

Production Status Update

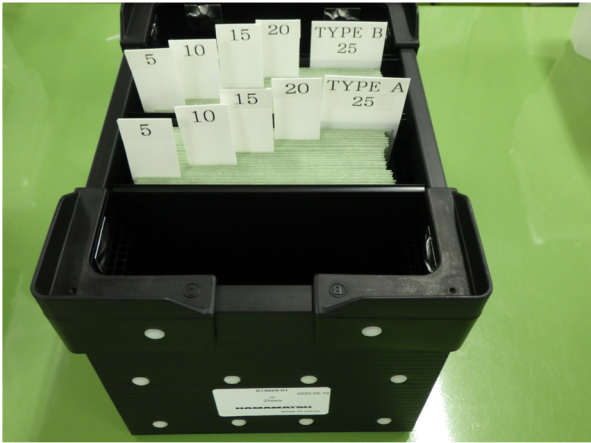
RIKEN/RBRC
Itaru Nakagawa

Executive Summary

- Silicon Sensors
 - 100 Sets (batch-2) production silicons are to be delivered on May 20th as scheduled.
- FPHX
 - ~1500 good FPHX chips are delivered to NCU on April 29th.
- HDI
 - 19 HDI's are delivered to NCU on April 30th.
 - To be shipped 39 HDI's to BNL to be delivered by June 1st (reopening).
- Stave
 1. 12 prototype-IV staves are delivered to RIKEN in April 30th.
 1. 4 staves will be shipped to NCU on May 8th.
 2. To be shipped 4+4 staves to BNL to be delivered by June 1st (reopening).
 2. Procurements towards production
- Trigger Scintillators and PMTs
 - Scintillators+light guides \$2k (2weeks) PO on hold
 - 4PMTs \$2.5k (2.5month) PO on hold

Silicon Sensors (Batch-2) Production Status

Photo by Hamamatsu Co.

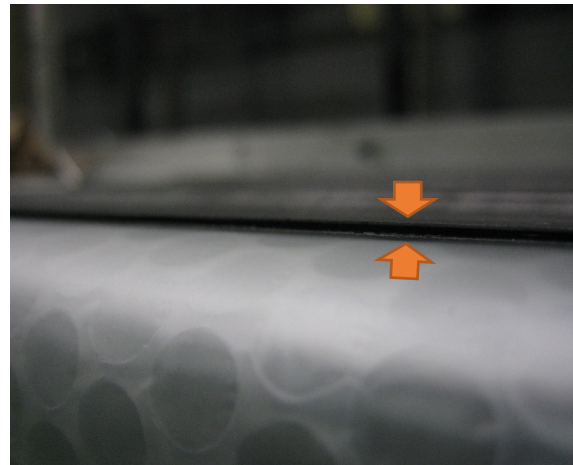
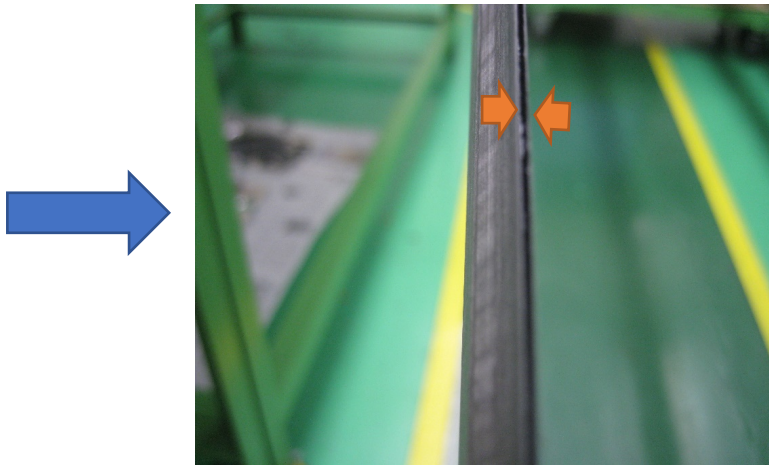
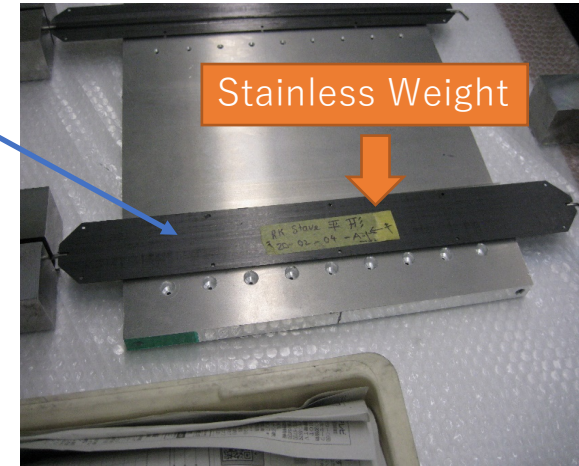
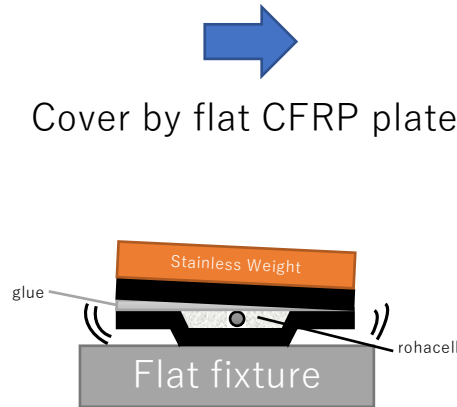
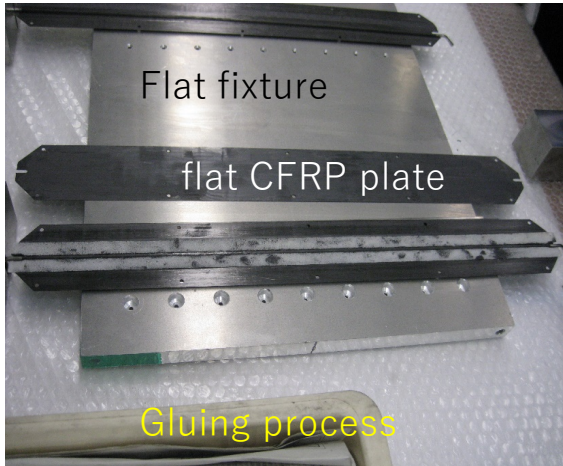


