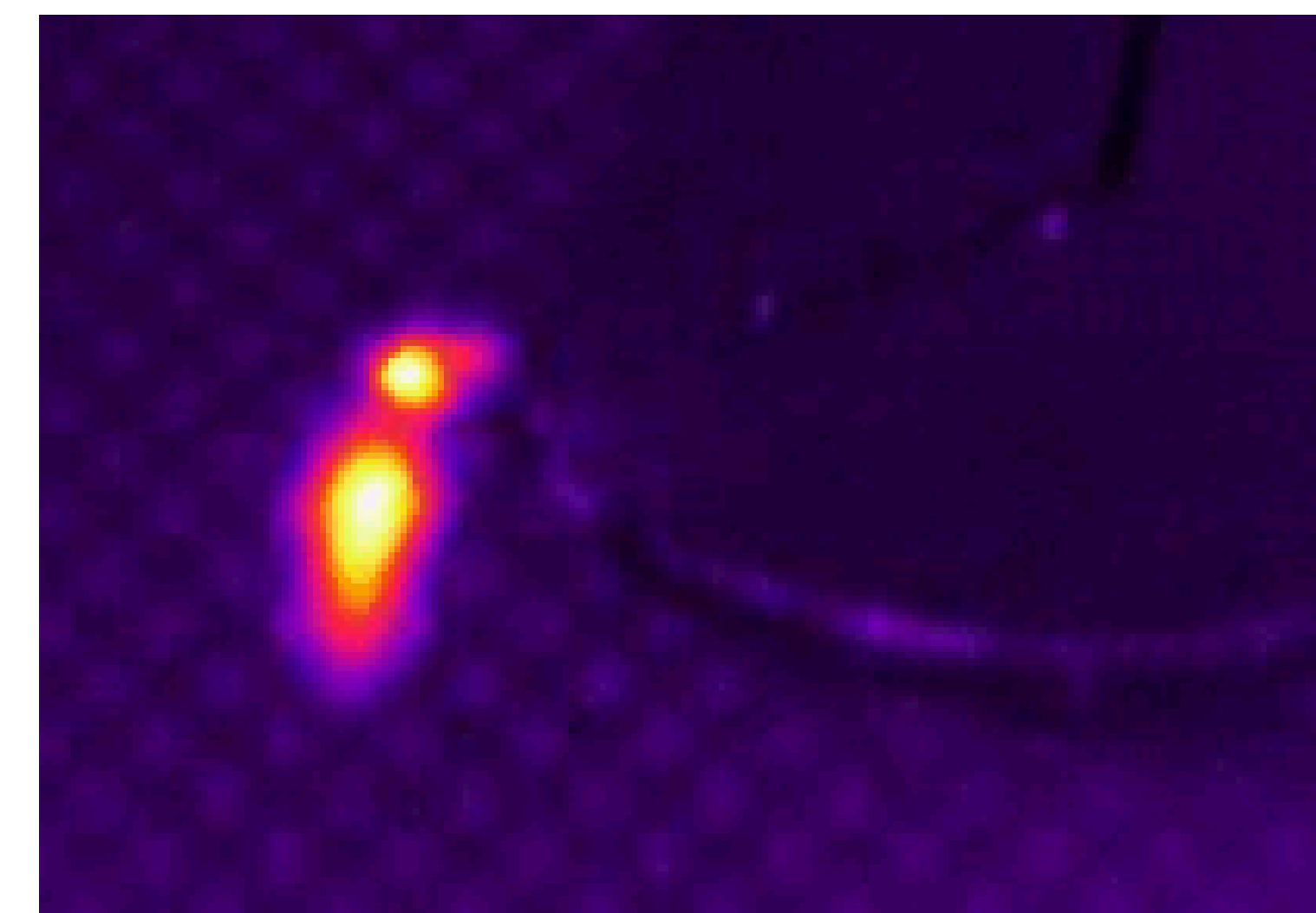
