ILC & SMTF(HPTF) Cost Estimate

Harry Carter

May 10 , 2005

Outline

- **The SMTF Proposal Cost Estimate**
- **Estimate Methodology**
- **ILC R&D Portion of Cost Estimate**
- **Infrastructure Portion of Cost Estimate**
- **Schedules**
- **Conclusions**

The SMTF Proposal Estimate

SMTF Proposal: Budgetary & Personnel Estimates

Version 2.5

WBS	Description	SMTF Phase	Totals		FY05		FY06		FY07		FY08		FY09		FY10		FY11	
			k$	FTE-y	k$	FTE	k$	FTE	k$	FTE	k$	FTE	k$	FTE	k$	FTE	k$	FTE
	Totals		$ 95,083	913.35	$ 8,372	95.95	$ 23,056	189.45	$ 21,048	128.55	$ 16,269	134.25	$ 11,859	102.25	$ 5,204	86.90	$ 6,120	95.00
1,2,3,& 10	SMTF		$ 44,474	689.25	$ 3,234	49.75	$ 9,451	125.85	$ 9,759	91.25	$ 5,660	96.00	$ 5,305	83.00	$ 3,955	81.40	$ 3,955	81.00
4 & 5	ILC		$ 17,644	80.10	$ 2,518	14.20	$ 2,710	20.10	$ 2,444	9.80	$ 4,879	14.25	$ 4,044	14.25	$ 849	5.50	$ 200	2.00
6	Injector		$ 6,219	30.00	$ 320	0.00	$ 1,114	11.00	$ 1,310	2.00	$ 710	5.00	$ 400	0.00	$ 400	0.00	$ 1,965	12.00
7	CW		$ 8,650	26.00	$ -	0.00	$ 3,000	10.50	$ 3,450	9.50	$ 2,200	6.00	$ -	0.00	$ -	0.00	$ -	0.00
8	RIA		$ 1,970	6.75	$ -	0.00	$ -	0.50	$ 850	3.00	$ 1,120	3.25	$ -	0.00	$ -	0.00	$ -	0.00
9	Proton Driver		$ 16,126	88.00	$ 2,300	32.00	$ 6,781	22.00	$ 3,235	16.00	$ 1,700	13.00	$ 2,110	5.00	$ -	0.00	$ -	0.00

- **A Budgetary and Personnel Estimate was developed for the SMTF Proposal in a WBS format using Excel**
- **This estimate was separated into six major categories:**
  - **SMTF (henceforth called HPTF)**
  - **ILC**
  - **Injector**
  - **CW**
  - **RIA**
  - **Proton Driver**
- **Only the Infrastructure, ILC, and Operations estimates for fiscal years 2005 thru 2009 are included in this presentation**

Estimate Methodology

- **Budgetary and personnel estimates for each of the six major categories were developed by consulting with experts in each of the categories**
- **Component cost estimates are based on**
  - Known costs for existing equipment
  - Vendor quotes and budgetary estimates
  - Scaling from TESLA, SNS, FNAL, and JLab costs
  - Engineering estimates
  - Educated "guesstimates"
- **Labor cost estimates are made using Engineering, Technician and Physicist categories only and using TD SWF averages (actual)**
- **No contingency analysis has been performed**
- **Costs are shown in current dollars**

Items in the Estimates

- **Cost of Project Management (including reviews)**
- **Costs associated with ongoing and near-term R&D efforts**
- **Costs for setting up the HPTF and the Cryomodule Assembly Factory (CAF)**
- **Costs for procuring, fabricating and installing all technical components up to and including FNPL**
- **Costs to set up tests of R&D cryomodules in HPTF**
- **Costs of operating HPTF and CAF**
- **Costs for spares**

Overview of the ILC Costs FY05-09

SMTF Proposal: Budgetary & Personnel Estimates

Version 2.5

WBS	Description	Totals		FY05		FY06		FY07		FY08		FY09	
		k$	FTE-y	k$	FTE	k$	FTE	k$	FTE	k$	FTE	k$	FTE
	Totals	**$ 47,846**	**426.84**	**$ 5,773**	**57.35**	**$ 11,908**	**128.91**	**$ 11,825**	**74.44**	**$ 10,223**	**91.82**	**$ 8,117**	**74.32**
1,2,& 3	**HPTF**	**$ 19,203**	**116.14**	**$ 2,505**	**32.43**	**$ 6,374**	**46.93**	**$ 5,676**	**11.76**	**$ 2,472**	**19.01**	**$ 2,176**	**6.01**
10	**Operations**	**$ 8,858**	**219.60**	**$ 430**	**10.72**	**$ 1,710**	**50.88**	**$ 2,395**	**50.88**	**$ 2,162**	**53.56**	**$ 2,162**	**53.56**
4 & 5	**ILC**	**$ 15,930**	**73.10**	**$ 2,518**	**14.20**	**$ 2,710**	**20.10**	**$ 2,444**	**9.80**	**$ 4,879**	**14.25**	**$ 3,379**	**14.75**
6	**Injector**	**$ 3,854**	**18.00**	**$ 320**	**0.00**	**$ 1,114**	**11.00**	**$ 1,310**	**2.00**	**$ 710**	**5.00**	**$ 400**	**0.00**