- 100 sets (batch-2) sensors are to be delivered on May 20th on schedule.
- We have 100 sets (batch-1) sensors in RIKEN. 29 in NCU, 20 in BNL
- Sensors are to be shipped to NCU accordingly once NCU testing starts to run smoothly (middle of May?)

Stave

- 8 Staves are delivered on Feb. 28th
- 12 Staves are delivered on April 30th

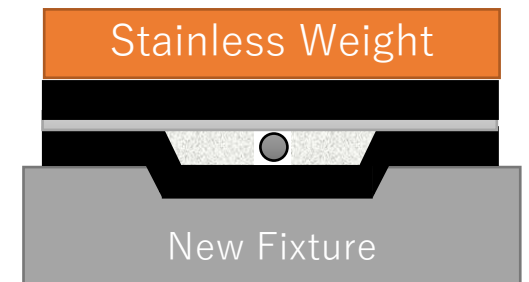
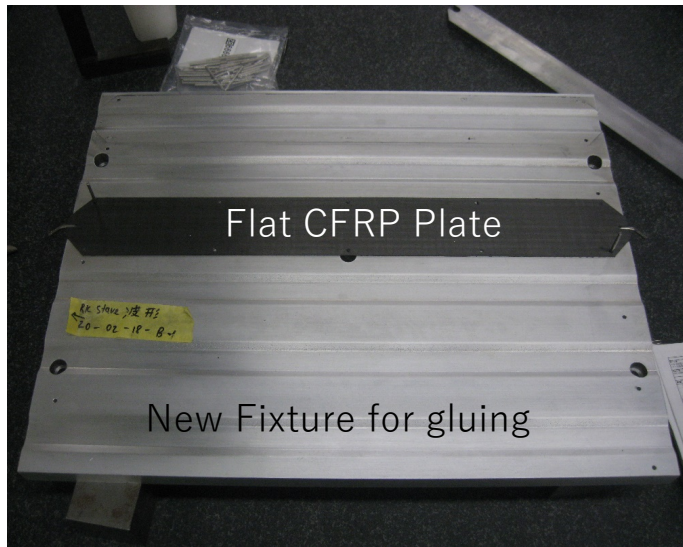
CFRP Assembly (for 8 staves in February)



- Keep the weight for a while until epoxy glue dries.
- Due to **instability** of the stave on the fixture, staves ended up with non-uniformity in the space between CFRP plates.

