



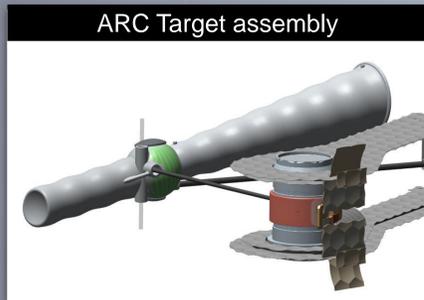
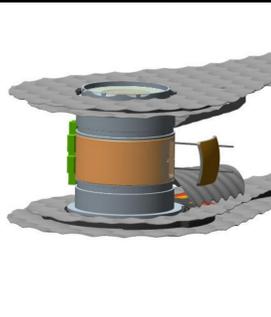
Cryogenic Target Diagnostic Band Subassemblies and Target Shielding for Laser Experiments at the National Ignition Facility

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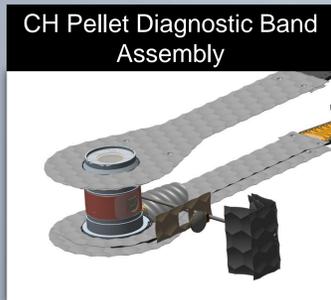
INTRODUCTION

The target diagnostic band (DB) is a key component to a cryogenic target. Multiple types of cryogenic targets require a diagnostic band subassembly (DBSubA), to complete the assembly for a NIF laser experiment. Targets may also require additional shielding and backlighters to be installed to complete the intended target design. Utilizing precision tooling, Optical Coordinate Measuring Machines (OCMMs) and various adhesive or bond types, components are deterministically assembled.

Water Filled Capsule Diagnostic Band Assembly



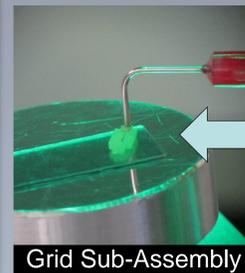
ARC Target assembly



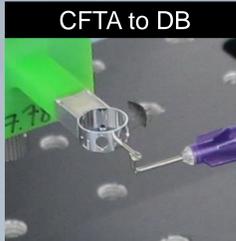
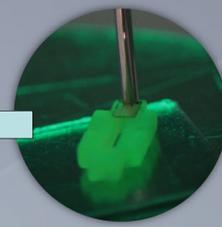
CH Pellet Diagnostic Band Assembly

NOVEL DIAGNOSTIC BAND SUB-ASSEMBLIES

GBAR Diagnostic Band Subassemblies

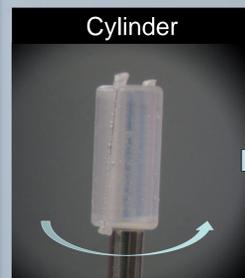


Grid Sub-Assembly

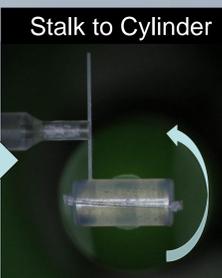


CFTA to DB

- Malleability of grid material
- Securing the 3D printed bracket
- Securing the CFTA
- Multi-axial rotation of cylinder
- Order of install
- Bonding points
- Tooling to secure cylinder



Cylinder

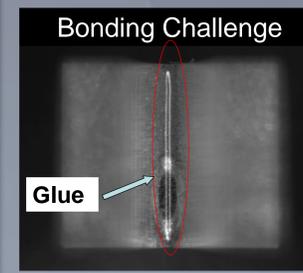


Stalk to Cylinder



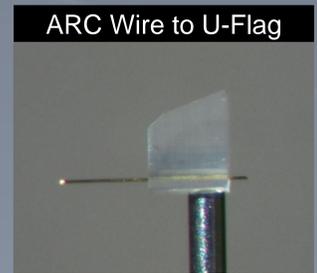
Cylinder/stalk to DB

ARC Backlighter Diagnostic Band Backlighter Assembly

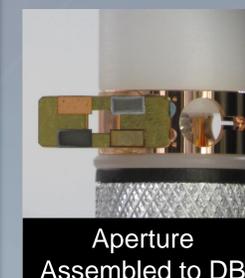


Bonding Challenge

- 10-25 um diameter wire
- Handling of wires and ensuring they remain straight
- Limit glue from enveloping the wire
- Positioning of foils
- Positioning of aperture



