

Re: Alignment of microscope optics – how...?

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- *From:* justbeats <steve_beats@xxxxxxxxxxxx>
 - *Date:* Sun, 10 Feb 2008 15:38:18 –0800 (PST)
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On 10 Feb, 19:58, Kevin Cunningham <sms...@xxxxxxxxxxxx> wrote:

On Feb 10, 12:56 pm, justbeats <steve_be...@xxxxxxxxxxxx> wrote:

How does one ensure every component in the light path of a research microscope is exactly central with respect to the optical axis? What do you use as the reference to line everything else up against?

The question is prompted by recent efforts to correct a minor niggle on my Zeiss ICM 405 inverted. The realignment required me to adjust grub screws in a the dove–tail mount to shift a component relative to the centre line. I got stuck in an endless loop where fixing the niggle introduced other alignment problems (usually vignetting) and fixing that introduced yet more problems elsewhere. Argh!

I've got it all back where I started, the scope performs great, and I've decided the niggle is bearable after all – until I know more. I hope I'm asking the right question. Can anyone point me at more info on this subject? Thanks in advance...

Cheers
Beats

PS. In case it helps, the specific niggle is with an optovar fitted under the trinocular head. It delivers a full, unobstructed field of view at all magnifications but the phase–telescope view is shifted

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left of centre. Adjusting the grub screws on the dovetail recentred the phase telescope image, but then the main (specimen) view is vignetted with a black crescent around one side. Adjusting the dovetail on the trinocular head to fix that problem brings the original niggles back, and leaves the internal photo reticle off centre (can't see an adjustment for that – although it is on a removeable slider in the main body of the instrument). Given that EVERYTHING is on a dovetail – where do you start...?

Beats, what you need you probably can't get. There are several ways to approach this, what Zeiss did was to use a pre-centered eyepiece and a dummy objective with a pre-centered target built in. This was strictly for repair tech and production techs so not a lot of these were made. However if you had one it was trivial to adjust everything and then lock it in place. With out one, well, its a lot more trouble.

Now the interesting point. This wouldn't have done a thing for the problem you describe. This problem is in the rotary part of the optovar, actually in the phase centering section. You have to adjust that, put it back together and check, shampoo, repeat. Don't under any circumstances change the adjustment screws for the head, you'll have the problems you described.

Thanks,

Kevin Cunningham
SMS– Hide quoted text –

– Show quoted text –

Thanks Kevin – I was hoping you'd pitch in ;–)

I initially wondered if the Optovar phase telescope alignment was the only problem, and decided I couldn't do anything about it, even if it was....

But then I noticed another "artefact" that led me to the centreline question. Namely – if I center the illumination field diaphragm with a certain slide in place, subsequently using a thicker or thinner slide will shift the image of the field diaphragm left or right by a small amount. I can't think of any mechanism that would cause this unless things were skew-whiff with respect to the optical centreline. Maybe this is the basis of a technique to get things properly aligned?

I'll take a longer look at optovar phase centering; but I've found the "image shift" issue is still there with optovar removed so it seems something else is out of whack (unless this image shift is normal; in which case there's something else I don't understand. Doh!)

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It's too late to "not adjust" the grub screws, I did it already and have probably bugged the setup in the process – although general optical performance seems brilliant to me.

I have two objective turrets (transmitted and epi) and they are parcentric and parfocal at all positions, so I assume they're aligned. Is that a correct assumption? Can I use the objective back focal planes as references? If so – how?

What about these tools I "probably can't get". Are they *that* hard to acquire or borrow? You say "without these its a lot more trouble" which implies it's still possible. I've yet to follow the reference from lumi, maybe the answer will be there, but can you point me at anything else that describes alternative approaches to this sort of alignment...?

Thanks for taking the time to respond. Appreciated.

Cheers
Beats

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