New CFRP Assembly (for 12 staves)

- They developed a new fixture which accommodates structure of the bottom CFRP plate.



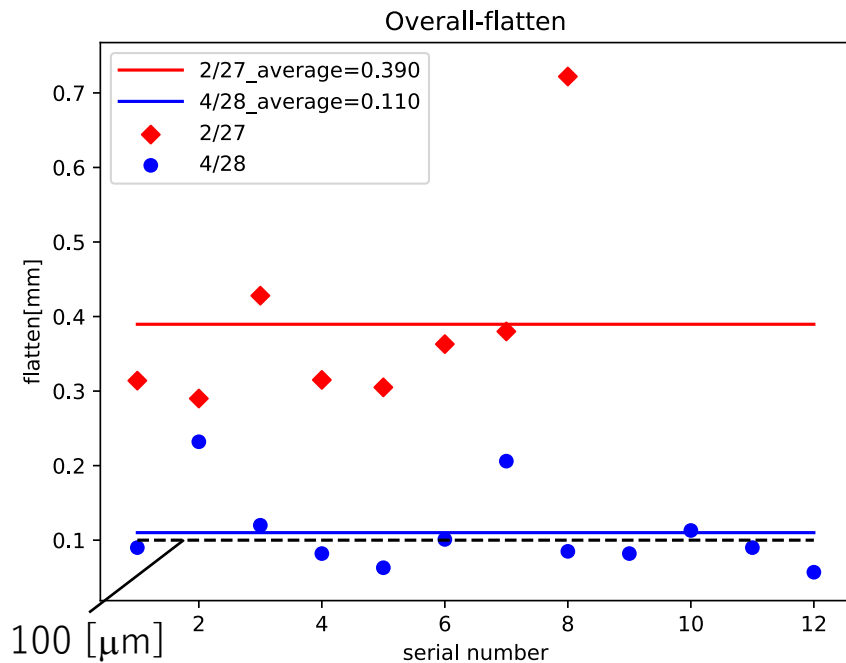
Now the stave in assembly is kept stable while steel plate weight is placed on it. This improved not only uniformity of the space between CFRP plates, but also the flatness of the stave.

