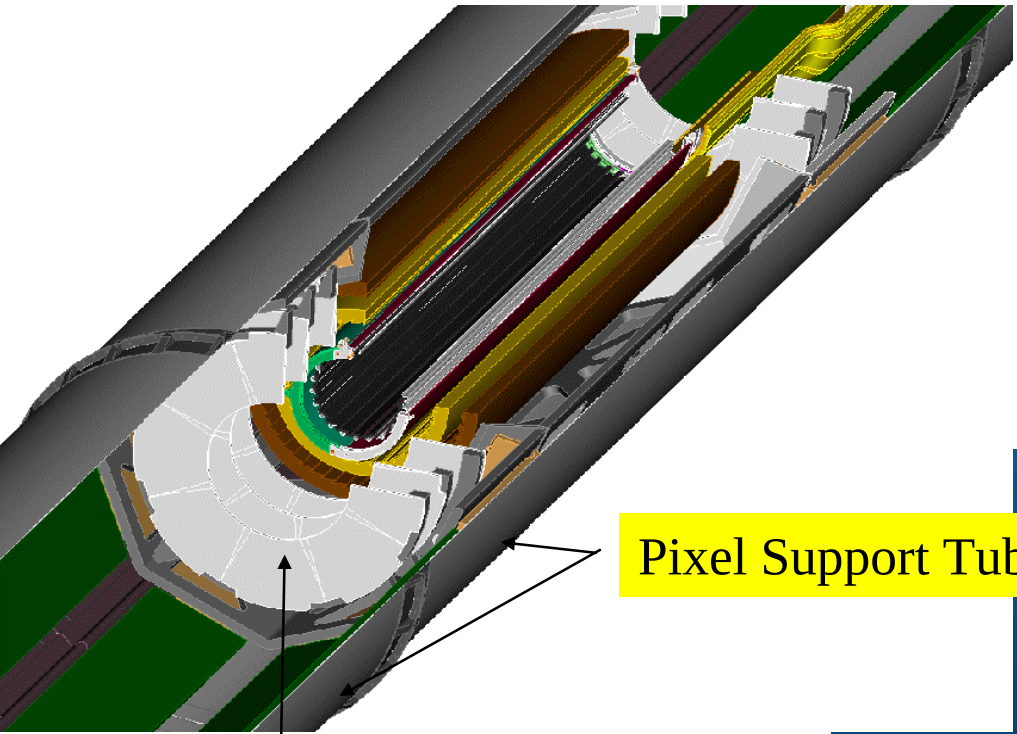
Mechanics Labor and Disk Sectors

US Pixel Meeting

November 2001

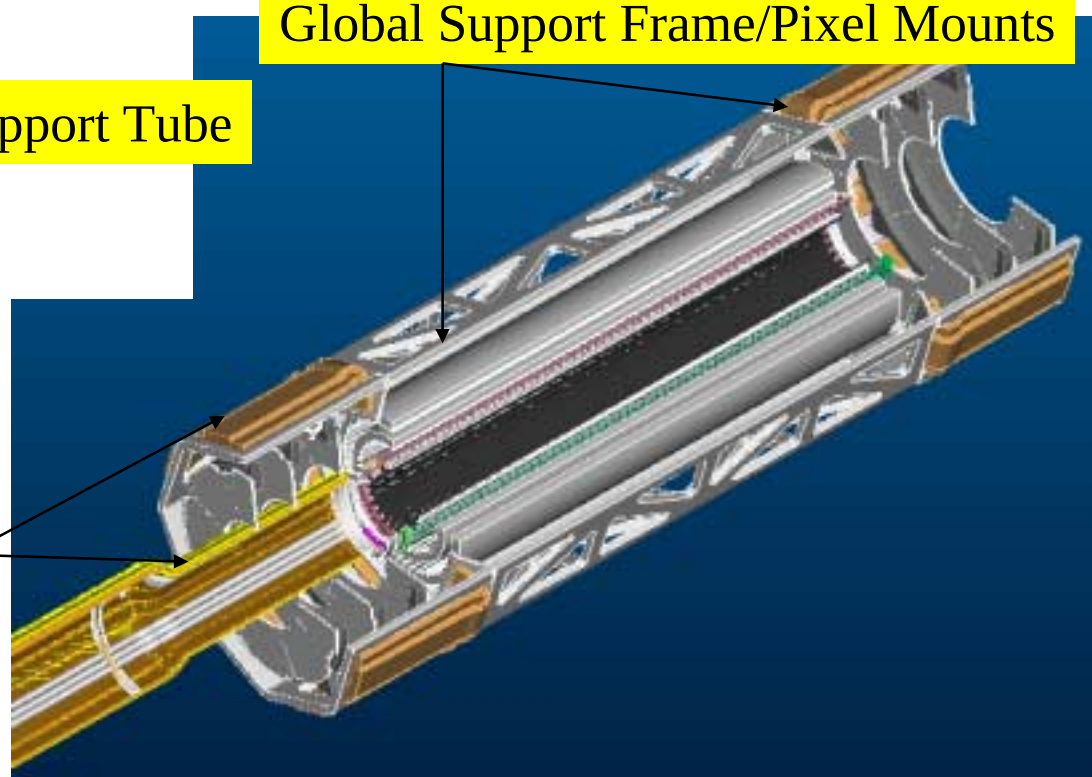
M. Gilchriese

Pixel Mechanics - I



Pixel Support Tube

