UNDERSTANDING KULICKE & SOFFA PATTERN RECOGNITION

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- SCOPE: What is pattern recognition and how is it used in automation on Kulicke and Soffa (KnS) automatic bonders for ball and bump bonding.

Pattern recognition is the process of identifying trends in a given pattern. A pattern is something that has some kind of regularity or follows a trend. The recognition of these patterns is determined by computer algorithms and is used in various applications, such as computer vision, speech recognition and facial recognition.

Systems in microelectronic production, assembly or test that use automation will utilise some sort of camera vision system and pattern recognition (PR) technology, in order to help determine locations of the part being manufactured or assembled.

An example of a system that has an integrated PR system is an automated ball or bump wire bonder. For best results, the wire bonder must be able to accurately place all bonds. Variations in manufacturing steps prior to wire bonding cannot ensure repeatable part placement from device to device. Therefore to overcome this variable, PR uses trends (also referred to as models or fiducials) common to all devices to compensate for placement variations. Using the same fiducial, PR accurately aligns each device, even if the fiducial is not in exactly the same place each time. This is because the original coordinate is recorded, along with a snapshot of the fiducial. This is known as a PR model.

Systems such as an automated wire bonder will have different PR modes that can be used; this depends on which one gives the best result for your application. Each individual PR mode will use a different algorithm for trend recognition. Having a PR mode that is repeatable, accurate and fast are the determining criteria for the PR mode selection.

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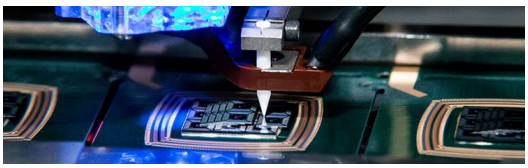

Pattern recognition algorithms compare a taught model against the current image seen by the machines vision system. The most basic form of PR algorithms will group and grid the field of view pixels of the live image from the vision system. The PR system will convert the live image into grey scale, and will be compare and score each grid against the model that is taught, particularly looking at the contrast in each grid. If the live model is found to be shifted in the X and/or Y dimensions, the wire bonder will acknowledge this and shift the process programme position.

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