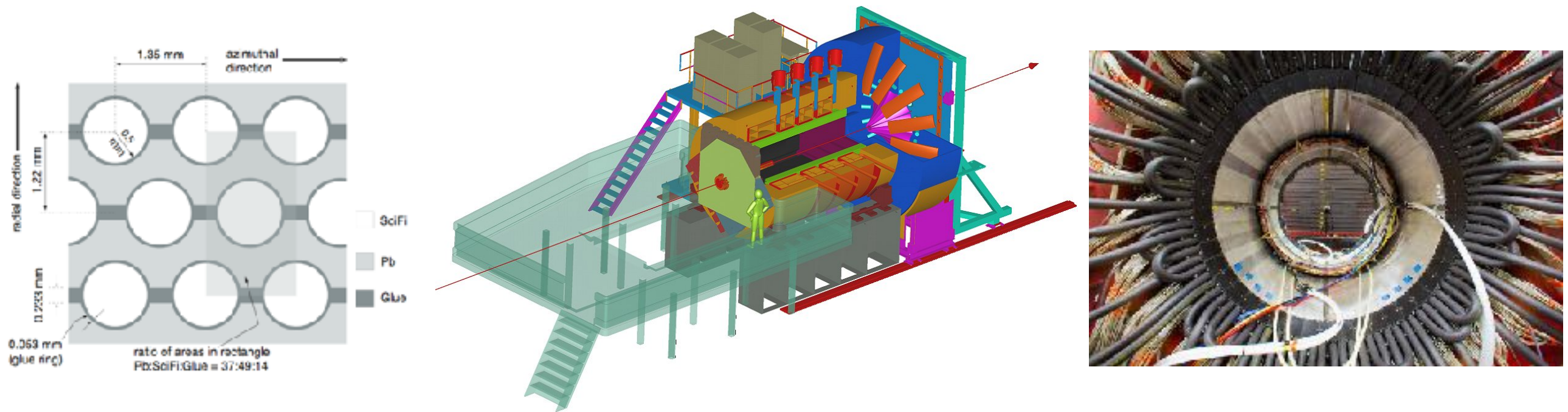




GlueX Barrel ECAL - Installation and Integration

In-Person Barrel Imaging Calorimeter Meeting

Argonne National Lab

June 12-16, 2023

Z. Papandreou



University
of Regina



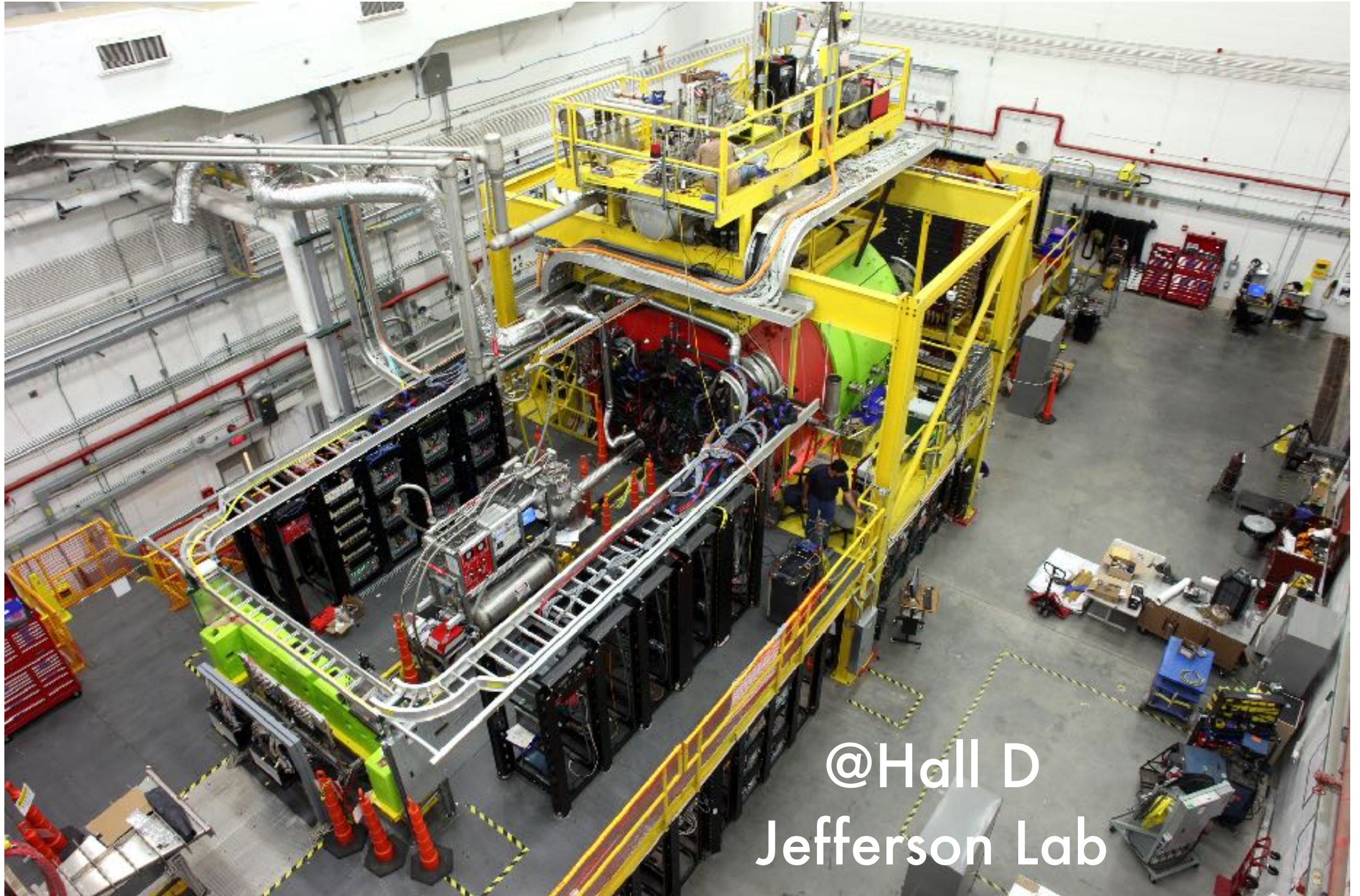
Faculty of
Science



**NSERC
CRSNG**



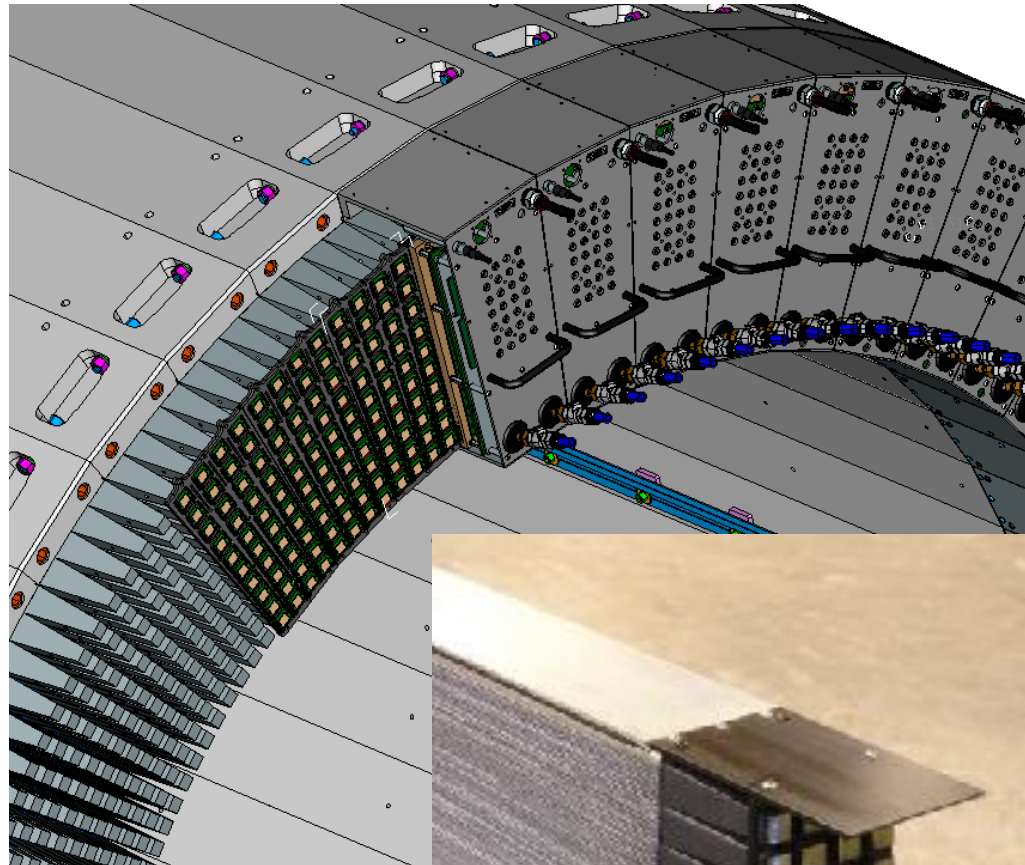
The GlueX Detector



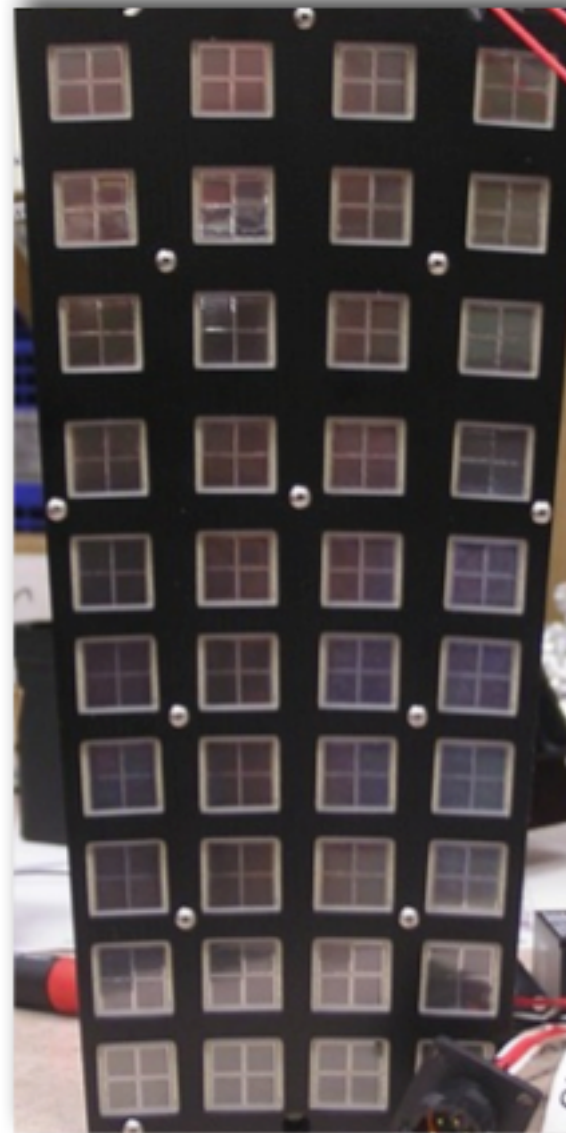
The Barrel Calorimeter



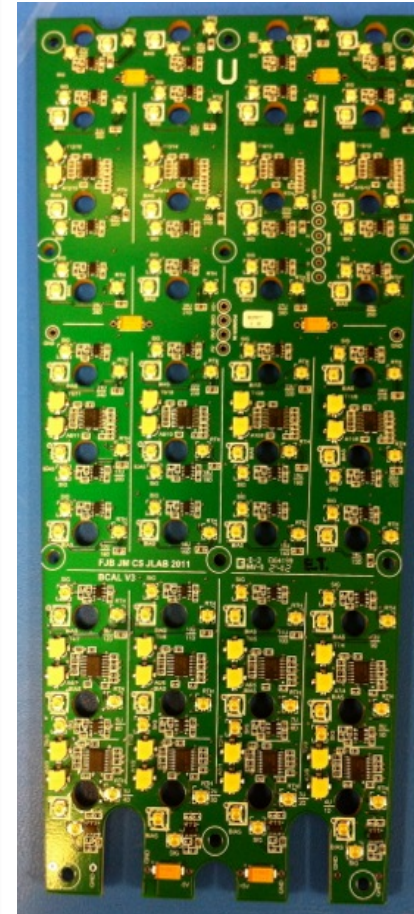
SiPM Readout Assemblies



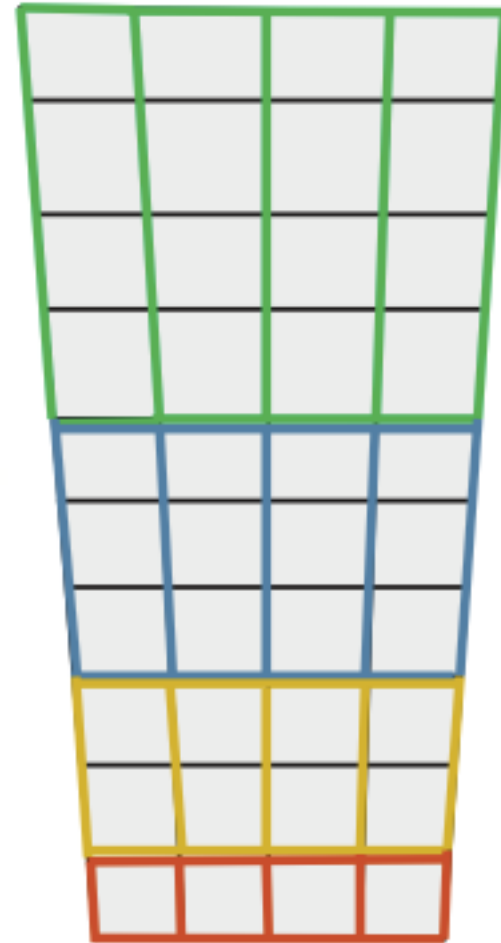
Light
guides



Assembly



Electronics



Summing
Scheme

Light Guides



THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY

12000 Jefferson Avenue

Newport News, VA 23606

HALL D PROCEDURE NO.:

D00000-01-07-P003 Rev -

BCAL Light Guide Installation & Rework Procedure

Introduction & Safety Notes:

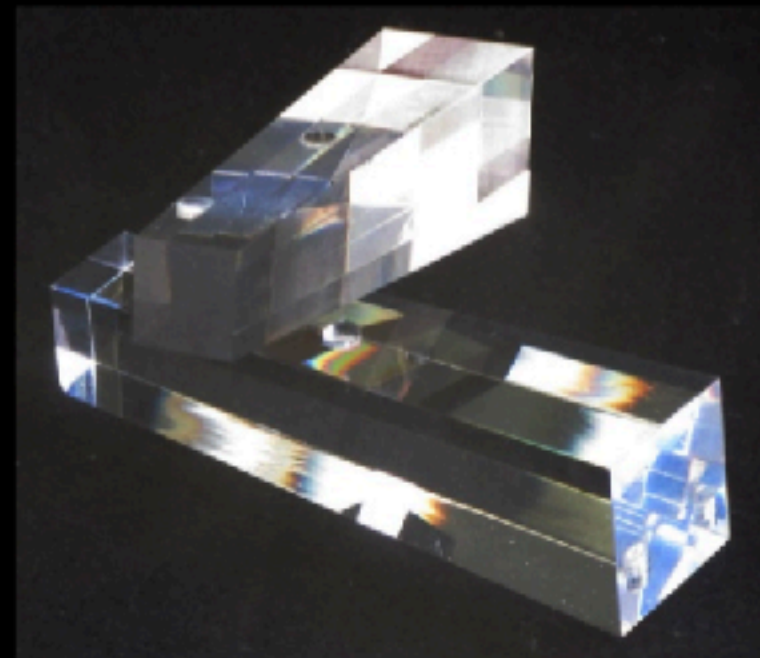
This procedure details the installation steps required to properly install light guides (including wraps and monitoring system) and the BCAL cage assembly onto each end of the BCAL wedges. It works with the appropriate traveler and does not necessarily indicate steps requiring information to be recorded during assembly.

Light Guides

Lightguide Production

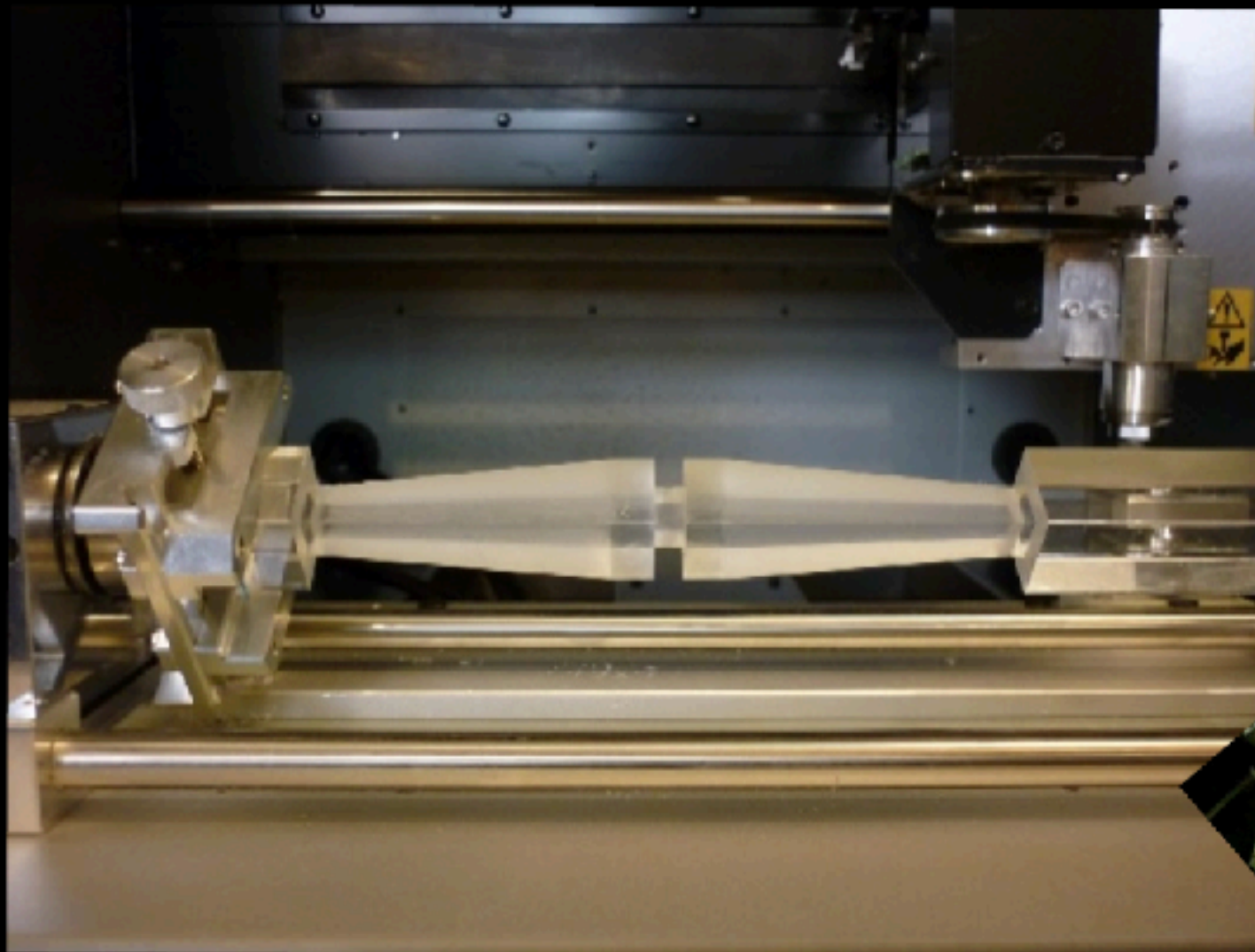


USM Chile



Light Guides

Prototyping 4 axis milling machine.



