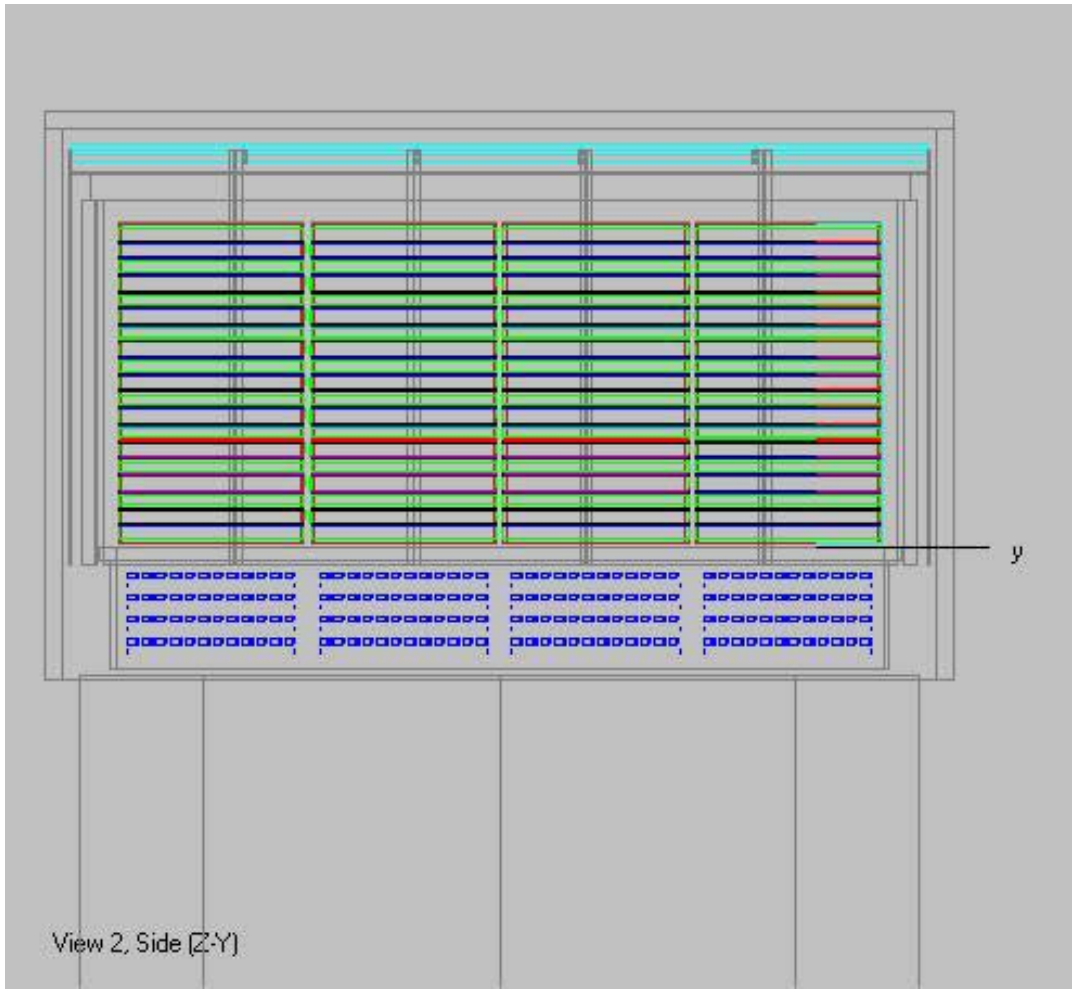
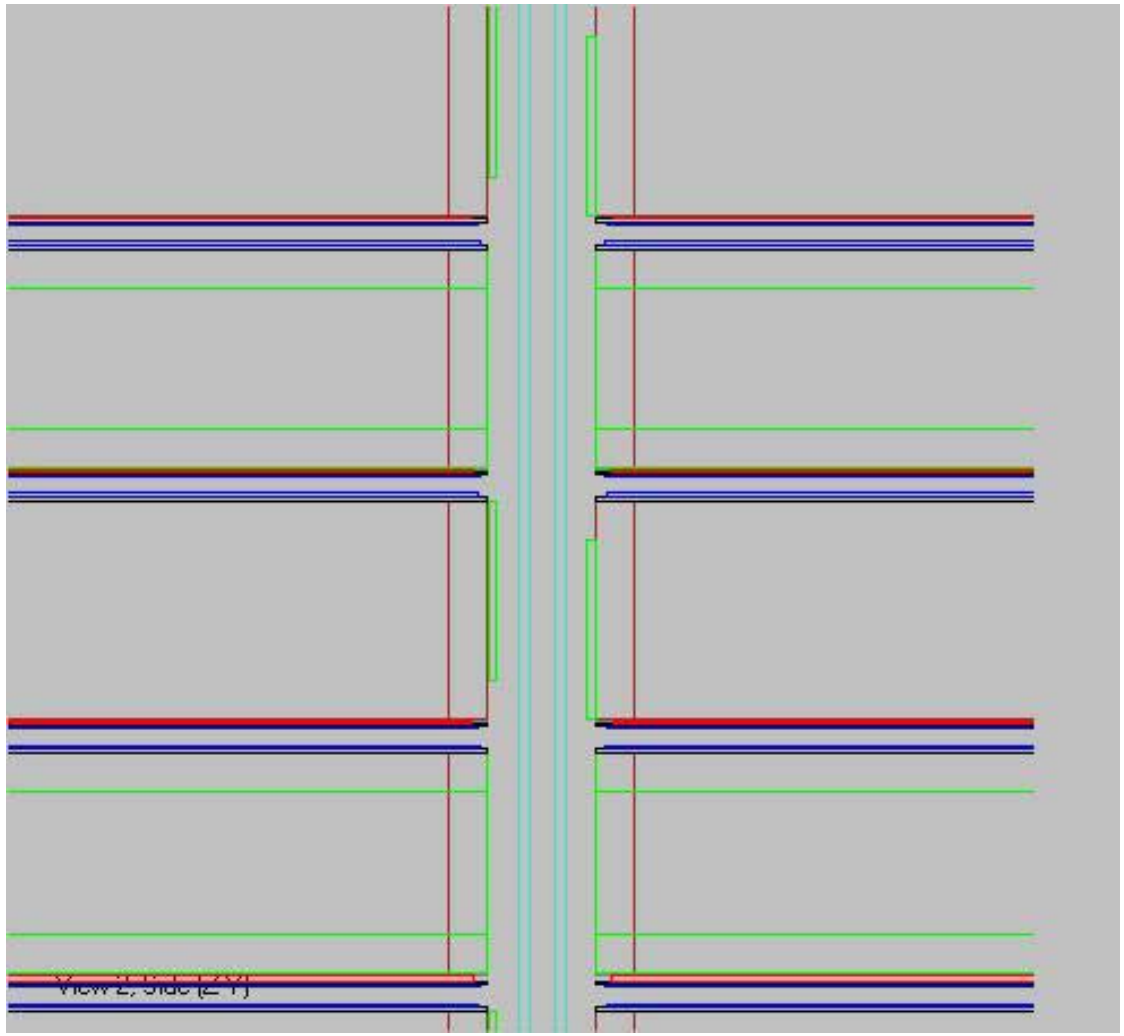
Review of Tracker Geometry