				ILC/SMTF Program ($ Amounts in Thousands, Direct Costs Only)									
		TOTAL		FY05			FY06			FY07			FY08
ILC SRF Development Program		M&S	SWF		M&S	FTE		M&S	FTE		M&S	FTE	
Infrastructure	**$36,471**	**$23,057**	**$13,414**	**$6,068**	**$2,825**	**32.43**	**$13,281**	**$7,488**	**57.93**	**$8,362**	**$6,986**	**13.76**	**$5,583**
Cryogenic infrastructure	$14,919	$9,719	$5,200	$2,172	$797	13.75	$6,404	$4,254	21.50	$5,159	$4,484	6.75	$1,080
Building infrastructure	$3,903	$2,439	$1,464	$652	$384	2.68	$1,353	$760	5.93	$974	$773	2.01	$523
Preparation and processing facilities	$6,825	$4,675	$2,150	$995	$345	6.50	$1,270	$570	7.00	$320	$220	1.00	$2,370
CM fabrication infrastructure	$3,170	$1,370	$1,800	$1,530	$780	7.50	$1,640	$590	10.50	$0	$0	0.00	$0
SRF materials research	$2,000	$1,000	$1,000	$400	$200	2.00	$400	$200	2.00	$400	$200	2.00	$400
Photoinjector move and upgrade	$5,654	$3,854	$1,800	$320	$320	0.00	$2,214	$1,114	11.00	$1,510	$1,310	2.00	$1,210
ILC Component Development	**$23,240**	**$15,930**	**$7,310**	**$3,938**	$2,518	14.20	**$4,720**	$2,710	20.10	**$3,424**	$2,444	9.80	**$6,304**
Cryomodules (4 US + 1 European)	$10,065	$7,855	$2,210	$2,438	$2,018	4.20	$2,910	$2,100	8.10	$2,119	$1,689	4.30	$2,004
RF Sources	$10,575	$6,475	$4,100	$1,500	$500	10.00	$1,510	$510	10.00	$1,005	$655	3.50	$3,300
Industrialization program	$2,600	$1,600	$1,000	$0	$0	0.00	$300	$100	2.00	$300	$100	2.00	$1,000
Operations	**$30,818**	**$8,858**	**$21,960**	**$1,502**	**$430**	**10.72**	**$6,798**	**$1,710**	**50.88**	**$7,483**	**$2,395**	**50.88**	**$7,518**
Cryogens	$1,675	$1,675	$0	$0	$0	0.00	$134	$134	0.00	$469	$469	0.00	$536
Operations and maintenance	$16,790	$3,942	$12,848	$300	$300	0.00	$3,814	$736	30.78	$4,314	$1,236	30.78	$4,182
Controls Systems	$2,090	$750	$1,340	$0	$0	0.00	$523	$188	3.35	$523	$188	3.35	$523
Safety Systems	$536	$268	$268	$0	$0	0.00	$134	$67	0.67	$134	$67	0.67	$134
Computing and licenses	$268	$268	$0	$0	$0	0.00	$67	$67	0.00	$67	$67	0.00	$67
Program management	$4,166	$816	$3,350	$800	$130	6.70	$954	$284	6.70	$804	$134	6.70	$804
Modulator and klystron development	$5,293	$1,139	$4,154	$402	$0	4.02	$1,173	$235	9.38	$1,173	$235	9.38	$1,273
TOTAL	**$90,530**	**$47,846**	**$42,684**	**$11,508**	**$5,773**	**57.35**	**$24,799**	**$11,908**	**128.91**	**$19,269**	**$11,825**	**74.44**	**$19,405**

Summary of the ILC Costs FY05-09

ILC SRF Development Program	TOTAL	M&S	SWF
Infrastructure	**$36,471**	**$23,057**	**$13,414**
Cryogenic infrastructure	$14,919	$9,719	$5,200
Building infrastructure	$3,903	$2,439	$1,464
Preparation and processing facilities	$6,825	$4,675	$2,150
CM fabrication infrastructure	$3,170	$1,370	$1,800
SRF materials research	$2,000	$1,000	$1,000
Photoinjector move and upgrade	$5,654	$3,854	$1,800
ILC Component Development	**$23,240**	**$15,930**	**$7,310**
Cryomodules (4 US + 1 European)	$10,065	$7,855	$2,210
RF Sources	$10,575	$6,475	$4,100
Industrialization program	$2,600	$1,600	$1,000
Operations	**$30,818**	**$8,858**	**$21,960**
Cryogens	$1,675	$1,675	$0
Operations and maintenance	$16,790	$3,942	$12,848
Controls Systems	$2,090	$750	$1,340
Safety Systems	$536	$268	$268
Computing and licenses	$268	$268	$0
Program management	$4,166	$816	$3,350
Modulator and klystron development	$5,293	$1,139	$4,154
TOTAL	**$90,530**	**$47,846**	**$42,684**

