Electronics design and production

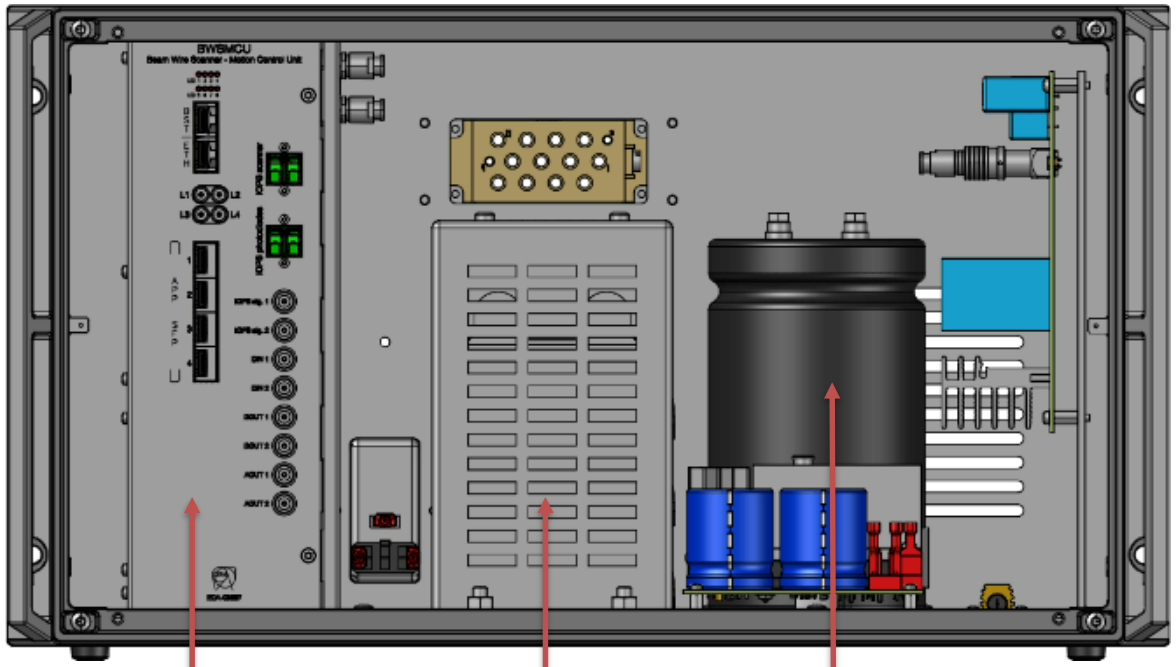
LIU-BWS Project meeting

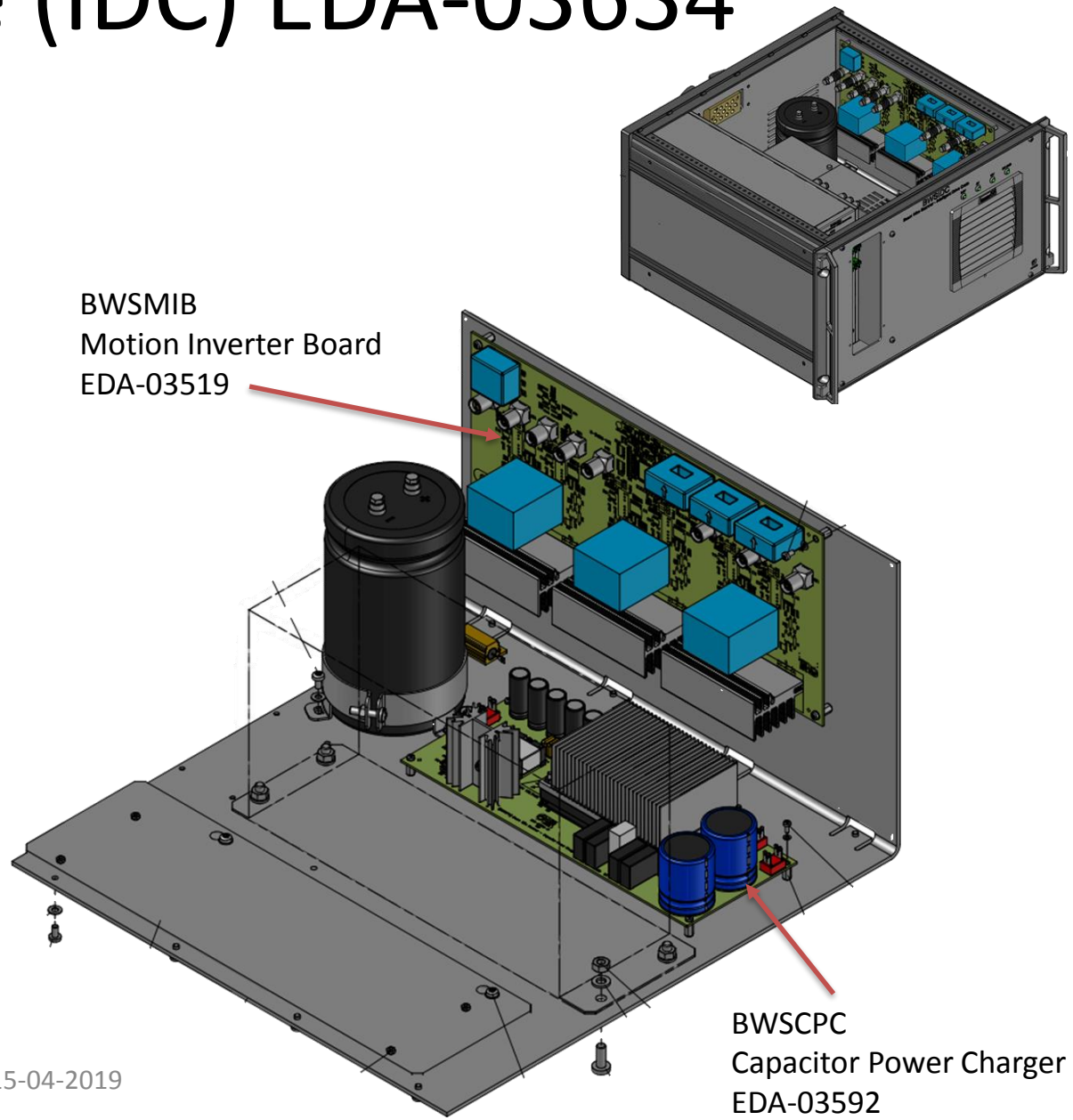
Electronics design and production

- Design status and milestones
- Production planned quantities
- Production schedule
- Production speeding-up

