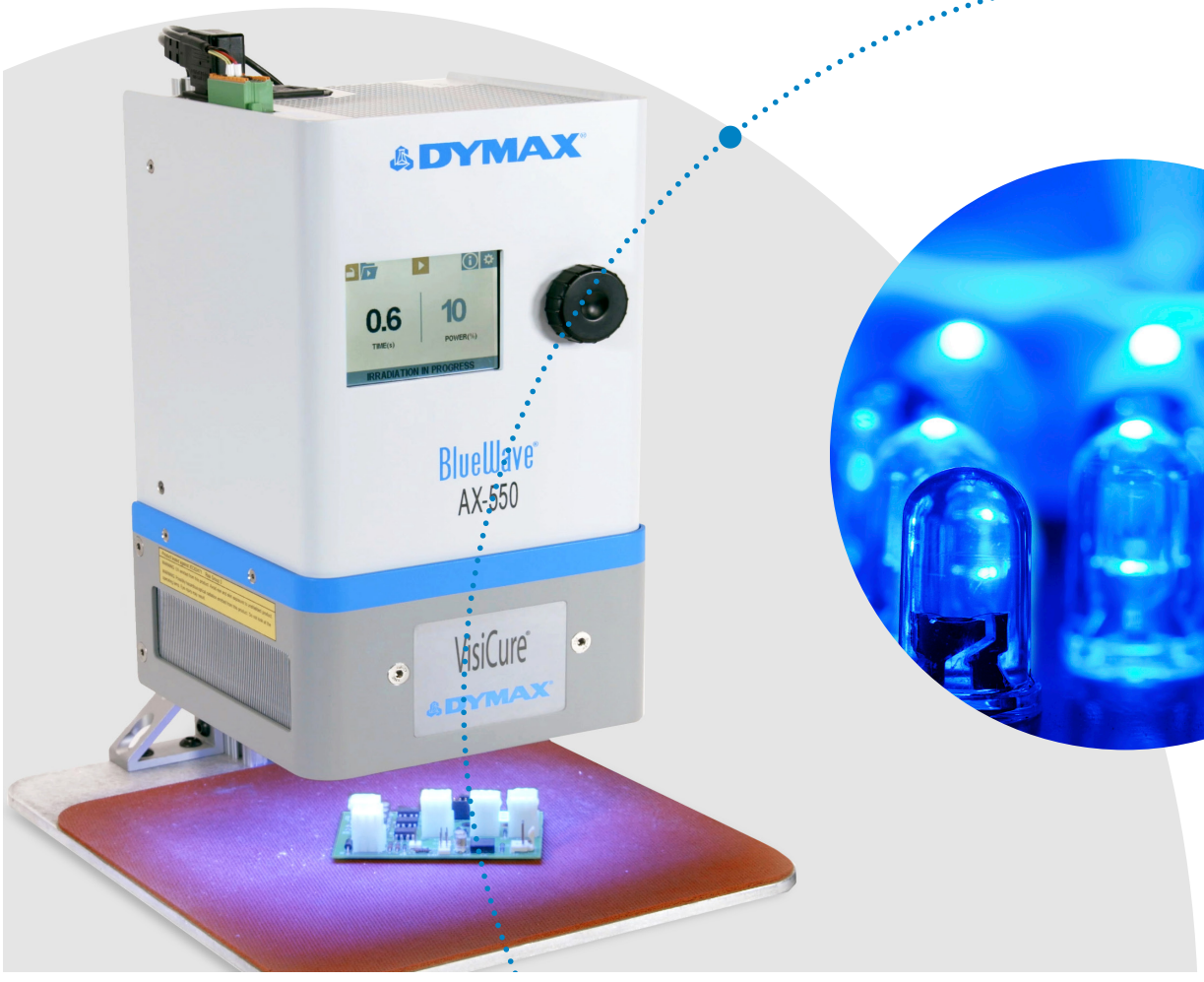
# LED CURE STUDY



# The Study

With the popularity of LED light-curing systems rising and more and more manufacturing facilities switching to LED, one of the most commonly asked questions is, "Will my traditional broad-spectrum material cure with LED?". This study explores how well Dymax traditional broad-spectrum UV-curing materials cured with LED equipment.

## The Materials

The Dymax Application Engineering Team tested 11 different light-curable adhesives and conformal coatings (Table 1) to see how well they cured with LED. The selection represented a diverse range of products from different industries. M-SC

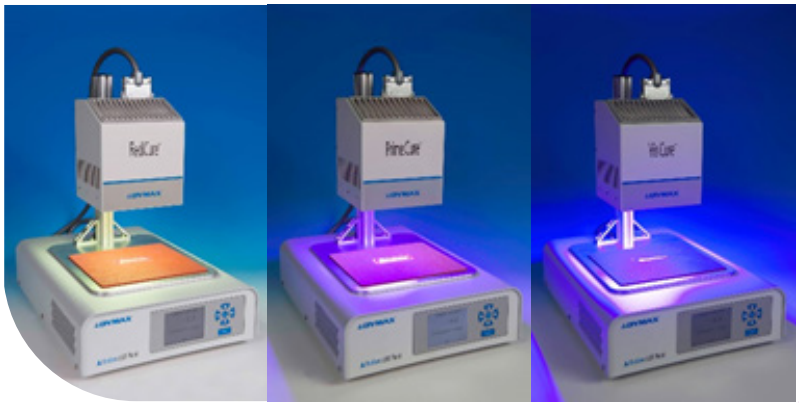
| Materials Tested | |
|---|---|
| **Adhesives** | **Conformal Coatings** |
| 431 | 9781-E |
| 6-630-T | 9-20557-LV |
| 3099 | 9-20557 |
| 3025 | 984-LVUF |
| 1403-M | |
| 1201-M-SC | |
| 1180-M | |

## Testing

Polycarbonate lap shear testing was performed for plastic bonders and glass-to-glass lap shear testing was performed on structural adhesives to compare the mean maximum load of the adhesive bond at three different LED wavelengths (365, 385, and 405 nm) when compared to broad-spectrum UV curing. A BlueWave® LED Flood (Figure 1) was used to perform the testing.