This total represents 2/3 of the overall infrastructure cost

This total represents the overall ILC R&D cost

This total represents 2/3 of the overall operations cost

Summary of the ILC R&D* Costs FY05-09

(All costs in 2005 K$)	ILC
M&S	15,930
SWF	7,310
Subtotal	23,240
G&A (16.05% M&S & 30.35% Labor)	4,780
Subtotal (incl. G&A)	28,020
Contingency (30%)	8,406
Total Cost	36,426

Direct Costs

* ILC Component Development Costs

Overview of PD Costs FY05-09

SMTF Proposal: Budgetary & Personnel Estimates

Version 2.5

WBS	Description	SMTF Phase	Totals k$	Totals FTE-y	FY05 k$	FY05 FTE	FY06 k$	FY06 FTE	FY07 k$	FY07 FTE	FY08 k$	FY08 FTE	FY09 k$	FY09 FTE
	Totals		**$ 21,473**	**198.11**	**$ 2,599**	**38.60**	**$ 8,148**	**50.04**	**$ 4,923**	**44.61**	**$ 2,726**	**36.43**	**$ 3,077**	**28.43**
1,2,& 3	**HPTF**		**$ 1,975**	**17.71**	**$ 189**	**1.32**	**$ 626**	**6.92**	**$ 903**	**7.49**	**$ 158**	**0.99**	**$ 99**	**0.99**
10	**Operations**		**$ 3,372**	**92.40**	**$ 110**	**5.28**	**$ 740**	**21.12**	**$ 785**	**21.12**	**$ 868**	**22.44**	**$ 868**	**22.44**
9	**Proton Driver**		**$ 16,126**	**88.00**	**$ 2,300**	**32.00**	**$ 6,781**	**22.00**	**$ 3,235**	**16.00**	**$ 1,700**	**13.00**	**$ 2,110**	**5.00**

ILC/SMTF Program ($ Amounts in Thousands, Direct Costs Only)

ILC SRF Development Program	TOTAL	M&S	SWF	FY05	M&S	FTE	FY06	M&S	FTE	FY07	M&S	FTE	FY08	M&S	FTE
Infrastructure	**$3,746**	**$1,975**	**$1,771**	**$321**	**$189**	**1.32**	**$1,318**	**$626**	**6.92**	**$1,652**	**$903**	**7.49**	**$257**	**$158**	**0.99**
Cryogenic infrastructure	$1,824	$774	$1,050	$0	$0	0.00	$652	$252	4.00	$1,172	$522	6.50	$0	$0	0.00
Building infrastructure	$1,922	$1,201	$721	$321	$189	1.32	$666	$374	2.92	$479	$380	0.99	$257	$158	0.99
Preparation and processing facilities	$0	$0	$0	$0	$0	0.00	$0	$0	0.00	$0	$0	0.00	$0	$0	0.00
CM fabrication infrastructure	$0	$0	$0	$0	$0	0.00	$0	$0	0.00	$0	$0	0.00	$0	$0	0.00
SRF materials research	$0	$0	$0	$0	$0	0.00	$0	$0	0.00	$0	$0	0.00	$0	$0	0.00
Photoinjector move and upgrade	$0	$0	$0	$0	$0	0.00	$0	$0	0.00	$0	$0	0.00	$0	$0	0.00
PD Component Development	**$24,926**	**$16,126**	**$8,800**	**$5,500**	**$2,300**	**32.00**	**$8,981**	**$6,781**	**22.00**	**$4,835**	**$3,235**	**16.00**	**$3,000**	**$1,700**	**13.00**
Front End	$8,233	$5,633	$2,600	$1,800	$600	12.00	$4,763	$3,763	10.00	$1,170	$970	2.00	$500	$300	2.00
Spoke Resonator Module	$5,600	$4,100	$1,500	$500	$300	2.00	$1,500	$1,300	2.00	$2,200	$1,500	7.00	$1,400	$1,000	4.00
RF Sources	$5,178	$2,578	$2,600	$2,370	$1,070	13.00	$1,698	$1,098	6.00	$400	$100	3.00	$400	$100	3.00
1.3 GH Cryomodule	$5,915	$3,815	$2,100	$830	$330	5.00	$1,020	$620	4.00	$1,065	$665	4.00	$700	$300	4.00
Operations	**$12,612**	**$3,372**	**$9,240**	**$638**	**$110**	**5.28**	**$2,852**	**$740**	**21.12**	**$2,897**	**$785**	**21.12**	**$3,112**	**$868**	**22.44**
Cryogens	$825	$825	$0	$0	$0	0.00	$66	$66	0.00	$231	$231	0.00	$264	$264	0.00
Operations and maintenance	$5,610	$858	$4,752	$0	$0	0.00	$1,337	$215	11.22	$1,337	$215	11.22	$1,469	$215	12.54
Controls Systems	$1,030	$370	$660	$0	$0	0.00	$257	$92	1.65	$257	$92	1.65	$257	$92	1.65
Safety Systems	$264	$132	$132	$0	$0	0.00	$66	$33	0.33	$66	$33	0.33	$66	$33	0.33
Computing and licenses	$132	$132	$0	$0	$0	0.00	$33	$33	0.00	$33	$33	0.00	$33	$33	0.00
Program management	$2,144	$494	$1,650	$440	$110	3.30	$516	$186	3.30	$396	$66	3.30	$396	$66	3.30
Modulator and klystron development	$2,607	$561	$2,046	$198	$0	1.98	$578	$116	4.62	$578	$116	4.62	$627	$165	4.62
TOTAL	**$41,284**	**$21,473**	**$19,811**	**$6,459**	**$2,599**	**38.60**	**$13,152**	**$8,148**	**50.04**	**$9,384**	**$4,923**	**44.61**	**$6,369**	**$2,726**	**36.43**