ARC Wire to U-Flag



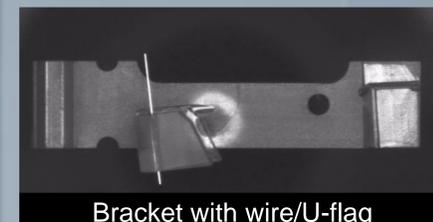
Aperture Assembled to DB



Diagnostic Band Assembly



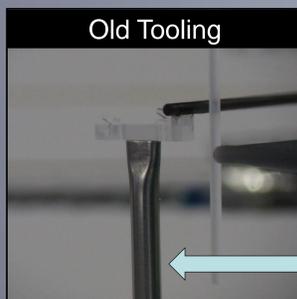
Metrology to position wires



Bracket with wire/U-flag

- Securing components
- Compound angles for positioning components
- Repeatable measurements with OGP due to component material
- Tight tolerances

TOOLING IMPROVEMENTS



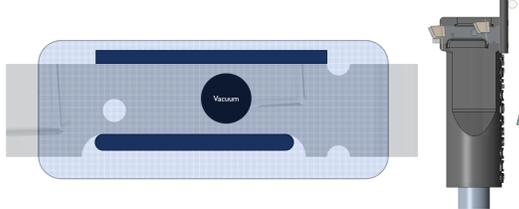
Old Tooling

- Not secure for and holding the backlighter bracket for placement and gluing.
- Bracket was susceptible to teetering, sliding and rotating on the vacuum tip

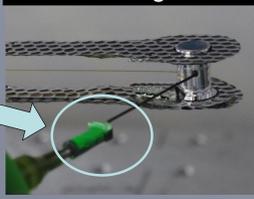
ARC backlighter held with modified aluminum dispensing tip

- New tooling design concept for a 3D printed tool
- Large enough platform for bracket to sit flat on tooling to prevent teetering
 - Ribs along edge of bracket to secure bracket to prevent rotation and sliding

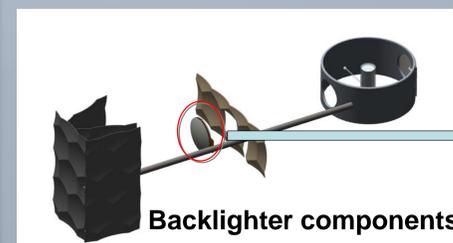
Concept and CAD rendering of new tooling



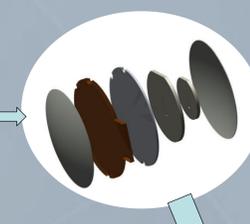
New Tooling in Use



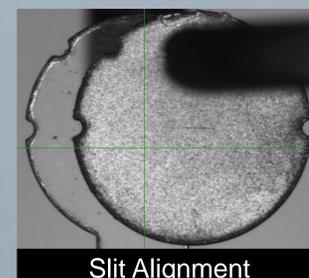
BACKLIGHTER SHIELDING



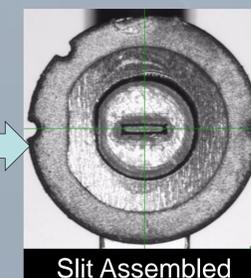
Backlighter components



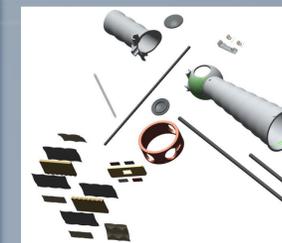
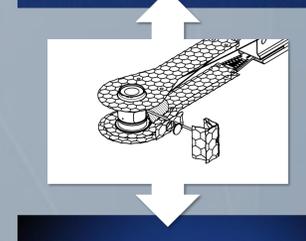
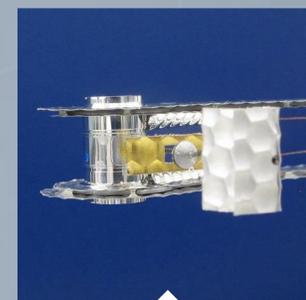
Shielding



Slit Alignment



Slit Assembled

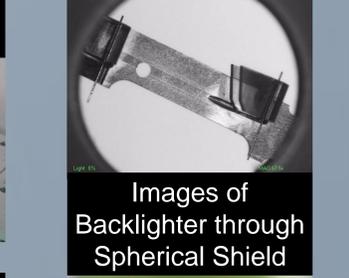


Custom Cradle to place Cone Shield



Completed Target

- Unique aspects of ARC targets for DBSubA
- 30 individual components
 - 7 sub assemblies
 - 25 um tolerance on many components



Images of Backlighter through Spherical Shield

- Backlighter and shielding challenges
- Slit assembly and alignment
 - Control shifting and sliding of components during assembly
 - Measuring slit rotation and alignment
 - Handling of dimpled shields, easily deformed
 - Tube placement and measuring
 - Aperture alignment, done after target closing