Light Guides

Parts List (per BCAL end):

1. 40 total light guides 4 each of 10 unique parts A thru K (no light guide I) to make 4 columns (reference drawings D00000-01-07-2057 through -2066 revision C)
2. 40 total Tedlar light guide wrap (unique wrap for each unique light guide)
3. 40 each LED board assemblies
4. 4 each ribbon cables for LED printed circuit boards
5. Cage Plate Assembly (PN D00000-01-07-1016)
 - a. Outer Wall Assembly (PN D00000-01-07-1017)
 - b. Inner Wall Assembly (PN D00000-01-07-1018)
 - c. Wedge Plate Assembly (PN D00000-01-07-1019)
6. 2 each threaded inserts (E-Z LOK® Part Number 303-4)
7. 2 each ¼-20x1" socket head cap screws, 316 stainless steel
8. 3 each #6-32x5/16" button head cap screws, 304 stainless steel

BCAL LED Light Monitoring System Configuration

The BCAL system consists of 48 lightguide modules with 40 LEDs on either end of a module. The 40 LEDs are grouped into 4 independent groups. LEDs in the same group are triggered simultaneously by a common trigger signal. The system configuration is shown in *Figure 1*.

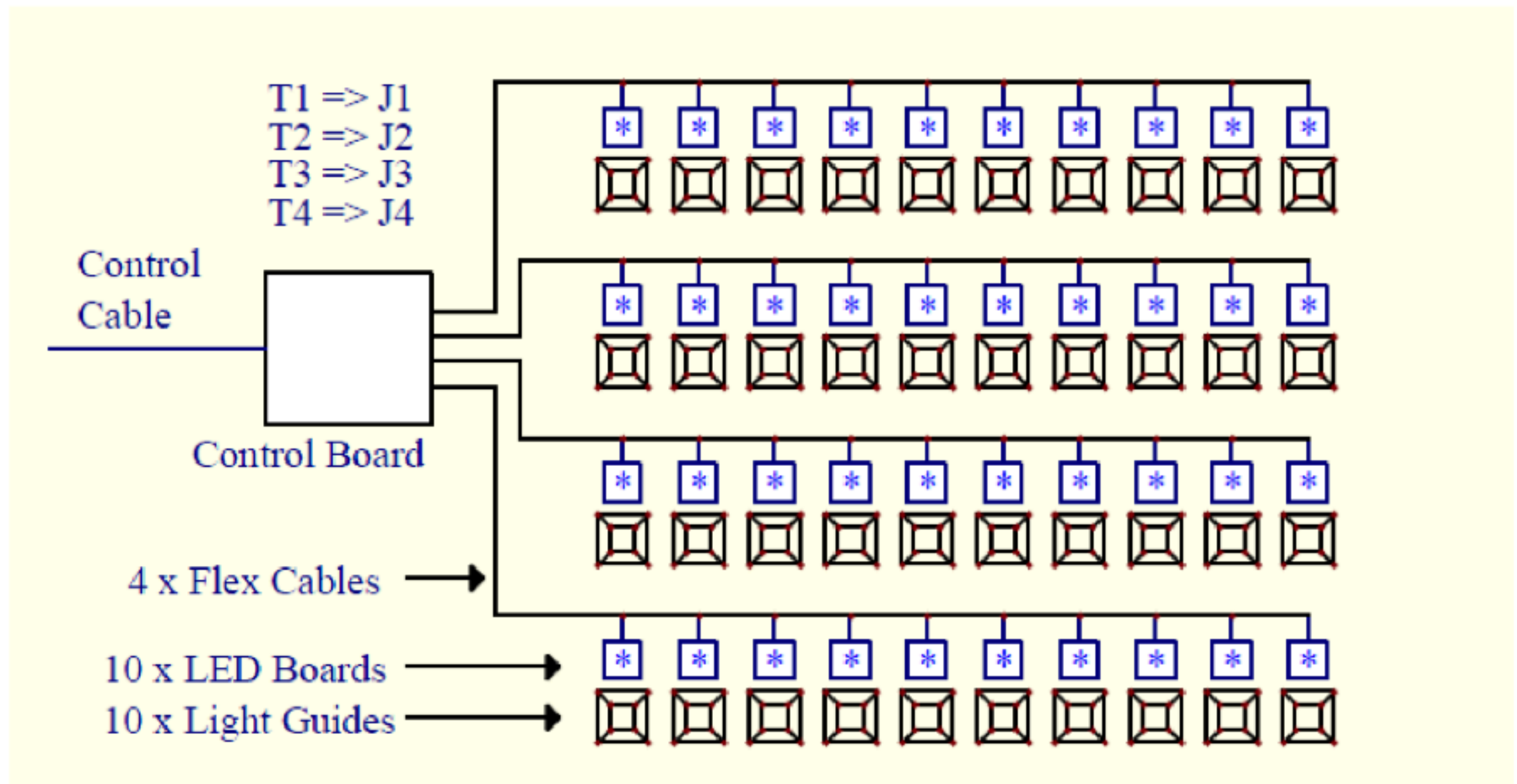


Figure 1: BCAL LED system configuration at one end of a lightguide module.

