First Ten Ångstroms

USB 2 Camera Images

13 October 2004

Setting up and running a USB 2.0 camera is different from running an NTSC camera connected to a frame grabber. The primary difference is that brightness is adjusted by the "exposure" time of each frame. In this way frame rate and brightness become tied together. The fastest possible frame rate has the least exposure time per frame, and hence will be the darkest.

Fitting a USB 2 Camera to an Existing System

1. Most cameras use a 5mm spacer ring to correctly position the camera's CCD behind the lens. This is called the back focal length. If your existing camera uses such a ring, transfer it to the new USB camera. It is, however, possible there is no ring present and none would be transferred.

2. If the lens is a zoom microscope, having the correct number of rings (0 or 1) is necessary so the microscope will stay in focus as the zoom is changed. This is called being parfocal. You check this by focusing the microscope at high magnification, then zoom down to low and see if focus is maintained (at least approximately).

3. If the lens is a fixed lens (not a zoom), then there is no issue of being parfocal. Adding the 5mm spacer will shorten the working distance slightly (you must move the lens closer to the object) and increase the magnification slightly, say 20%. Conversely, removing it will have the opposite effect.

USB 2 Cameras on Any System

1. USB 2 cables must stay plugged into the same connector to avoid reloading the driver.

2. If a second USB cable is present to run the backlight, it must stay plugged in also. On some systems, the backlight must stay switched on while the Fta32 program is running.