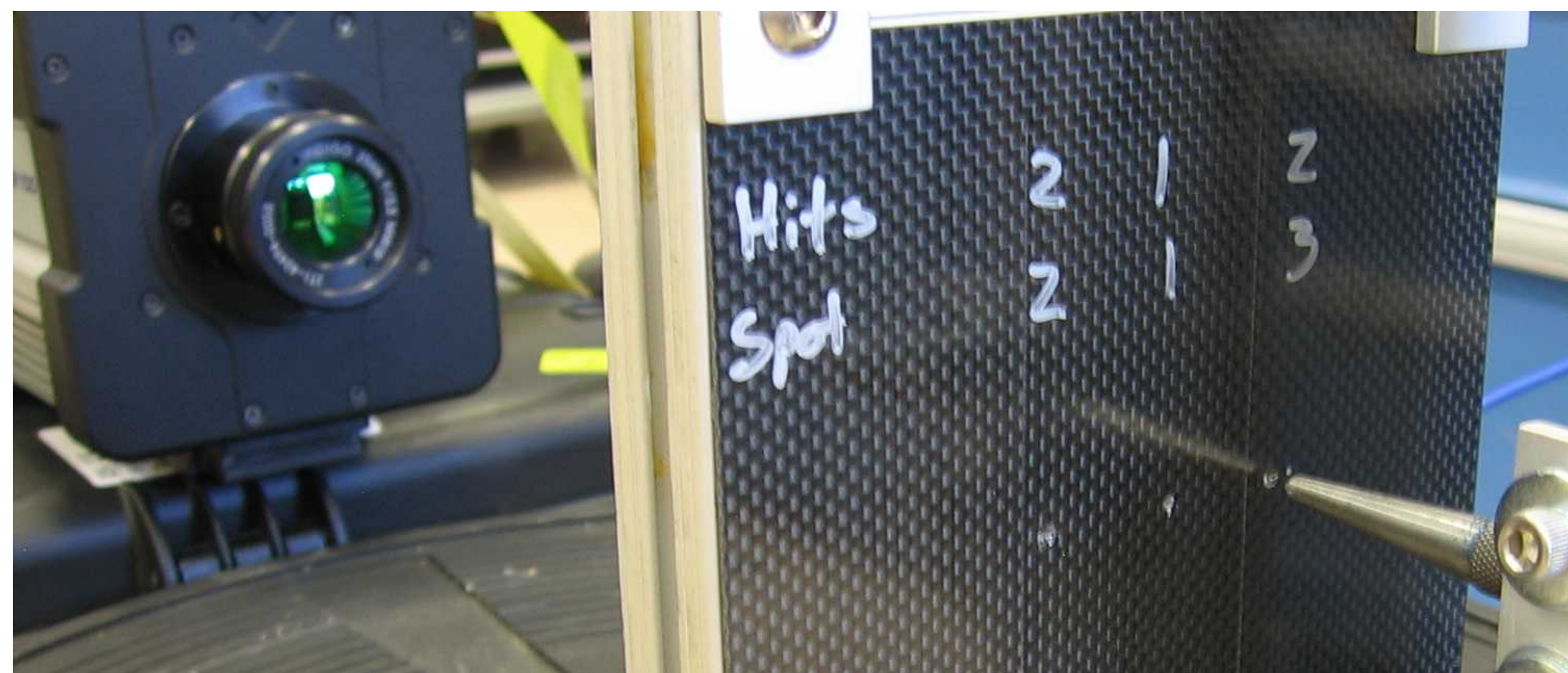
