

BCP-037 (Strips): Summary of Changes

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Main changes in BCP-037 (1)

- Stave Cores

- Updated tasks for all **Carbon Foam** and **Honeycomb** purchases
 - Updated quotes for material and shipping, **entire production purchase order to be places ~ now**
- Additional **bus tape** samples (pre-drilled to improve y distortions)
- Additional order of **pre-preg** CF from Toray for pre-production

- Electronics

- Updated quotes for preproduction and production of **all ASICs** (HCCstar/AMAC, ABCstar)
- Updated quotes for **HVMux and Coils**
- Updated/obtained quotes for **PB Shield Box and Burn-in system**
- Added **delay of ~2m in submission of HCCstar and AMAC** (in part due to Covid-19)

Main changes in BCP-037 (2)

- Modules:

- Added **missing manpower in FY20** for Site Qualification tasks for UCSC
- Added **customs and handling** fees for importing silicon sensors

- Stave Assembly:

- Updated glue dispenser **consumables** and building materials in Production
 - Less consumables for glue dispenser, **no more silver epoxy**, added missing consumables, ...
- Updated shipping needs in pre-production
- **Plasma Cleaner** to improve bonding efficiency and **Laser** for stave metrology

- Other CERN Payments

- Added Material Payment for HV/LV Power Supplies for SR1 testing (~12k CHF)

Impact on Schedule

Overall relatively modest

- HCCstar and AMAC pre-prod submission delayed by ~ 2 months
 - Mainly due to delays in re-design of the HCCstar
- Impact on the overall schedule of the project: 12 days
 - Most of the delay re-absorbed in new structure of Pre-Production
 - PP3-A uses pre-prod ABCstar but prototype HCCstar/AMAC

Impact on Cost

- 6.2.1 Cores: -18k\$:

- additional order of carbon fiber and bus tape samples is compensated by quote adjustment for foam and honeycomb;

- 6.2.2 Electronics: -\$18k

- due to quote adjustments;

- 6.2.4 Modules: +\$169k

- Due to customs fees for Sensors in production and additional manpower at UCSC in FY20;

- 6.2.5 Stave Assembly: -\$24k

- Due to updates in production material and equipment and shipping costs;

- 6.2.7 US Contributions to CERN Procurements: +70k

- Updated quotes for ASICs, coils, and added HV/LV power supplies for SR1 testing.

Impact on Cost Baseline: Cobra Delta Report

Row Labels	Sum of Total
After	40,099,980
6.02.01 Stave Core	5,533,561
6.02.02 Readout Electronics	5,830,932
6.02.03 Hybrid Assembly	1,315,371
6.02.04 Modules	16,716,909
6.02.05 Stave Assembly	6,347,881
6.02.07 US Contributions to CERN Procurements-BNL	4,355,326
Before	39,921,631
6.02.01 Stave Core	5,551,899
6.02.02 Readout Electronics	5,849,041
6.02.03 Hybrid Assembly	1,315,371
6.02.04 Modules	16,547,902
6.02.05 Stave Assembly	6,372,119
6.02.07 US Contributions to CERN Procurements-BNL	4,285,299
Delta	178,349
6.02.01 Stave Core	(18,338)
6.02.02 Readout Electronics	(18,110)
6.02.03 Hybrid Assembly	-
6.02.04 Modules	169,007
6.02.05 Stave Assembly	(24,237)
6.02.07 US Contributions to CERN Procurements-BNL	70,027

Discussion of Risks

Cores

- Realized risks: RD-06-02-01-006 -- Bus tapes do not meet specification
 - Additional (pre-drilled) samples aim to improve the y distortions observed in bus tapes

Below threshold for mitigation

- Stave Assembly RD-06-02-05-008: Stave damage in shipping
 - Some of the shipping costs in 6.2.5 will help mitigate the risks associated with shipping staves to CERN, slightly reducing the post-mitigation probability of RD-06-02-05-006.
 - But reduction is too small to be quantifiable
- Cores: RD-06-02-01-002: Risk related to Foam vendor
 - Ordering the foam now slightly mitigates this risk RD-06-02-01-002
 - Again, reduction is too small to be quantifiable

Backup

More quantitative info

A	B	C	D	
All costs are fully loaded	New cost	old Cost	Diff	
Cores			\$ (18,338.0)	
Additional PrePreg and Bus Tape orders	\$ 57,165	\$ -	\$ 57,165	
Yale Foam + Honeycomb	\$ 619,391	\$ 697,583	\$ (78,193)	
Other			\$ 2,690	
Electronics			\$ (18,110.0)	
Shield box	\$ 94,985	\$ 129,792	\$ (34,807.6)	
PB test system	\$ 235,236	\$ 202,344	\$ 32,892.0	
Coils	\$ 91,001	\$ 108,768	\$ (17,767.0)	
Other			\$ 1,572.6	
Modules			\$ 169,007.0	
USCS additional effort in Fy20	81000		\$ 81,000.0	
Sensors customs fees	67700		\$ 67,700.0	
Minor changes and escalation			\$ 20,307.0	
Stave Assy			\$ (24,237.0)	
Glue dispenser	\$ 136,800	\$ 148,800	\$ (12,000.0)	
Plasma cleaner	\$ 69,404	0	\$ 69,404.0	
Stave for plasma cleaner	\$ 12,000	0	\$ 12,000.0	
Laser	7743	0	\$ 7,743.0	
Consumables in production (remove silver epoxy and add rest)+ escalation			\$ (63,384.0)	
Additional shipping costs	\$ 38,000		\$ 38,000.0	
Payments to CERN			\$ 70,027.0	
6.02.07.01 / BNL / RE170050M Material Payment for HV/LV Power Supplies	\$ 12,174		\$ 12,174	
6.02.07.01 / BNL / RE310335M PMT: Material for Pre-Production Chip Sub	\$ 182,824	\$ 165,885	\$ 16,939	Preprod ASICS
6.02.07.01 / BNL / RE320650M PMT: Material Payment for Pre-Production	\$ 421,947	\$ 332,680	\$ 89,267	
6.02.07.01 / BNL / RE350260M PMT: Material for Submit Chip to Fab via	\$ 138,033	\$ 138,033	\$ -	
6.02.07.31 / BNL / RE140400M PMT: Material Payment for Fabrication Ord	\$ 564,696	\$ 895,237	\$ (330,541)	HVMux*
6.02.07.31 / BNL / RE261405M PMT: Material Payment for Production BPOL	\$ 204,239	\$ 210,366	\$ (6,127)	
6.02.07.31 / BNL / RE310390M PMT: Material Payment for Production by C	\$ 1,057,842	\$ 852,977	\$ 204,865	Prod ASICS
6.02.07.31 / BNL / RE321030M PMT: Material Payment for Chip Production	\$ 556,256	\$ 472,806	\$ 83,450	
Grand Total			\$ 178,349.0	