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# Inspection of Imaging Devices
# CCD
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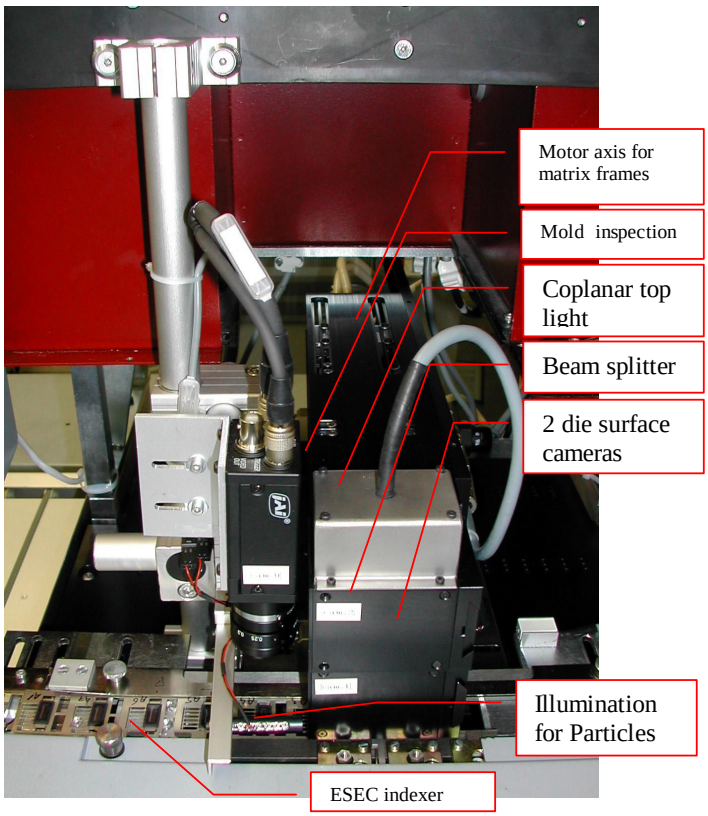
The system inspects die surface after bond and mold in the leadframe. The die is in an open cavity. A cover glass plate may be placed for dust protection. The whole device is extremely critical for dust in the cavity, on the die surface. Due to the nature of imaging devices, any micron dust particles or contamination on the die surface (specifically in the sensor area) produces spots in the camera image. Therefore the quality surface inspection on imaging devices is extremely important.
This system includes inspection of the die surface, plus inspection of the mold quality, and the cavity check for lose particles.
The die surface inspection includes

- Special COMB tool to qualify the surface absorption of each cell surface,
- Special SFDIE tool to measure general die surfaces,
- Special PIT tool to find small defects in a uniform surface
- The system detects any defect on the sensor light sensitive area
- Dust particles, star dust cluster
- Oil or mold contamination




Integration into an existing ESEC wire bonder (camera replaces bond head) allows an easy and reliable handling for any standard leadframe type. The handling also is compatible to the ESEC AutoLine. And the user can re-utilize any type of ESEC wire bonder (also old models) to re-use for this purpose of quality control.
Two 2000x2000 pixel very high resolution cameras and a highly sophisticated software for die surface inspection catch defects down to 10 micron size and below. It is possible to measure the percentage of light absorption on each cell element, and analyze for variations in coating, stardust (cluster of small particles), and other defects.
Simultaneously, the package cavity is also inspected for particles (mold flitter), and the quality of glue of the cover glass plate.
Altogether this is the complete 100% inspection of imaging devices after cavity encapsulation in the leadframe. The UPH of 3000 pph assures 100% production control.

## Operation Mode

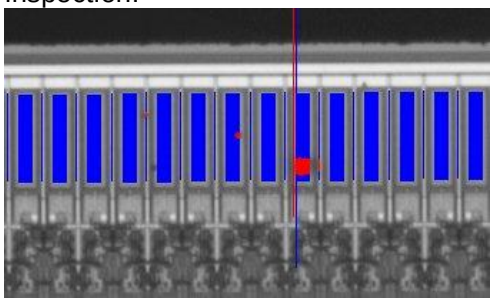
Two very high resolution array cameras with total image area of 4000 x 2000 pixel are used for die surface inspection. Typical pixel size of 2.5 micron allow inspection of a 10x5 mm die area. This is sufficient for most image sensor applications.

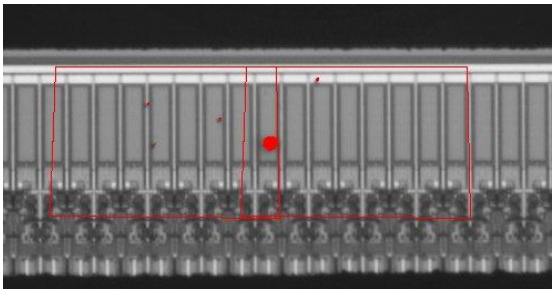
Each sensor element is inspected by a number of camera pixel elements. Each pixel element measures the exact image reflective portion of the coplanar incident light. Variations in the reflectivity are integrated to sum to a integral reflective (and transmittal) light intensity. This way the system analyses and reports results on every single sensor element. This can sum up to a full megapixel imaging sensor, so 1.3 Mio sensor elements for inspection.

Special care is taken for sensor edge effects, to make sure that each sensor element is calculated correctly in the physical statistics of reflective light intensity.

Any contamination from oil, human skin, mold flash, or other reason is measured. You define how much variation in reflectivity you wish to allow.

**SfDie Tool:** This tool is for inspection of general die surface. Any contamination, die crack, epoxy flash, wire bond residue or mold flash is recognized as a possible defect, its size is calculated. If it exceeds the tolerances, a REJECT is generated. This is the general tool for structured die surface inspection, which is used in any logic die area.





## Technical Data

| **Camera for Die Inspection** | | |
|---|---|---|
| Resolution | 4000 x 2000 | Pixel |
| Image | 10 x 5 | Mm |
| Pixel size (configurable, example) | 2.5 | Micron |
| Spots | >= 10 | Micron |
| Contamination | >= 20 | Grey levels |
| Min cell size | 10x10 | micron |
| Die surface defects | 10 | micron |
| Performance | 3000 | Units / sec |
| Interface to ESEC | Standard AUX | |

| **Mold and Cavity Inspection** | | |
|---|---|---|
| Camera resolution | 1300 x 1024 | pixel |
| Pixel size | 10 | Micron |
| Image size | 13 x 10 | Mm |
| Mold voids | 20 | Micron |
| Particles in cavity | 20 | Micron |
| Glue defect | 20 | Micron |
| Missing cover glass | Yes | |
| Missing glue | yes | |
| Reject marking | Inker or Puncher | |
| Matrix frame | 80 | Mm width |