Summary of PD Costs FY05-09

ILC SRF Development Program	TOTAL	M&S	SWF
Infrastructure	**$3,746**	**$1,975**	**$1,771**
Cryogenic infrastructure	$1,824	$774	$1,050
Building infrastructure	$1,922	$1,201	$721
Preparation and processing facilities	$0	$0	$0
CM fabrication infrastructure	$0	$0	$0
SRF materials research	$0	$0	$0
Photoinjector move and upgrade	$0	$0	$0
PD Component Development	**$24,926**	**$16,126**	**$8,800**
Front End	$8,233	$5,633	$2,600
Spoke Resonator Module	$5,600	$4,100	$1,500
RF Sources	$5,178	$2,578	$2,600
1.3 GH Cryomodule	$5,915	$3,815	$2,100
Operations	**$12,612**	**$3,372**	**$9,240**
Cryogens	$825	$825	$0
Operations and maintenance	$5,610	$858	$4,752
Controls Systems	$1,030	$370	$660
Safety Systems	$264	$132	$132
Computing and licenses	$132	$132	$0
Program management	$2,144	$494	$1,650
Modulator and klystron development	$2,607	$561	$2,046
TOTAL	**$41,284**	**$21,473**	**$19,811**

This total represents 1/3 of the overall infrastructure cost

This total represents the overall PD R&D cost

This total represents 1/3 of the overall operations cost

Summary of the PD R&D* Costs FY05-09

(All costs in 2005 K$)	PD
M&S	16,126
SWF	8,800
Subtotal	24,926
G&A (16.05% M&S & 30.35% Labor)	5,259
Subtotal (incl. G&A)	30,185
Contingency (30%)	9,056
Total Cost	39,241

Direct Costs

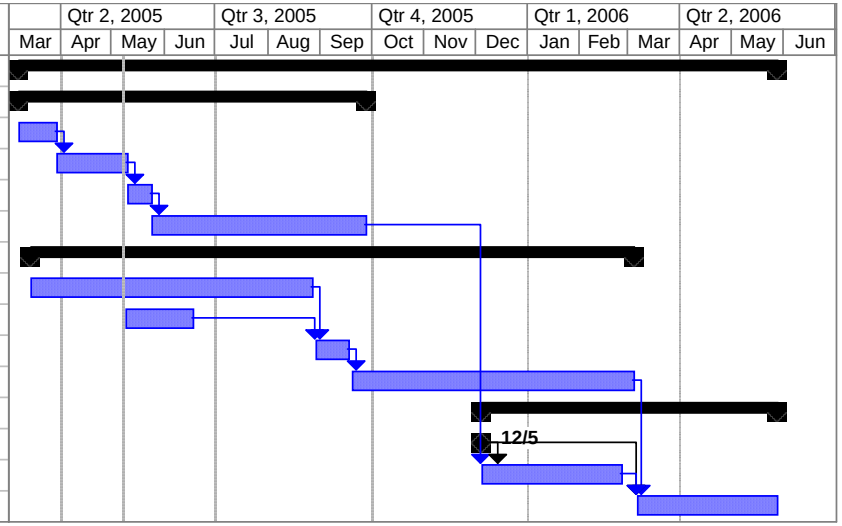
* PD Component Development Costs

Summary of Infrastructure and Operations Costs FY05-09

(All costs in 2005 K$)	ILC	PD	ILC+PD
M&S	31,915	5,347	37,262
SWF	35,374	11,011	46,385
Subtotal	67,289	16,358	83,647
G&A (16.05% M&S & 30.35% Labor)	15,859	4,200	20,059
Subtotal (incl. G&A)	83,148	20,558	103,706
Contingency (30%)	24,944	6,168	31,112
Total Cost	108,092	26,726	134,818
Grand Total (inc. component costs)	144,518	65,967	210,485