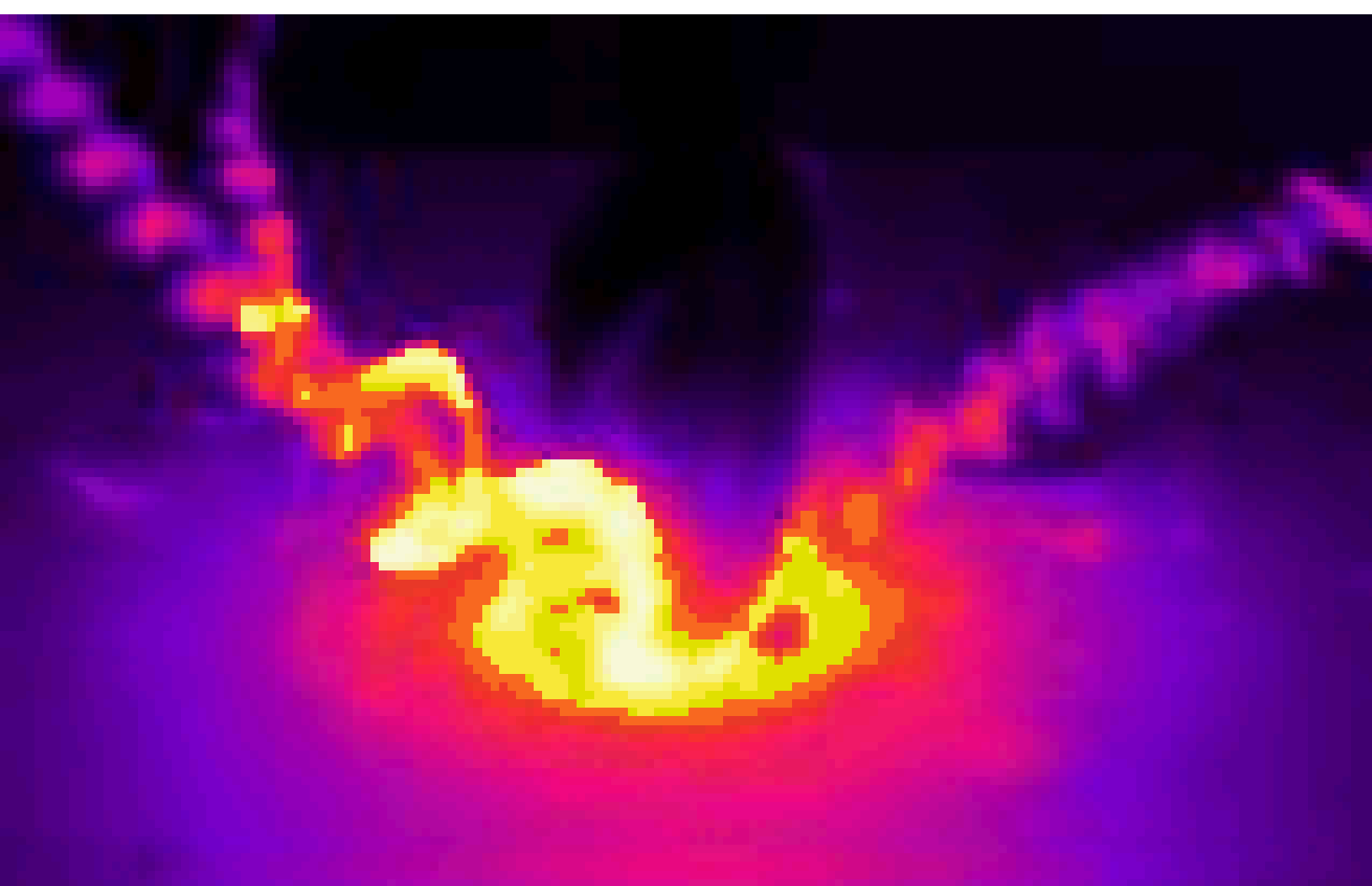


