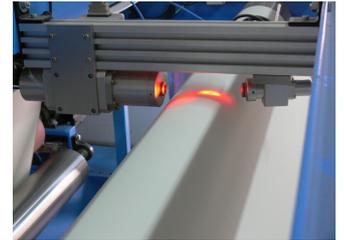


A short description of Hairiness measuring :

The System consists of a light source(LED) and a monochrome CCD-Camera. The light source shines tangential on the fabric-surface, where the direction is slightly tilted, so the camera does not see the shadow of the protruding fibers, but the refracted light

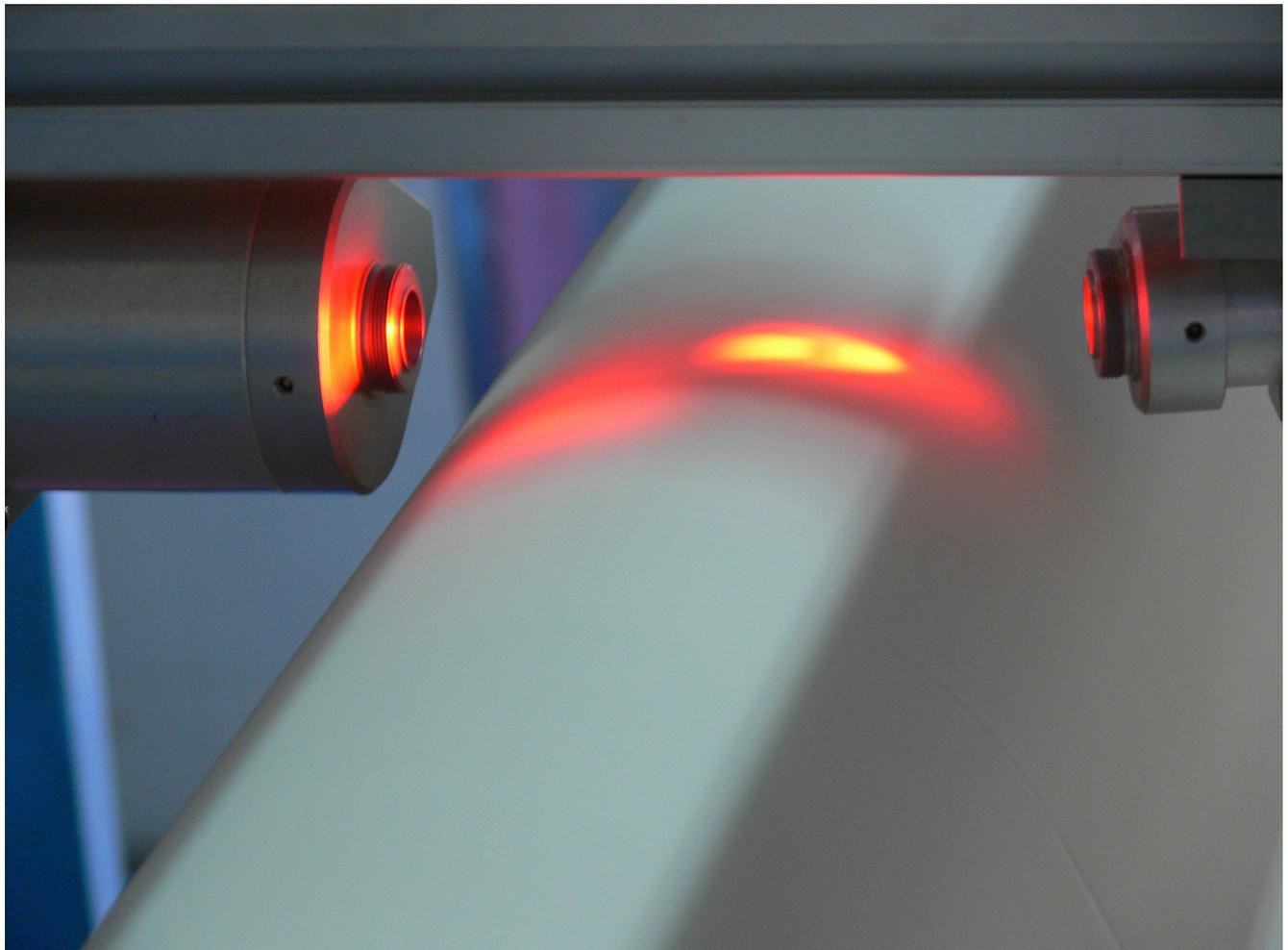
This type of measurement is called dark field measurement, because the background remains black, whereas the objects are shown bright.

