Eutectic Die Attach
The Power of Precision

Northrop Grumman Eutectic Chip Alignment

"The Power of Precision"

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Background

Have you ever thought about why electronics such as the Hubble Space Telescope are able to withstand so many cycles of constant use?

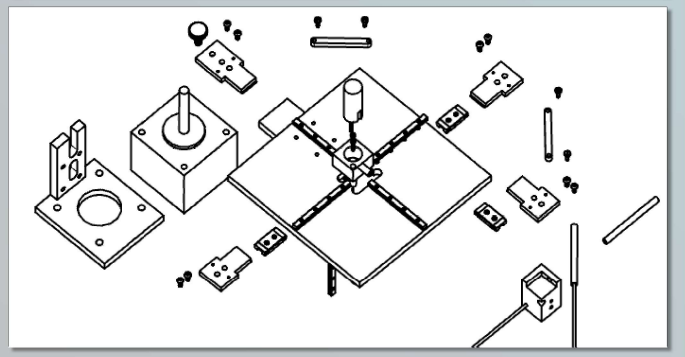
Many of these electronic devices rely on precise assembling methods to create their micro components. That is why we believe in the power of precision. Through the use of our unique slider design, we will stack and align GaN chip components that are the size of a single grain of rice to a tight tolerance within 0.0005"

Overview / Design Specs

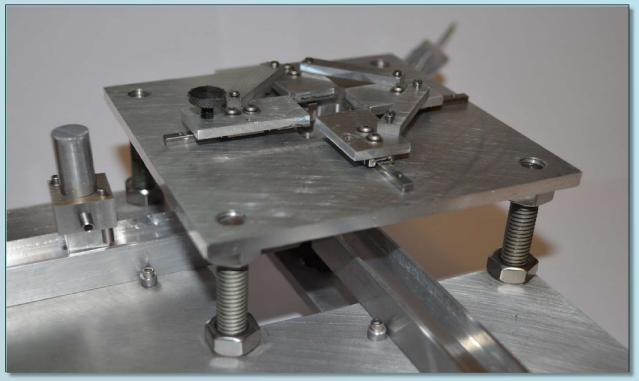
Precise assembly is required for the optimum performance of GaN power amplifiers. A misalignment of over 0.0005" can compromise the performance of one of these Monolithic Microwave Integrated Circuits (MMIC). The current solution involves stacking the chips on top of each other using a canal, but it is not precise enough.

Key Specifications that need to be met:
- Alignment within 0.0005"
- Withstand high temperature of 340 C
- Holds array of 100 chip stacks

Exploded View of Linear Bearing Alignment Device



Linear Bearing Alignment Device

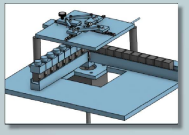


- Image of our final product for Northrop Grumman

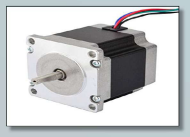
Hardware / Key Components

Linear Bearing and Sliders
Image of our machined sliders attached to the precision linear bearings

Pedestal and Pin weight for Chip Stack
- image of final pedestal and pin weight design that uses dowel pins
- Pin weight is securely fastened using a set screw

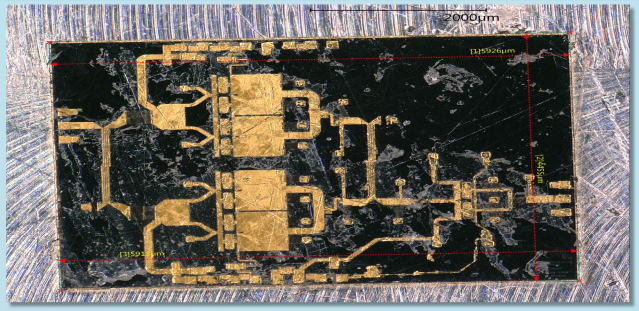


Chip Array
- Array of securely aligned chips that are ready to be transported into the vacuum furnace.



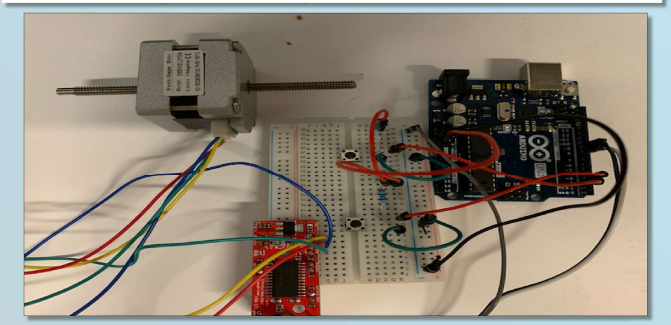
Semi-Automated Z-Axis
Z axis automation with the push of a button. Controlled using a stepper motor and Arduino

Key Result #1 Alignment Tests Confirm Tolerances



- Analyzed our alignment device using a Keyence Microscope in the UCSB Microfluidics Laboratory
- Achieved an alignment tolerance of 0.00047" (Tolerance had to be within 0.0005" to meet the specifications)

Key Result #2 Meeting Throughput Requirement



- Incorporated a semi automated Z-axis system to help meet the throughput requirement of 100 stacks in 1 hour.
- The subsystem is controlled using an Arduino microcontroller and allows the user to vary the height of the chip stack using the corresponding push buttons.

THE VALUE OF PERFORMANCE.
NORTHROP GRUMMAN

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