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How to save time in semiconductor final test

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esmo semicon

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I. Automating the semiconductor hand-test for lab characterization.

II. Semi-automation of the board access, board exchange and board locking during final test.

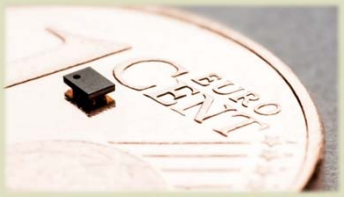
I. Automating the hand test for lab characterization

Semiconductor hand test – How is it done?

The devices are contacted with a manual hand adapter, the Thermostream supplies the test temperature.

Main challenges:

- The device needs about two minutes to get on a stable temperature.
- Full-time operator support is needed to exchange and test the parts. Exchanging the parts takes about one minute.
- The handling of ever smaller components is difficult and laborious.



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Benefits of hand test automation

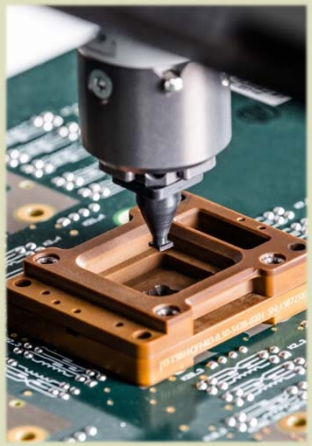
Automating this hand test would:

- give the operator / engineer time for more important tasks.
- reduce the time for the device lot to be tested.
- make the handling process reliable and safe.

Device handling system to address those challenges

- Reliable and easy to use Pick & Place device handling system to automate the hand test.
- -60 ℃ to +175 ℃ device testing temperature and high accuracy through a chamber-less active thermal control system.
- Easily moveable even by one person.

How to save time with the talos



- Higher throughput than the hand test

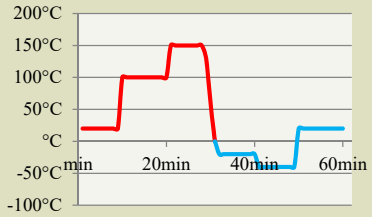
  Hand test -40°C: ~24 [uph]
  → For 1000 device 42 hours needed.

  talos -40°C: ~240 [uph]
  → For 1000 devices 4.5 hours needed.

- Automated testing and sorting even over night or the weekend.

  Throughput over night -40°C (8 hours): ~1920 [uph]
  Throughput over the weekend (48 hours): ~11520 [uph]

- Testing at several test temperatures without operator interaction.



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Further advantages

Many additional options:

- Tray and tube loading/unloading
- Bar code reader
- Ionizer
- Dual site testing

- Small footprint (1,74m x 1,43m x 1,93m | L / W / H)
- Cheap conversion kit; Conversion time < 5 Minutes.
- Flexible – support any test head / pitch / board.
- Best temperature performance and reduced soak times through chamber-less active thermal control in contact with plunger.
- On board Camera for manual alignment and detection of socket contamination.
- Double device detection
- High contact force of 450N.

II. Semi-automation of the board access during final test

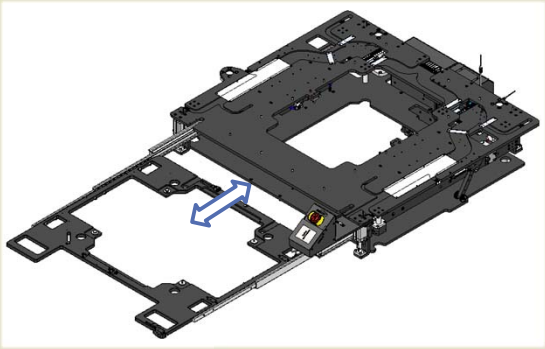
Final test board access / exchange – How is it done?

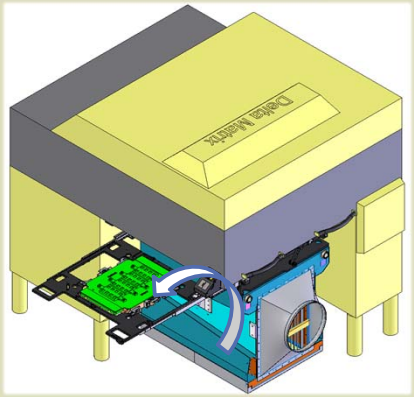
Especially for high contact forces, the board stiffener is fixed to handler with a lot of screws. To exchange the board in case of an error or service, the tester needs to be undocked and moved away, before unscrewing the stiffener from the handler.

Main challenges:

- Board exchange is time intensive and lasts about one hour. Production stops in this time.
- Laborious overhead mounting of the heavy board stiffener to handler. At least two persons are needed.
- Bad yield or damages through incorrect adjustments during re-dock procedure.
- Handler must be brought to room temperature before exchanging the board.

