Dear Rizal,

Thanks for pointing me to the picture of the microscope. You did a good job of installing things. From the tube movies I would say that the magnification is about optimum for DNA-tube studies. Since I did not notice any evidence of bleaching during the movie one could probably increase the laser power and use a faster video frame rate to reduce the blurring due to Brownian motion.

The more I think about it, the more I am of the opinion that the artifacts in the images are due to manufacturing imperfections rather than dust on the CCD window. So I would recommend that you not try cleaning the CCD surface because of the potential that real dirt may be blown on the surface.

You may want to check some of the old photos from when we first used the CCD to see if the defects are in those images as well. I noticed similar defects in the raw images of Titan that were taken by the Cassini spacecraft. So, these defects may simply be an indication of what the state of the art in the manufacturing of these cameras currently is. The blemishes could, of course, be corrected by software by taking images with out the sample present but for which one has uniform illumination across the field of view. This data could be used to scale the brightness of the pixels for sample images to remove the blemishes. This would require some software writing. The defects are regions with lower signal, so the signal to noise ratio in these regions will be somewhat degraded compared to the rest of the field of view.

Should you decide that you need larger magnification I would recommend that you replace the two inch tube with the square cross-section by a longer one from Thor Labs and that you keep the sections of black tubing relatively short. I think that this would yield a sturdier construction that would be less susceptible to vibrations. Also, since you live in earthquake country, it would be a good idea to tie the two meter tube to the wall or ceiling in such a way that the microscope will not fall over. One should use something like flexible rubber tubing that will not couple vibrations to the microscope. A better solution might be to design a restraint that does not physically touch the microscope but that will catch it and keep it from falling over should an earthquake occur. I don’t like the idea of having that chunk of aluminum fall on someone’s head.

I don’t know where things currently are in the lab, but if things have not been moved around too much, chunks of paraffin should be in the center drawer of what used to be my lab bench and the
Vaseline should be somewhere on that bench.

Hope this helps,

Bernie Yurke