COGNEX DEEP LEARNING TECHNOLOGY ALLOWS THE AUTOMATIC INSPECTION OF COMPLEX FABRICS

No tedious software development is required. The software algorithm is trained on a set of known good samples to create reference models. Once this training phase is completed, the inspection is ready to go. Defective areas on the fabric can quickly be identified and reported while tolerating large but irrelevant variations in its appearance. Best of all, there is no need for extensive defect libraries!

Cognex Deep Learning is the first set of deep learning-based vision solutions designed specifically for factory automation.

This novel approach combines the human performance and flexibility in visual inspection with the reliability and consistency of a computerized system. It finally offers a way to precisely and repetitively inspect all sorts of natural and man-made textiles.

Cognex Deep Learning radically differs from traditional machine vision solutions since it is:

- **Easy to train**  No software development required
- **Human-like**  Outperforms the best quality inspectors
- **Powerful**  Solves hard to tackle or even impossible to program inspection challenges
CHALLENGES IN TEXTILE INSPECTION

Complexity
The fabric pattern can be highly complex, and position variants can preclude the use of rule-based methods.

Natural variability
Visual appearance varies drastically due to the stretchable nature of the fabric and other variations such as yarn thickness.

Countless forms and types
Defects in textiles come in countless forms and types and explicitly searching for all defects is not an option.

AS SIMPLE AS 1-2-3

1. Collect images of “known good parts”
2. Let Cognex Deep Learning train on those samples and create its reference model
3. Proceed with testing and start detecting anomalies

ViDi Blue-Locate finds complex features and objects by learning from annotated images. Self-learning algorithms locate parts, count translucent glass medical vials on a tray, and perform assembly verification checks on kits and packages.

ViDi Red-Analyze is used to detect anomalies and aesthetic defects. Be it weaving, knitting or braiding problems, incomplete or improper stitching or even printing alignment errors; the red tool can identify all of these and many more problems simply by learning the normal appearance of an object including its significant but tolerable variations.

The Red-Analyze tool is also used to segment specific regions such as defects or other areas of interest. Be it a specific foreign material on a medical fabric or the cutting zone on lace; the red tool can identify all of these regions of interest simply by learning the varying appearance of the targeted zone.

ViDi Green-Classify is used to classify an object or a complete scene. Be it the identification of printed pattern families, the wear-and-tear rates on textile samples or the separation of acceptable or unacceptable defects; the green tool learns to separate different classes based on a collection of labeled images.

ViDi Purple-Read deciphers badly deformed, skewed, and poorly etched codes using optical character recognition (OCR). The pre-trained font library reads most text out of the box and minimizes training steps for fast, easy implementation. This robust tool can be retrained to adjust to specific OCR application requirements—no vision expertise required.
**WEAVING**

Cognex Deep Learning distinguishes unacceptable defects on seat belt and tire fabric while tolerating naturally occurring variations.

**KNITTING**

Cognex Deep Learning identifies a broken needle in thick yarn as well as knitting loops in warps and wefts despite the complex pattern.

**BRAIDING**

Cognex Deep Learning is able to find various types of defects such as gaps or misalignments despite the reflectivity of the carbon fibre fabric. The second example below shows the detection of a broken wire on a braided metal sleeve.
FINISHING

Cognex Deep Learning can detect anomalies like soil or ink spots on garments as well as defects in highly critical stitching such as on airbags. It also excels at verifying embossed characters on medical fabrics.

PRINTING

Cognex Deep Learning allows the inspection of printed webs. It is able to identify problems in printing quality such as misalignment of different color channels (black outline versus filling) while the motifs can be highly complex.
Cognex Deep Learning is the first set of deep learning-based vision solutions designed specifically for factory automation. The field-tested, optimized and proven technology is based on state-of-the-art machine learning algorithms.

Rather than following a rule-based approach to solving inspection challenges, like traditional machine vision applications, Cognex’s deep learning solutions learn to spot patterns and anomalies from reference image examples. Deep learning automates and scales complex inspection applications that until now still required human inspectors such as defect detection and final assembly verification.

**In-Sight ViDi**

In-Sight ViDi deep learning applications are deployed on the In-Sight D900 smart camera without the need for a PC, making deep learning technology accessible to non-programmers. It uses the familiar and easy-to-use In-Sight software platform which simplifies application development and factory integration.

**VisionPro ViDi**

VisionPro ViDi deep learning software combines a comprehensive machine vision tool library with advanced deep learning tools inside a common development and deployment framework. It simplifies the development of highly variable vision applications and allows engineers to build flexible, highly customized deep learning solutions tailored to their specific needs.
BUILD YOUR VISION

2D VISION SYSTEMS
Cognex machine vision systems are unmatched in their ability to inspect, identify and guide parts. They are easy to deploy and provide reliable, repeatable performance for the most challenging applications.

www.cognex.com/machine-vision

3D VISION SYSTEMS
Cognex In-Sight laser profilers and 3D vision systems provide ultimate ease of use, power and flexibility to achieve reliable and accurate measurement results for the most challenging 3D applications.

www.cognex.com/3D-vision-systems

VISION SOFTWARE
Cognex vision software provides industry leading vision technologies, from traditional machine vision to deep learning-based image analysis, to meet any development needs.

www.cognex.com/vision-software

BARCODE READERS
Cognex industrial barcode readers and mobile terminals with patented algorithms provide the highest read rates for 1D, 2D and DPM codes regardless of the barcode symbology, size, quality, printing method or surface.

www.cognex.com/barcodereaders