*Exceptional service in the national interest*



# High Speed Infrared Imaging of Composite Impacts & Material Heat Stresses

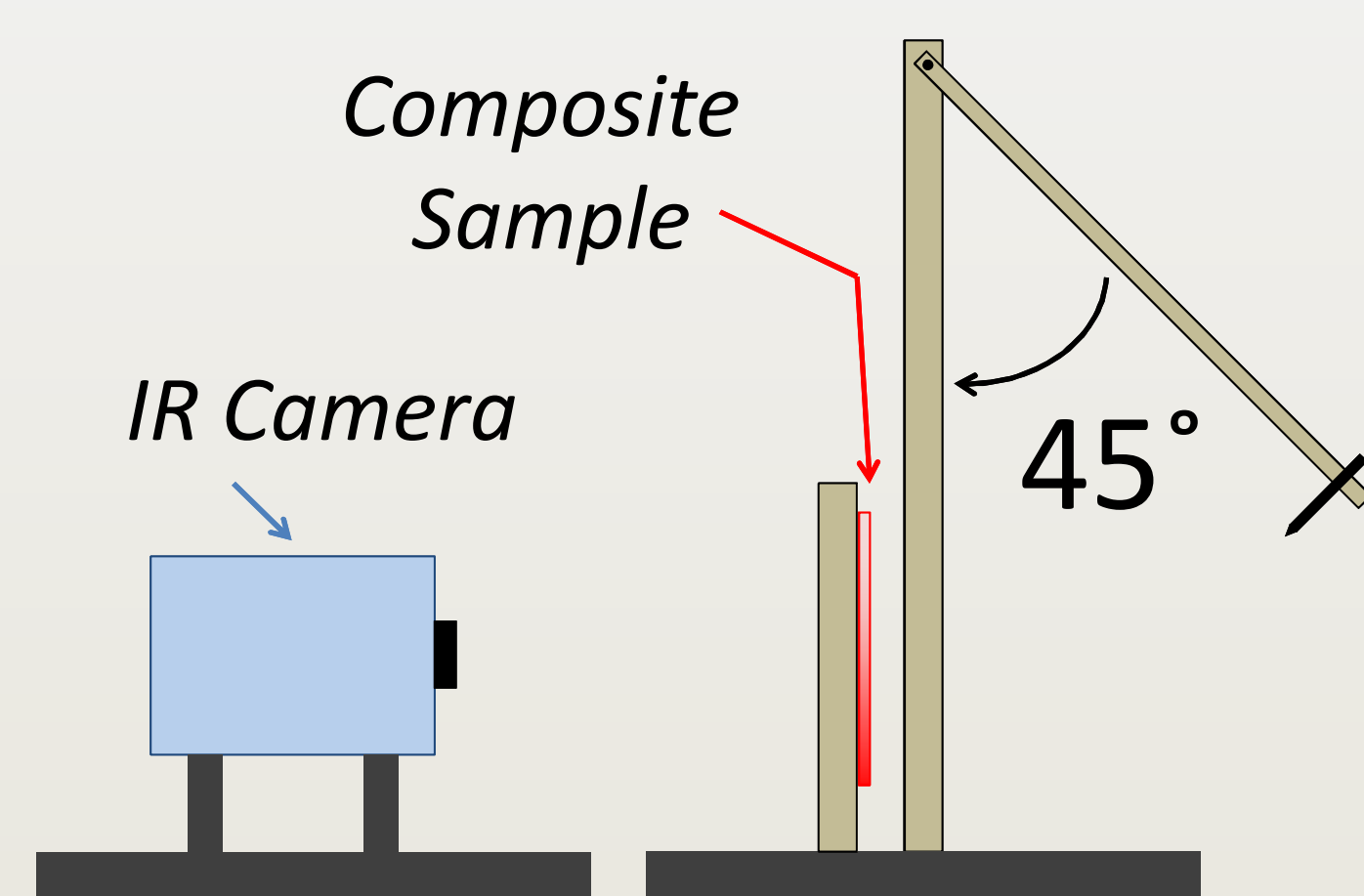
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## Composite Weave Pendulum Impact Test