Global Support Frame/Pixel Mounts

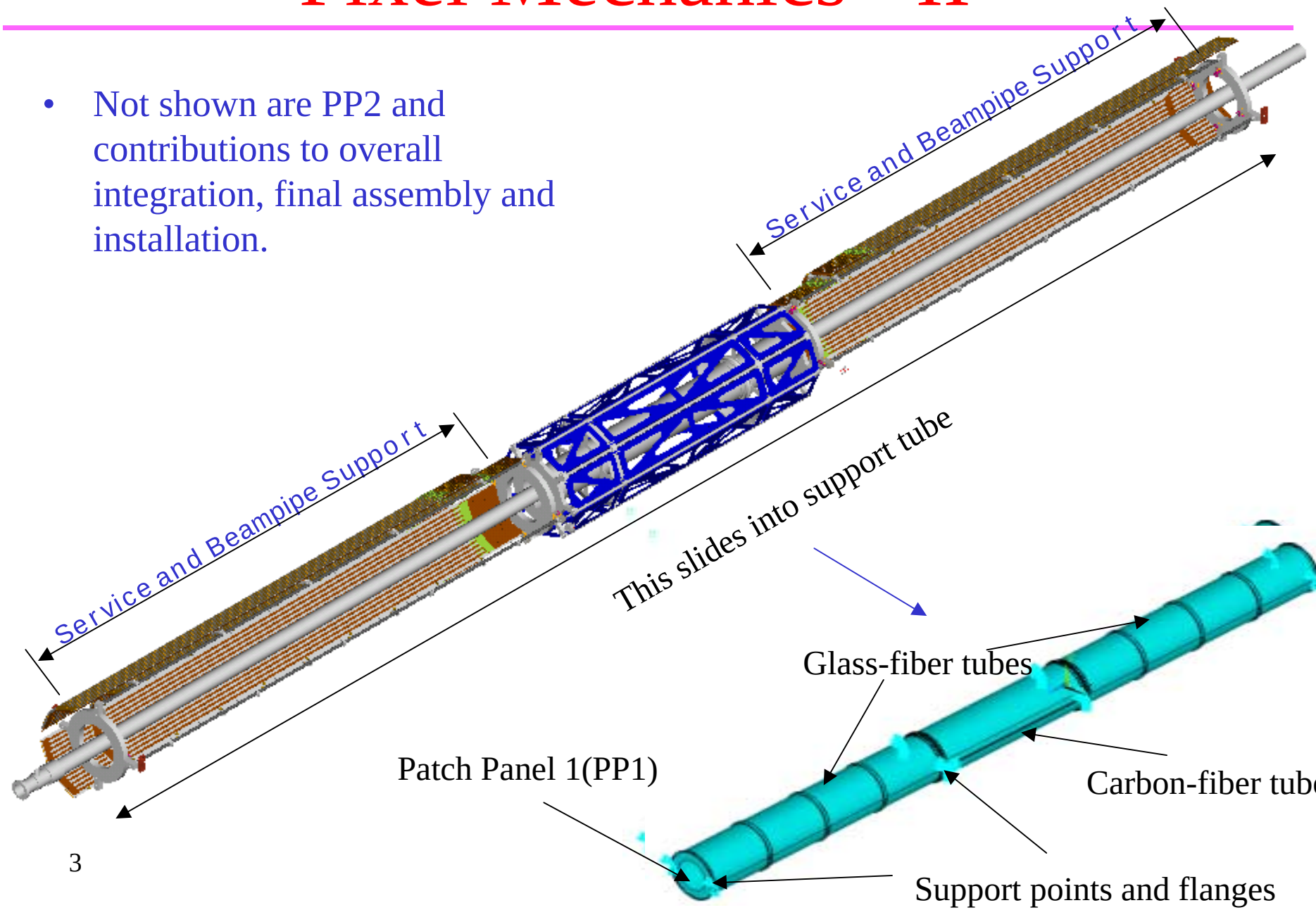


Disk sectors and support ring

Services

Pixel Mechanics - II

- Not shown are PP2 and contributions to overall integration, final assembly and installation.