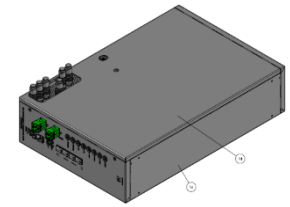
Intelligent Drive Crate (IDC) EDA-03634

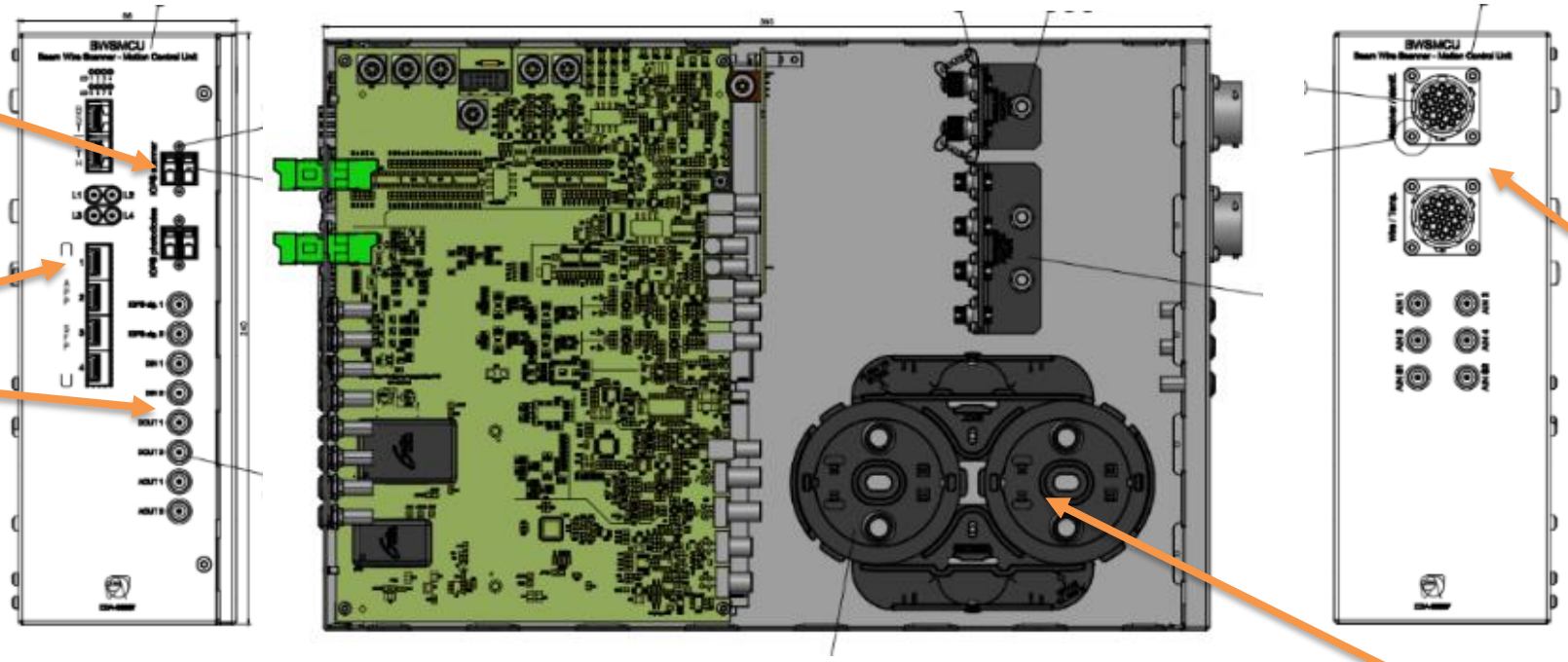
6U, ≈ 22Kg

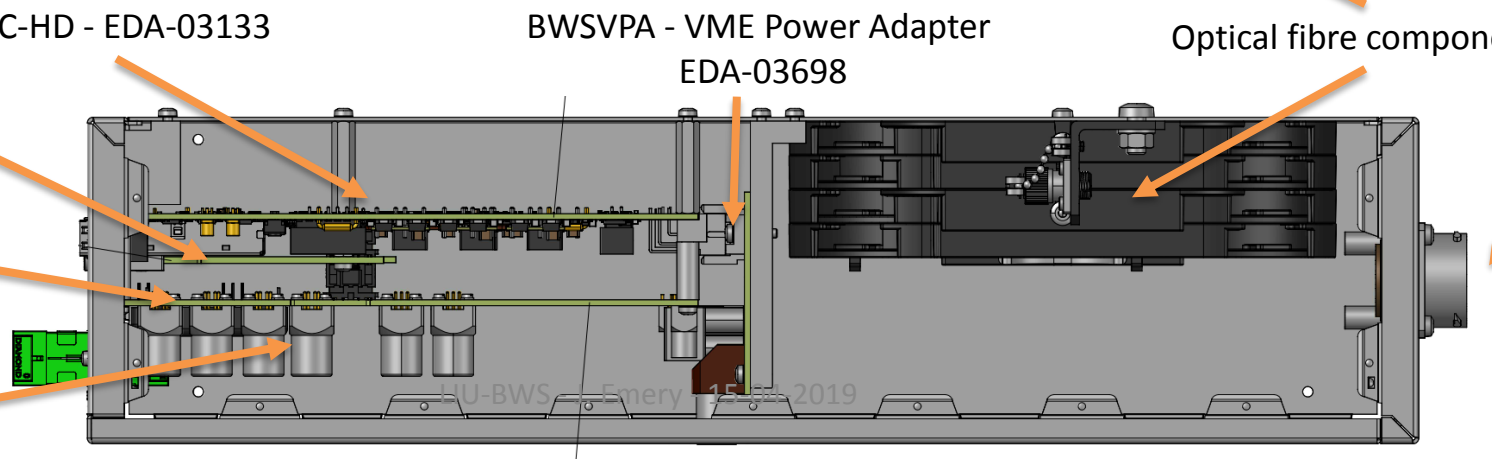




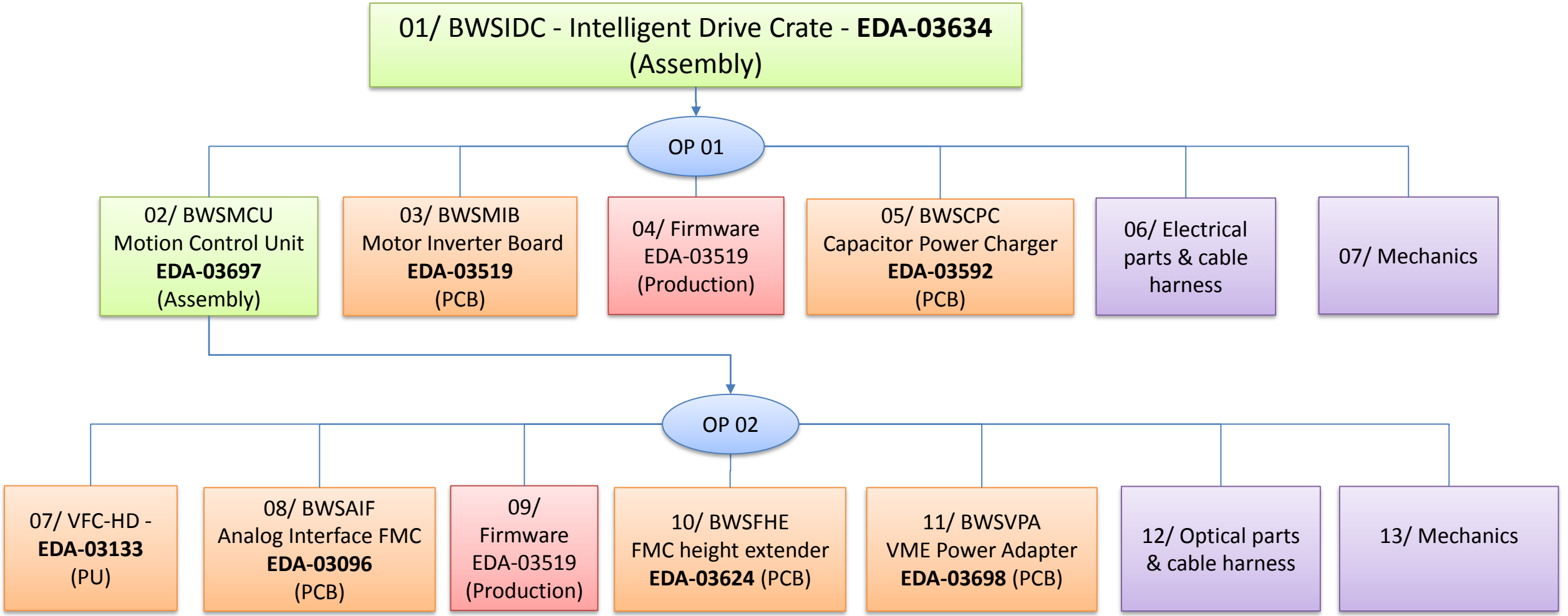
Motion Control Unit (MCU) EDA-03697







BWS Drive system - Bill of Material



BWSIDC - items

EDA	Designation	Estimate completion	Description	rev.	Part Numbers	Status	next
EDA-03592	BWSCPC	70%	BWS – Capacitor Power Charger	V3	40	V3 + modifications under tests	Finalise validation then at the design office for V4
EDA-03519	BWSMIB	80%	BWS – Motor Inverter Board	V2	64	10 boards produced, 1 under tests	assemble for prototype 2
EDA-03096	BWSAIF	60%	BWS – Analog Interface FMC	V3	95	3 proto ready for tests	Electrical tests + Firmware modification V2 -> V3
EDA-03624	BWSFHE	90%	BWS – FMC Height Extender	V2	1	10 pcs ready for final test	assemble for prototype 2
EDA-03698	BWSVPA	90%	BWS – VME Power Adapter	V1	2	12 pcs ready for final test	assemble for prototype 2
EDA-03764	BWSPSA	100%	BWS – Particle Shower Acquisition	V1	16	Tested with beam - ready for series production	order PCB + componants
EDA-03634	BWSIDC	80%	BWS – Intelligent Drive Crate	V2	105	Prototyping on-going	assemble for prototype 2
			box			commercial product	
			custom mechanics			3 sets under construction (BE-BI)	
			Cables harness			under prototyping with EN/EA	
EDA-03697	BWSMCU	80%	BWS – Motion Control Unit	V2	57	Prototyping on-going	