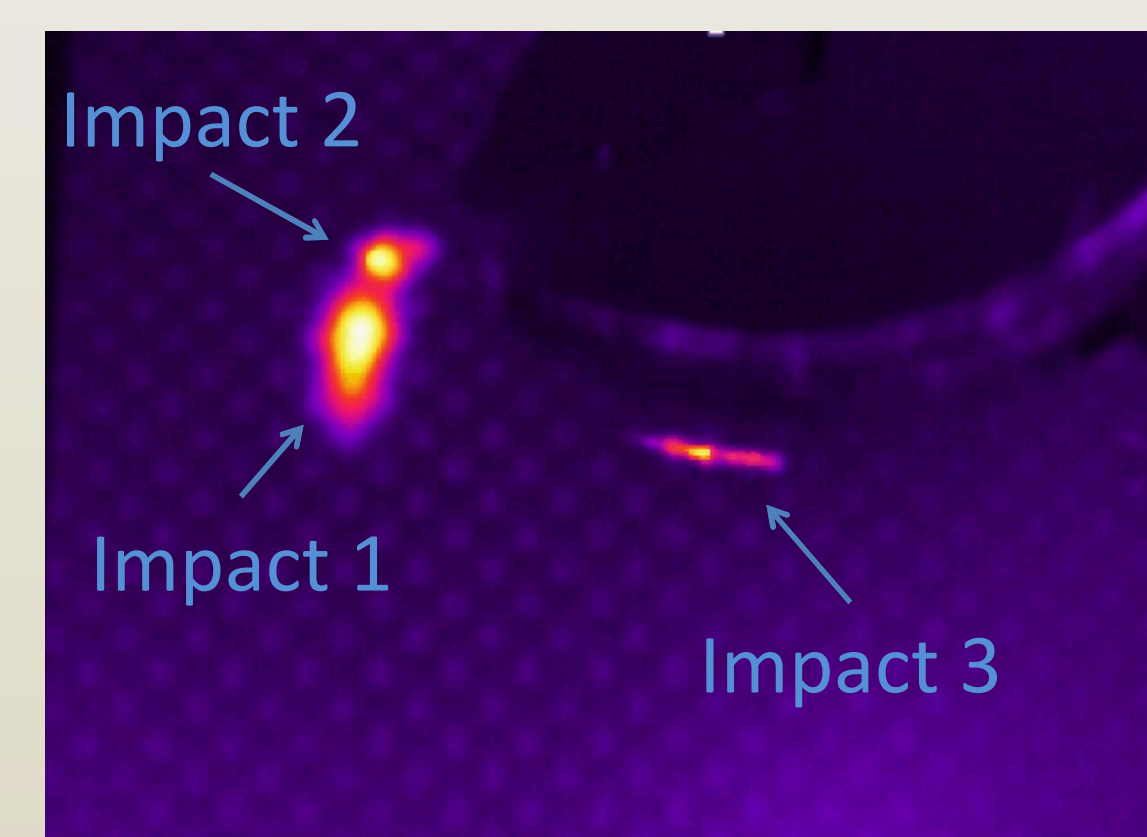
A FLIR 6100 Camera acquired images of the impact at 1300 frames per second, with an image size of 160 x 128 pixels. Impact speed was approx. 6 ft/sec with 2.2 Joules of Force.

- Temperature was measured and recorded for each pixel of each frame.
- The temperature of fibers breaking, and the damage pattern in the weave were studied.