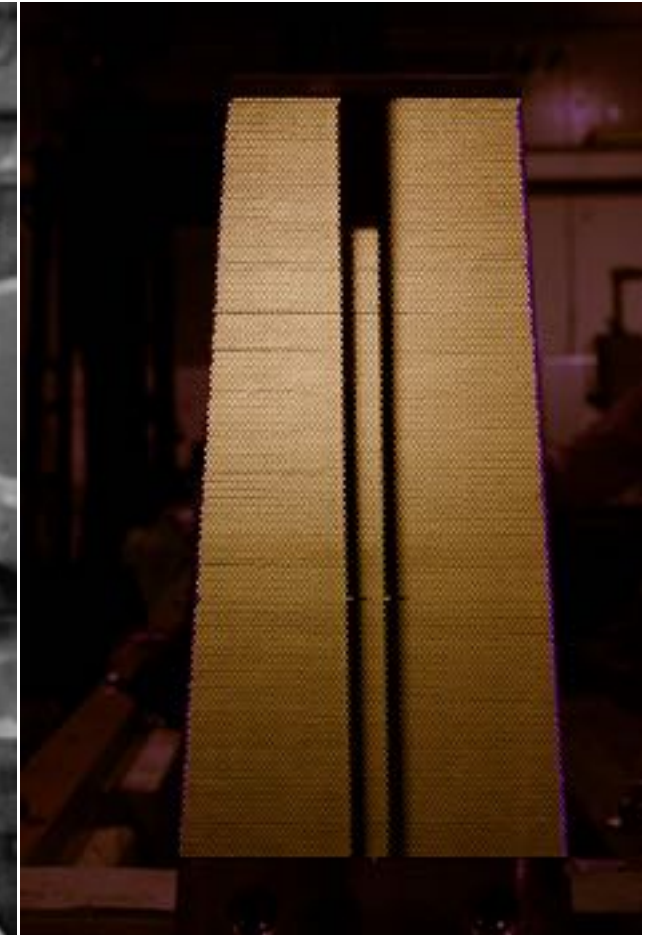
Machined Modules



Prototype

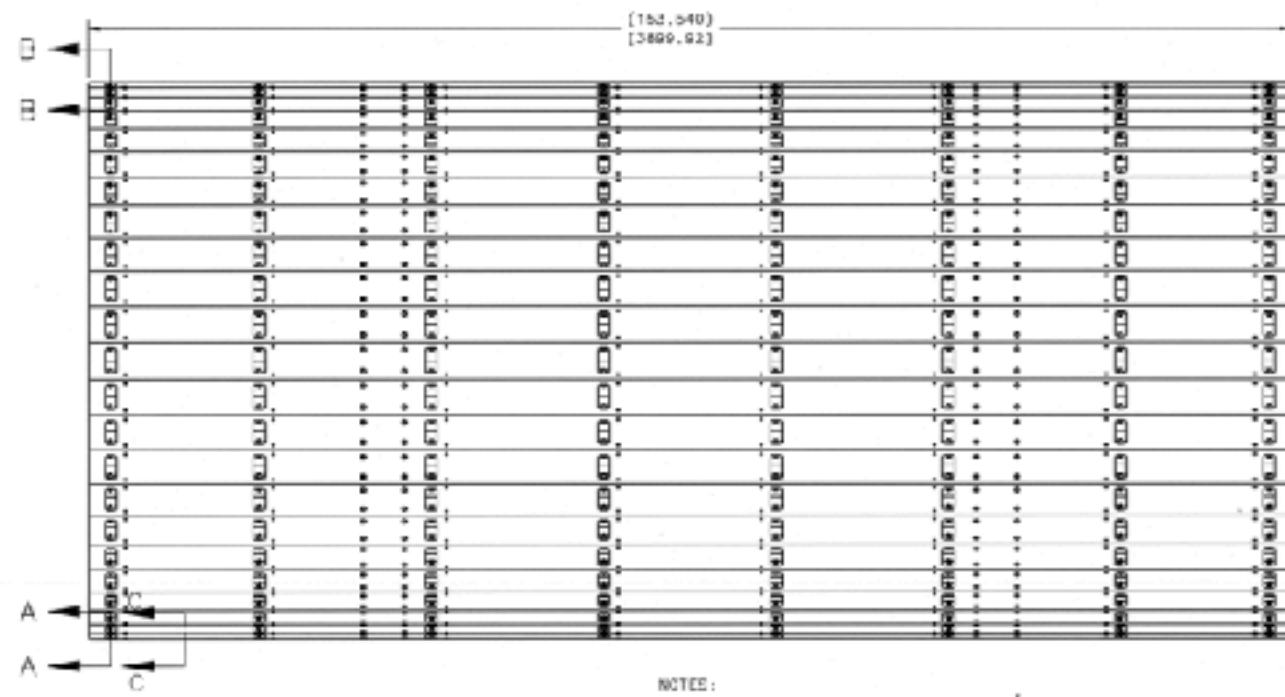
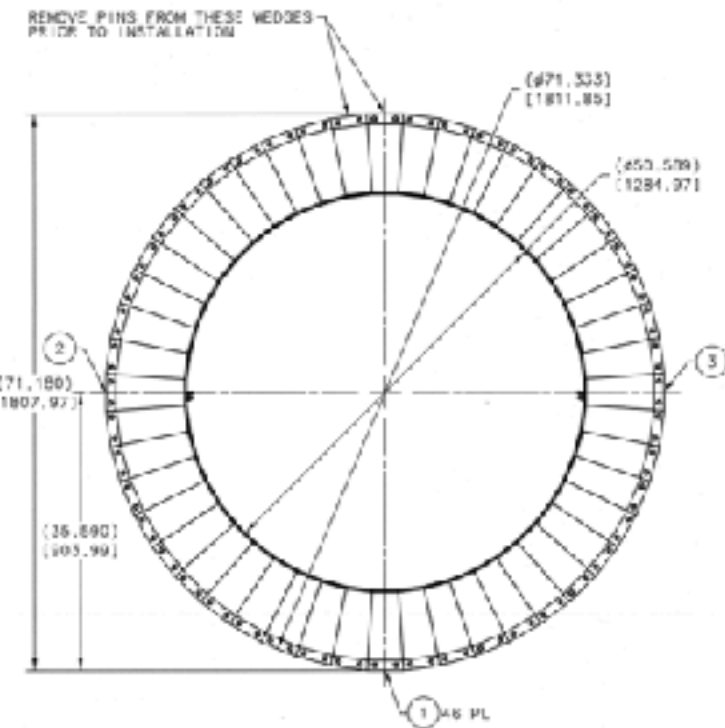
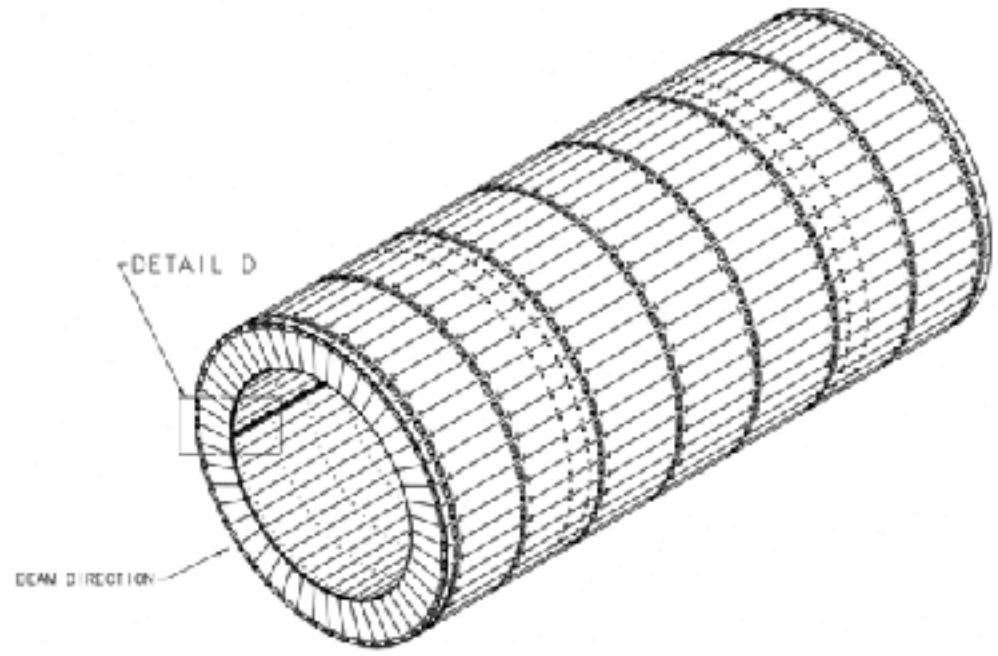
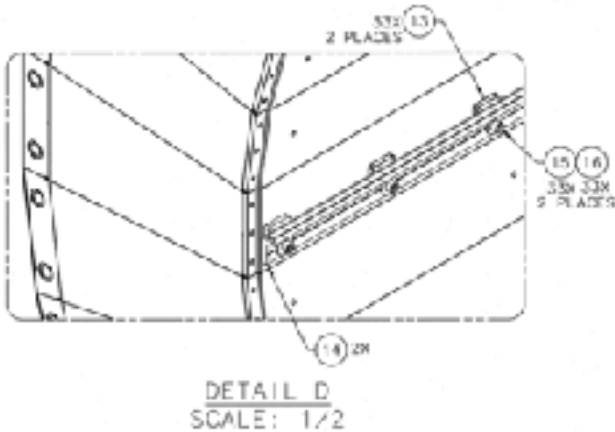
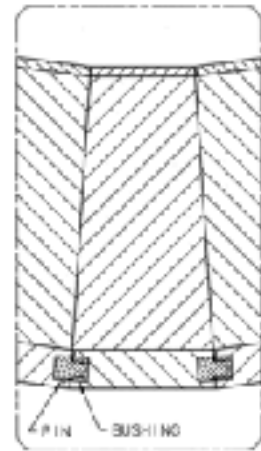
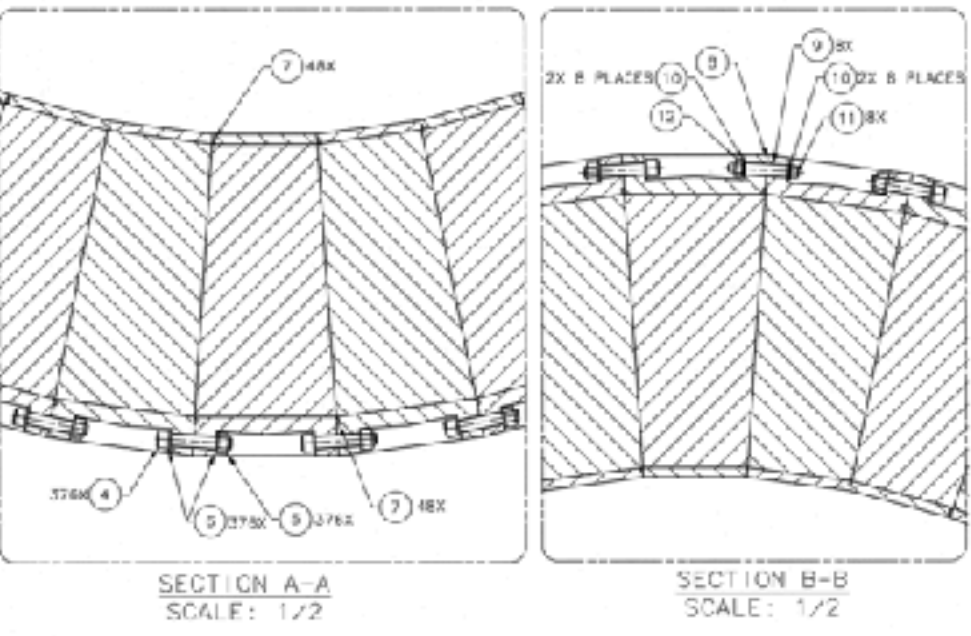