			box			production 25 units (PENTAIR)	
			custom mechanics			2 systemes under construction	
			Cables harness			under prototyping with EN/EA	change of connectors ongoing (for better reliability)
total					380		

System design milestones

- Assembly BWSIDC V2 with latest boards (May):
  - small mechanics under production
  - BWSMIB V2 (tested by Patrik before leaving)
  - BWSCPC V3 with manual modifications (modified by Jonathan)
  - BWSAIF V3 (firmware to adapt from V2)
- New BWSCPC revision (V4) to fix the 'diode burning' (May):
  it will not be ready for June validation,
  will have to be integrated in July and tested separately.
- Functional and thermal validation BWSIDC (June):
  - Operate all functionalities of the system at nominal conditions
  - Multiple calibrations with it, check stability.
  - On-line survey temperatures of the parts, check elevation.
  - try tests at higher ambient temperature?
- Go ahead of the production (end of June):
  PCB productions (~1 month)
  PCB assembly (~2 month)

Electronic boards tests bench design

- Basic procedures of board tests are existing (using multi-meters and power supplies..)
  But they are missing functionalities and are unsafe (live boards at 230V).

- For the BWSMIB
  More sophisticated one using Labview is on-going (Jose Maria).
  Adding to the initial work of Patrik and Marc (stagiaire).

