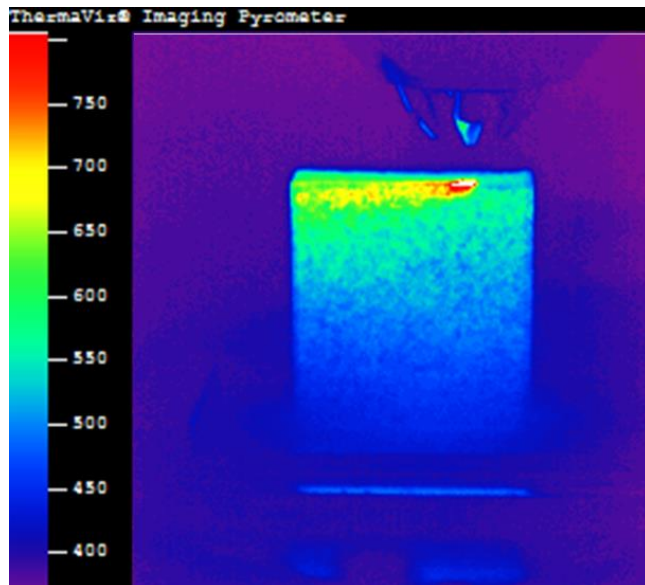
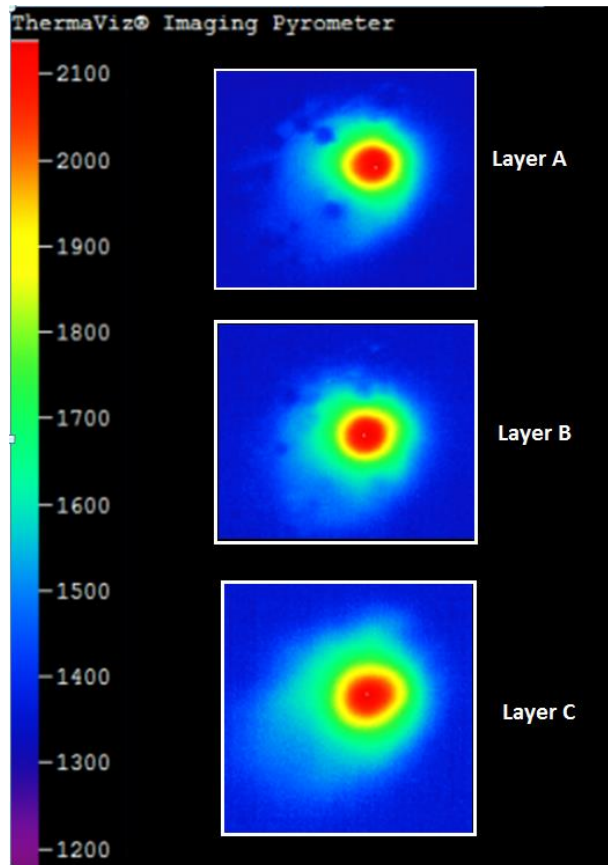


Mississippi State University Center for Advanced Vehicular Systems-Cavs Incorporates Stratronics ThermoViz® Sensor Systems to Evaluate Melt Pool Anomalies and Heat Transfer during Laser Deposition Process

Melt pool anomalies from pyrometer data can help predict defects in a build. For instance, the image to the right shows the melt pool in three different height-wise layers during a thick, rectangular wall build. Layers A and B are taken from earlier layers that were found to be porous using post-processing techniques. Layer C, however, fused well with previous layers and did not exhibit any porosity. Melt pools of A and B are seen to have an irregular shape with random blue spots while the second image is much smoother. From these types of comparisons we can learn not only about the temperature response in these regions of the build, but we can also calculate cooling rates/gradients, visualize the flow of the melt pool over different temperature surfaces, and determine how much fusion is occurring.

When coupled with the infrared (IR) images from the side view below, and once the parameter settings have been considered, relationships such as parameter-porosity influence may be found. With new relationships we can better design our parameter space and also learn about the geometry effects on the heat transfer during the build process.



Pyrometer and IR sensors are also useful for process control. Such technology is currently being used in places as the input to feedback loops to control delivered laser power in order to output a part with desired mechanical properties. Proper implementation of thermal data for characterization and control will be paramount to the widespread use of additive manufacturing in industry.

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