02



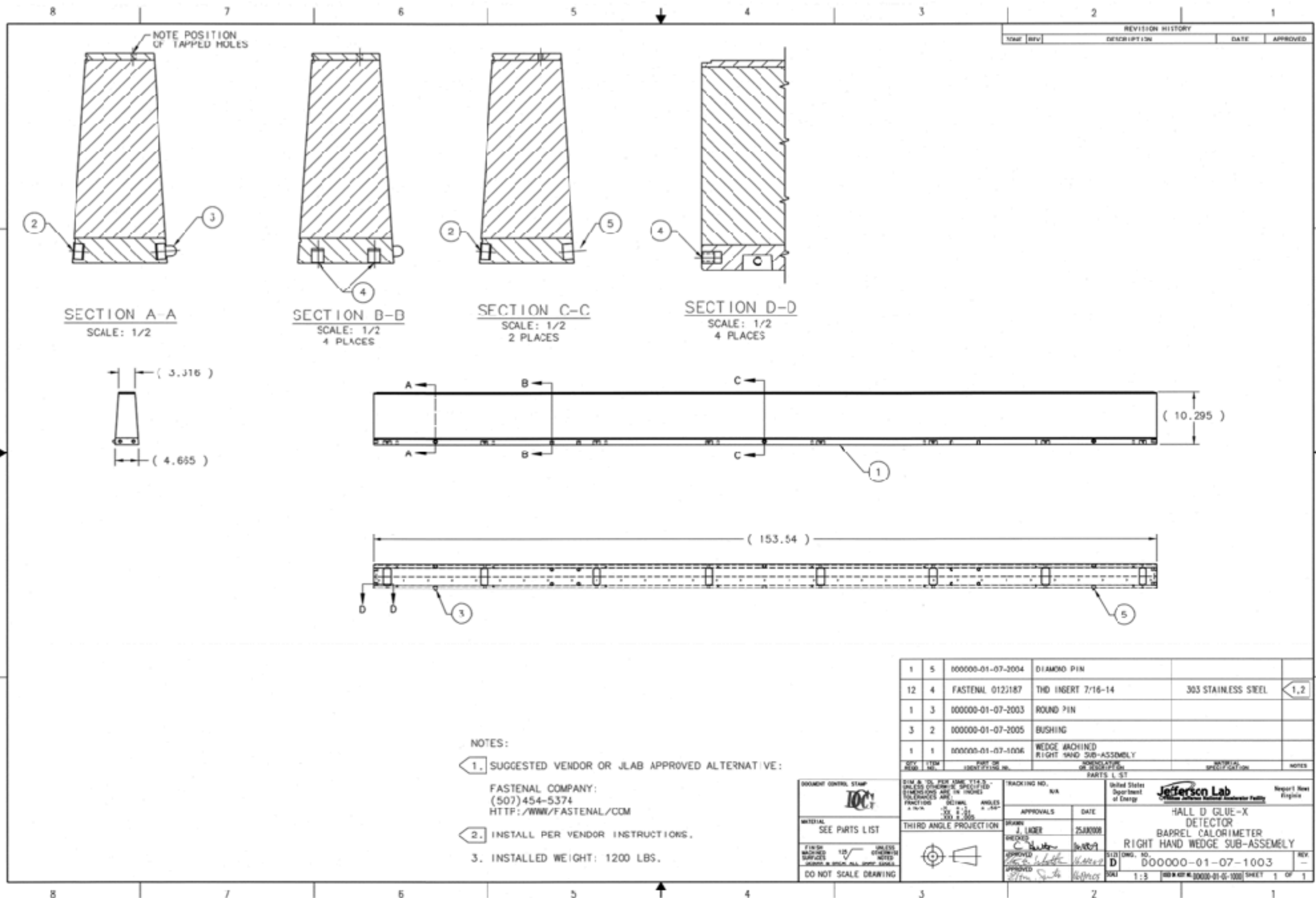
04

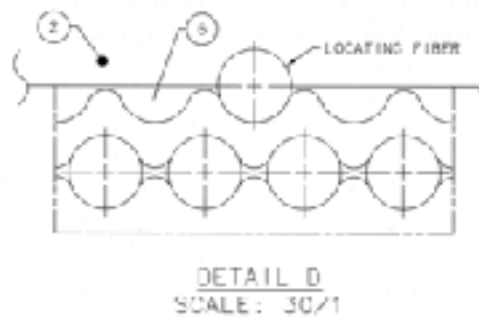
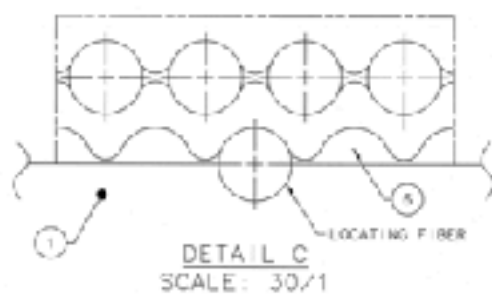
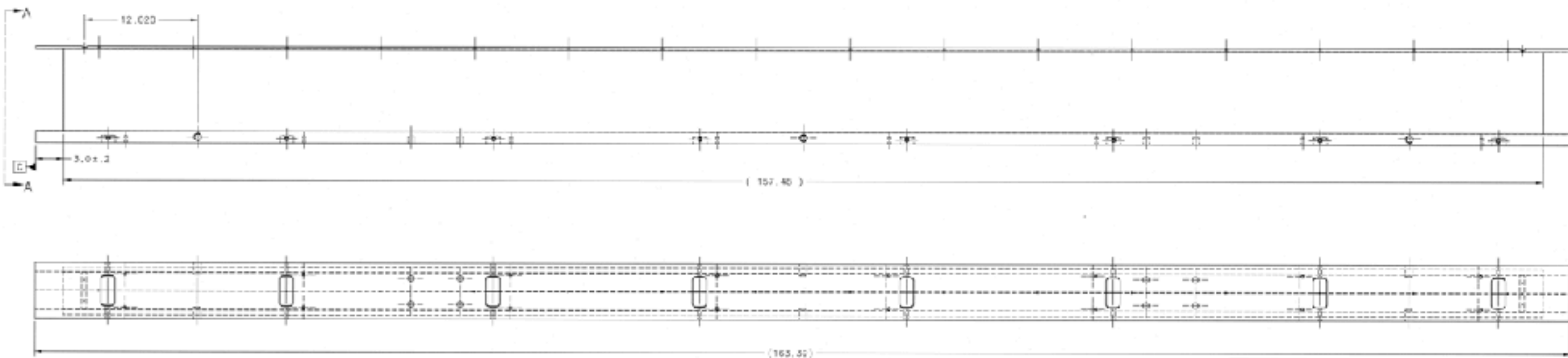
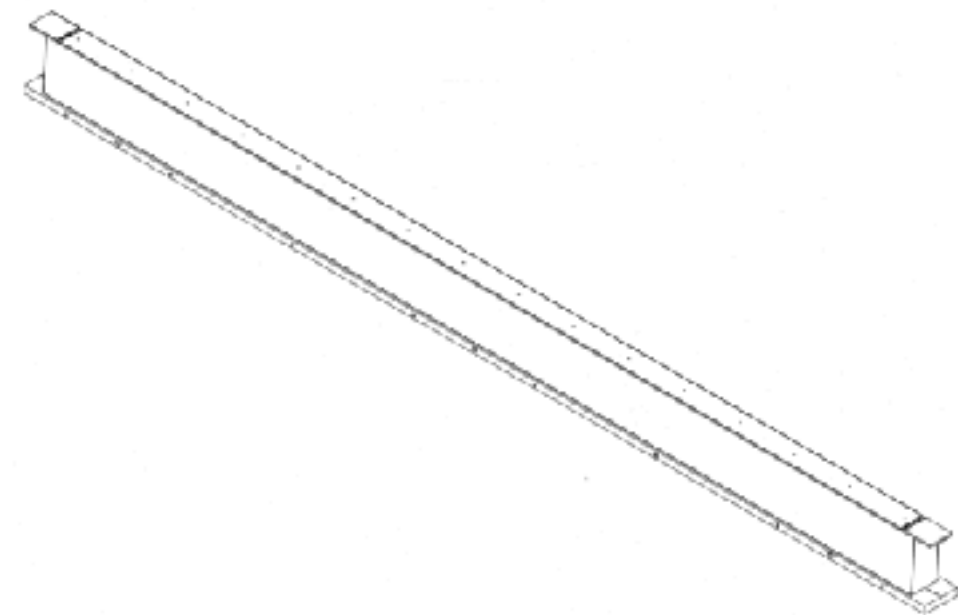
- Excellent finish of end faces & transmission uniformity
- 52 modules have been built & machined (3 prototypes, 48 production, 1 spare)



- NOTES:
1. SEE BCAL ASSY. PROCEDURE 000000-01-07-1000.
 2. ITEM 8 TO BE ATTACHED TO THE NON-GRIND SIDE OF WEDGE PLATES. FULL COVERAGE OF WEDGE FACE.
 3. SUGGESTED SOURCE OR LAB APPROVED ALTERNATIVE:
 MONSTER CARR SUPPLY COMPANY
 (800) 589-3000
 HTTP://WWW.MONSTER.COM
 4. ESTIMATED WEIGHT 57800 LBS.

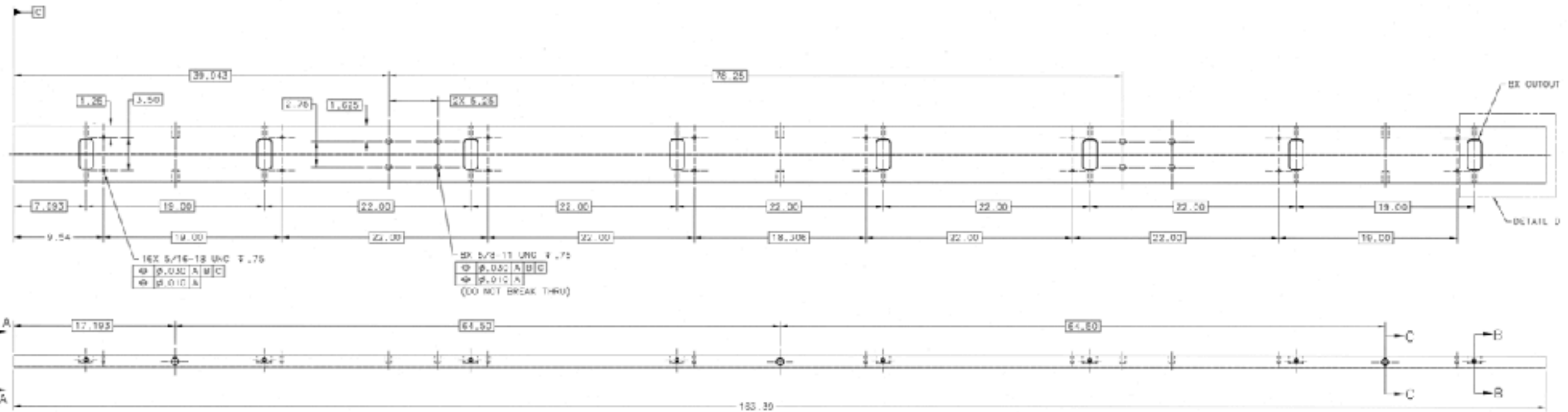
00	18	MONSTER-CARR	FLAT WASHER .25	1.00E AL	2
00	19	MONSTER-CARR	SCREW CAP SCREW .25-18 UNC X .75 LG	SILICON BRONZE	
00	20	000000-01-07-1000	WALL		
00	21	000000-01-07-1000	SPACER		
00	22		HEX NUT .20-20 UNC	SILICON BRONZE	
00	23		SCREW CAP SCREW .25-18 UNC X 1.25 LG	SILICON BRONZE	
00	24	MONSTER-CARR	FLAT WASHER .25	1.00E AL	1
00	25	000000-01-07-1000	SLIDE		
00	26	MONSTER-CARR	SCREW CAP SCREW .25-18 UNC X 1.25 LG	SILICON BRONZE	2
00	27	MONSTER-CARR	3 RING GORE STOCK 1/32 DIA.	OPEN	2
00	28	MONSTER-CARR	FLAT WASHER .25	SILICON BRONZE	2
00	29		HEX NUT .20-20 UNC	SILICON BRONZE	
00	30		SCREW CAP SCREW .25-18 UNC X 1.25 LG	SILICON BRONZE	
00	31	000000-01-07-1000	WEDGE SUB-ASSEMBLY 1		
00	32	000000-01-07-1000	WEDGE SUB-ASSEMBLY 2		
00	33	000000-01-07-1000	WEDGE SUB-ASSEMBLY 3		





- NOTES:
- 1. FOR BOWL WEDGE FABRICATION SEE 000000-01-07-7001.
 - 2. FOR BOWL SCINTILLATING FIBER SPEC SEE 000000-01-07-5001.
 - 3. FOR BOWL LEAD SPEC SEE 000000-01-07-5002.
4. ESTIMATED WEIGHT: 1400 LBS.

