



BladeCam series
WinCamD series
TaperCamD series

We Need to Capture EVERY Pulse!

Applies to: All *current* BladeCam, WinCamD & TaperCamD series products.

Issue addressed: The philosophy and practicality of capturing EVERY pulse in a pulse train

We are sometimes asked about the possibility/practicality of capturing every pulse in a pulse train. We have two responses - the practical and the philosophical.

Practical Capture Rate limit: The cycle time for DataRay cameras is the serial addition of:

- The exposure time, 0.040 to 1024 ms.
- The ~50 ms transfer time across the USB 2.0 interface, limited by the USB 2.0 standard and the Capture Block size.
- The *highly PC and processor dependent* processing time for analysis and display, 50 to 500 ms.

Even at the shortest exposure time of 0.040 ms, this cycle time is 100 to 300 ms, so the highest **Pulse Capture Rate** is going to be **3 to 10 Hz**. [The system will also capture isolated pulses, such as those used in Laser fusion and similar experiments.]

i.e. Whatever the Pulse Repetition Rate (**PRR** Hz), the **Capture** rate for *individual* pulses is a (PC and camera settings dependent) rate of ≤ 10 Hz.

Practical Data Storage limit: At **Fast** resolution, 1024 x 1024 capture block, the file size is 0.54 MB. If the Pulse Repetition Rate is **PRR** Hz, and you wish to accumulate data for an hour, you need to be able to store **0.54 x 3600 x PRR MB**. At 20 Hz, if we could capture at that rate, this would be **39 GB**. (At full resolution and full frame it would be 195 GB). Do this more than a few times and hard drive space becomes an issue. i.e. Even if we could engineer a higher Pulse Capture Rate, it would only be appropriate for short bursts of pulses.

Practical Human Limit: If the primary aim is to look at the images and the calculated diameters, then it is hard to assimilate this data visually at capture rates above 1 Hz.

Statistical Philosophy: For almost all lasers, the measurement statistics on a set of regular samples from a train of laser pulses will be *identical* to the statistics gathered by looking at every single pulse.

Yes, you may prefer to see every pulse, but ask yourself carefully, if you do not see every pulse, is the data really less valid?

Exceptions *may* include your particular laser measurement requirements, but if you insist on seeing every pulse in the pulse train, you may exclude measurement systems which would otherwise be excellent for the job.