DIB changing system to address those challenges





Drawer mechanism for bringing the board to an access position.

- Easy, fast and ergonomic board access.
- High locking force and stiffness, even possible for 32x applications.
- Permanently mechanical alignment between handler and tester.
- No misuse possible through sensor monitoring.
- Operation via touch screen.

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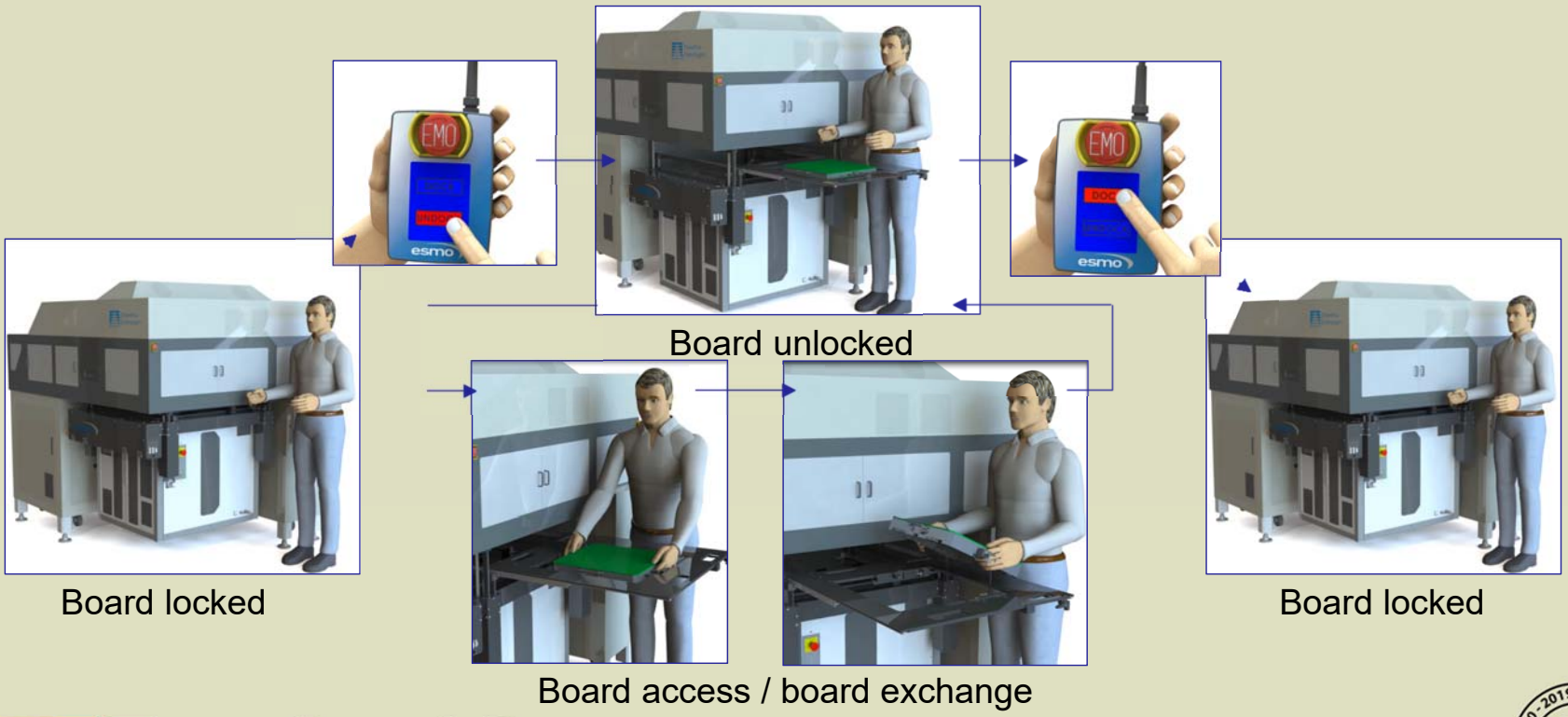
Procedure



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How to save time with a DIB changing system

Example: Delta Matrix – Ultra Flex

- Board exchanging time was reduced:

  - Conventional method: About **one hour + ½ hour de-icing**

  - DIB changing system: About **one minute**.
  → The Handler can **remain on test temperature** without icing

- **Improvement of the yield by 2-3%** through permanently mechanical connection of tester and handler.
  → **No tedious troubleshooting, no tensions**.

Conclusion and Summary

The automation of the hand test can save resources and time.

- Throughput is about 10 times higher.
- Expensive Engineer got more time to focus on important tasks.

The semi-automation of the board access during the final test can save time in production, improves the yield.

- Board can be exchanged by one person.
- Board exchanged time will be reduced drastically.