- Overall view
- Recent bug fixes
  - Offset
  - Wrong Converter
- Typical tray
- "Active" tracker
  - Vertical dimensions
    - Groupings
    - Radiation Lengths
  - Horizontal dimensions
- "Passive" tracker
  - Closeout
  - Walls
  - MCM
  - Other
    - Cables
    - Heat Straps
    - Flexures
    - Bosses
    - ???

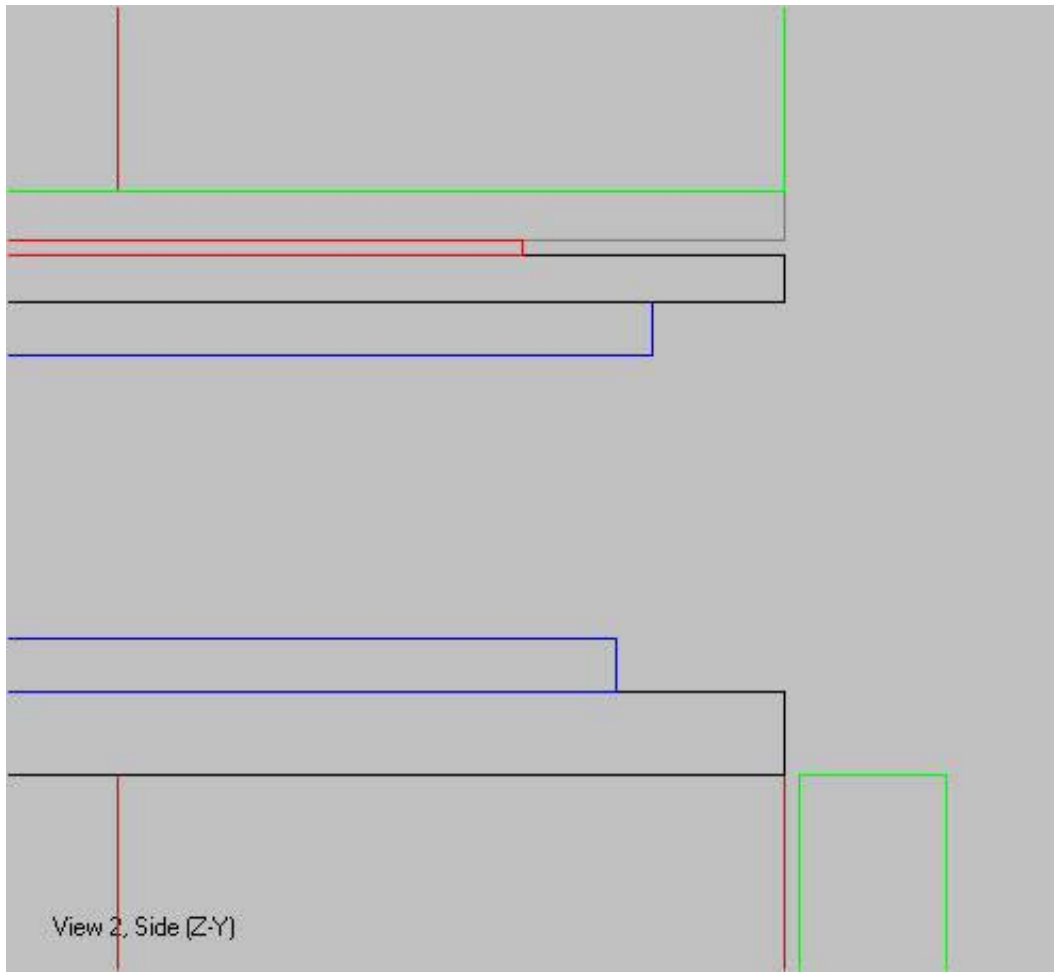
Overview



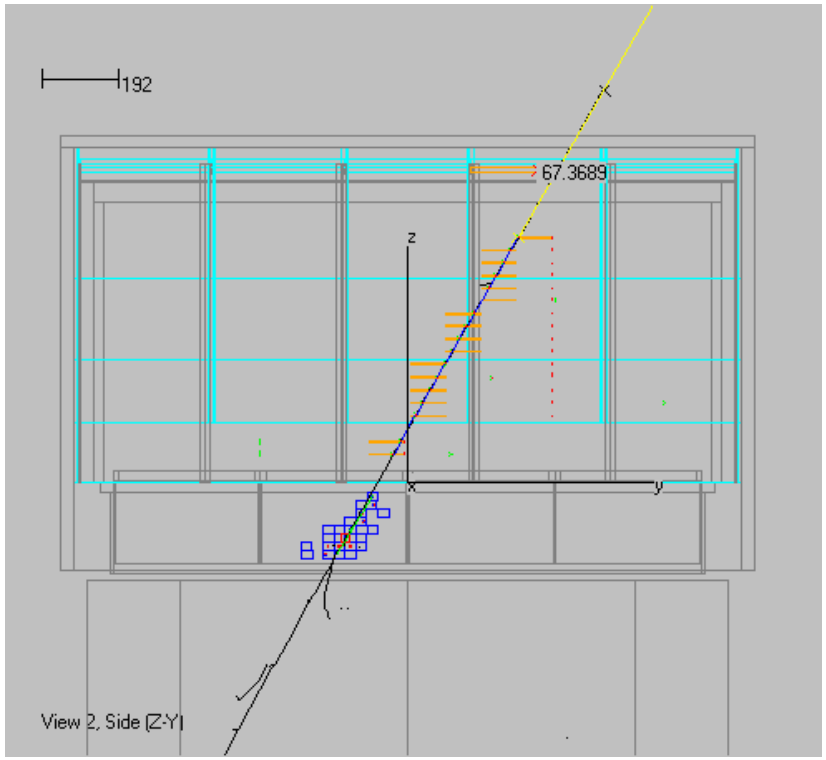
Zoom In



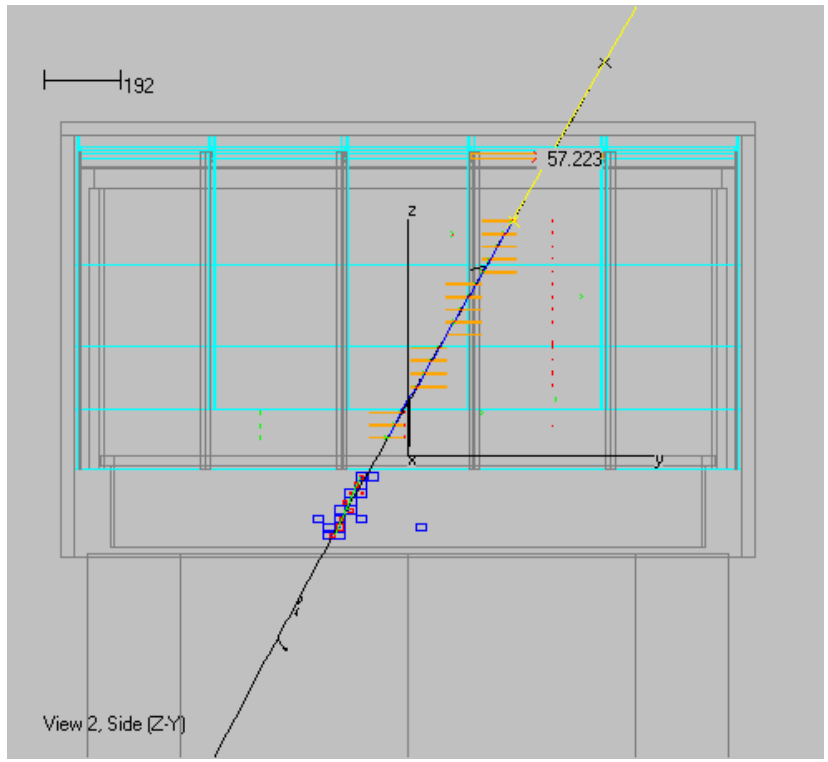
More Zoom



Comparison of Previous & (Mostly) Corrected Geometry

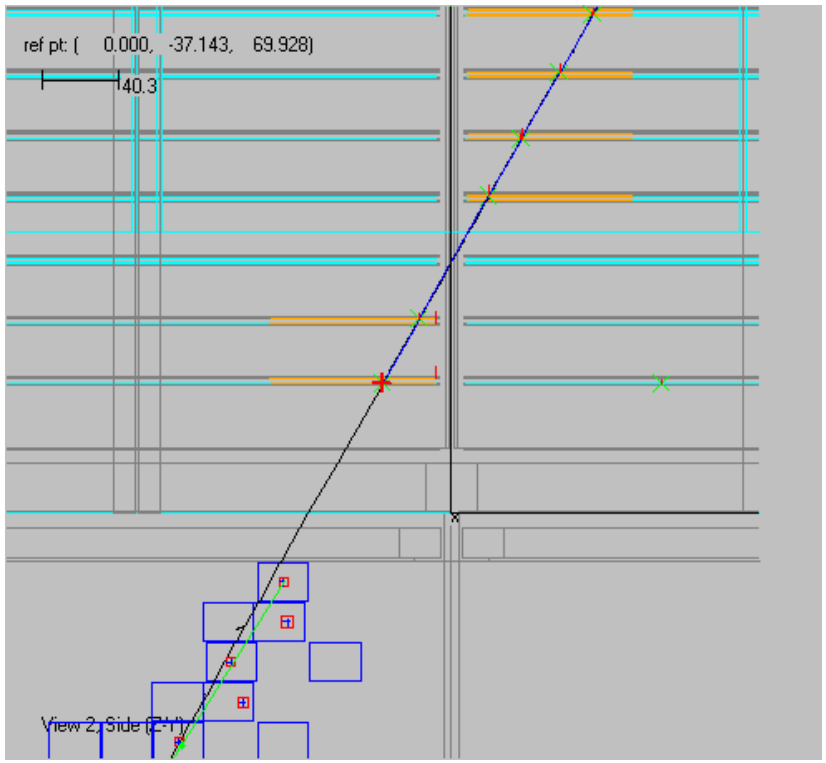


Previous

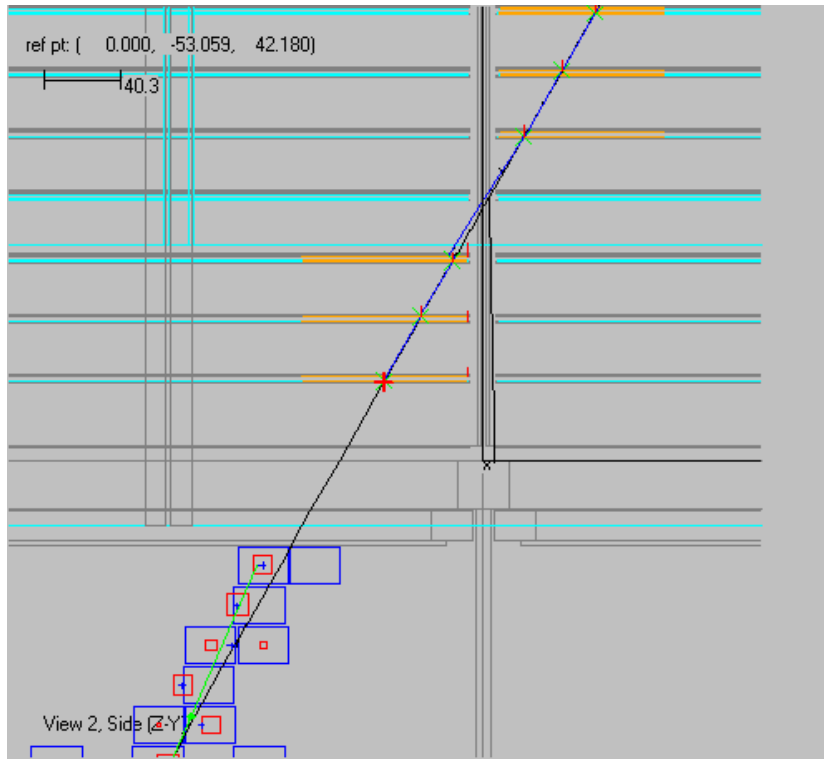


New, 1st Draft

Detail



