RGB Colour sheet break detection at a paper machine

Sheet break detection can be a challenging task, because of the different applications (environments) in the paper machine’s wet end compared to the dry end. Traditionally photoelectric sensors are used for web break detection, where visual contact from one side of the machine to another can be arranged, and the air is clean. But this is not always the situation. In many cases the light is blocked by rollers, cylinders, threads or blankets making it impossible to use sensors. The steam inside the machine also prevents the use of photoelectric sensors, particularly in the press section. The air around a paper machine contains dust and oily fumes which rapidly colours the sensors and makes the web break detection unreliable, thus causing false alarm or missed break. Photoelectric sensors require continuous monitoring and maintenance. Therefore, in difficult applications and in cases where the sheet is supported by fabrics, fiber optic break detectors have been used. Most of the existing units use infrared light or red laser. The disadvantage of these two lights is that they cannot separate the web from a new fabric – especially when the wire or the felt is red.

KPM, Kajaani Process Measurements Ltd., has developed a sheet break detector for demanding applications, using RGB colour measurement. The KB² Sheet Break detector has two alternative light sources for maximum performance – the conventional IR light and a new RGB colour measurement. With the RGB colour measurement the best of the colours red, green and blue or any combination of the colours can be selected for the break detection. The break detection becomes reliable even with different fabric colours. KB² Sheet Break detector utilizes proven fiber optics which makes it suitable in hot environments such as in the paper machine’s dryer section. Thanks to the air purge system in the sensor head, KB² can be installed in very humid and dirty locations. At Oulu Mill, Stora Enso, more than 20 sheet break detectors are installed at their paper machines. All original sheet break detectors delivered with KB² in the end of the dryer section. The wire colour (red in this case) does not affect the reliability.

Automation specialist Pekka Greus thinks that KB² is very easy to setup and operate.
the paper machines have been replaced by KB². The speed of PM6 is over 1000 m/min and the web is approximately 9 metres wide. Oulu Mill has now been using KB² for five years and no regular adjustments have been required.

KB² Sheet Break Detector was installed at PM6 in the middle of the dryer section, where the red wire supports the paper sheet. The first KB installation was done in May 2006. After one week of monitoring, the alarm signal was connected to the automatic logic to cut the sheet as the break is detected. Since then the unit has been on automatic mode without any problems. Automation specialist Pekka Greus has been monitoring and using the KB Sheet Break detector since it was installed. He has been working with sheet break detectors at the mill for years and has now replaced all of the old ones with KB².

“With KB²’s colour measurement the reliability of break detection has improved significantly compared to the older models” says Pekka Greus. The user interface of KPM’s Sheet Break detector is very easy, and so are the setup, large display and clear menu with sample buttons making it easy to store reference values (BREAK and PAPER) in the memory, which helps at setup.

In the beginning Mr. Greus used the data logging feature to monitor the long term stability of the KB². “Because there was no drift at all on the signals we quickly connected it to the automatic sheet break detection system”, he says. Mr. Greus considers the reliable sheet break detection as the number one feature of KB², and then he also mentions the ease of monitoring the detector’s performance.

With the KB²’s data collection feature he can easily download the data to a computer and evaluate it. No other sheet break detector has this kind of maintenance feature. KB² is setup to use the blue or green colour for measurement, which gives the biggest difference between the white sheet and the red fabric behind it. In some cases ratio signal gives best difference over time since the fabric colour may change when getting dirty. The signal difference between the paper and a break is very clear. The break alarm trigger point has been set to the middle of the paper/break signal levels. KB² has an additional maintenance alarm which has been set to a slightly higher level than the break alarm. It is to alarm the user if the unit’s self diagnostic finds a need for maintenance, such as cleaning. Further Mr. Greus, also finds the adjustable mounting rack that help adjust the sensor position easy. It has a “position memory” if a sensor has to be removed.

Thanks to the two light sources KB² can be configured to any application, which allows reliable sheet break detection against any surface. KB²’s extended measurement distance also permits installation farther away from the web. KPM has sold over 400 KB units since the introduction in 2007.