- For the BWSCPC
  To be completed by a small test stand (Guillaume & Jose Maria)

- For the BWSAIF
  To be developed using FPGA firmware (Jonathan)

- For the complete crate
  will be using the existing python application adding one panel (Jonathan and Guillaume)

LIU–BWS intelligent drive crate quantities

23

- PSB: 8
- PS: 5
- SPS: 4
- Operational spares: 4
- Calibration bench: 1
- Firmware & Software dev: 1

- Initially requested (2016): 28
- 4 spares are the absolute minimum number to unsure quality of service having 19 running systems.
- Extra electronic boards with be produced to unsure mid-term maintainability, avoid end-of-life components problems (~220 Part numbers!)
- According to R. Berberat (TE-MPE-EM), the best solution to store spares components is to mount them on extra boards (to avoid humidity and thermal problems)

ESS–BWS intelligent drive crate quantities

7

- Operational: 6
- Calibration bench: 1
- Spare electronics boards: 1 of each types

- Initial request: 6
- Calibration bench (recently): 1
- Agreed to provide one PCB of each type for maintenance:
  BWSMIB
  BWSCPC
  BWSAIF
  VFC ?

LHC–BWS intelligent drive crate quantities

10

- Operational: 8
- Spare: 2

- Control of the consolidated linear scanners with the LIU-BWS electronics
- Mechanical design study done
- Motor selection done
- Procurement on-going for 2 prototypes to be installed in the LHC.