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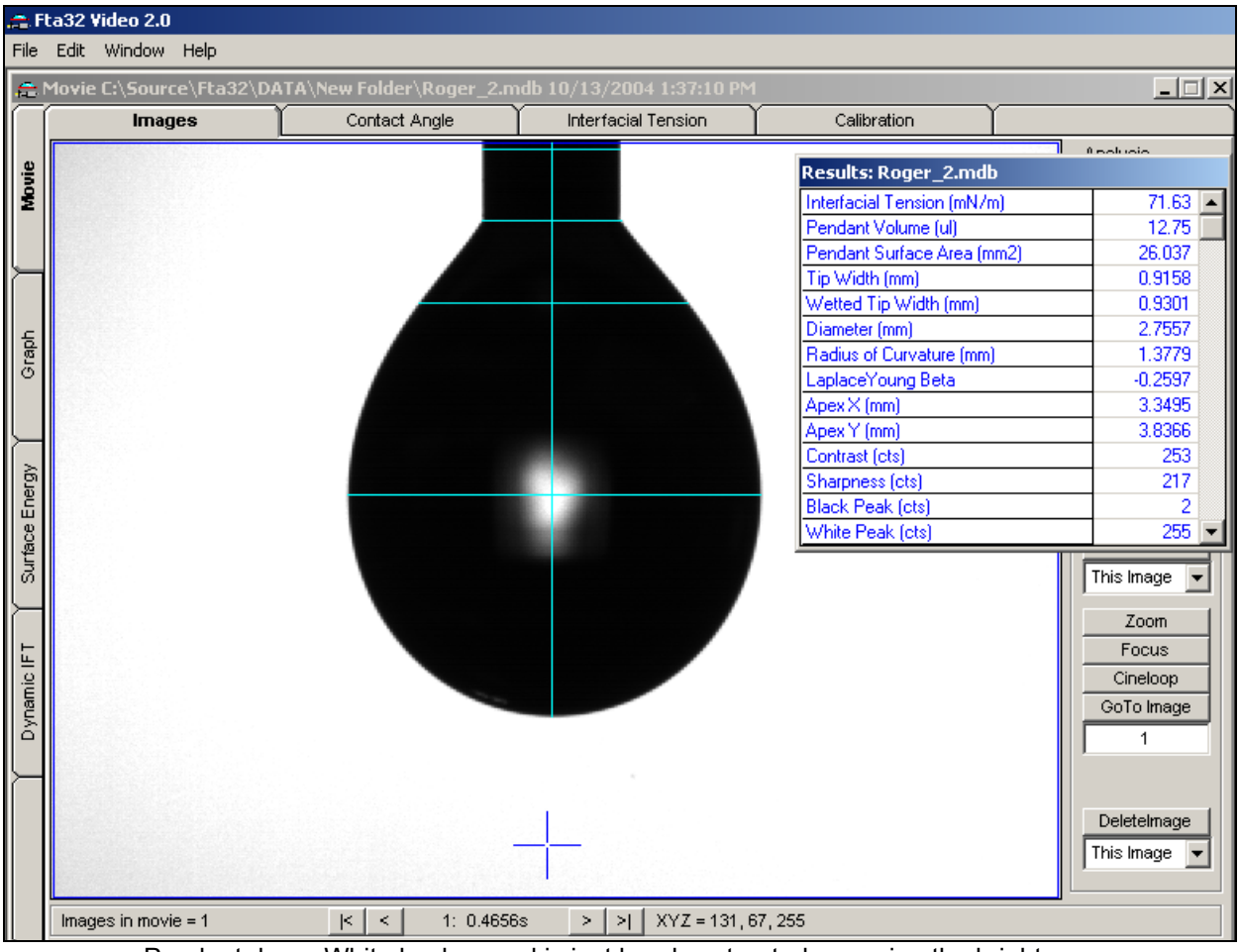
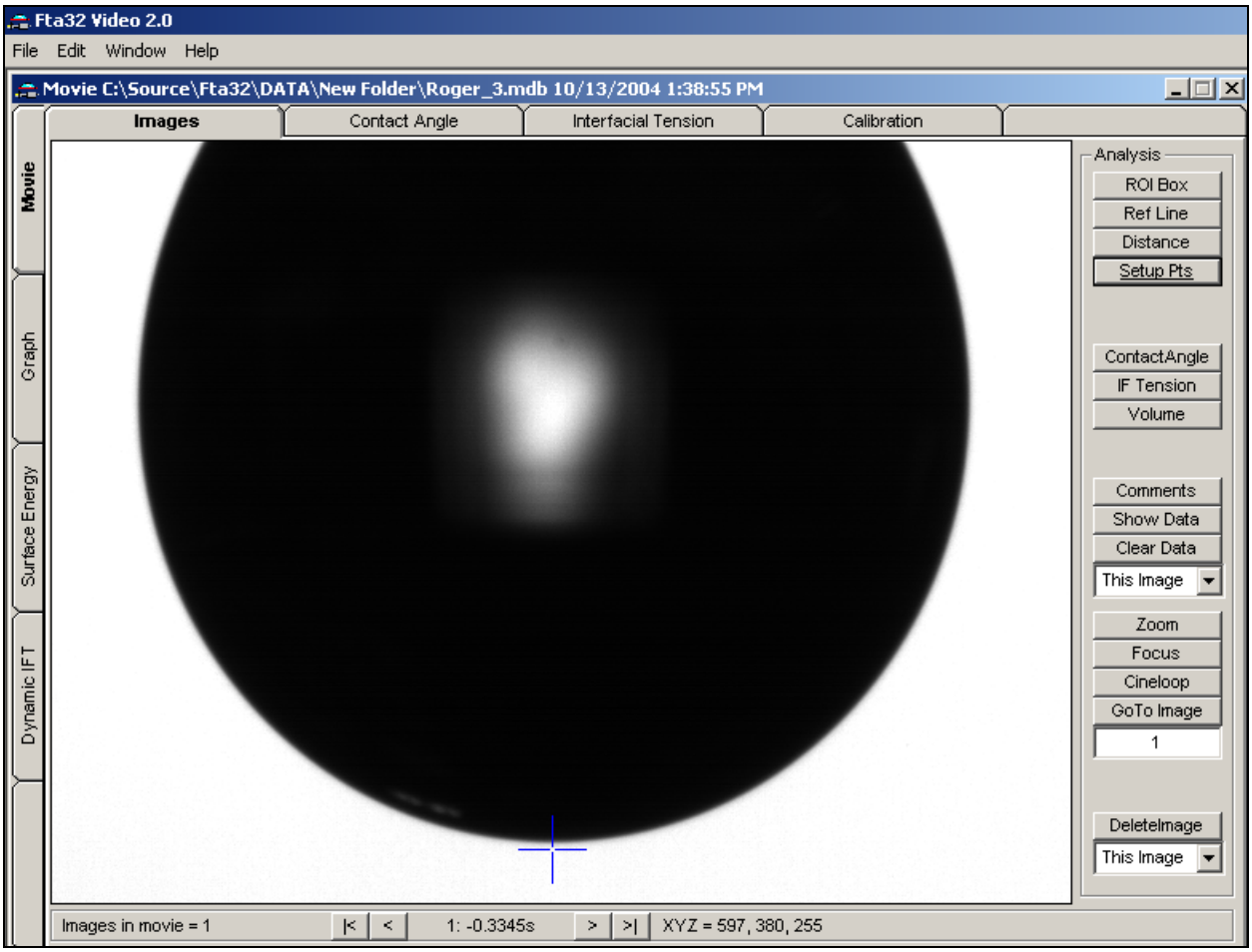
Example Images on an FTA188