Stave Performance Report from Asuka

Location	Device	Machine No	Reference	Sample					S/N0003	S/N0004	S/N0009	S/N0007	S/N0008	S/N0009	S/N0010
				S/N0001	S/N0005	S/N0006	S/N0010	S/N0002							
1	S	A002	497.0	496.840	496.737	496.631	496.722	496.680	496.828	496.771	496.833	496.725	496.795	496.812	496.863
2	S	A002	248.5	248.430	248.366	248.352	248.361	248.357	248.459	248.374	248.414	248.322	248.394	248.416	248.396
3	S	A002	38.0	37.895	38.030	38.008	37.984	37.973	37.985	37.993	38.009	38.000	37.996	37.993	37.974
4	S	A002	234.0(front)	233.999	233.999	233.989	233.988	233.996	234.049	233.992	233.981	233.974	233.986	233.985	233.993
4	S	A002	234.0(back)	233.984	233.995	233.999	233.911	234.040	234.006	234.016	234.011	233.971	233.979	233.988	234.002
5	S	A002	2.0(front)	1.999	2.002	2.003	2.004	1.990	1.998	1.988	2.004	1.998	2.000	1.999	1.999
5	S	A002	2.0(back)	1.996	2.003	1.998	2.008	1.997	1.995	2.000	2.000	2.001	2.005	1.996	1.997
6	S	A002	Position 0.05(A)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6	S	A002	Position 0.05(B)	0.043	0.030	0.022	0.038	0.086	0.074	0.045	0.047	0.044	0.041	0.010	0.025
6	S	A002	Position 0.05(C)	0.015	0.024	0.029	0.033	0.029	0.052	0.050	0.013	0.026	0.040	0.080	0.041
6	S	A002	Position 0.05(D)	0.049	0.009	0.044	0.034	0.097	0.062	0.034	0.062	0.032	0.040	0.068	0.043
7	S	A002	Position 0.35(E)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7	S	A002	Position 0.35(F)	0.033	0.030	0.022	0.043	0.013	0.042	0.006	0.015	0.035	0.008	0.016	0.010
7	S	A002	Position 0.35(G)	0.004	0.007	0.012	0.023	0.042	0.016	0.048	0.015	0.033	0.014	0.003	0.006
7	S	A002	Position 0.35(H)	0.006	0.029	0.022	0.003	0.007	0.019	0.005	0.010	0.043	0.027	0.001	0.007
8	S	A002	0.126	0.090	0.082	0.113	0.057	0.232	0.120	0.082	0.090	0.063	0.101	0.206	0.085
9	S	A002	//0.126	0.075	0.116	0.060	0.089	0.122	0.119	0.118	0.109	0.063	0.095	0.009	0.079
10	S	A002	//1.01(左)	0.840	0.220	0.733	0.651	0.627	0.680	0.113	0.975	0.296	0.923	0.289	0.280
10	S	A002	//1.01(右)	0.214	0.061	0.240	0.546	0.142	0.895	0.230	0.751	0.302	0.501	0.097	0.415
11	S	A002	246.0(左)	245.972	246.019	245.945	245.916	245.847	246.045	246.036	245.958	245.947	246.006	245.997	245.964
11	S	A002	246.0(右)	245.944	245.916	245.774	245.999	245.965	245.926	246.015	246.019	246.017	246.060	245.957	245.944
12	S	A002	236.0(左)	235.962	235.993	235.940	235.908	235.848	236.044	235.963	235.990	235.945	236.019	235.906	235.973
12	S	A002	236.0(右)	235.965	235.945	235.785	235.990	235.949	235.930	236.004	236.027	236.037	236.076	235.921	235.945
13	S	A002	Flatness A	0.050	0.019	0.069	0.013	0.049	0.018	0.030	0.049	0.023	0.041	0.031	0.013
13	S	A002	Flatness B	0.033	0.040	0.082	0.033	0.041	0.020	0.031	0.049	0.040	0.024	0.018	0.040
13	S	A002	Flatness C	0.024	0.029	0.079	0.031	0.042	0.018	0.028	0.026	0.032	0.023	0.013	0.026
13	S	A002	Flatness D	0.054	0.027	0.052	0.041	0.052	0.056	0.024	0.044	0.029	0.046	0.032	0.014
14			Leak < 0.01ml-mbar/sec	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Desination				NCU					BNL(2)				BNL(1)		
Judge				合	否	合	否	合	否	合	否	合	否	合	否

Excel spreadsheet is available in : <https://wiki.bnl.gov/sPHENIX/index.php/Stave>

Stave Flatness Performance (Overall area)

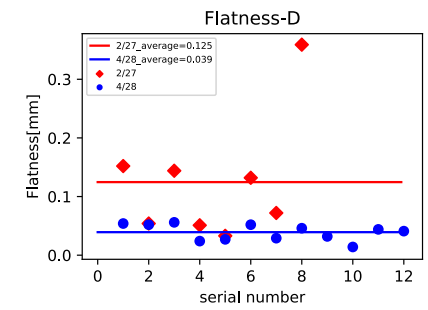
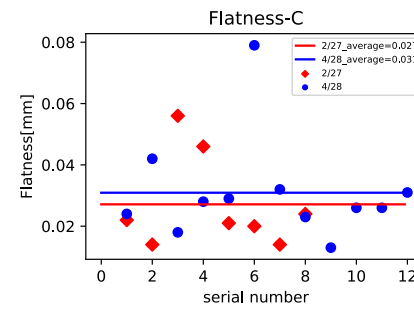
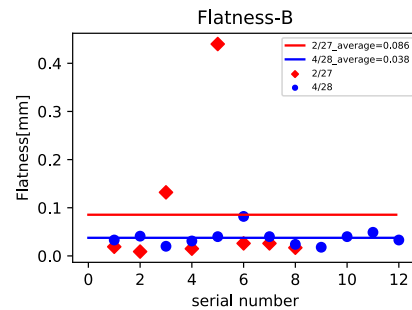
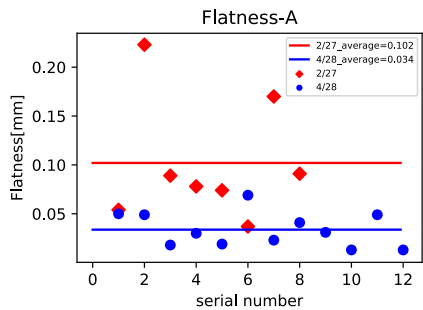


Plot by Hikaru Imai (Rikkyo Univ.)