MP9 (CAF) Infrastructure Schedule

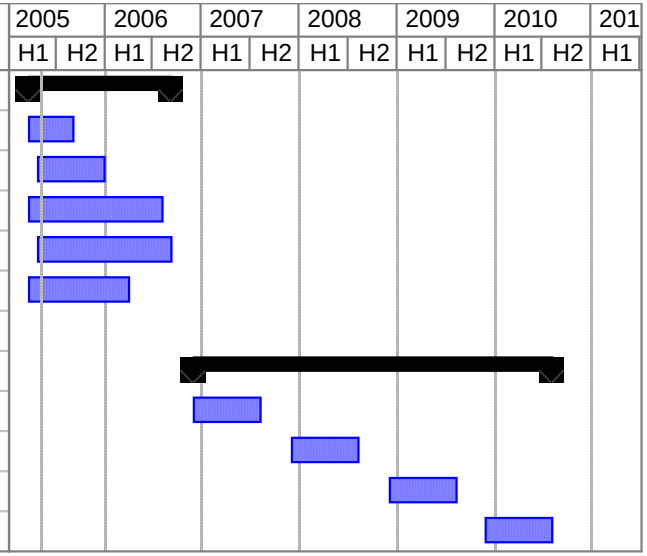
ID	Task Name	Duration	Start	Finish
1	**MP9 Infrastructure**	**320 days**	**Mon 3/7/05**	**Fri 5/26/06**
2	**Cleanrooms Procurement**	**146 days**	**Mon 3/7/05**	**Mon 9/26/05**
3	Develop specifications	16 days	Mon 3/7/05	Mon 3/28/05
4	RFQs and Bid Process	30 days	Tue 3/29/05	Mon 5/9/05
5	Place orders	10 days	Tue 5/10/05	Mon 5/23/05
6	Cleanrooms arrive	90 days	Tue 5/24/05	Mon 9/26/05
7	**Fixturing and Tooling**	**255 days**	**Mon 3/14/05**	**Fri 3/3/06**
8	Drawing Acquisition and Rework	120 days	Mon 3/14/05	Fri 8/26/05
9	Prepare Equipment and Fixturing Specifications	30 days	Mon 5/9/05	Fri 6/17/05
10	Order Tooling and Fixturing	15 days	Mon 8/29/05	Fri 9/16/05
11	Fixturing and Tooling Arrives	120 days	Mon 9/19/05	Fri 3/3/06
12	**Infrastructure Installation**	**125 days**	**Mon 12/5/05**	**Fri 5/26/06**
13	MP9 Becomes Available	0 days	Mon 12/5/05	Mon 12/5/05
14	Install Cleanrooms	60 days	Mon 12/5/05	Fri 2/24/06
15	Install Tooling and Fixturing	60 days	Mon 3/6/06	Fri 5/26/06



- Cleanroom procurement in FY05
- Major fixturing procurements in FY05
- Building becomes available NLT December 2005
- Ready for assembly operations in late Spring 2006

Cavity Procurement Schedule

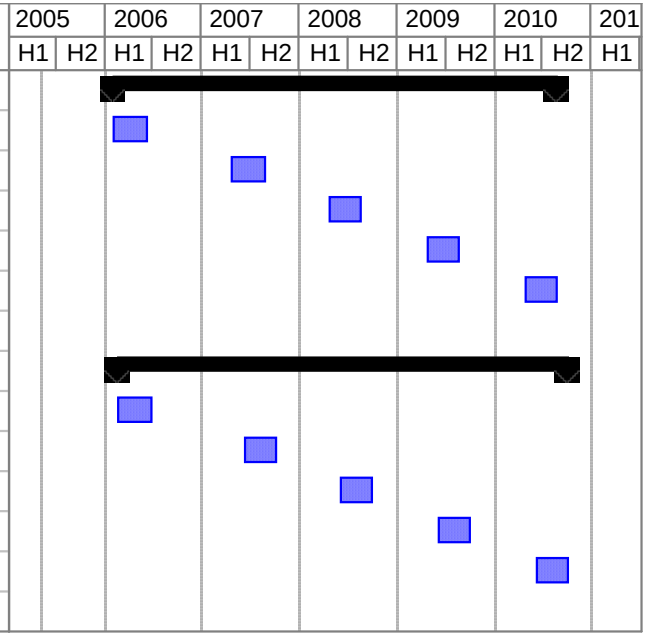
ID		Task Name	Duration	Start	Finish
1		**Initial 1.3 GHz Cavities**	**381 days**	**Fri 3/18/05**	**Fri 9/1/06**
2		ACCEL: 4 Cavities	120 days	Fri 3/18/05	Thu 9/1/05
3		KEK: 4 Cavities	179 days	Mon 4/18/05	Thu 12/22/05
4		DESY: 8 Cavities (Cryomodule Kit)	360 days	Fri 3/18/05	Thu 8/3/06
5		Cornell/Jlab/AES: 6 Cavities	360 days	Mon 4/18/05	Fri 9/1/06
6		Jlab: 6 Cavities	270 days	Fri 3/18/05	Thu 3/30/06
7					
8		**SMTF Cryomodule Cavities (36 total)**	**962 days**	**Mon 11/27/06**	**Tue 8/3/10**
9		Cryomodule 3 cavities (9 total)	180 days	Mon 11/27/06	Fri 8/3/07
10		Cryomodule 4 cavities (9 total)	180 days	Mon 11/26/07	Fri 8/1/08
11		Cryomodule 5 cavities (9 total)	180 days	Tue 11/25/08	Mon 8/3/09
12		Cryomodule 6 cavities (9 total)	180 days	Wed 11/25/09	Tue 8/3/10