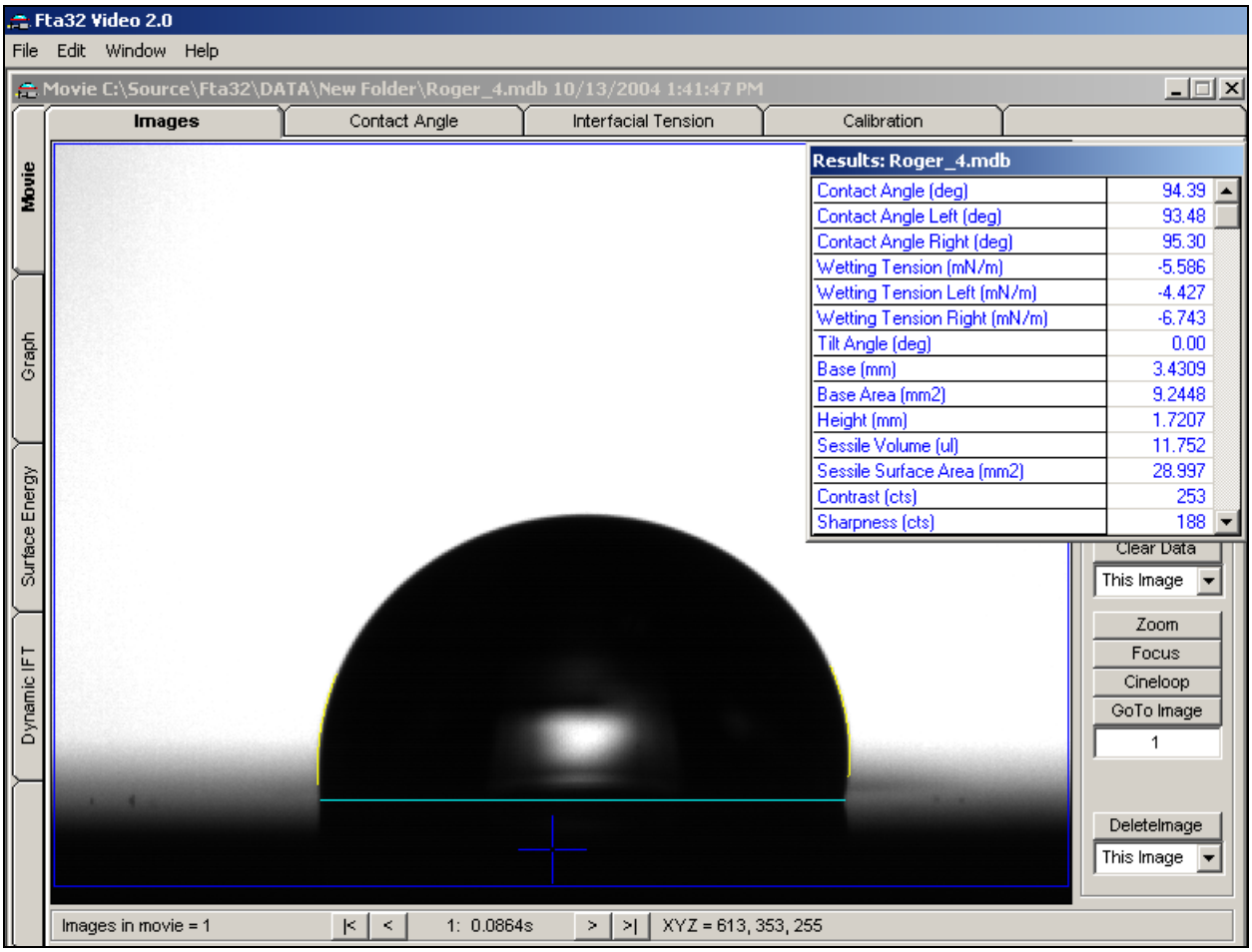
The following images were taken on an FTA188 which has a fixed lens.