FY02 Design/Fab Team

- Engineers, designers, students, technical staff.
- Additional designer time budgeted currently for support tube,service panel, beam pipe support...

ITEM	DESIGN	FABRICATION
Disk sectors	Wirth	Johnson, Wirth
Sector QA	Jones, Anderssen	Jones, shops
Coolant fittings	Goozen, Hartman	Company, Weber
Disk rings	HYTEC	Company
Disk mounts	HYTEC	Company
Support frame	HYTEC	Company
Disk rings-to-frame	Goozen	Goozen, Johnson
Disk assembly	Goozen	Goozen, Wirth, Johnson
Dry assembly of frame elements	Goozen	Goozen, Wirth, Johnson
Pixel mounts	Loew, Anderssen,Hartman	Shops, company?, TBD
Support tube mockups	Uken, Hartman, Anderssen	Dardin, Weber, shops
Support tube prototypes and production	Hartman, Anderssen	Dardin, Anderssen, Hartman, Stillwater, TBD, company
Beam pipe support	Anderssen, Hartman	TBD
Service panels	Anderssen, Hartman	Weber, elec shop techs, Johnson, Wirth, TBD
Support tube heaters/EMI	Anderssen	Weber, Bartolo

Tasks in FY02

- Disk sectors - in production but some tooling to be finalized, finish production by end of FY02
- Complete coolant fitting design, fabricate for sectors.
- Disk support rings - preproduction just starting, finish production by end FY02
- Global support frame - design nearly complete, PRR in Feb. ‘02, half production in FY02, remainder in FY03
- Disk assembly, insertion into frame. Prototype complete, final design can wait until early FY03?. Same for dry assembly of frame elements.
- PST and related design - just beginning final design for some aspects, remainder still in conceptual phase. Many interfaces.
- PST prototypes - design for foot-long sections, heaters, thermal tests leading up to FDR in June ‘02
- PST production design to follow prototype phase, including heaters
- Beam pipe support design by beam pipe FDR in Feb. 02
- Service panel design, including prototype, in ‘02. Integrated with beam pipe support.
- PP1 design and possibly prototype. PP2 responsibilities moving to Europe.

1.1.1.1 FY02-03 Personnel

- All personnel, not just design. As posted last week. Needs some modification after input today/tomorrow. HYTEC not shown - see Bill's talk tomorrow.

							Project		Base	
PROFESSIONAL	*FY 96*	*FY 97*	*FY 98*	*FY 99*	*FY 00*	*FY 01*	*FY 02*	*FY 03*	*FY 02*	*FY 03*
	FY 96									
Software Prof.	.0	.0	.0	.0						
Engineer - EE	.0	.0	.0	.0			.5	.3		
Engineer - ME	.0	.0	.0	.0		.0	1.0	1.0	1.5	1.5
TECHNICAL										
Design & Draft	.0	.0	.0	.0		.0	.8	1.0		
Electrical Technician	.0	.0	.0	.0			.1	.5		
Mechanical Technician	.0	.0	.0	.0			1.4	.5	1.8	3.0
Admin. Supervisor	.0	.0	.0	.0						
Other Admin	.0	.0	.0	.0						
TRADES										
Contract Labor	.0	.0	.0	.0						
Shops	.0	.0	.0	.0			.8	1.4		
Technical Services	.0	.0	.0	.0						
Student	.0	.0	.0	.0			1.0	1.0		
TOTAL LABOR	.0	.0	.0	.0	.0	.0	5.5	5.7	3.3	4.5

Trades Legend:
Contract Labor = Job Shopper
Shops = Fabrication (in-house facility) from raw materials
Technical Services = Rigging, electricans, etc.

Hoeferkamp?