- First cryomodule cavities will be the best combination of the four KEK, four ACCEL, and four AES cavities procured in FY05-FY06
- Second cryomodule cavities to be supplied in “kit” from DESY
- Sources for remaining cryomodule cavities TBD

Cold Mass and Vacuum Vessel Procurement Schedule

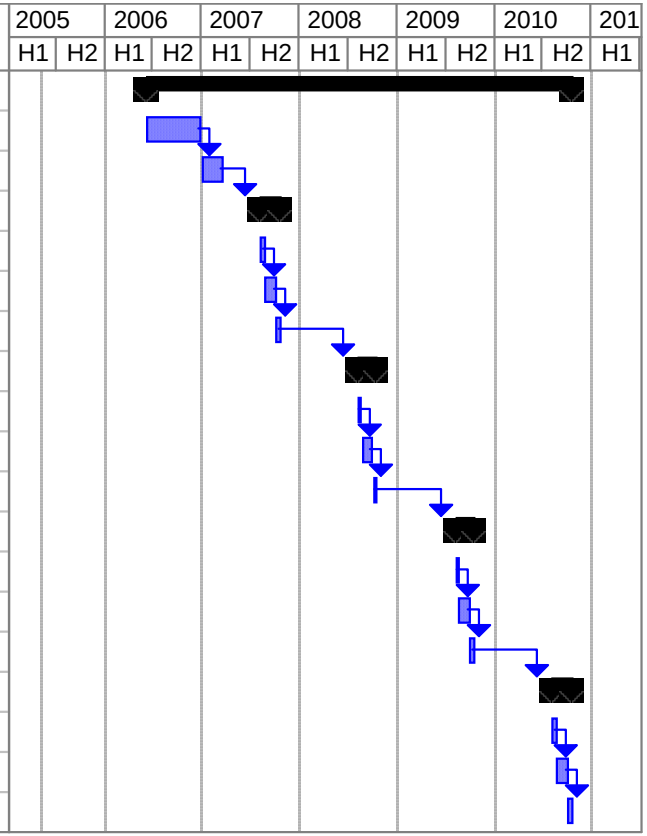
ID	Task Name	Duration	Start	Finish
14	**SMTF Cryomodule Cold Masses**	**1185 days**	**Wed 2/1/06**	**Tue 8/17/10**
15	Cryomodule 1 (U.S. built)	87 days	Wed 2/1/06	Thu 6/1/06
16	Cryomodule 3	87 days	Fri 4/20/07	Mon 8/20/07
17	Cryomodule 4	87 days	Thu 4/17/08	Fri 8/15/08
18	Cryomodule 5	87 days	Fri 4/17/09	Mon 8/17/09
19	Cryomodule 6	87 days	Mon 4/19/10	Tue 8/17/10
20				
21	**SMTF Cryomodule Vacuum Vessels**	**1206 days**	**Wed 2/15/06**	**Wed 9/29/10**
22	Cryomodule 1 (U.S. built)	87 days	Wed 2/15/06	Thu 6/15/06
23	Cryomodule 3	87 days	Fri 6/1/07	Mon 10/1/07
24	Cryomodule 4	87 days	Thu 5/29/08	Fri 9/26/08
25	Cryomodule 5	87 days	Fri 5/29/09	Mon 9/28/09
26	Cryomodule 6	87 days	Tue 6/1/10	Wed 9/29/10
27				



- First U.S. built cryomodule will be a TESLA Type III design and the cold mass and vacuum vessel will be procured from U.S. industry
- Second cryomodule cold mass and vacuum vessel (also a TESLA Type III design) to be supplied in “kit” from DESY
- Sources for remaining cryomodule cold masses and vacuum vessels will be in U.S. industry, but may be a revised design (ILC prototype?)