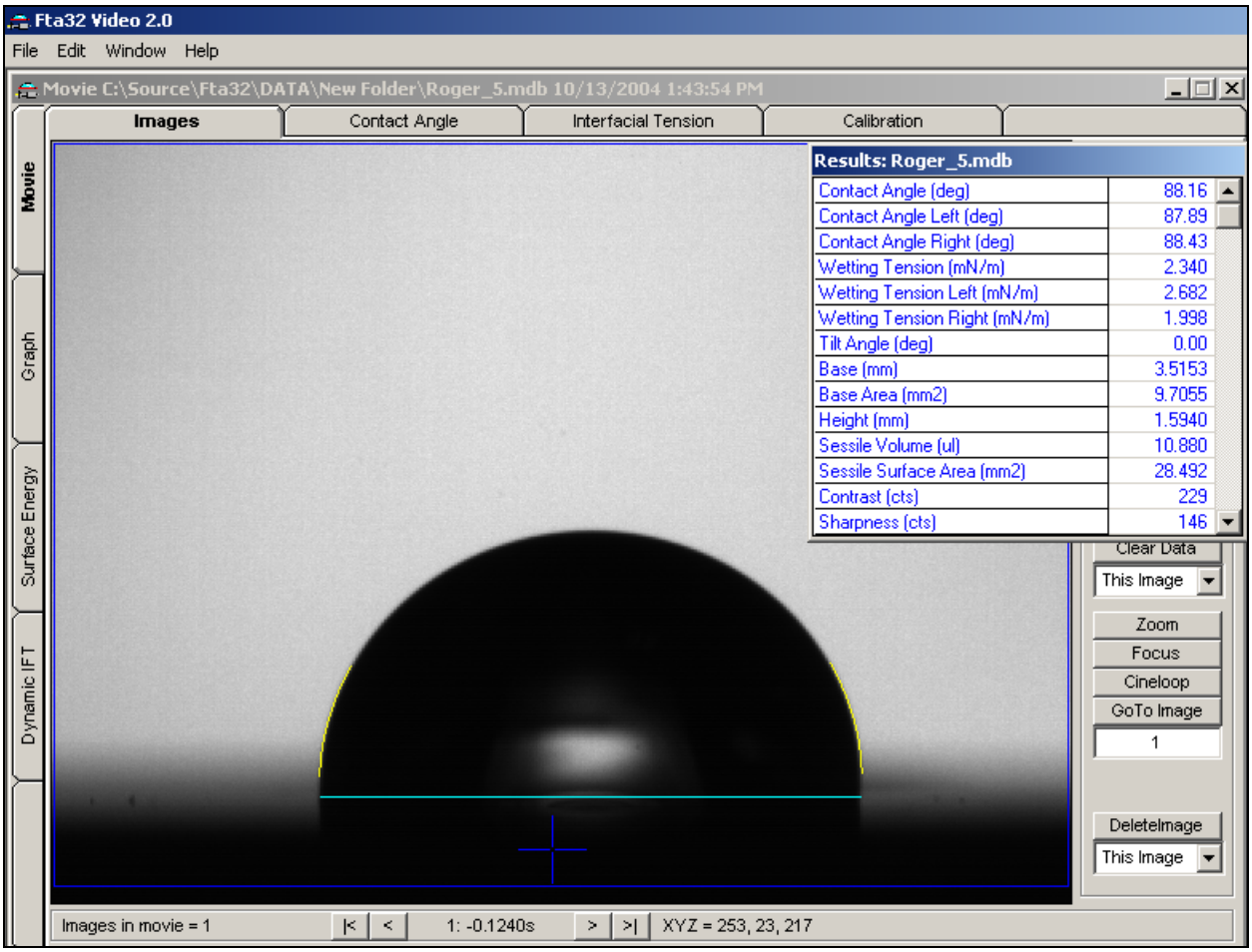
Pendant drop. White background is just barely saturated, meaning the brightness is sufficient to make it (mostly) have the maximum pixel value of 255. The horizontal field of view is 6.7mm. The needle is a 20GA.



Same image as before except employing the 2× zoom of the megapixel camera and panning down slightly to show the bottom of the drop. This image shows excellent quality.



Contact angle experiment. The background is saturated but the foreground is not. We are looking down slightly on the sessile drop. The frame rate was about 48 per second.



The shutter time was reduced to its minimum on the previous drop for this image. The background is no longer saturated, but is smooth gray with no obvious sign of noise. The frame rate was 50 per second.

File: USB2CameraImages.doc