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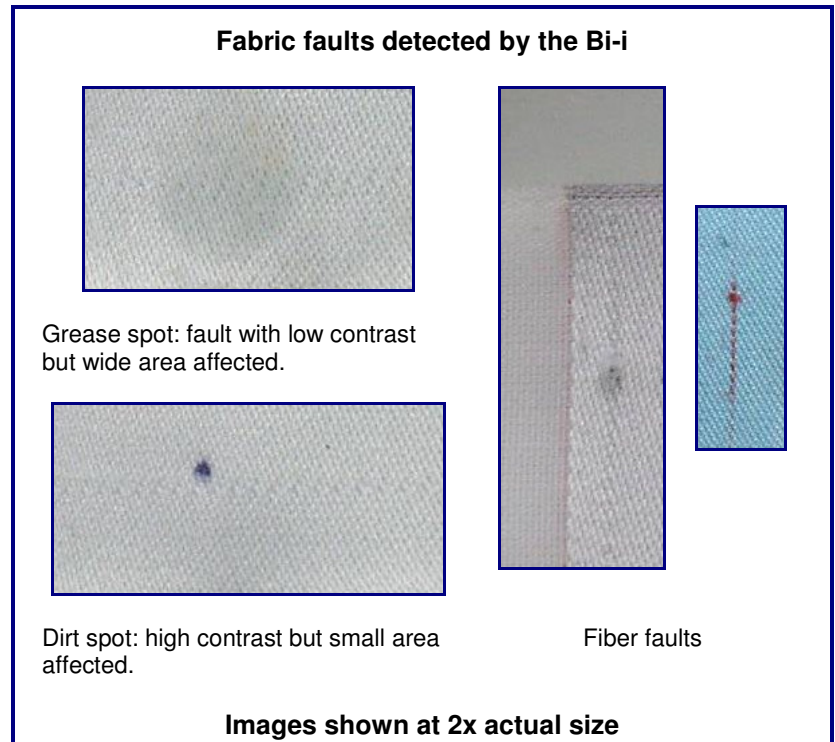
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High Speed Textile Inspection

The Bi-i smart camera system can be used for quality control applications of fabric items. The visual inspection system identifies different faults either in the weave or due to foreign substances on the surface of fabrics.

One or more Bi-i camera systems are positioned above the moving fabric. When faults are identified, the Bi-i camera—without the aid of a computer—will send messages directly to the control system of the equipment handling the textiles.

The visual inspection system first takes a reference image and calculates different characteristic features of it. During the inspection process the system takes images of the material being inspected and compares it to the reference image. All the above is done in real time.



This comparison is a difficult task for a number of reasons:

- The fabric runs fast and the inspection cannot slow down the process.
- The fabric will be distorted. This is a normal situation when fabric is pulled off a roller. The system compensates for distortion so that distortion does not show up as a fault despite the fact that the image significantly differs from the reference image.
- The fine texture of the woven fabrics appears as noise on the images. Faults below this noise level must also be detected (if they are large enough). A grease spot is a good example of this situation.

The following are the main steps of the algorithm used for textile inspection:

- After taking an image, the position of the pattern on the fabric is calculated.
- The actual positions of some characteristic patterns are identified.
- The distortion of the fabric is corrected based on the characteristic positions.
- The image is compared to the reference image resulting in an error image.
- Applying several threshold levels, binary error images are generated.

The current implementation of the textile inspection algorithm runs on the Bi-i v301. The algorithm inspects periodic repetitive patterns.

At 0.3 mm/pixel resolution:

- The length of the period must be smaller than 384 mm.
- The width inspected with one Bi-i can be up to 307.2 mm.
- The speed of inspection depends on the width to be inspected. (e.g. 200mm width can be inspected at 100 cm/second.)
- The required setting can be adjusted to optimize the inspection.
- The optimum setting will depend on the thickness of the fibers.
- The viewing area of the Bi-i is 1280 x 1024 pixels, which is 384 mm x 307.2 mm at this resolution.