ImSpector WITH FIBER OPTIC LIGHTLINE

The ImSpector is a line imaging system, and thus a fiber optic lightline a very appropriate illumination device for it. Lightlines and light sources for them are available from several manufacturers, like Schott-Fostec and Illumination Technology.

The following notes provide a check list for achieving proper alignment and performance with a system consisting of halogen light source with a fiber optic lightline and a ImSpector/camera unit with a fore lens (Figure 1) . Alignments and adjustments are easiest to do when live image from the camera is available.

Check list

Check that the fore lens numerical aperture is set to 2.8, which is the numerical aperture of the ImSpector. Thus the lens will not limit the system throughput.

If the application is in the visible region, and the light source is equipped with a standard EKE halogen lamp, adjust the light intensity knob in the light source to its maximum for best signal in the blue region. If the application covers near infrared (NIR) too, and no NIR blocking filter is used in the light source, it is recommended to set the light intensity knob to 75-80% of the maximum.

Usually it is appropriate to illuminate at 45 degrees and image at 90 degrees with respect the target surface (as shown in Figure 1).

If the target surface is 3-dimensional (has height variations), it is better to go to a smaller angle between the illumination and imaging. However, care should be taken that specularly reflected light does not get to the spectrograph.

The fiber optic lightline can be used without or with a cylindrical lens. If the lightline can be placed close to the sample surface, light intensity will be usually sufficient and very uniform without the lens.

With the cylindrical lens, the light becomes collimated in a narrow line. The width of the line depends on the separation between the lens and the fiber optic line.

Align the illuminated line so that the line of sight of the spectrograph is in the middle of the it (see also Technical Note 1).

Having a white calibration sample as a target, adjust the illuminated line width so that the highest signals in the image are close to the maximum range in the system. However, be sure that the signal is not saturating in any of the image pixels.

If there tends to be too much light, it is recommended to make the light to spread over a larger area than e.g. reduce the lens numerical aperture. Spreading the light over a larger area will make the illumination more uniform.

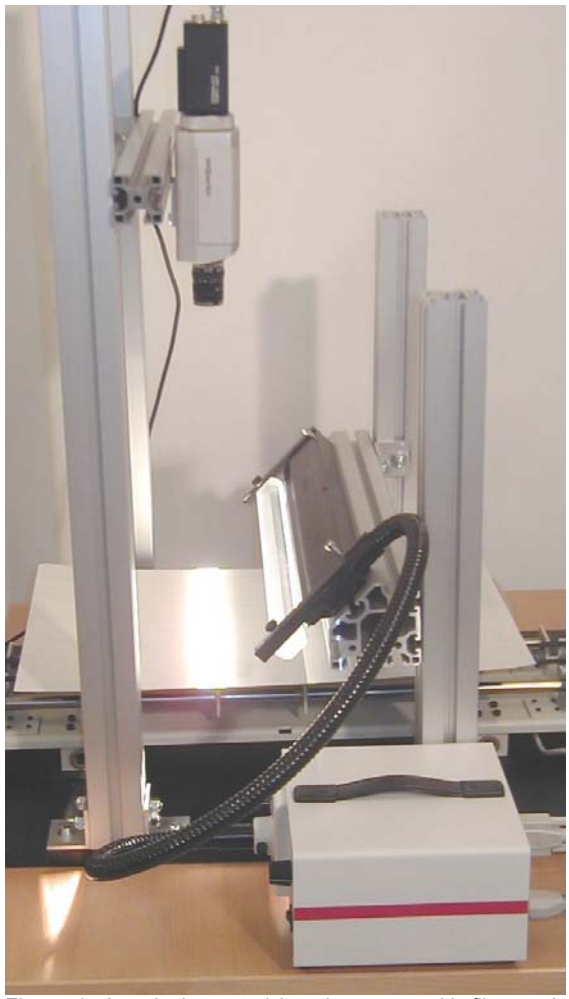

Figure 1. A typical spectral imaging setup with fiber optic lightline.