



### 1. Positioning of a filament in a bulb

1A filament must be positioned precisely into a bulb. It should be noted that the filament can be bent, thus the end of the filament lies not on the symmetrical axis of the bulb. The inner diameter of the bulb is equal to approximately 1.8mm and the diameter of the filament is around 0.3mm. At this a line-scan camera type **L-LAS-CAM-512-SL** in connection with a macro objective type **MO-J-2x/26** is used. The lightning source consists of an optical fiber type **R-S-R2.1-(6x1)-1200-67°** and a **SPECTRO-3-FIO-JR**. The lightning source (6mm x 1mm spot size) and the macro objective are pointed on the place where the filament should be positioned. During the positioning process the filament will be shifted as long as the top of the filament crosses the light curtain from the camera system, simultaneously a digital output will be set which informs that the right position of the filament is already reached and the movement of the filament stops immediately. As shown in the screenshots, a range of approximately 1.5mm can be covered with the line-scan camera and the filament can be detected properly.

