

Modern ATEs Gallery

Even if in use by 30 years, the in-circuit test systems still play an important role at present and target to grant a future, aiming to parallelism, automation, digital components programming and integration with functional test.

If we think of the evolution of electronics in the last 30 years, the continuous miniaturization of components and consequently, the higher electrical and mechanical complexity of the boards, it is evident how the automatic test equipments (ATE) had to change and improve their performances in time to grant a cost effective board test. After the functional test systems, which have always been the most widespread since they could test boards checking their operational condition in a almost real environment, the in-circuit ATE, based on a relatively simple architecture, is the most used among the electronic boards manufacturers worldwide. It is equipped with stimuli/measurements instruments, switching matrix and requires a specific bed of nail interface (fixture) for every single board.

The in-circuit tester between past and present

Croce e delizia of the in-circuit technique, the bed of nail fixture represented at the beginning the secret of its success, simplifying the writing of test programs: the complete knowledge of the product to be tested (fundamental to prepare a good functional test program) is not required. However, in many instances, the necessity to design and manufacture a specific fixture for every kind of board, is the highest limit of the in-circuit test, since the costs required to set up a bed of nails fixture are difficult to be written off and the time needed for test setup do not always match the actual "time to market" requirements of a product. In the 90s, the flying probe testers began to replace the in-circuit ATEs to test small and medium volumes aiming to get round the bounds of the in-circuit ATEs. But, since the test speed of a bed of nails system remains unreachable (assuming the same test coverage) the in-circuit systems are still applied to test high volumes, such as to test boards bound to "consumer electronics", automotive, and information.

The in-circuit tester between present and future

Nowadays the most relevant features to make an in-circuit test attractive are, together with an extremely high fault coverage to detect fault process (which is inherent to the method itself when the boards are designed according to the "design for testability" principles), there's also the high throughput. That's why a modern in-circuit ATE can not disregard **the test process automation**, must allow the **simultaneous test** of several boards (in this case we refer to "parallel test") must perform **digital devices programming** (microcontrollers, memories and programmable logics). Last but not least, the actual in-circuit tester must be endowed with good **functional test capabilities**, to optimize the board test and supply alternative solutions where the test points for bed of nails are not available or in case of electrical and mechanical bonds which could limit the efficiency of the traditional in-circuit technique.

The modern tester is not only in-circuit

The test automation, normally granted by one or two automatic conveyors which convey the boards through the tester, does no longer require an operator on the test system and provides several hours of operation with no human interference, which is an evident decrease of management costs.

The possibility to test more boards at a time considerably decreases test time, promoting the introduction of the ATE directly in the board assembly line, without being a dangerous "bottleneck". It often happens that with very strict time cycles, required to cope up with very high volumes, the in-circuit ATEs testing one board at a time do not always keep pace with the scheduled cadency, slowing down the whole production line and causing productivity loss!

The digital components programming capability of an in-circuit tester is an additional weapon to optimize the manufacturing and test phase of electronic boards: since the components programming is often performed on dedicated station (often out of the line and separated from test), if these were replaced by an in-circuit ATE, this would imply an immediate cost saving in terms of equipments and less "manipulations" for the board (this means less risks of faults and damage and a higher throughput).

Since the in-circuit is not an alternative solution to the functional test, but its ideal completion, a modern in-circuit tester must be capable of a wide range of functional measurements, promoting the integration in a single application of the most used test techniques, which can be further optimized eliminating redundancies, single test report output and an easier product traceability.

The modern tester is STRATEGY.SL

In the wide range of Seica's ATEs based on the VIP platform, Strategy.SL stands out for possessing all the modern ATE features described up to now. It is, in fact, equipped with SMEMA conveyor, motorized press with software programmable stroke and multiple positions for bed of nails and parallel VIP architecture (from 1 to 4 measurement systems based on DSP). Strategy.SL can perform both in-circuit/functional tests on 4 boards at a time and can program up to 16 digital devices such as microcontrollers and flash memories.

Equipped with all the performances available on the Seica VIP platform, both software and hardware, the Strategy.SL can be set up for automatic optical inspection through a set of fixed cameras, component soldering verification through "vectorless" techniques, "boundary scan" test and can be obviously equipped with all the accessories required for test line automation such as barcode readers, waste management software, repair stations networked to the test system, monitoring and statistics software. Strategy.SL can also recognize the bed of nail automatically according to the test application, which avoids accidents on the line where, inadvertently, the test program selected does not correspond to the fixture installed in the system.

Nowadays there are many problems for those who assembly and test electronic boards: the answers provided must hence be as many as the problems and flexible, regarding the investment (to be contained) and to the good lifetime of the solution chosen (to be granted): Strategy.SL strikes a happy medium for those who seek an integrated, flexible, performing and automated test solution as requires the future we are living in.

Didascalie

1. Didascalia per foto Strategy.sl: **Seica's Strategy.SL ATE**
2. Didascalia per foto particolare interno della macchina: **Detail of the Strategy.SL SMEMA conveyor**
3. Didascalia per foto fixture con 4 schede: **fixture for 4 boards parallel test**
4. Didascalia per schemi utilizzo strategy.sl: **different modes of use for Strategy.SL**