Cryomodule Final Assembly Schedule

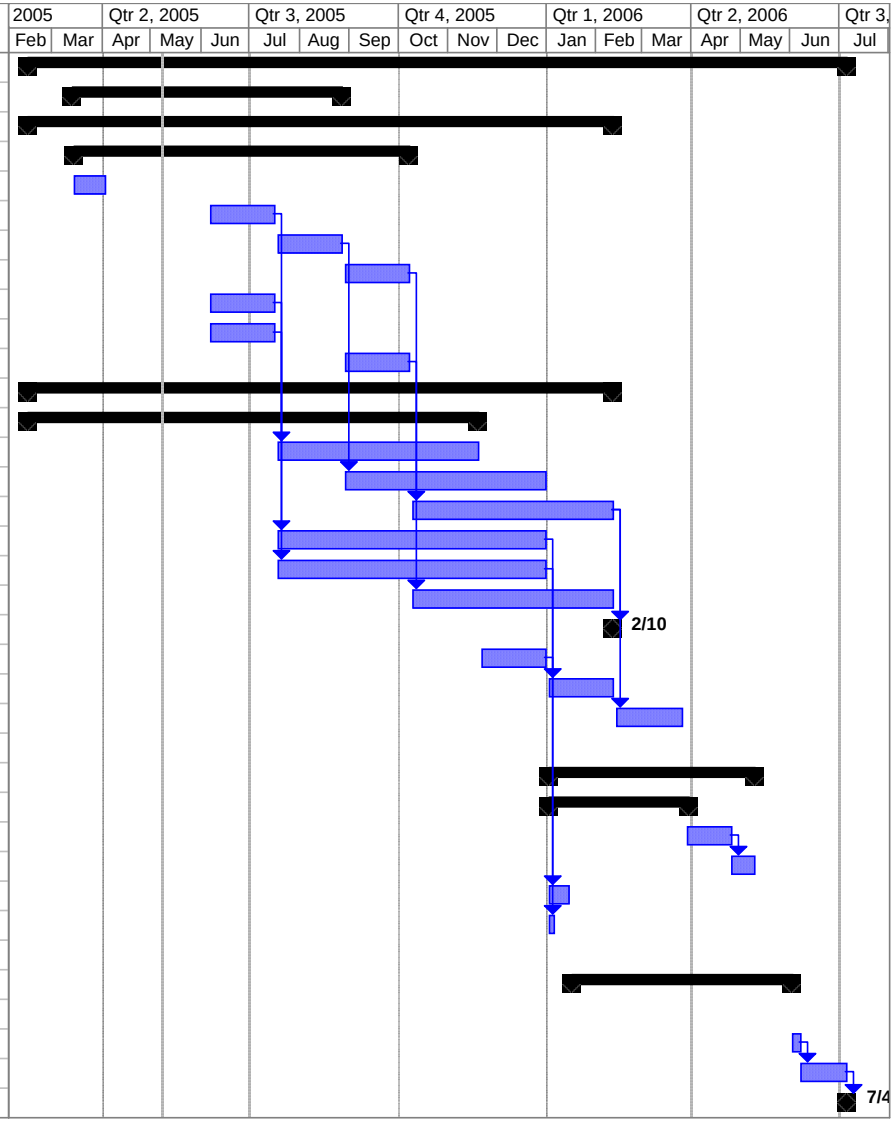
ID	Task Name	Duration	Start	Finish
28	**SMTF Cryomodules Final Assembly**	**1139 days**	**Thu 6/1/06**	**Tue 10/12/10**
29	Cryomodule 1 (U.S. built)	147 days	Thu 6/1/06	Fri 12/22/06
30	Cryomodule 2 (DESY Kit)	60 days	Mon 12/25/06	Fri 3/16/07
31	**Cryomodule 3**	**50 days**	**Mon 8/6/07**	**Fri 10/12/07**
32	String Assembly	10 days	Mon 8/6/07	Fri 8/17/07
33	Cold Mass	30 days	Mon 8/20/07	Fri 9/28/07
34	Vacuum Vessel	10 days	Mon 10/1/07	Fri 10/12/07
35	**Cryomodule 4**	**50 days**	**Mon 8/4/08**	**Fri 10/10/08**
36	String Assembly	10 days	Mon 8/4/08	Fri 8/15/08
37	Cold Mass	30 days	Mon 8/18/08	Fri 9/26/08
38	Vacuum Vessel	10 days	Mon 9/29/08	Fri 10/10/08
39	**Cryomodule 5**	**50 days**	**Tue 8/4/09**	**Mon 10/12/09**
40	String Assembly	10 days	Tue 8/4/09	Mon 8/17/09
41	Cold Mass	30 days	Tue 8/18/09	Mon 9/28/09
42	Vacuum Vessel	10 days	Tue 9/29/09	Mon 10/12/09
43	**Cryomodule 6**	**50 days**	**Wed 8/4/10**	**Tue 10/12/10**
44	String Assembly	10 days	Wed 8/4/10	Tue 8/17/10
45	Cold Mass	30 days	Wed 8/18/10	Tue 9/28/10
46	Vacuum Vessel	10 days	Wed 9/29/10	Tue 10/12/10