Previous



New, 1st Draft

Wrong Converter

- A one point, the material for the SuperGlast converter was changed from pure tungsten to a tungsten alloy.
- Since the alloy is less dense, the thickness of the converter had to be increased to yield the same radiation length.
- This was done, but the material was left as pure tungsten.
- Fixed now…

Vertical Dimensions of Stack (mm)

(Zero starts at level of the Grid)

Numbers in **bold** represent deviations from routine dimensions; in **bold**, items changed since the last version.

Tray Type	**Bottom**	**No-Converter**	**SuperGlast**	**Standard**	**Top**
X-Y Gap (above tray)	**2.125(?)**	2.130	2.127	2.125	N/A
Silicon	0.400	0.400	0.400	0.400	
Glue	0.150	0.150	0.150	0.150	
Bias Plane	0.100	0.100	0.100	0.100	
Glue	0.100	0.100	0.100	0.100	**(0.100*)**
Face Sheet	**0.290**	0.200	**0.290**	0.200	0.200*
Glue	0.075	0.075	0.075	0.075	0.075*
Closeout	**36.435***	27.92	27.92	27.92	**33.895***
Glue	0.075*	0.075	0.075	0.075	0.075
Face Sheet	**0.290***	0.200	**0.290**	0.200	0.200
Glue	**(0.100*)**		0.100	0.100	0.100
W Converter			**0.723**	0.105	0.105
(Rad Lengths)			**(18%)**	(3%)	(3%)
Glue		0.100	0.100	0.100	0.100
Bias Plane		0.100	0.100	0.100	0.100
Glue		0.150	0.150	0.150	0.150
Silicon		0.400	0.400	0.400	0.400
Number of Modules	1	2	4	11	1