[illegible][illegible]



BCAL Construction Traveller

BCAL Construction

Traveller version 1.0

Module No. **01** **Nonconformities:** [Build & Machining](#) **Fibres**

Base Plate

Stamp/Segment No. 005 [Drawing](#) [RMS Traveller](#)

Matrix Build

Date Start	09/11/09	Fibre Shipment	02	Epoxy Used (g)	14576.9
Date End	02/12/09	Fibre Lots (JS-)	32-34, 37-39,	Epoxy Lost (g)	899.6
No. of Layers	187		41,42,45,46,49,	Pb Sheets Lost	4
No. of Builds	23		51,52,59,60,63		
Temp Range	20-22C	AttenLen Means	334-387cm	Build Stats	
Humid Range	20-22%	Npe Means	6.5-7.6	Epoxy Stats	
		Fibres Used	15468	Procedures	
		Fibres Lost	3	Photos	

Top Plate

Stamp No. 01 [Drawing](#) **DC Rails:** No

Machined Module

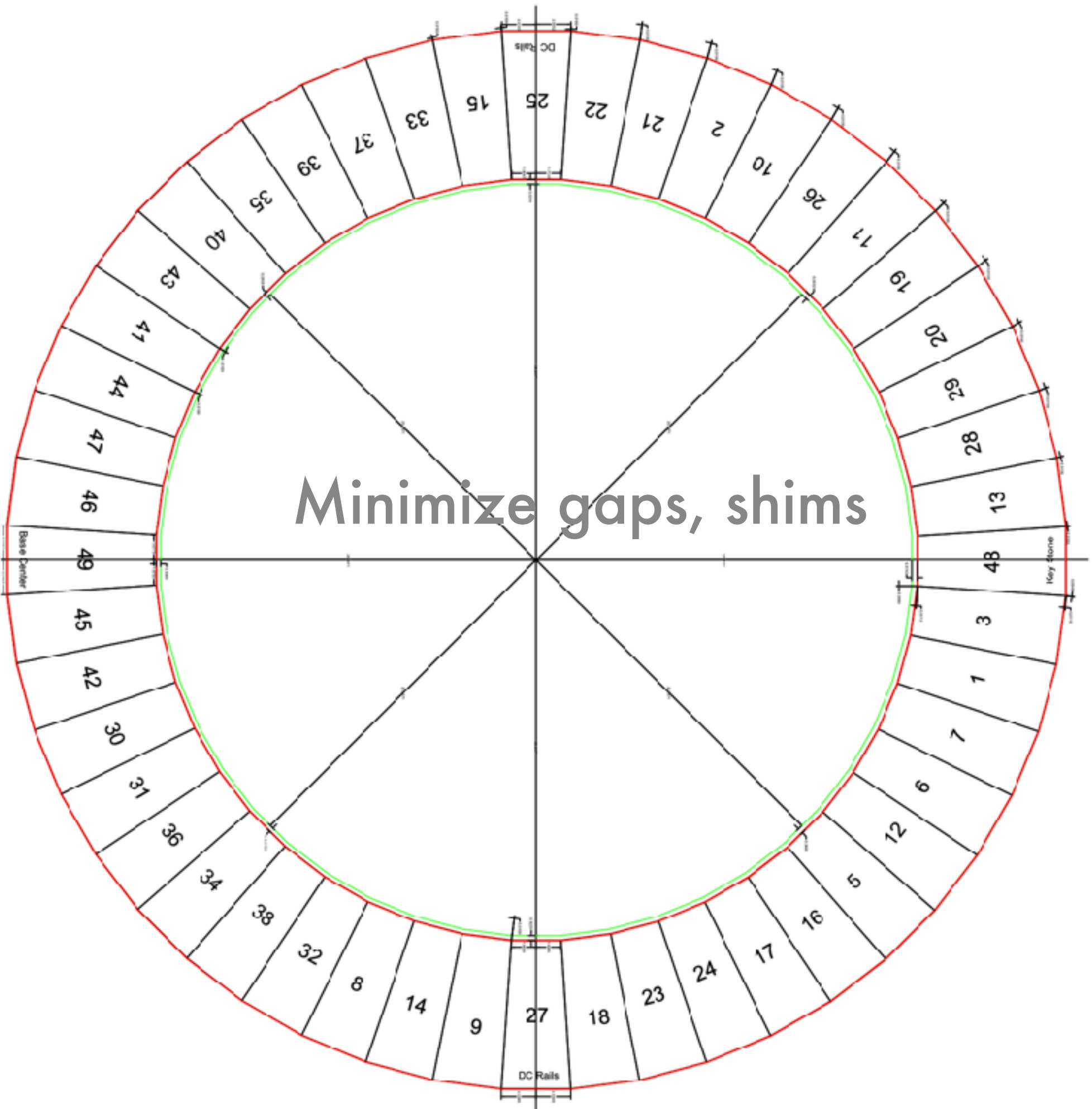
Module/Segment No. 01 [Drawing](#) [RMS Traveller](#)

Transmission Uniformity

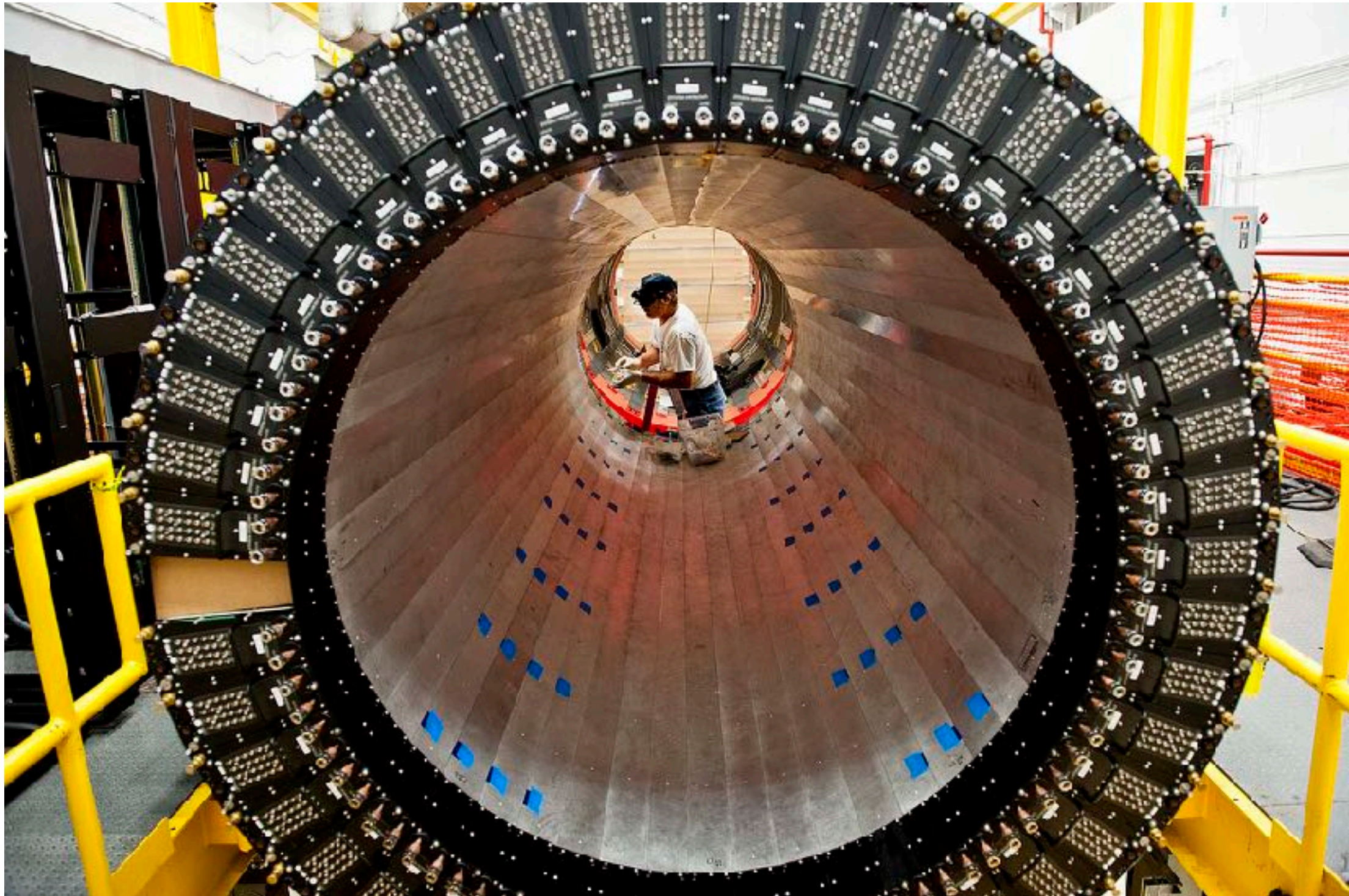
Light Source:	UV-LED	Coupling:	Air gap	Uniformity Results
Coupler:	Winston Cone	Readout:	Winston Cone	End 1 Image
				End 2 Image