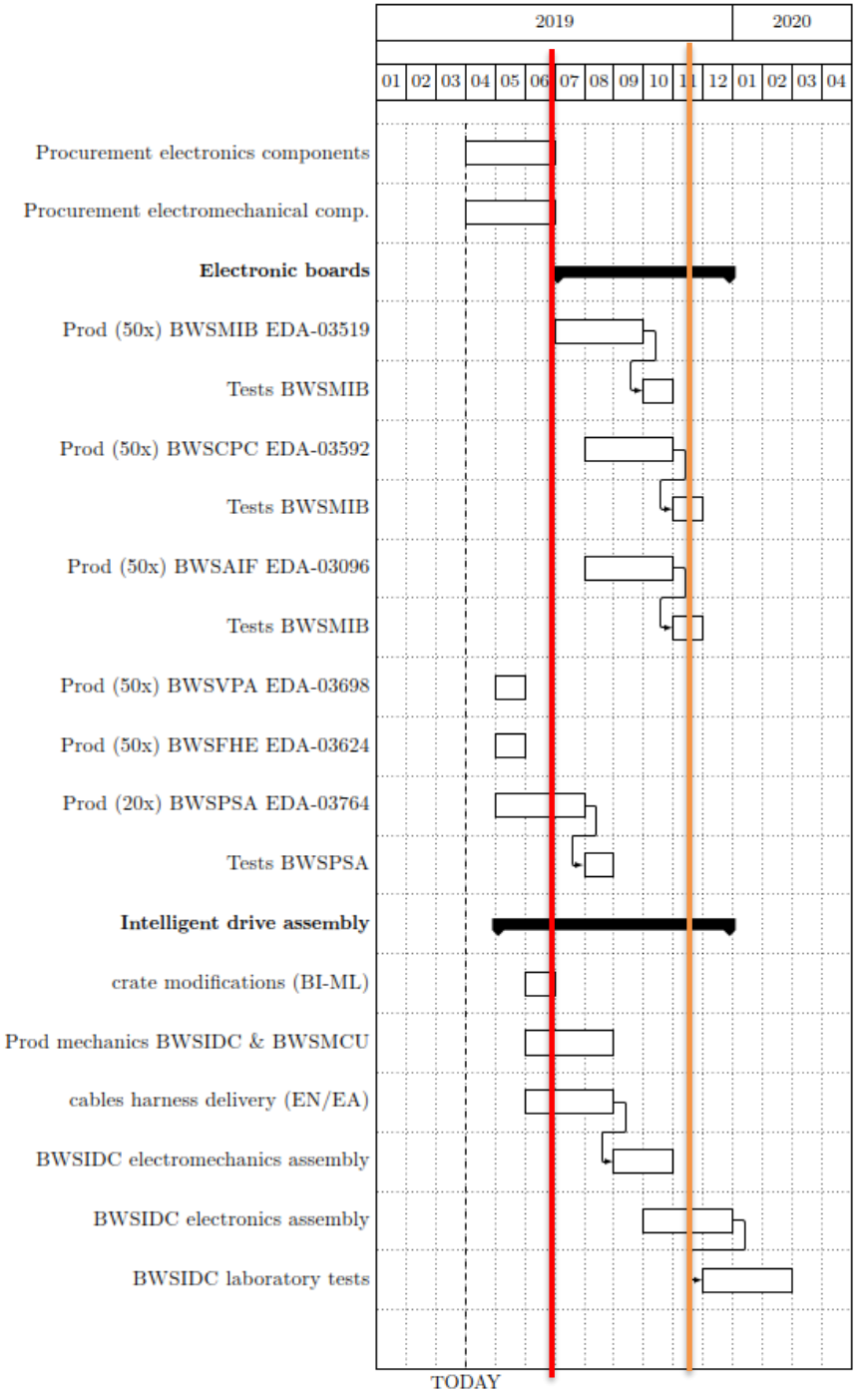
Production schedule

- <u>Production go ahead on hold</u>
  Not before end of June after validation (red line)
  board production is about 3 months (summer time…)