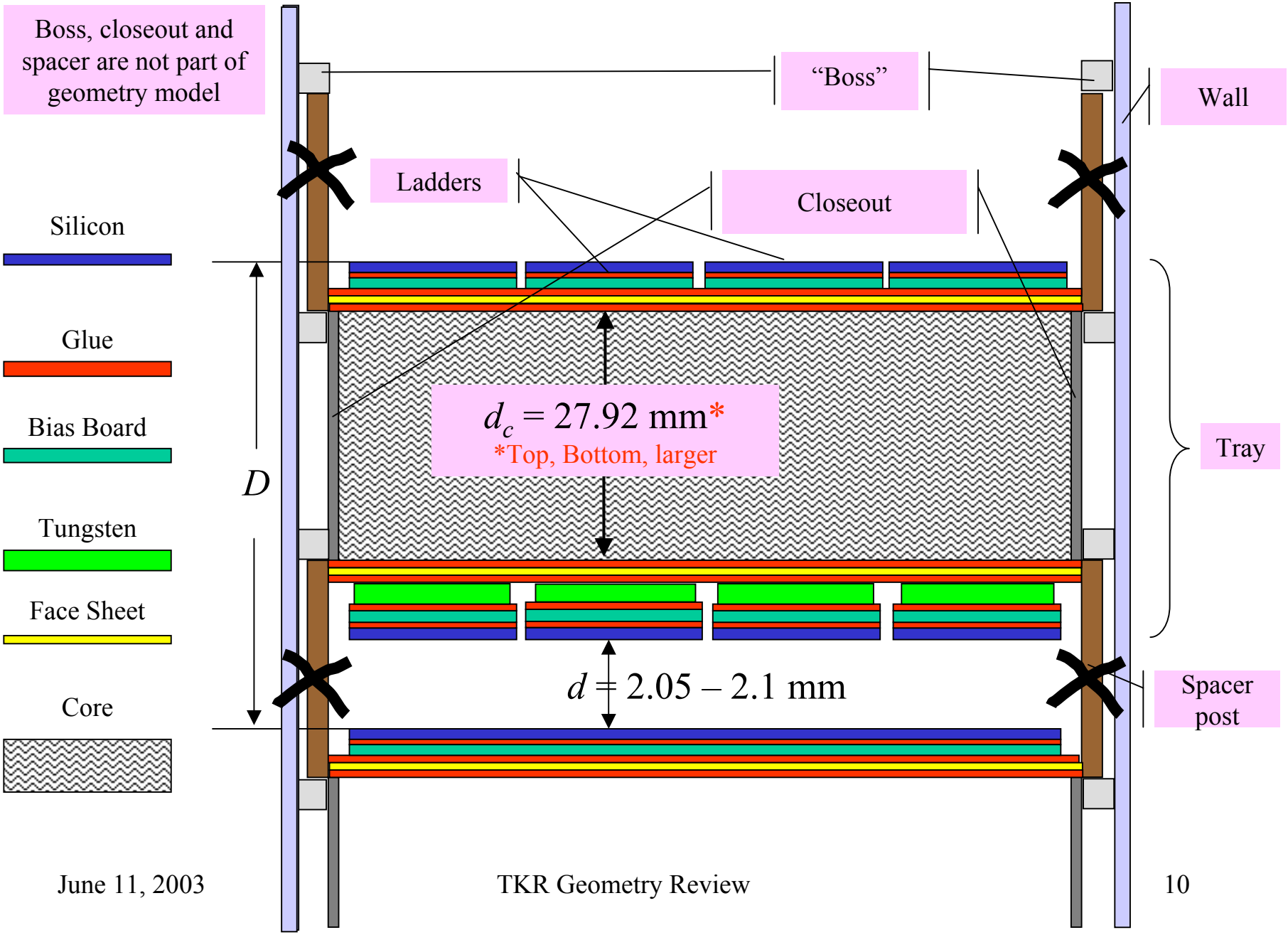
** The top- and bottom-most face sheets are recessed in their respective closeouts. In this table, they are included as part of the stack, and the closeout dimension is reduced accordingly (e.g., 34.27 -> 33.995). The thickness of the phantom glue layer is also removed. (In reality, there's lots of stuff going on at the bottom of the bottom tray and to a lesser extent, the top of the top tray, that isn't correctly modeled.)*

