
EIGHTEENTH ANNUAL
BiTS
Burn-in & Test Strategies Workshop
March 5 - 8, 2017
Hilton Phoenix / Mesa Hotel
Mesa, Arizona
Archive – Poster
© 2017 BiTS Workshop – Image: tonda / iStock

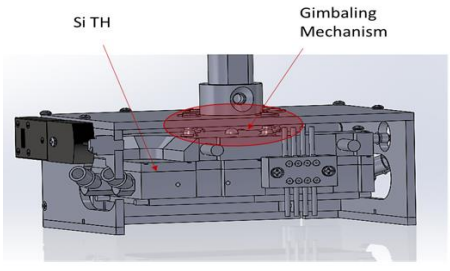
Copyright Notice

New Gimbaling Mechanism for Automated Test Systems

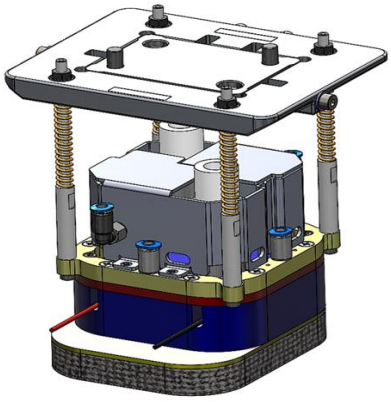
Nicky Strumtza; Intel Corporation

INTRODUCTION

- Automated thermal test systems in Intel use gimbaling mechanisms for correct TT (Thermal Tool) alignment allowing good thermal coupling with low thermal resistance and good electrical contact
- This is needed in order to run thermal controlled tests and get as accurate results as possible
- Some of these systems were designed by external designers/vendors at the request of Intel lab owners
- During this time, there was no standard design and each division or development team used their own version
- The problem with externally developed gimbaling systems is that they are unique and only compatible with the system they were designed for
- Intel was dependent on the designers/vendors and was forced to continue using the proprietary systems which prevented consolidation of the systems into one solution
- Simultaneously an old version gimbaling mechanism was developed in-house and was used in one handler.



Cross –Section



Two types of gimbaling mechanism used in the past

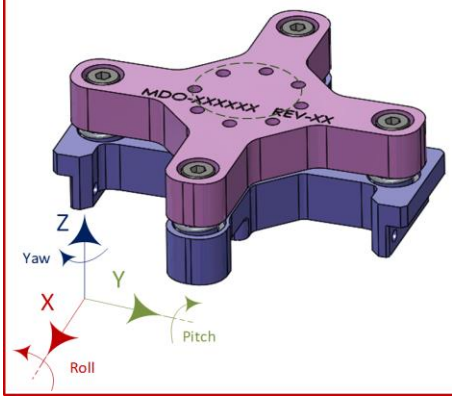
CHALANGES

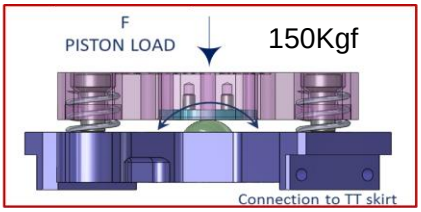
- This situation triggered the need to have a common gimbaling TT (Thermal Tool) and one structure for the automated MoW (Mode of Work) systems with the following requirements:
  - Compatible with all our testers in use
  - Compatible with all TTs in use and easy to adopt on future ones
  - Low profile structure, to ensure robotic arm actuation between TT and Socket/Unit
  - Six DoF (Degree of Freedom) for displacement and rotation, Respectively: X, Y, Z, Pitch, Roll, and Yaw (previous solution had limited X, Y, Yaw and Roll DOF)

SOLUTION

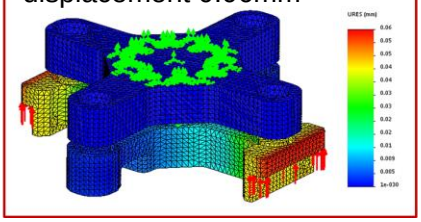
- The new gimbaling profile height is less than 1”
- It contains 4 coil springs in radial symmetry. It has two working positions relative to the force actuation (piston); normal, or rotated 45 º
- In the center a SST (Stainless Steel) hemisphere pivot is located. Its large DoFs are 2mm on Z axis and 5º in Roll and Yaw
- Its short DoFs are 0.7mm in X and Y axis and 5º in Pitch
- The gimbaling motion is performed from the bottom to the top part. The upper part is connected to a piston
- As load continues, the hemisphere pivot in the lower part contacts the upper part and the piston transfers force enabling DUT (Device Under Test) electrical contact and required thermal coupling force

FoS (Factor of Safety) above 3.

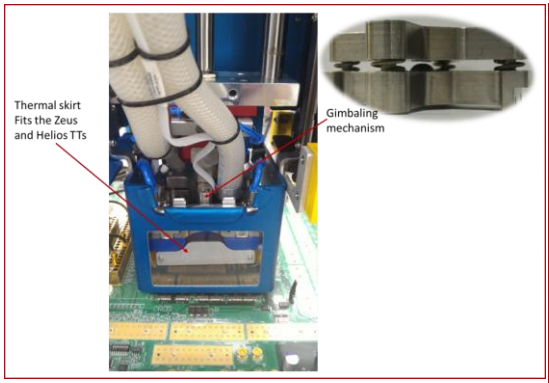




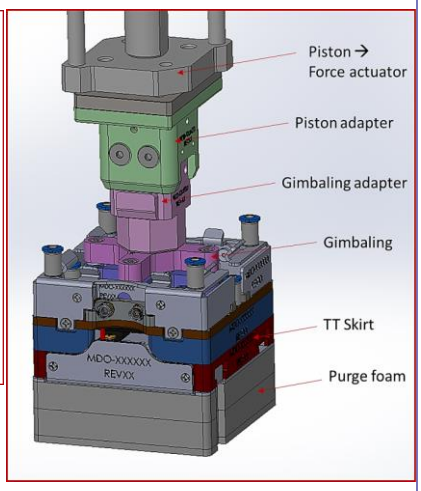
displacement 0.06mm



TECHNICAL APPROACH



New gimbaling working in one of Intel automated system



The gimbaling with TT and a piston.

SUMMARY

- ❑ This method is currently being used on Intel automated systems with a great deal of success on more than 300 sockets which support the entire span of Intel products portfolio
- ❑ It allows for one unified gimbaling solution to be used on 5 different automated machines, and raises the testing flexibility and quality

Acknowledgments

The author would like to thank MAD (Mechanical Automation Development) team in IDC (Israel Development Center) , especially to Andrey Evgraphov and Hagai Wertheim for their outstanding contribution to this project