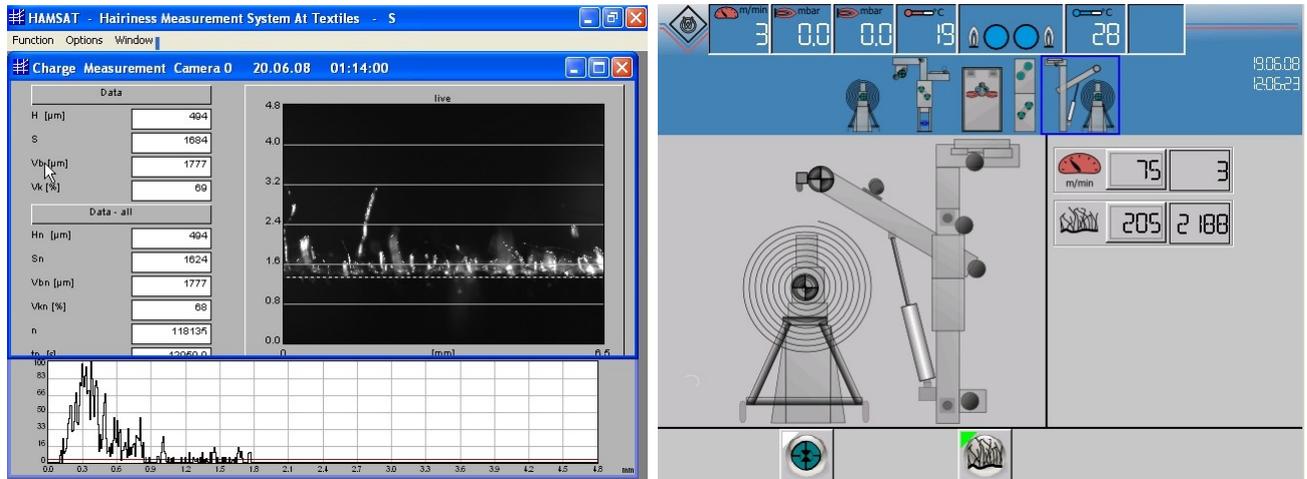
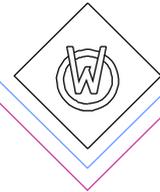
Camera and light source are installed in a dust- and waterproof enclosure(IP67). The lenses of the camera are protected by scratchproof sapphire crystal. Both parts of the unit have blowing nozzles, which keep the optics dustfree.



The camera signal (up to 2 cameras are possible) is sent to the industrial PC by a Gbit Ethernet cable. The Industrial PC is placed in the main cabinet. On this PC runs a analysis program, which determines the bottom limits of the hairs (fabric surface) and the top limits (top most visual point of hairs). The distance in between is the length of the hair. After this a variety of statistical data is calculated, where for the evaluation of the hairiness the mean value and the standard deviation are used. The mean value reflects the grade (how short are the hairs in general), the standard deviation reflects the quality (the equability of the hair length) of the hairiness

We define hairiness as the sum of the mean value and the standard deviation.





The left picture shows the Screen of the PC, which is analysing the signal from the camera. The important values are H_n (mean value) and S_n (standard deviation). Top right you see the camera picture, below is a histogram, which shows the distribution of the hair length. The sample indicates hairs between ca. 0.15mm and 1.8mm length, the greatest part is ca. 0.3mm long.

The right picture shows the operating panel of a singeing unit (our laboratory range). The range consists of a center unwinding device, dedusting, singeing unit (for woven and knitware), two more dedusting units and a batching device with center winding.

The hairiness tester is after singeing and after the dedusting mounted. On the right side you see as set value a hairiness of 205, the actual value is 2188.

By means of this hairiness tester we are for the first time able to measure and influence the important variable, this means the hairiness, directly.

The measured value is used for the modulation of the process parameters, or more detailed: we adjust the intensity of the burners depending on a hairiness set value.

Advantages:

1. It is ensured, that the whole batch has the same hairiness value.
2. Similar articles in future will be singed the same (repeatability)
3. The gas consumption is only as high as necessary. If the desired hairiness is achieved with a lower intensity, the setting is reduced.

One more time the same pictures as above, but with a lesser hairiness.