## Crescent Wrench Drop

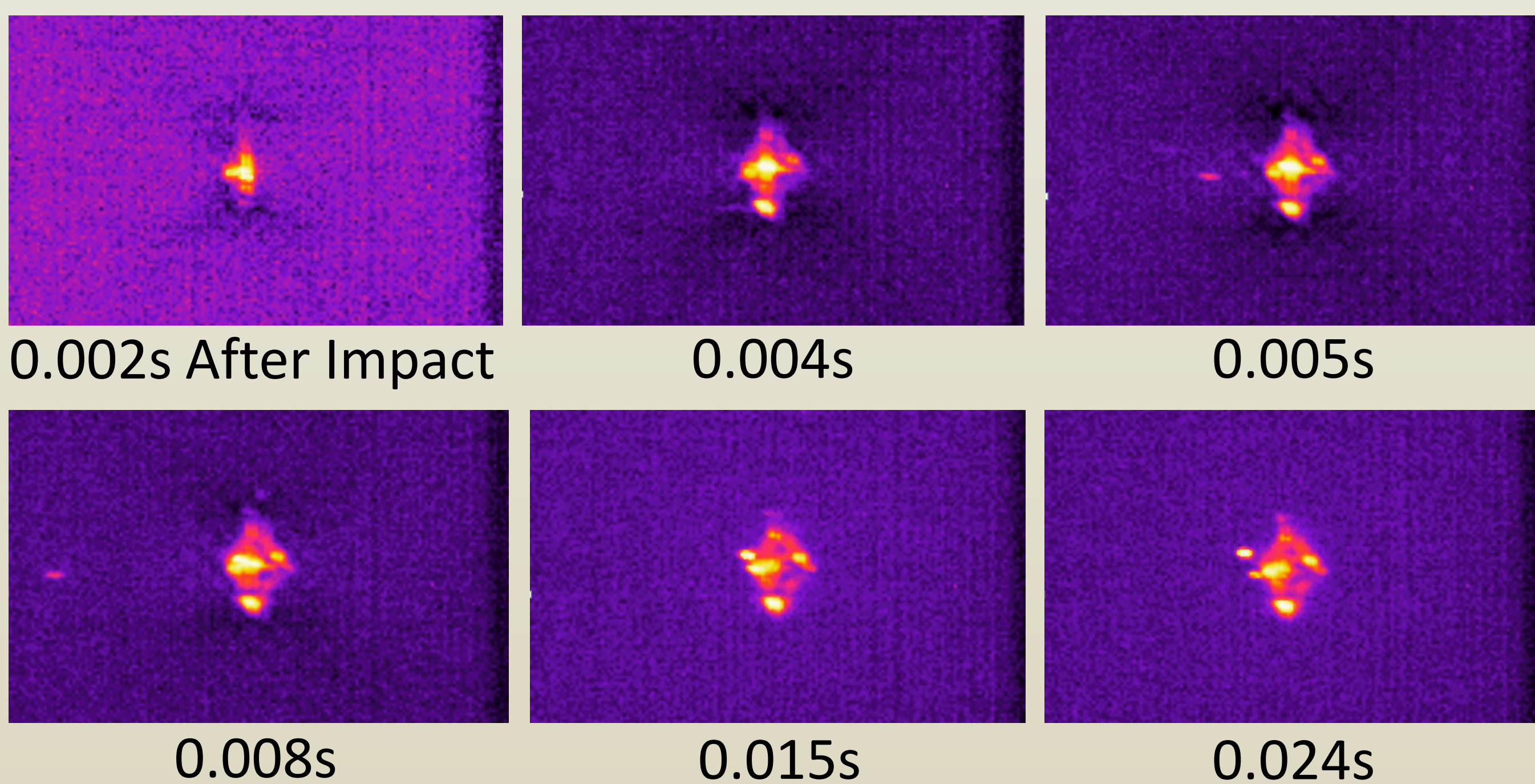
To simulate an accidental drop of an object, a crescent wrench was fixtured 24" above a composite weave sample. When released, the wrench impacted the sample at 11 ft/sec with 2.5 Joules of Force. Data was acquired at 430 fps, and 320 x 256 pixel window size.



The Wrench bounced three times before coming to rest.

At 0.62 seconds after the first impact, the heat produced from damaging fibers is visible at all three locations.

## Sample of IR Images Recorded During Test



## Drill Bit Spinning

To study the heat stresses of metals during machining a 11/32" drill bit was painted black and the camera focused on the area being machined.

At 990 fps and a 160 x 128 pixel image, the Temperature's were measured of:

- the drill bit,
- the parent material,
- and metal chips.