Anderssen, Goozen

Hartman

Bartolo

Dardin, Weber, Wirth
Should be 2.5 FY02
Could be 1 for FY02, but should be 1 for FY03.
Johnson

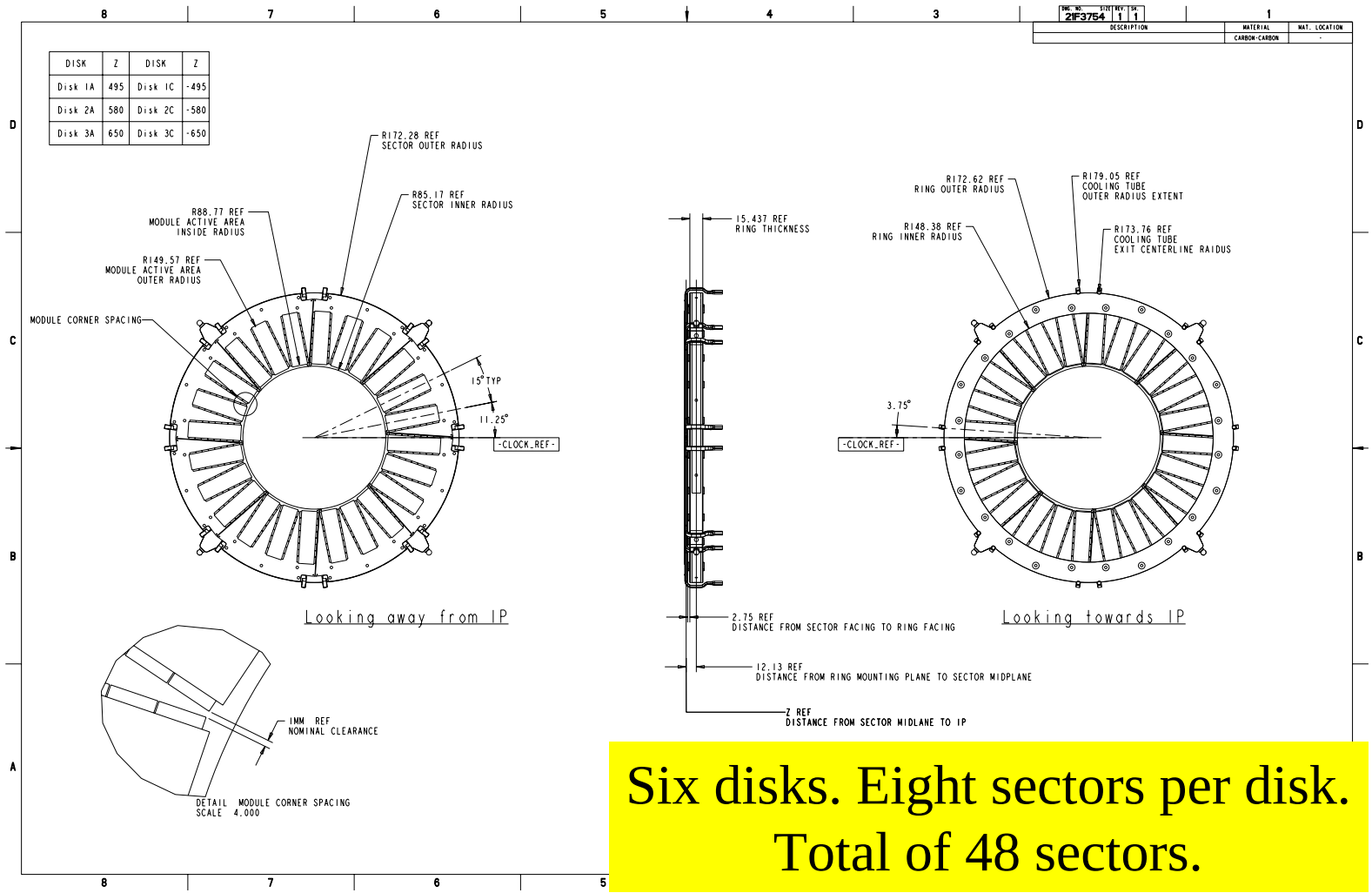
80hrs FY02 and 960 in FY03 For service panel soldering to be added.