Horizontal Dimensions

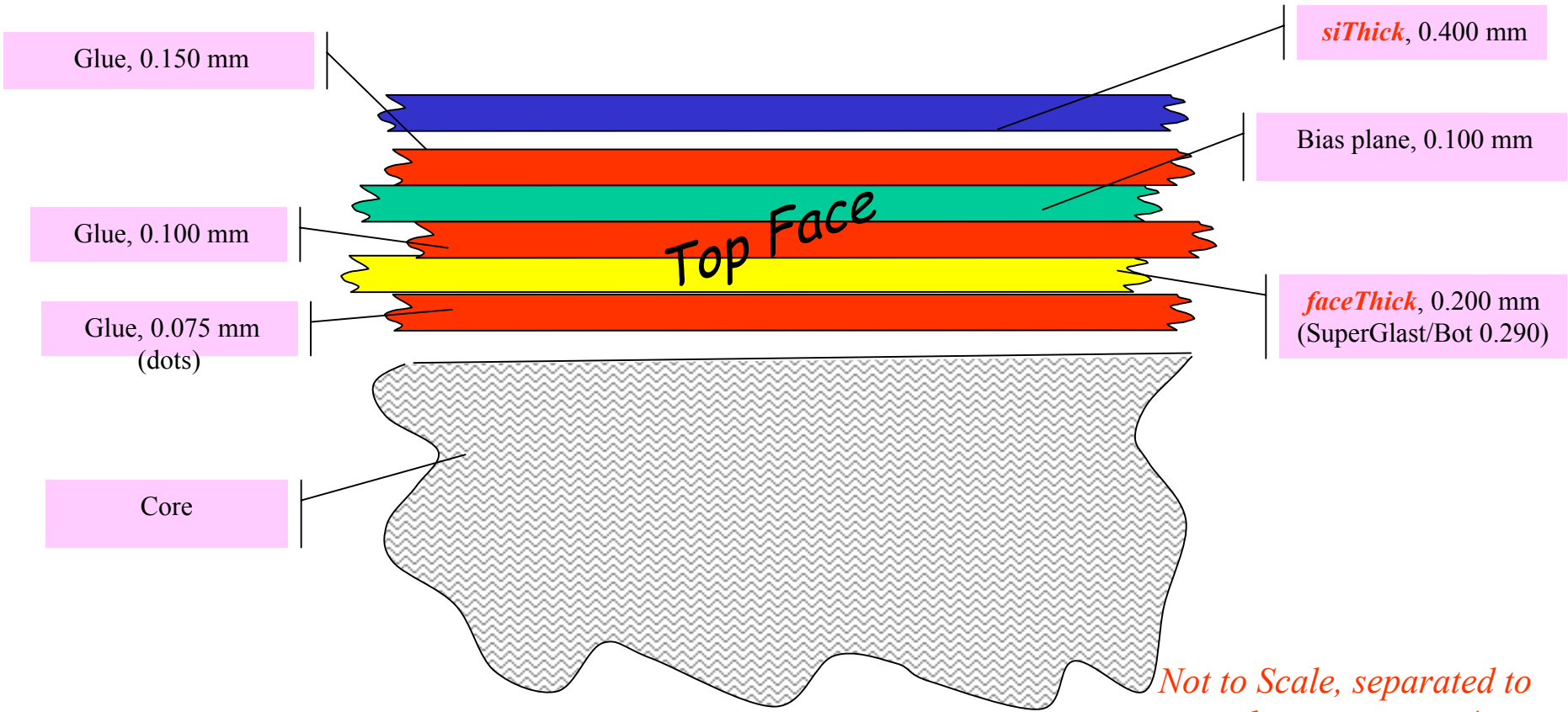
- Nothing has changed since the last iteration.
- In the last design, the top and bottom ladders on a tray were translated in opposite directions along their length so that they were out of register by about 1.5 mm.
  - This was never modeled in the geometry.
  - BJ says this "feature" has been eliminated from the current version.

Not to Scale!!

