



## LED Test in the test bay



LEDs are used in a great variety of electronic devices, with an upward trend. For the verification of correct LED function and quality usually the complete test item respectively the loaded board with LEDs has to be considered.

### Electrical test of LEDs

A simple and low-cost detection of defective LEDs can be realized by measuring the breakdown voltage. However, this testing method only allows the verification of the correct LED assembly. An inspection of the correct color by electrical tests often is not possible, as the breakdown voltages of LEDs with different colors are partly overlapping or have a too small divergence. For instance, a determination of red and orange LEDs by the measurement of voltage is quite difficult.

### Optical inspection of LEDs

LEDs often have to be inspected more in detail, especially if they are integrated directly in control panels or in car dashboards. In these cases besides the correct function, the detailed optical parameters as intensity and color have to be tested. Today, a variety of optical sensors or camera systems from different manufacturers are available for those examinations. The main challenge is the integration of these systems into a test fixture, as each placement of LEDs at the board leads to different conditions and requires an individual solution.

### Test fixtures for LED-Test

For testing LEDs test programs need to stimulate the LEDs in a defined way according to their application. Therefore it is necessary to contact the board electrically during the optical evaluation. The optical signal typically is adapted by fiber optic cables, leading the signal to the corresponding sensor or evaluation element. Alternatively, various types of camera systems can be integrated into a test fixture for an optical inspection of LEDs.



### Integration of holders for fiber optics into test fixtures

For the LED test integration into test fixtures the main technical challenge is to realize an optimized adaption of the optical signal under the condition given by the individual board layout.

If for example LEDs are located at the board-outline with 90° angle of radiation, the optical signal can be transmitted to the evaluation device simply by a lateral guided optical fiber. But in many cases the LEDs to be tested on SMD-loaded boards are surrounded by test points and components and due to limited space conditions the adaption of the optical signal may become difficult. On the one hand, fiber optics have to be positioned very precisely, on the other hand the possible light incidence of neighboring LEDs has to be avoided. In this case one solution is the usage of special receptacles for optical fibers, guiding the fiber very close to the LED (fig. 1). If the LED is encircled extremely close by test points, a combined holder for fiber optics and spring contact probes can be a solution. Those combined holders can be realized down to 50mil grids.



*Figure 1: Assembly of receptacles for fiber optics and test probes*



For positioning the fiber optics directly to an LED segment and to avoid the incidence of extraneous light sometimes very individual holders for fiber optics are designed and manufactured (fig.2).



*Figure 2: Customized test fixture with holders for fiber optics*

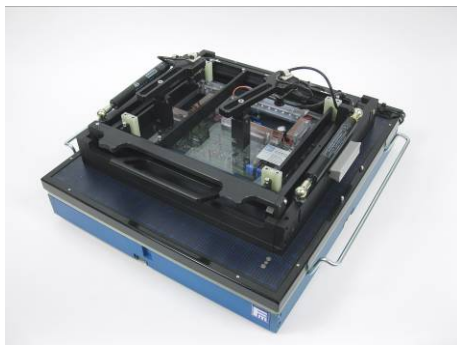
In some cases, due to the tolerance of the LED position on the boards being tested, the LEDs placed on the PCBs are not exactly in the same position below the fibers. This small deviation in the location of the fiber above the LED can result in a high difference between the readings taken from the same LED at different boards. This may be critical especially for intensity measurements and can be avoided by using special Optical Heads (from the company Feasa), that bundle the light by special lenses.

In general, the sensor elements used in a test fixture are chosen in very close coordination with our customers and then integrated into a standard fixture for in-circuit and functional test. The variety of different tasks and projects requires a very high level of individual and creative ideas, and particularly a long time of experience.



### **LED-test with camera system „PlatiJet“**

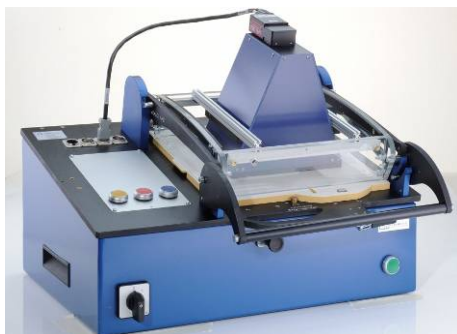
For testing LEDs, for inspection of color displays and 7-segment displays as well as for a general component inspection, the integration of a camera system into a test fixture is usual. There is a great variety of individual requirements for these applications leading to specific solutions. In cooperation with the company WG TEST we are designing integrated test fixtures with the optical inspection system “PlatiJet”. This system includes up to eight high resolution cameras as well as the corresponding examination and analysis software and offers a great variety of test solutions (fig. 3).



*Figure 3: Test fixture with optical inspection system „PlatiJet“*

### **LED-Test with “Smart Multimedia Test Fixture”**

For monitoring test items or a PCB by one single picture and without incidence of extraneous light a camera dome can be integrated to a test fixture. The Smart Multimedia Test Fixture shown in the picture has been designed in cooperation with the company NOFFZ and includes a solution with integrated camera dome, connection to the test system and corresponding analysis software (fig. 4). On request, also speakers or microphones can be integrated, for example for testing communication equipment, call systems or other control elements.



*Figure 4: Smart Multimedia Test Fixture with integrated camera dome*



### About Feinmetall:

FEINMETALL was established in 1964 in Herrenberg, Germany, and has specialized in the field of precision engineering and micro-mechanical contact technology. The product portfolio includes spring contact probes, test fixtures and probe cards. The products are designed and developed for application in the electronic and automotive industries.

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