Design Milestones

Task_Name	Baseline Date	ETC02 Date
Disk Sector PRR	20-Jun-01	Complete
Global Support CDR	20-Jun-01	Complete
Global Support FDR	16-Oct-01	Complete
Release bids for support	18-Dec-01	1-Feb-02
Bid evaluation complete for support	12-Feb-02	15-Mar-02
Global Support PRR	26-Feb-02	26-Feb-02
ATLAS PM approval of global support procurement	5-Mar-02	1-Apr-02
Support tube CDR	20-Jun-01	Complete
Support tube FDR	10-Dec-01	15-Jun-02
Release bid for Support tube	4-Dec-01	15-Jul-02
Support tube bid eval complete	12-Feb-02	15-Oct-02
Support tube PRR	26-Feb-02	15-Oct-02
ATLAS PM approval of Support tube procurement	5-Mar-02	?
B-layer CDR	26-Feb-02	delete
B-layer FDR	8-Oct-02	delete
B-layer PRR	17-Jun-03	delete
Cables/services CDR	20-Jun-01	10-Dec-01
Cables/services FDR	26-Feb-02	15-Oct-02
Release bids for initial cables	16-Apr-02	delete
Bid evaluation complete for outer cables	11-Jun-02	delete
Cables/services PRR	25-Jun-02	15-Feb-03
ATLAS PM approval of outer cables procurement	2-Jul-02	delete
Assembly/Installation CDR	26-Feb-02	26-Feb-02
Management contingency decision on US contribution to installation	16-Sep-02	1-Jul-03
Assembly/Installation FDR	8-Oct-02	8-Oct-02
Assembly/Installation PRR	17-Jun-03	17-Jun-03

