THE EVOLUTION OF A VERSATILE PROBE CARD LOADER-TRANSPORT TROLLEY

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Overview

- Problem Statement
- Prototype Concept
- Specification of Design Requirements
- Mission Statements
- Project Scope Redefined
- The Solution
- The Future
- Summary
The Problem

- Oversized Probe Card
- Heavy Probe Card

Extended reach by operator
Danger of operator injury
Danger of probe card damage
Manual Loading Station
Transport
Handshake
Drawer Closure
Reset
Specs

Mechanical Requirements

1. Compatible with all applicable TI head stages and defined interfaces
2. Compatible with all Accretech 300mm probers (UF300, UF300A, UF3000, UF3000Exe, FP3000)
3. Compatible with Tesec 4170, Tesec 4380, and Rasco SO3000 Strip Handlers
4. Work with 12", 18" round probe cards and TI SQ/Strip stiffeners
5. Be able to maneuver between 42“ min. wide aisleways while holding a probe card
6. Probe card pick-up and drop-off time < 3 minutes (Does not include travel time between pick up and drop off points)
7. Lift/Cart features can not extend underneath prober
8. Arm must self-align to probe card for pick-up from carrier (workstation) or head stage
9. Must be able to pick up probe card from probe card carrier box on table between 34" - 40" from floor
10. Must be able to pick-up and drop-off probe card to probers ranging in height of 27" - 51"
11. Arm holding probe card needs to self-align to head stage features
12. Must be able to lower probe card into head stage opening aligning to ring insert alignment features (auto-align)
13. Must be able to twist probe card from DUT down to DUT up (180 deg. to load onto analyzer)
14. Must be able to clear prober side docking hardware (REF 51")
15. Must be able to clear test head with DUT down in the max up manipulator position
16. Arm locks to prevent arm (probe card) from moving during transport
Specs

Cleanroom Protocol

1. These materials can not be used: Polyethylene
2. No contamination sources directly over opening of head stage

Electrical Requirements

1. Rechargeable gel battery
2. Gel battery type with 12 hrs. of run time, 3 hrs. charge time
3. Charging system auto switching and compatible with all probe site power requirements
4. Cart must have capability to run off of direct power plug and be auto voltage switching
5. Manual operation (override) if power failure

Ergo / Safety Requirements

1. Must meet Semi S2/S8 standards and TI ESH.
2. Meets tip spec with arm extended and 50 lb. load
3. Arm mechanism must have crush force of < 50 lbs.
4. One person operation (Male or Female)
5. Lift must be able to maneuver on 5 deg. ramp safely
6. If cart is motorized, can not exceed 4 mph
7. Wheel locks to prevent lift from moving during pick-up or release of probe card
8. Probe card latching mechanism must be user friendly, require no tools, and hold probe card securely
9. Must have safety device to prevent probe card from falling if latching mechanism should fail
10. If motorized, arm must maintain current position in case of power failure (auto-braking)
11. Arm can not be extended while cart is in motion
12. < 27 lbs. initial and < 10 lbs. to sustain push or pull of cart/manipulator
Mission Challenges

• Secure Transport of the Probe Card to the Prober
  o Safe probe card pickup at the storage
  o Follow test floor guidelines
  o Achieve the technical machine directives (tilting, ...)

• Exact Probe Card Positioning
  o Vehicle alignment and security to the prober
  o Reference position to the probe card
  o Repeatable positioning

• Safe Probe Card loading into the Prober’s Insert
  o Accessing the prober
  o No interference with the prober head plate or periphery
  o No accidental damage of the needles
Mission Challenges

• Fool Proof Operation
  - No accidental release of the probe card
  - No accidental collision with environment or prober periphery
  - Sequential tasks that require serial execution to avoid operator error

• General
  - Easy handling for operators including those of small stature
  - Universal for all kinds of probers and probe card types
PC Transport and Feeder in One

- Probe Card Pickup
- Transport Trolley
- Prober Loader

Patent Pending

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IEEE Workshop
Principle Function

1. Stroke

2. Stroke

Transport

Pickup / Release

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Loading Station

Pickup position can be adjustable for different prober references

Pickup drawer slides forward for loading and unloading
Prober Handshake

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The probe card can be extended to the rear position and rotated 180° for inspection.
Analyze Probe Card
Key Functions

Prober & Loading Station Latch

Frog-leg arms allow free turret float, X/Y & Theta

Mainframe brake
Probe card transition is only possible when trolley is interlocked with target equipment and turret is in upper position.
Safety Features

Turret operation (probe card up/down) is only possible when the drawer has reached the extended position.
Safety Features

Probe card can only be captured or released after reaching secure destination

Tilt Prevention
Modular Concept

Various gripper modules available

Round, square ...

8", 10", 12" ...
Specifications Achieved
Versatile
Is “versatile” today… “universal” enough for tomorrow?
Moving Forward

Direct Probe
Moving Forward

Legacy Bottom Loaders
Thank you for your Support!

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