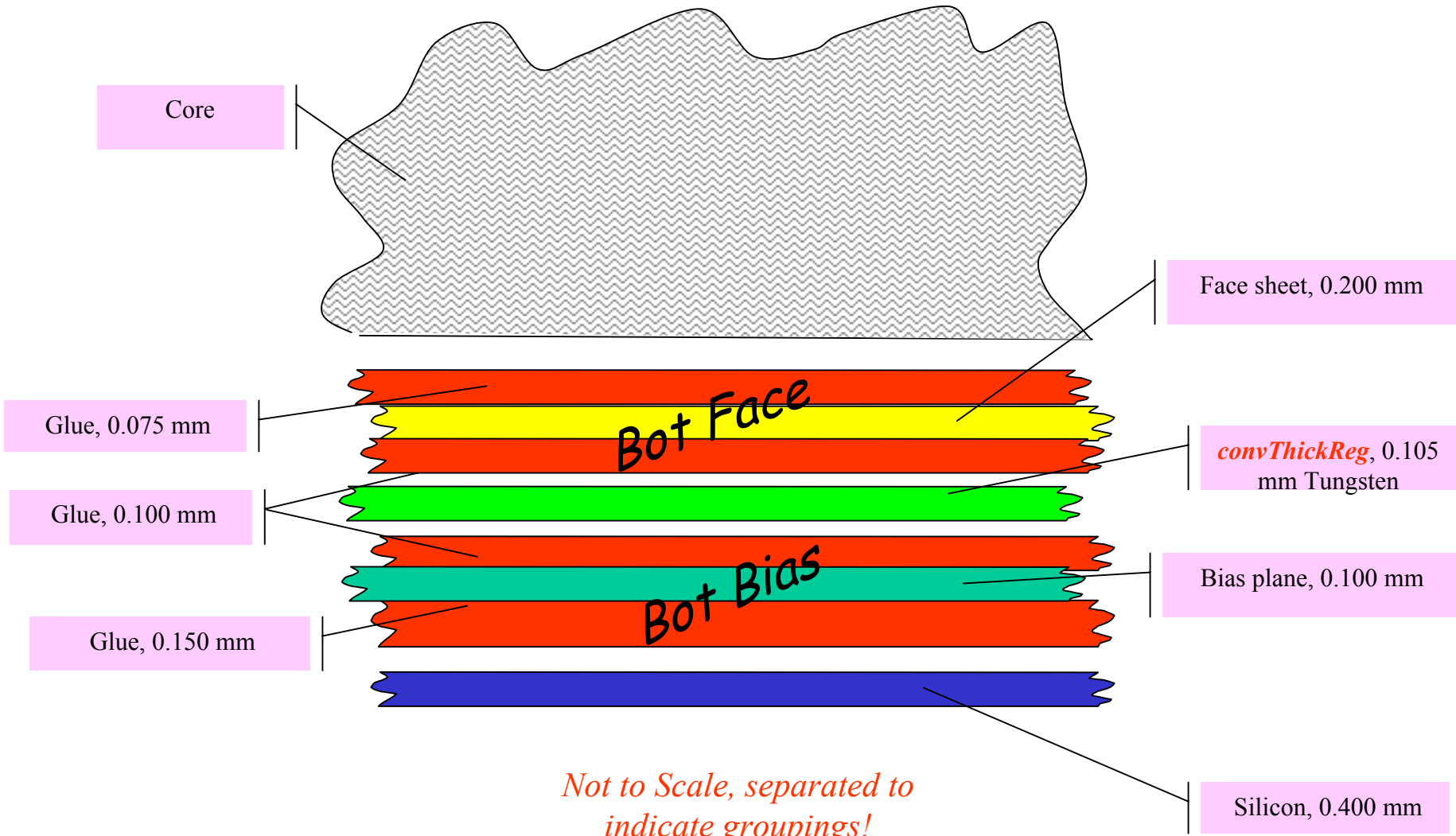
Side View of a Typical Tray in a Tower



Details of Top Face of Trays
(all trays the same, except top tray)

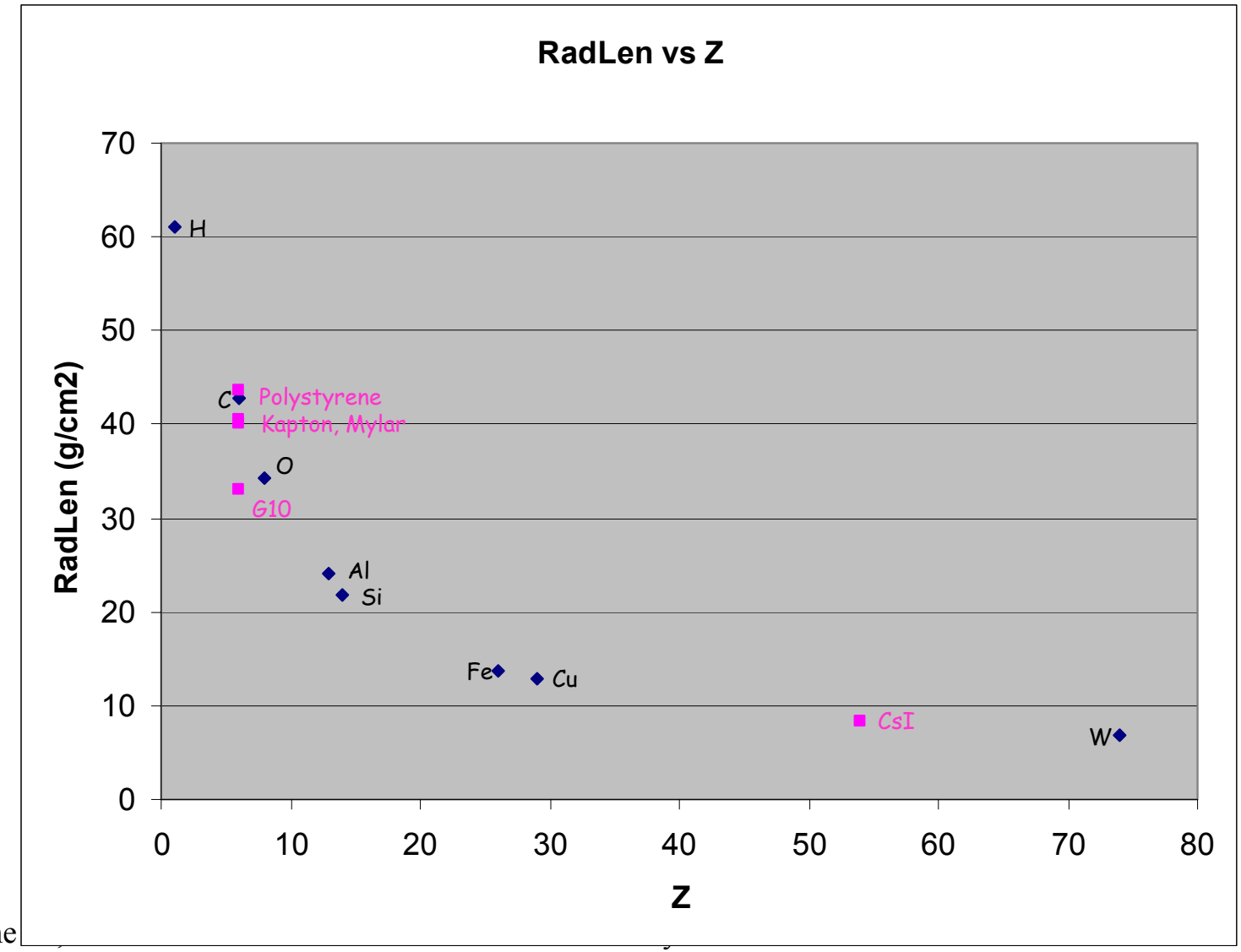


Details of Bottom Face of Standard Tray, including Bottom Face of Top Tray



Not to Scale, separated to indicate groupings!