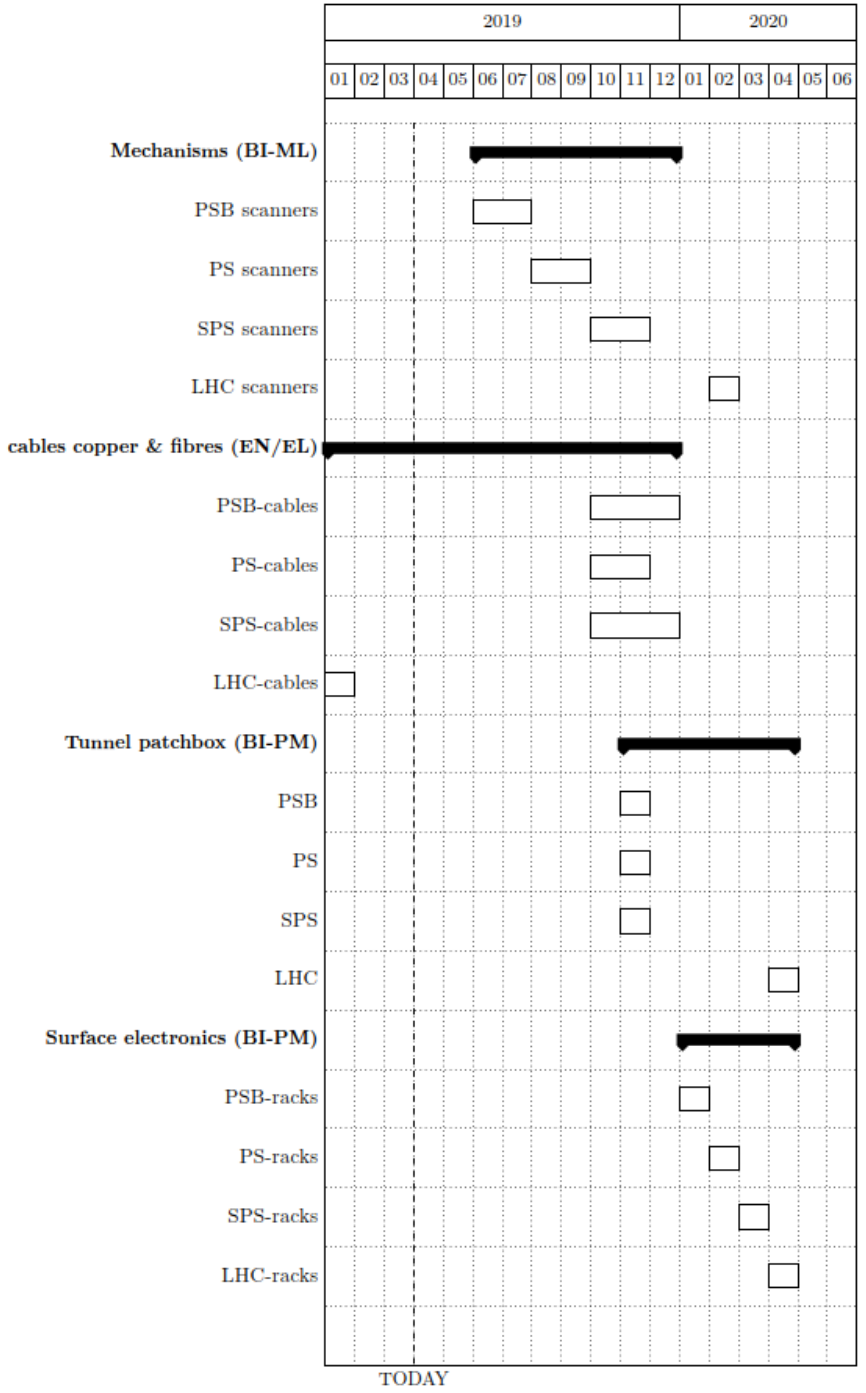
- R. Berberat (TE-MPE-EM) suggested to start before this date to meet our deadlines of the end of the year

- <u>We could gain a month:</u>
  Launch the PCB production by end of May,
  Risk of having to reproduce these if final test reveal some problems….
  Cost estimate for these PCB: 26k in total.
  BWSMIB: 6k, BWSCPC: 10k, BWSAIF: 10k

- Production testing starts mid-November and continue during the beginning of the year 2020 (orange line)