Delivery	# of stave	Average Flatness [mm]	# of stave achived <100[μm]	fraction
2/27	8	0.390	0	0
4/28	12	0.110	7	58%

- Evidently, the flatness of the stave is very much improved.
- Requiring the flatness <100[μm] now becomes feasible with a bit more improvement in the yield rate of 20% or so.
- Goal yield rate > 80% is already achieved if <120 [μm].

Stave Flatness Performance (Local area)



Plot by Hikaru Imai (Rikkyo Univ.)

Average flatness of each silicon region [mm]

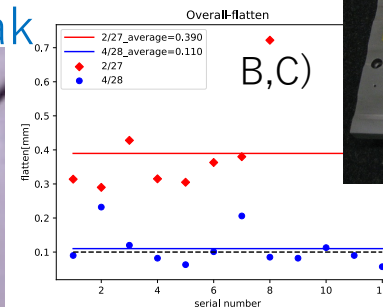
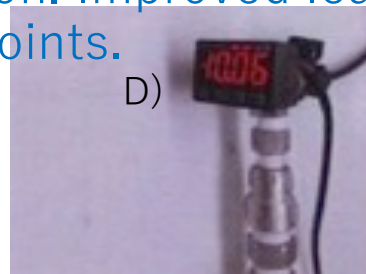
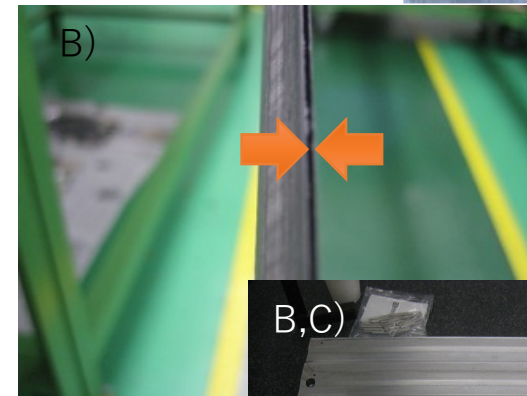
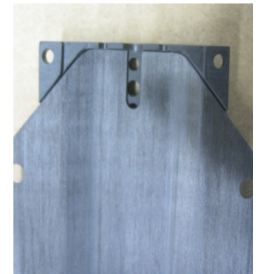
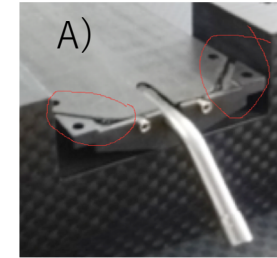
Delivery	A	B	C	D
2/27	0.102	0.086	0.027	0.125
4/28	0.034	0.038	0.031	0.038

The flatness of the local area of each silicon sensors are well establishing <100 [μm]

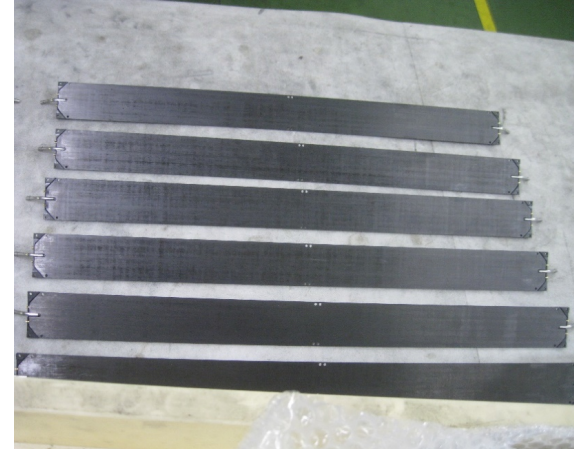
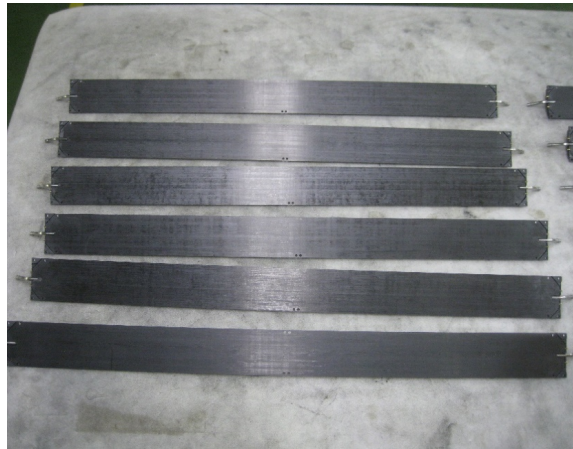
Stave Prototype-IV Summary

Issues in 8 staves delivered on Feb.28

- A) Extra space between end cap and CFRP plates: Fixed by fine tuning machining
- B) Non-uniform space between CFRP plates: developed new fixture which stabilize weight holding while glue is cured.
- C) Poor flatness: Solution for B) also improved the flatness.
- D) Poor leak test records: Upgraded the pressure gauge to improve the precision. Improved leak tight condition at the fitting joints.