Radiation Lengths for some common Materials



Example of Composite Material Calculation

137	Bottom Face		Thickness	density					
138		Hysol	0.0075	1.5	0.01125		0.01125	H	2
139								C	2
140								O	1
141									
142									
143		Face Sheet	0.02	1.85	0.037		0.037	C	
144									
145		Redux	0.0075	1	0.0075		0.0075	H	2
146			Total Thx	tot rho	Total Wt.			C	2
147			0.035	1.592857	0.05575			O	1
148							0.05575		
149									
150									
151									
152									
153									
154									
155					0.05575				
156									
157									

Composite Material Calculation, continued

At. Wt.			Split	Weight				
1.008		2.016	0.047958892	0.000539538		61.28	8.80446E-06	
12.01		24.02	0.571414978	0.006428418		42.7	0.000150548	
16		16	0.38062613	0.004282044		34.24	0.00012506	
		42.036						
			1	0.037		42.7	0.000866511	
1.008		2.016	0.047958892	0.000359692		61.28	5.86964E-06	
12.01		24.02	0.571414978	0.004285612		42.7	0.000100366	
16		16	0.38062613	0.002854696		34.24	8.33731E-05	
		42.036		0.05575				<X0>
							0.001340532	41.5879808
			H	0.000899229	0.899229232	0.016129672		
			C	0.047714031	47.71403083	0.855857055		
			O	0.00713674	7.136739937	0.128013272		
			N	0	0	0		
			Si	0	0	0		
			Cu	0	0	0		
				0.05575	55.75	1		

X0(*C*) = 42.7

Another Calculation

109			Thickness	density					
110	Bot bias	Silicone Glue	0.015	1.13	0.01695	0.5	0.008475	H	6
111								C	2
112								O	1
113								Si	1
114									
115		Kapton	0.0048	1.42	0.006816		0.006816	C	22
116								H	10
117								N	2
118								O	5
119									
120		Cu	0.0053	8.96	0.047488	0.25	0.011872	Cu	
121									
122		Hysol	0.0075	1.5	0.01125		0.01125	H	2
123			Tot thx	tot rho	tot wt.			C	2
124			0.0326	1.178313	0.082504			O	1
125							0.038413		
126									
127									
128									
129									
130									
131									
132					0.082504				
133									
134									

Another Calculation, continued

At. Wt.			Split	Weight				
1.008		6.048	0.081555598	0.000691184		61.28	1.12791E-05	
12.01		24.02	0.323903018	0.002745078		42.7	6.42875E-05	
16		16	0.215755549	0.001828528		34.24	5.34033E-05	
28.09		28.09	0.378785836	0.00321021		21.82	0.000147122	
		74.158						
12.01		264.22	0.691096464	0.004710513		42.7	0.000110316	
1.008		10.08	0.026365348	0.000179706		61.28	2.93254E-06	
14.01		28.02	0.073289391	0.00049954		37.99	1.31493E-05	
16		80	0.209248797	0.00142624		34.24	4.16542E-05	
		382.32						
			1	0.011872		12.86	0.000923173	
1.008		2.016	0.047958892	0.000539538		61.28	8.80446E-06	
12.01		24.02	0.571414978	0.006428418		42.7	0.000150548	
16		16	0.38062613	0.004282044		34.24	0.00012506	
		42.036		0.038413				<X0>
							0.00165173	23.25622223
			H	0.001410427	1.410427443	0.036717451		
			C	0.01388401	13.88401007	0.3614404		
			O	0.007536812	7.536812039	0.196204723		
			N	0.00049954	0.49954049	0.013004464		
			Si	0.00321021	3.210209957	0.083570925		
			Cu	0.011872	11.872	0.309062036		
				0.038413	38.413	1		

X0(*C*) = 42.7

Summary of "Active" Radiation Lengths

- Converter 1.0850 ✔
- Silicon 0.1584 ✔
- Core 0.0513 ✔

- BotFace 0.0363 ?
- TopFace 0.0341 ?
- BotBias 0.0250

- Top 3 items are simple elements; 93% of r.l.
- Remaining 3 are composites; mostly carbon, with Si, Cu, etc.
- TopFace is thicker than BotFace; should show more r.l.; Found a typo!

Passive Tracker

- Walls: Carbon Fiber, bolts, Al coating ✔
- MCM: Calculation based on BTEM module ½ ✔
  - Could be redone, if we had the info
- Closeout
  - Complicated shape; dimensions and effective density should be reviewed.
- Other material not in model
  - Cables
  - Flexures
  - Heat straps
  - ???

Conclusion

- Recent discovery of bugs has prompted a careful review of our model.
- Several new (minor) bugs have been uncovered.
- Minor design changes since last implementation need to be incorporated.
- Modeling of passive tracker should be re-examined.
- No big changes are expected.