For conformal coatings, FR4 boards were coated to a wet film of 2-3 mil and then cured using the BlueWave® LED Flood (Figure 1) at all three different wavelengths (365, 385, and 405 nm).

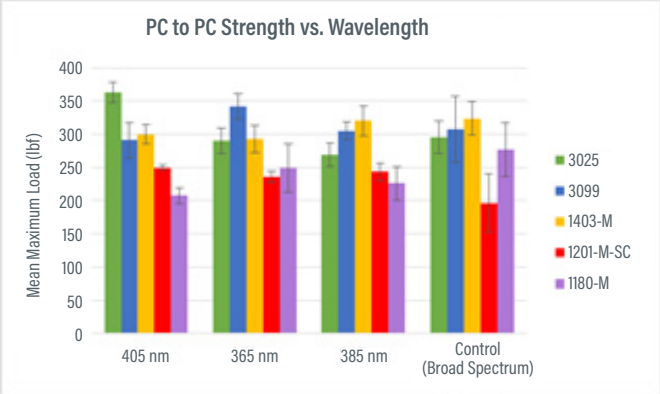
**Figure 1. BlueWave® LED Flood with 365, 385, & 405 nm Arrays**



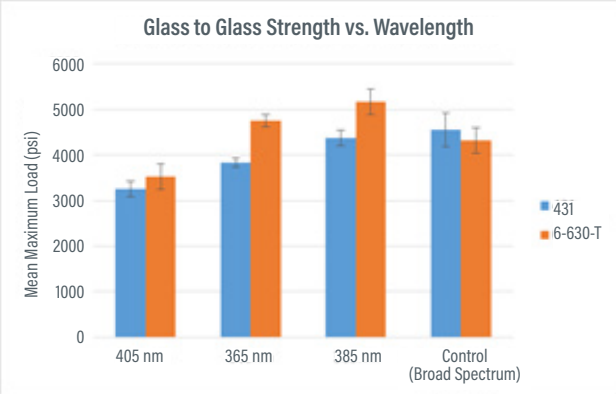
# The Results

The results from testing show us that there is a difference in the cured mechanical properties of the adhesive when cured at different wavelengths:

**LED Performance Results for Plastic Bonders**



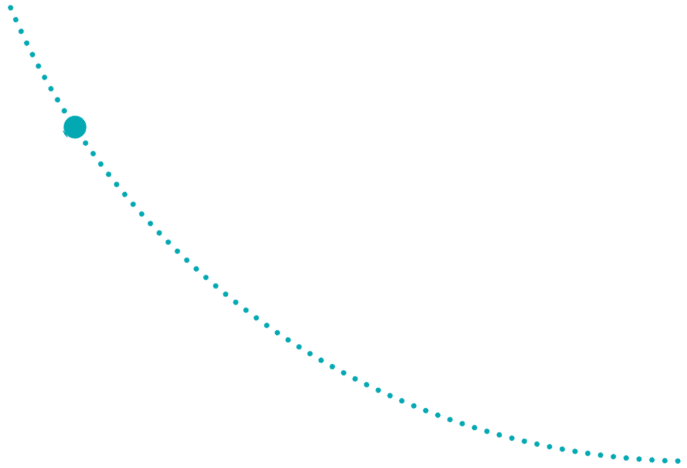

**LED Performance Results for Structural Bonders**




- 3025 had a higher mean maximum load when cured at 405 nm than it did with the broad-spectrum control.
- 3099 had a higher mean maximum load when cured at 365 nm than with the control.
- 1403-M had similar mechanical properties at all three LED wavelengths and the control.
- 1201-M-SC had a higher mean maximum load when cured with LED than with broad spectrum.
- 1180-M had the best cured mechanical properties when cured with broad spectrum.
- 431 had the best cured mechanical properties when cured with broad spectrum but was very close to the performance at 385 nm.
- 6-630-T had the best cured mechanical properties at 365 nm and 385 nm.
- Of the four conformal coatings tested, only 984-LVUF cured tack free at 365 nm and 385 nm and with slight tack at 405 nm.

## Conclusion

Many of Dymax's traditional UV broad-spectrum chemistries can be cured with LED, but the specific LED wavelength makes a difference in the properties of the adhesive. It is important to note that just because there's a difference in the cured mechanical properties at the different LED wavelengths. that doesn't mean that the adhesive won't meet the rquirements for a specific application. It is always necessary to test the adhesive in the true assembly to validate the curing process. If there are questions about a specific application, the Dymax Application Engineering Team is available to answer questions and even help manufactureres evaluate if LED curing is right for their application.



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