Last Updated: 05/08/10 13:17

Module Arrangement



SiM Wedge Assembly



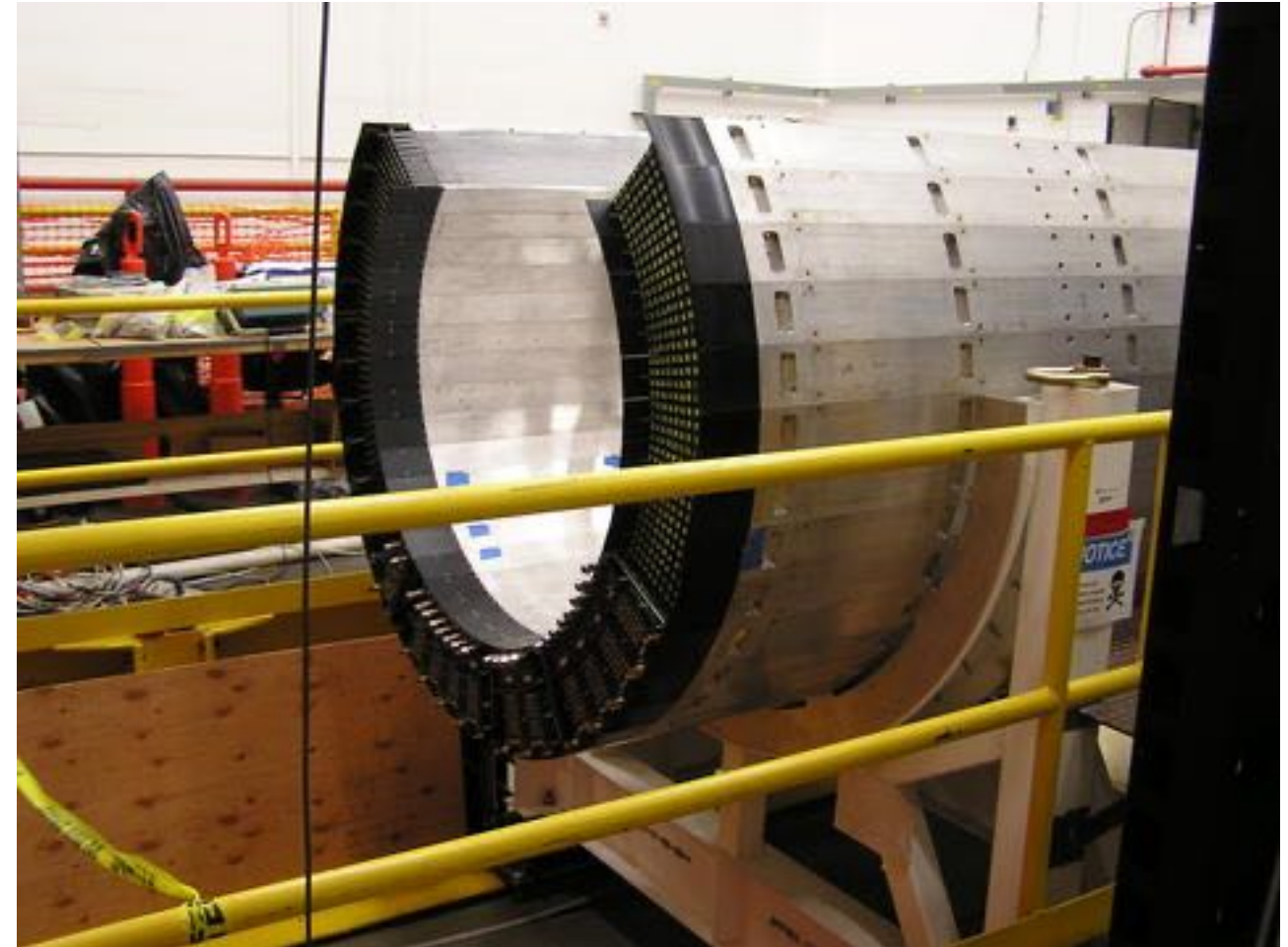
Sealing Assemblies



Assembly

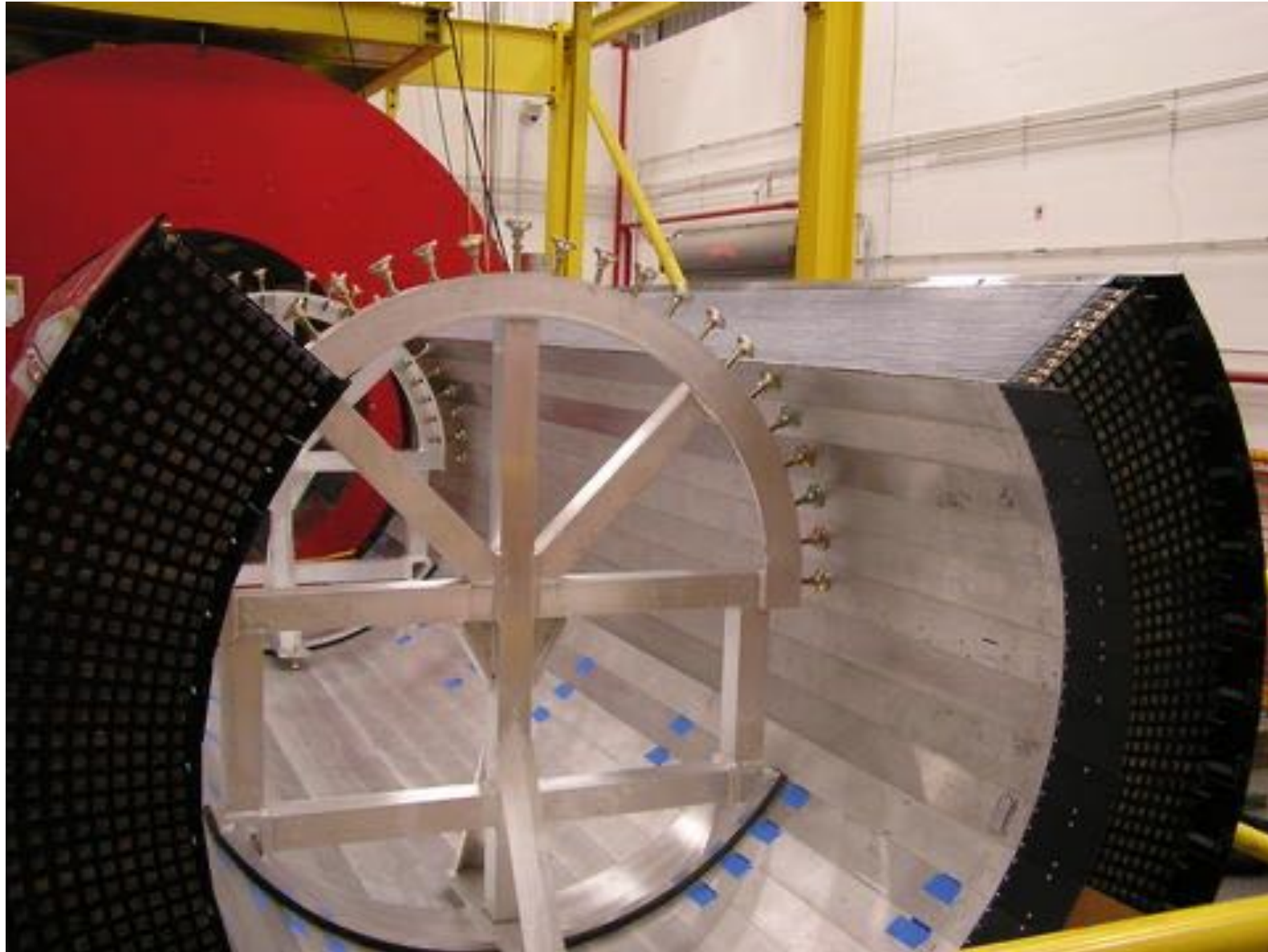


Cradle

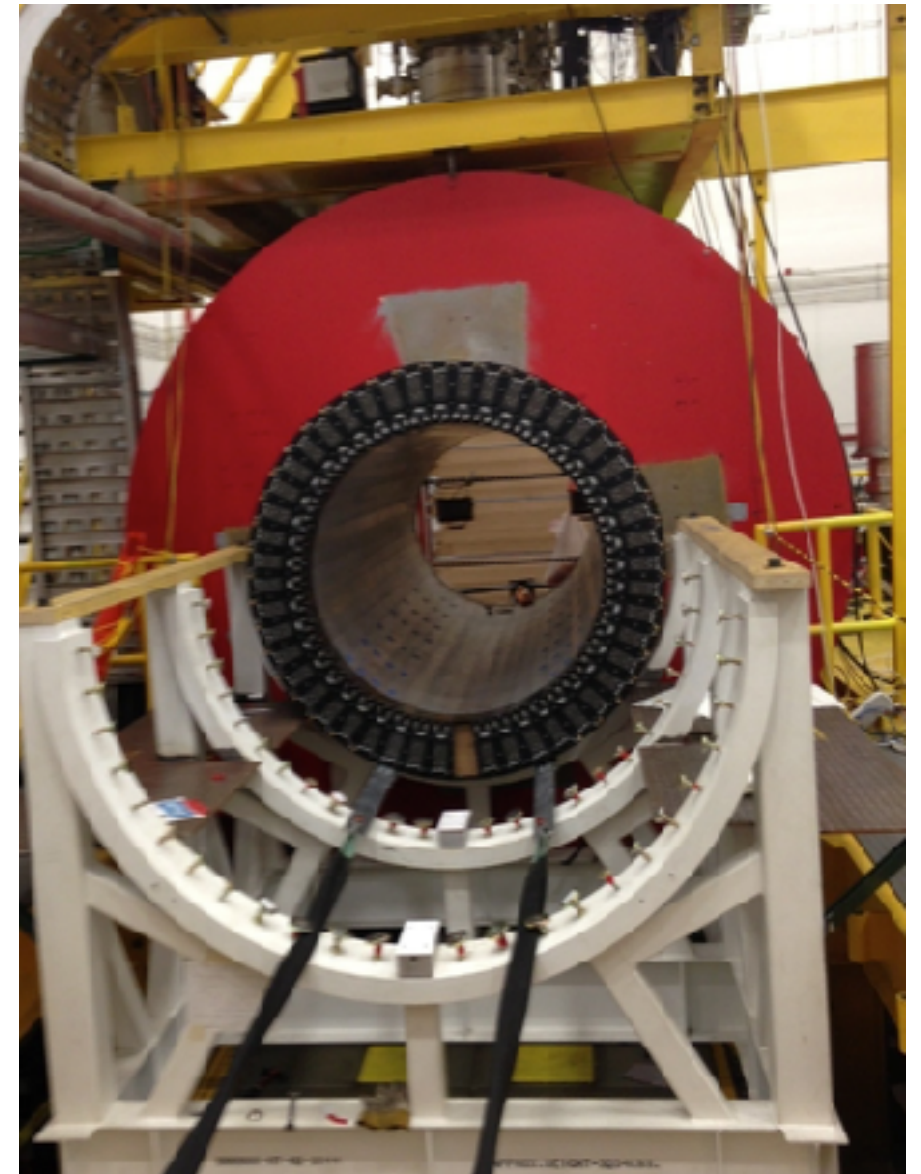


Assembly on floor
then upstream platform

