"Inspection of quartz glass tubes":

An Accuracy more consistent than previous manual Inpsection

The challenge:
Automating a complex manual inspection task

"How can we automate the inspection of

quartz glass tubes in our production line?"

Going from manual inspection to an automated system, can be a challenging. One thing is that manually inspection is not always very repeatable, an automated system can be a challenge to set up so it works the same way as the average manual inspector. The Machine Learning part helps as the system can be retrained with samples that gradually brings the automated system in alignment with the previous manual inspection, but with both higher accuracy and repeatability.

JLI VISION
just perfect

Solution:

Combining advanced machine vision with machine learning

JLI designed, manufactured and installed an inspection system that inspects quartz glass tubes while the tubes are being transported through the system. The tubes are scanned and processed using a combination of standard machine vision (selects candidates) and machine learning (classify candidates)that category.

Results:

Classification accuracy is >95% which is better and more consistent than the previous manual inspection

Hybrid vision is the perfect solution for classification of defects.
Traditional inspection has been done manually as the production speed is typically fairly low on quartz tube line. Replacing manual inspection with standard machine vision solves some of the problems with manual inspection, but for quartz glass tube, it is mandatory to distinguish between open and closed airlines. This can be achieved by adding Machine Learning to the standard Machine vision system.
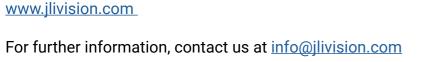

The standard machine vision system is able to detect all airlines and other defects. Images off all detected defects are then fed to the Machine Learning network that returns a likelihood of the defects being one of the typically 4 different types of defect including open- and closed airline. The Machine Learning network is trained by pictures recorded earlier from the standard machine vision system, so the cooperation of the two types of vision helps getting to system to perform as specified. This training can be done in a week or so after installation, as collection of pictures are automated and only a fraction of the pictures needs to be sorted manually before training. Sorting open and closed airlines has so far not been possible to do reliably, but with Hybrid Vision it is now possible.

What is "hybrid vision"?

Hybrid vision by JLI vision is a combination of:

○ Traditional machine vision with the use of 2D and 3D

○ Machine learning

○ Craftsmanship and deep knowledge about cameras, lenses, lightning, productions environments, etc..