12 Staves Delivery to RIKEN on April 30th



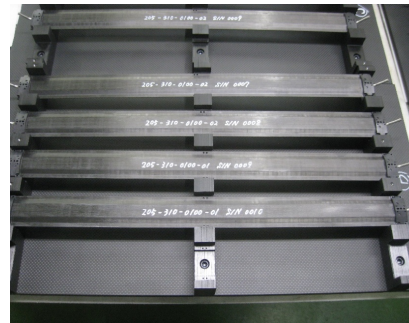
Shipping 3-boxes



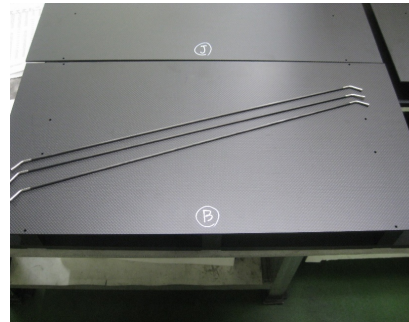
4 staves



NCU
To be picked up on May 8th
from RIKEN



4 staves



+ 3 tubes



BNL
to be delivered by the end of May



4 staves



BNL
to be shipped once 1st
box is delivered

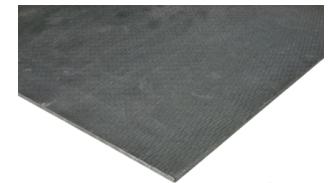
Preparation for Stave Production

Item	Make	Vender	Web	Product	Quantity	LeadTime [weeks]	Procurer	調達状況
NT91500-520S Prepreg	Japan Graphite Fiber	Japan Graphite Fiber Co.				8	RIKEN	
K13C2U Prepreg	Mitsubishi Chemical Co.	Mitsubishi Chemical Co.					ASUKA	
Roha Cell 110 RIST							ASUKA	
Ketron CA30 PEEK	Mitsubishi Chemical Co.	Monotaro				sufficient leftover available from preproduction	ASUKA	
CFRP Pipe	TORAYCA T700	Kimuraya Co.	http://www.saoya-kimuraya.com			8	ASUKA	
		ROCKWEST	https://www.rockwestcomposites.com/round-tubing/round-carbon-fiber-tubing/t-rnd-118				RIKEN	
SUS316 Tube	McMaster-CARR	McMaster-CARR	https://www.mcmaster.com/89935k39	3ft.	20	in stock	RIKEN	
SUS316 Tube Sleeve	McMaster-CARR	McMaster-CARR	https://www.mcmaster.com/1800t518	3ft.	9	in stock	RIKEN	
Pin Receptacle	Mill-Max MFG Corp	Digi-Key					ASUKA	
Epoxy Glue								
EP75-1	Master Bond	MasterBond	https://www.masterbond.com/tds/ep75-1	pints kit	10	2	RIKEN	
HYSOL 9396	Henkel-LOCTITE	ELLSWORTH					RIKEN	
Rohacell加工								
Super 77接着剤	3M						ASUKA	
VM&P Naphtha 溶解剤							ASUKA	

2 items takes 2 months for the procurements

Need some action prior to the contract

Item	Make	Quantity	Vendor	Price
Cooling Tube	TOLAYCA 700c	100 m	Kimuraya Co.	\$3,000
			Rockwest	\$2,000
Prepreg sheet	Nihon Graphite Fiber (NGF)	75 m ²	NGF	\$9,000



- Major difficulty is RIKEN is on hold any new contract. We have to wait until RIKEN reopens
- Tring to investigate a way to procure before the scheduled RIKEN's reopening day (June 7th).