Assembly & Installation

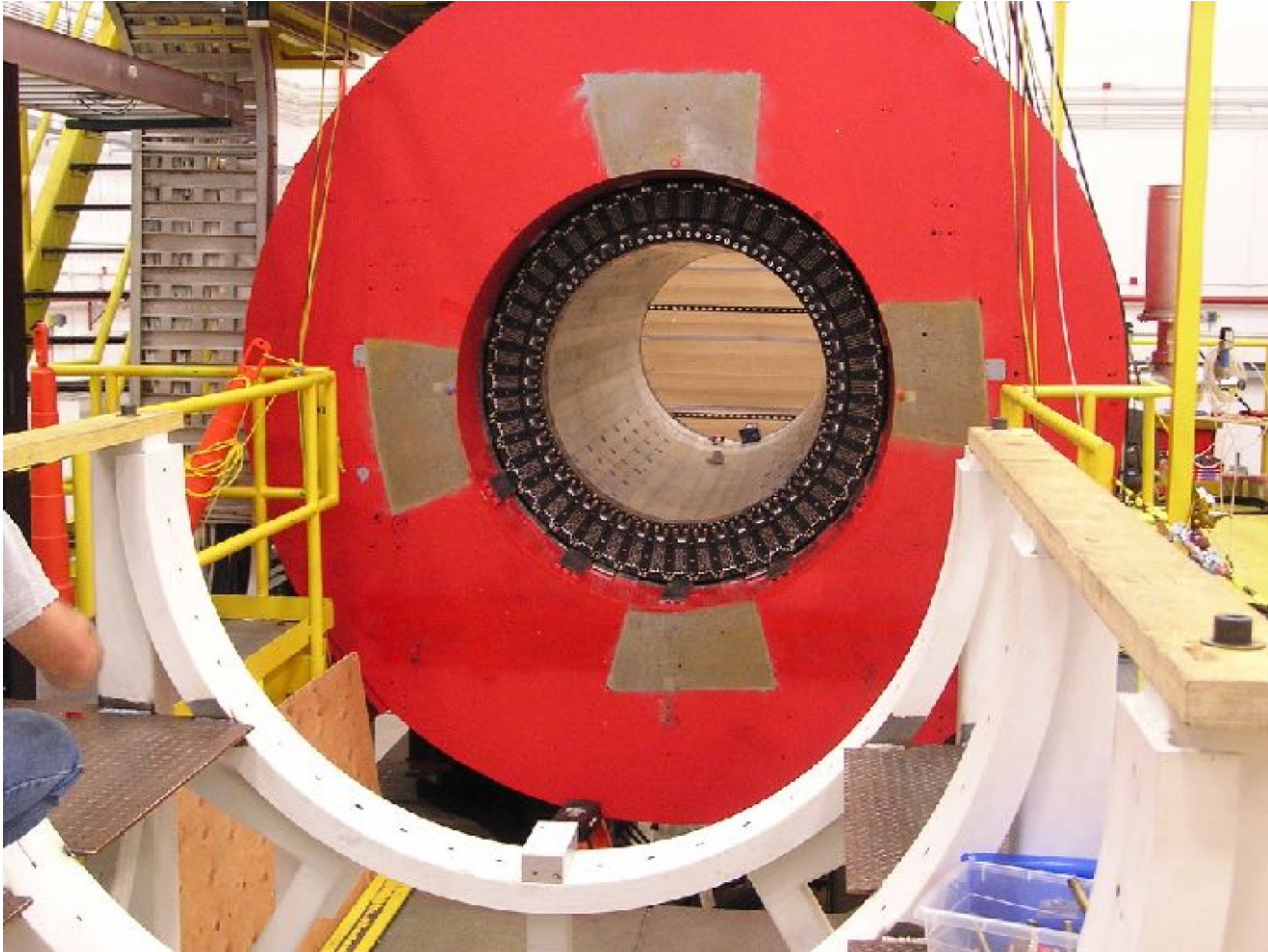


fixture to support top modules



into the solenoid

BCAL after Installation



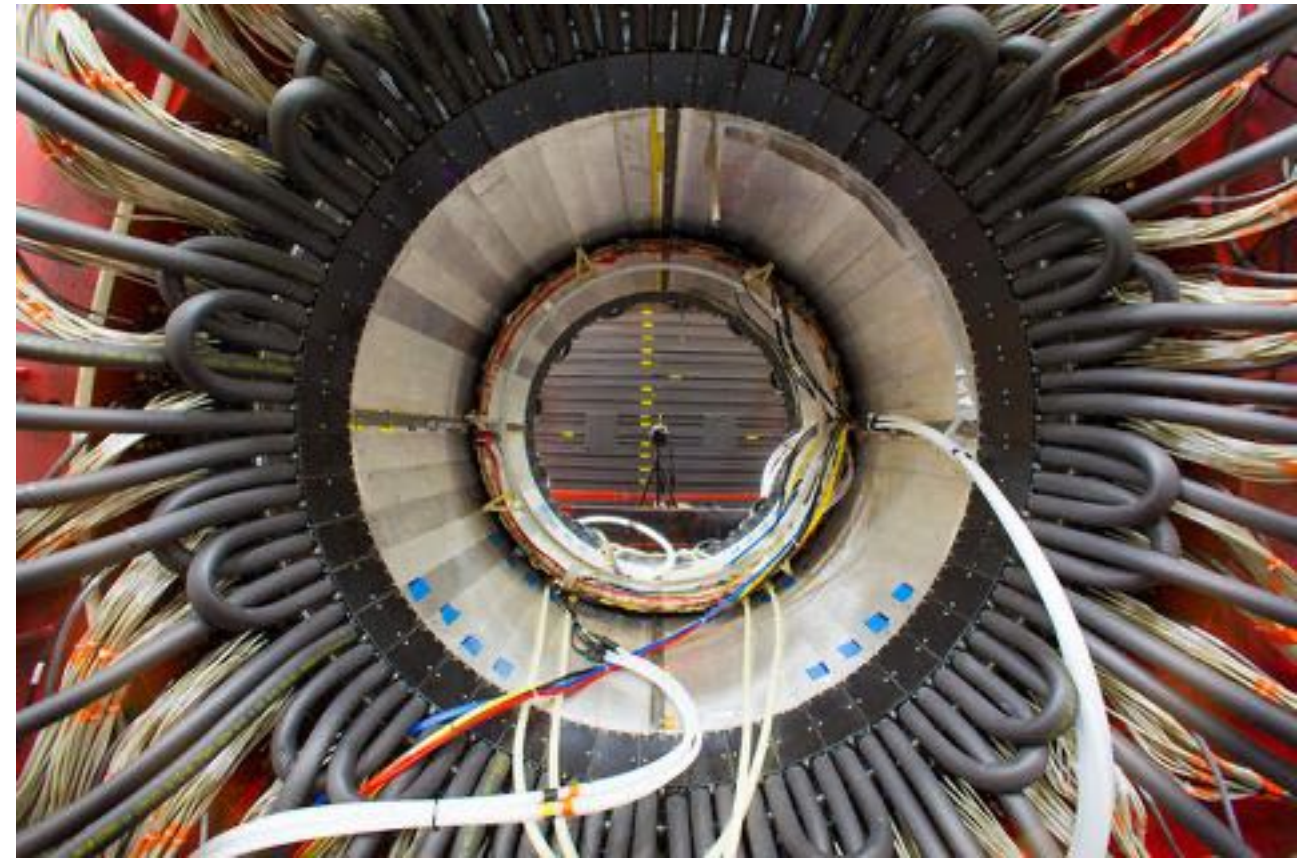
BCAL Support Strips



Cables, Cooling, N2



Cabling starts



Before tracker installation

Cabling Progress