- Schedule is driven by available funding rather than CAF capacity
- Projected funding only supports one cryomodule assembly every nine to ten months

3.9 GHz TTF Cryomodule Schedule

ID		Task Name	Duration	Start	Finish
1		**3.9 GHz Cryomodule for TTF**	**362 days**	**Mon 2/14/05**	**Tue 7/4/06**
2		**Engineering Design and Drawing Packages**	**120 days**	**Sun 3/13/05**	**Fri 8/26/05**
10		**Component Parts Acquisition**	**260 days**	**Mon 2/14/05**	**Fri 2/10/06**
11		**RFQs and Bid Process**	**150 days**	**Mon 3/14/05**	**Fri 10/7/05**
12		Cavities: Establish FNAL/JLAB MOU	15 days	Mon 3/14/05	Fri 4/1/05
13		Helium Vessel	30 days	Mon 6/6/05	Fri 7/15/05
14		Tuner	30 days	Mon 7/18/05	Fri 8/26/05
15		Power Couplers	30 days	Mon 8/29/05	Fri 10/7/05
16		Cold Mass	30 days	Mon 6/6/05	Fri 7/15/05
17		Vacuum Vessel	30 days	Mon 6/6/05	Fri 7/15/05
18		Assembly Fixturing and Tooling	30 days	Mon 8/29/05	Fri 10/7/05
19		**Place Orders**	**260 days**	**Mon 2/14/05**	**Fri 2/10/06**
20		**Bare Cavities**	**200 days**	**Mon 2/14/05**	**Fri 11/18/05**
28		Helium Vessel	90 days	Mon 7/18/05	Fri 11/18/05
29		Tuner	90 days	Mon 8/29/05	Fri 12/30/05
30		Power Couplers	90 days	Mon 10/10/05	Fri 2/10/06
31		Cold Mass	120 days	Mon 7/18/05	Fri 12/30/05
32		Vacuum Vessel	120 days	Mon 7/18/05	Fri 12/30/05
33		Assembly Fixturing and Tooling	90 days	Mon 10/10/05	Fri 2/10/06
34		**All Components in Hand**	0 days	Fri 2/10/06	Fri 2/10/06
35		Process Cavities at ANL	30 days	Mon 11/21/05	Fri 12/30/05
36		Vertical Test Cavities at A0	30 days	Mon 1/2/06	Fri 2/10/06
37		Process Power Couplers	30 days	Mon 2/13/06	Fri 3/24/06
38					
39		**Cryomodule Pre-Assembly Tasks**	**91 days**	**Mon 1/2/06**	**Mon 5/8/06**
40		**Dress Cavities**	**62 days**	**Mon 1/2/06**	**Tue 3/28/06**
46		Horizontal Test of Cavities	20 days	Tue 3/28/06	Mon 4/24/06
47		Assemble Cavity String	10 days	Tue 4/25/06	Mon 5/8/06
48		Assemble Cold Mass	10 days	Mon 1/2/06	Fri 1/13/06
49		Prepare Vacuum Vessel as necessary	3 days	Mon 1/2/06	Wed 1/4/06
50					
51		**Cryomodule Final Assembly**	**99 days**	**Mon 1/16/06**	**Thu 6/1/06**
58					
59		Package Cryomodule for Shipping to DESY	3 days	Fri 6/2/06	Tue 6/6/06
60		Shipping to DESY, including clearing customs	20 days	Wed 6/7/06	Tue 7/4/06
61		**3.9GHz Cryomodule Arrives at DESY**	0 days	Tue 7/4/06	Tue 7/4/06



Conclusions

- **The Budgetary and Personnel Estimate prepared for the SMTF Proposal established a basis for the development of a complete cost estimate for the Proposal. The complete cost estimate remains a work in progress.**
- **Coupled with a Resource Loaded Schedule presently under development, the complete cost estimate will form the basis for managing the SMTF program at Fermilab.**
- **Some details of the ILC R&D, Infrastructure, and Operations portions of the SMTF Proposal Estimate have been presented.**
- **A schedule overview for the establishment of infrastructure, the production of R&D quantities of beta=1 cryomodules, and the production of the 3.9GHz cryomodule for the DESY TTF has also been presented.**