Installation schedule



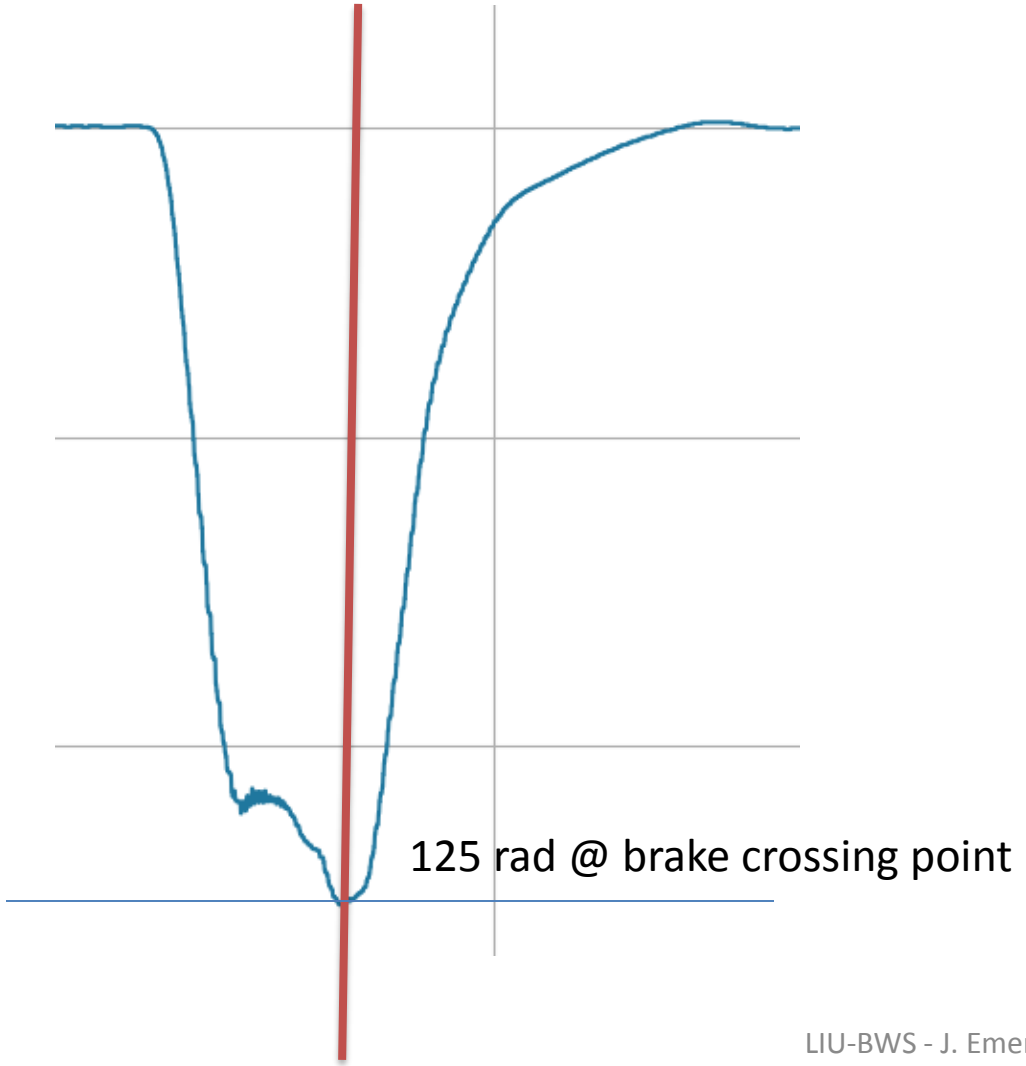
Summary of the BWSIDC production

- Total: 23+7+10 => 40 units
- Price for one unit ~9.5kCHF may be reduced due to large quantity orders
- Spare boards ~10pcs of each type
- Procurement of electronic components to be started now
- Assembly of boards will be launched after the final validation of the system
  => not before end of June.
- Production and tests of the units will take place likely from Sep 2019 and continue in 2020.
- Realistically, not all the units will be ready by the end of the year

TO DECIDE:

1) Order PCB at the end of May, with the risk of producing PCB boards not 100% tested?
2) Since ESS is late, can we postpone delivery and use the first units to install in the PSB?

Return speed consideration at 133 rad/s Scanner PSB-CR0004



- Speed is more difficult to achieve during the return
- The brake seems not useful for some scanners due to the large frictions.
- If we need faster or more stable speed, we should try without the brake
- How complex it is?