

## ArtCAM USB2.0 Camera Performance

July 26, 2004

USB 2.0 cameras offer some advantages over traditional frame grabbers. The first advantage is obvious: no frame grabber to install inside the computer. This opens up using laptops, for example.

It is important to understand that USB 2.0 cameras are entirely different from frame grabbers, in almost every imaginable way. In fact, they are also different from USB 1.1 cameras! The following table summarizes the important differences.

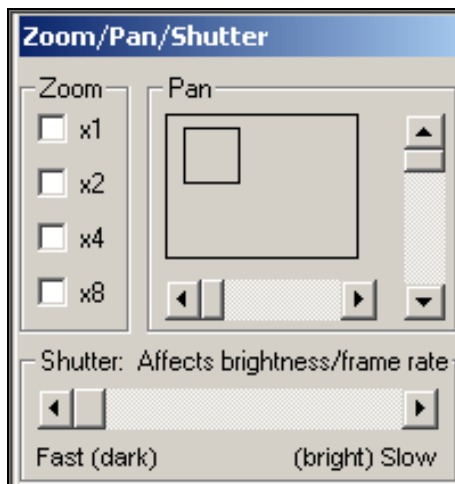
Feature	Frame Grabber	USB 1.1	USB 2.0
Fast CPU required	x	x	✓
Can power camera	✓	✓	✓
Laptop compatible	x	✓	✓
Low power	✓	✓	x
Fixed frame rate	✓ fixed by camera type	✓ fixed by camera, will vary with brand	x set by image size and brightness
Image compression	x	✓	x
High speed possible	✓ with cameras like JAI	x	✓ with smaller images
Color	x requires different grabber	✓ always, you may set color camera in B/W mode	✓ you can choose color camera, which will be slower and need more light
Megapixel	x	x	✓
Zoom	x	x	✓
Pan	x	x	✓

The most confusing aspect of USB 2.0 cameras is how fast they run. That is, what is the frame rate? The frame rate is anything but fixed. FTA software constantly monitors it and reports true time in Movies. This does not cause any loss of accuracy, but does require a different way of thinking. You still get to specify your acquisition rate. The system will do the best that it can to meet your timing, but it will not be perfect. What it does do is record the *actual* time of each frame so graphing is accurate.

The following table shows measured frame rates on a Dell Pentium 4 2.8GHz CPU with 512M ram. Note the theoretical rates for this (and other) cameras is considerably higher, but it gets lost in the operating system, in this case Windows XP Professional.

Format	Black and White Camera frames per second	Color Camera frames per second
640 x 480		
fast (short exposure)	44	16
normal	30	15
slow (long exposure)	7	4
320 x 240		
fast (short exposure)	80	50
normal	45	32
slow (long exposure)	10	7
160 x 120		
fast (short exposure)	80	80
normal	50	50
slow (long exposure)	10	10

The biggest advantage of USB 2.0 cameras is the electronic zoom and pan available with their megapixel format. This is a true zoom and pan – there is no interpolation involved. The field of view can be set to be a rectangle anywhere in the overall field of view. These functions are controlled by a popup window that floats beside the image.



File: ArtCamUSB2Camera.doc