FEM-IB

Debugging Plan of 2nd FEM-IB in Taiwan

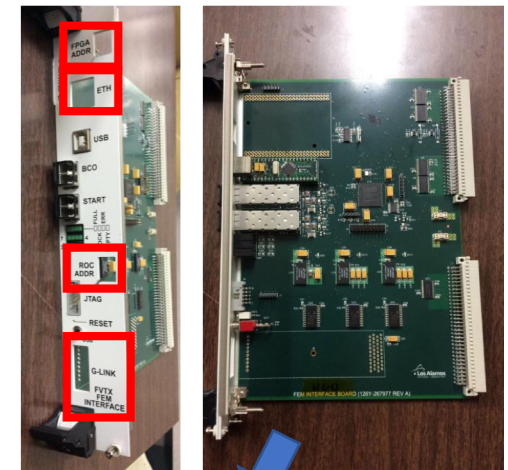
- Consulted with FVTX experts
- No one recall if this FEM-IB used to work, but no obvious reason of incompatibility with the standalone.
- Suggested to search for any record in DB and e-log (not available now).
- Suggested debugging procedure.
 - Whether you can program the FPGA?
 - Is the CLK/START it distributes looks OK?
 - Does it and its FEM respond to slow control command?
 - And you can run some test signal to debug pings which is usually very helpful.
- The FEM-IB is to be debugged at NWU or BNL once institutes are resumed normal operation.

bad FEM IB 1

Things not attached

(In the test at NWU, we didn't use any NWU's things for below places.)

- FPGA ADDR
- ETH
- ROC ADDR
- G-LINK



FEM INTERFACE BOARD (126Y-267977 REV A)

FVTX Electronics database

phenix.bnl.gov

Explore Rocky Po... Rocky Point Natu... LV Bulk PS Count... 特別定額計上... Steve - sPHENIX Upload file - sPH... coresoftware/PH... Sub access to int... INTT Bi-weekly... FEM interface bo...

FEM Interface Boards

ID	soft ID	assembly	power up	FPGA prog.	fiber comm.	links ¹	location	status
1	H	MB 2011-06-15 Done -> OK	2011-07-21 Done -> OK	MLB 2011-07-21 Done -> OK code: v0.01Jan10	xxx 2011-07-21 slow: Done -> OK data: not yet done	(none)		entry clobbered final ok
2	H	Done -> OK	2011-07-21 Done -> OK	MLB 2011-07-21 Done -> OK code: v0.01Jan10	xxx 2011-07-21 slow: Done -> OK data: not yet done	(none)	100B	entry clobbered final ok
3	H	1 SB 2011-07-18 Done -> OK	SB 2011-07-18 Done -> OK	SB 2011-07-18 Done -> OK code: v0.01Jan10	SB 2011-07-18 slow: Done -> OK data: not yet done		100B	Sent to BNL for Martin DAQ tests
4	H	2 SB 2011-07-19 Done -> OK	SB 2011-07-19 Done -> OK	SB 2011-07-19 Done -> OK code: v0.01Jan10	SB 2011-07-19 slow: Done -> OK data: not yet done		UNM	All ok
5	H	3 SB 2011-08-03 Done -> OK	SB 2011-08-03 Done -> OK	SB 2011-08-03 Done -> OK code: v0.01Jan10	SB 2011-08-03 slow: Done -> OK data: not yet done		UNM	All ok
6	H	4 SB 2011-08-03 Done -> OK	SB 2011-08-03 Done -> OK	SB 2011-08-03 Done -> OK code: v0.01Jan10	SB 2011-08-03 slow: Done -> OK data: not yet done		UNM	OK Had issue of programming from EEPROM at first, but seem to have recovered. Some pins on J5 had been bent and shorted, this may be possible reason

¹Numbers in brackets [nnn] link to elog entries.

SUBMIT to Data Base

<https://www.phenix.bnl.gov/WWW/p/draft/fvtx/WedgeAssembly/Database/daqtest.php?from=0>

backup

COVID-19 Status

- RIKEN :
 - Government emergency declaration extended another month.
 - RIKEN extends minimum operation until June 7th.
 - Minimum operation mode. Unless the work is approved as "essential", all new contract (including PO and shipping) are basically pended.
 - We can receive products delivery (HDI, Stave, Silicon, etc.)
 - We ship products to Taiwan, to avoid RIKEN to become the show stopper of their operation.
 - We cannot pursue shipping to BNL. The best we can do may be ship freights to be delivered by BNL reopening day (once fixed).

RIKEN management actively consider how to gradually restart research activities in the next month.