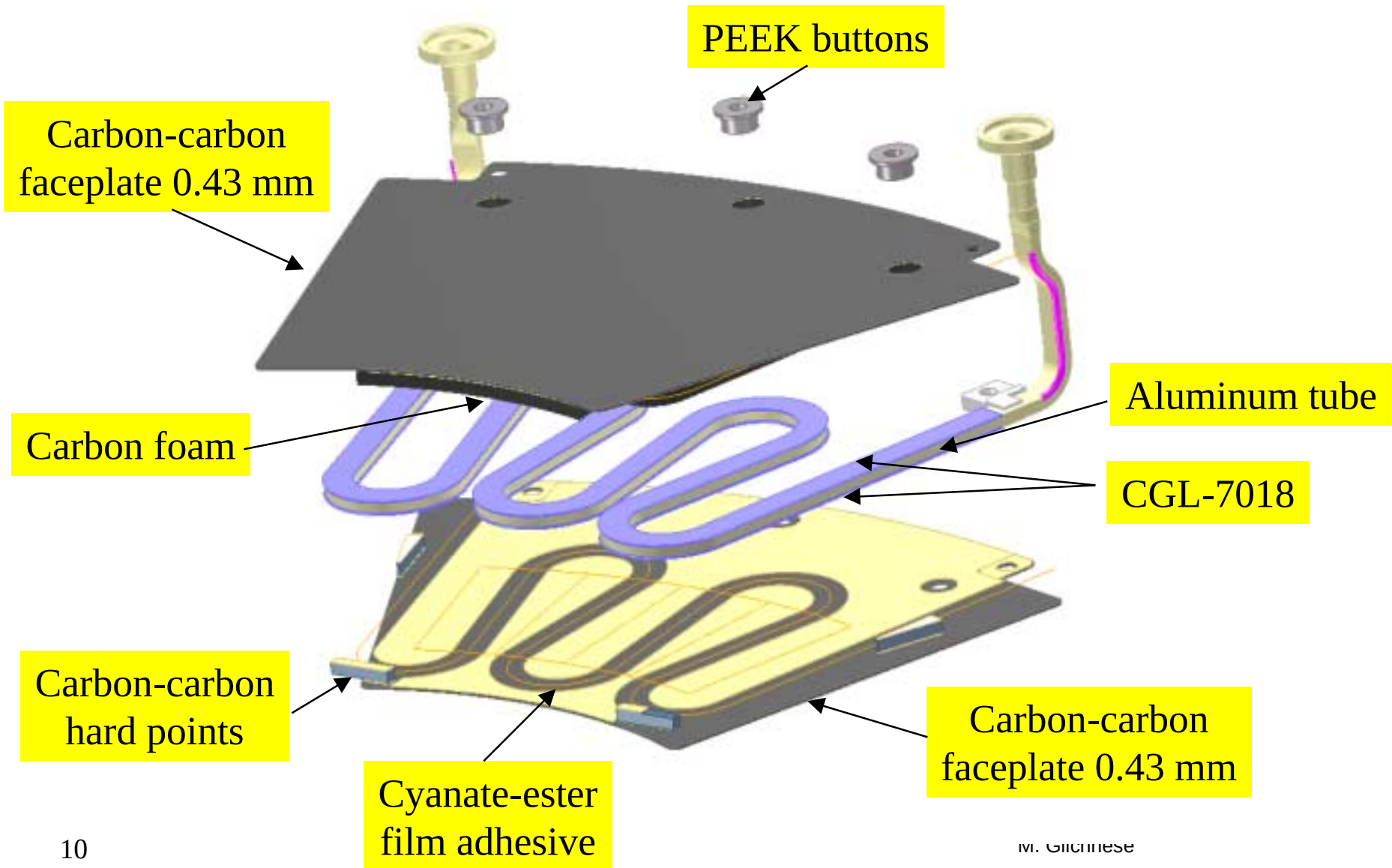
Disk Sectors

Disks



Six disks. Eight sectors per disk.
Total of 48 sectors.

Disk Sector Concept



Disk Sector Status

- PRR passed in July. In (pre)production. Assembly sequence at

  http://www-physics.lbl.gov/~gilg/PixMechCDRPRR/SectorAssemblySummary.pdf
- Some production fixtures to be made
- Most materials in hand(carbon-carbon, tubes, foam…)
- Reviewed costs this week with people doing work(Wirth et al)
- Remaining materials(adhesives, PEEK, pins, storage,….)
  - As posted last week 11K
  - Current estimate 12K
- Shop time
  - As posted last week 501 hours
  - Current estimate 501 hours
- Labor - covered previously and remains the same as posted. Mech tech shared with other items(eg. service panel prototypes, fittings) but costed totally here for convenience.
- Schedule. Complete by end FY02, assuming coolant fittings in time. Baseline date was 6/25/02. Three month delay projected.

Coolant Fittings

M. Gilchriese

Technical Status Summary

- Custom fittings for sectors - capillary inlet, U-tube(2 sectors operated in series) and outlet. Similar for staves.
- Connection at PP0, also custom fitting.
- Connection at PP1. Possibly commercial.
- US developments(see samples)
  - Variseal(plastic seals) - recently stopped
  - Al Luer-lok(syringe-like) - looks good, extensive test protocol for few prototypes to be complete in next week. Remaining issue - radiation length
  - Laser welding of aluminum fittings to aluminum sector tube samples demonstrated successfully on few parts. Remaining issues are welding on bent tubes(in progress) and yield(need more parts). Only one vendor successful so far.
- European developments
  - Cu-Ni part with Indium seal - looks good. Remaining issues are long term creep(under test), handling thin In(currently 200microns but will try In plated Cu) and making in aluminum(in progress).
- In general this has gone much more slowly than expected, now critical path item for sector construction. Schedule is very tight. Uncertainty about luer-lok vs Indium.

Fittings Plan/Costs

- This is preliminary. Developing quickly.
- Prototypes/test samples and preproduction(1.1.1.1.2.5.2)
  - Basic assumption is $250 per connection pair to cover fittings and laser welding in prototype phase(will be much less in production).
  - Prototypes/test samples 20 pairs=5K
  - Preproduction sectors 8x2=16+4spares=20 pairs = 5K
  - Bend fixture for U-tube. $1000 for materials. 25 hours shop time
  - Tech labor covered by base program or part of sector fabrication.
  - Total prototype(1.1.1.1.2.5.2). $11K materials, 25 hours shop, 0.5 FTE base program tech labor. All in FY02.
  - Estimate posted last week had 26K materials, 80 hours shop and 520 hours project tech labor…so this will go down substantially
- Production(1.1.1.1.3.7.3)
  - For now have kept original estimate done by Neal Hartman
  - This assumes we do all of tubes and fittings beyond those directly on staves. This may not be so, could do some of the fitting fab in Europe but joining should be done here since tubes are integrated into service panels.
  - Total is about 35K, should be moved into FY02. Meeting this schedule will be very difficult.

Potential Cost Reductions

- Design
  - Reduce LBL designer time in FY02, delay production design of some items eg. service panels and PP1 until FY03, until have some experience with real electronics. Concentrate on support tube and beam pipe support in FY02 then switch partly to service panels, PP1.
  - Reduce/eliminate UNM EE time for PP1 and cable plant in FY02, again delay some until FY03.
  - Reduce production engineering oversight for rings and frame from HYTEC. Would require more effort from LBNL physicists to save $.
- Sectors and Fittings
  - Not much. Tom Johnson to SCT work if fittings don't arrive fast enough? Go fast.