



Handling Engineering projects for LS2

(15 min)

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HE projects

- Cranes
- Lifts
- Handling machines
- Road vehicles

Cranes

Consolidation of all major cranes in the accelerator complex has started during LS1. Aim to finish most of them before LS2.

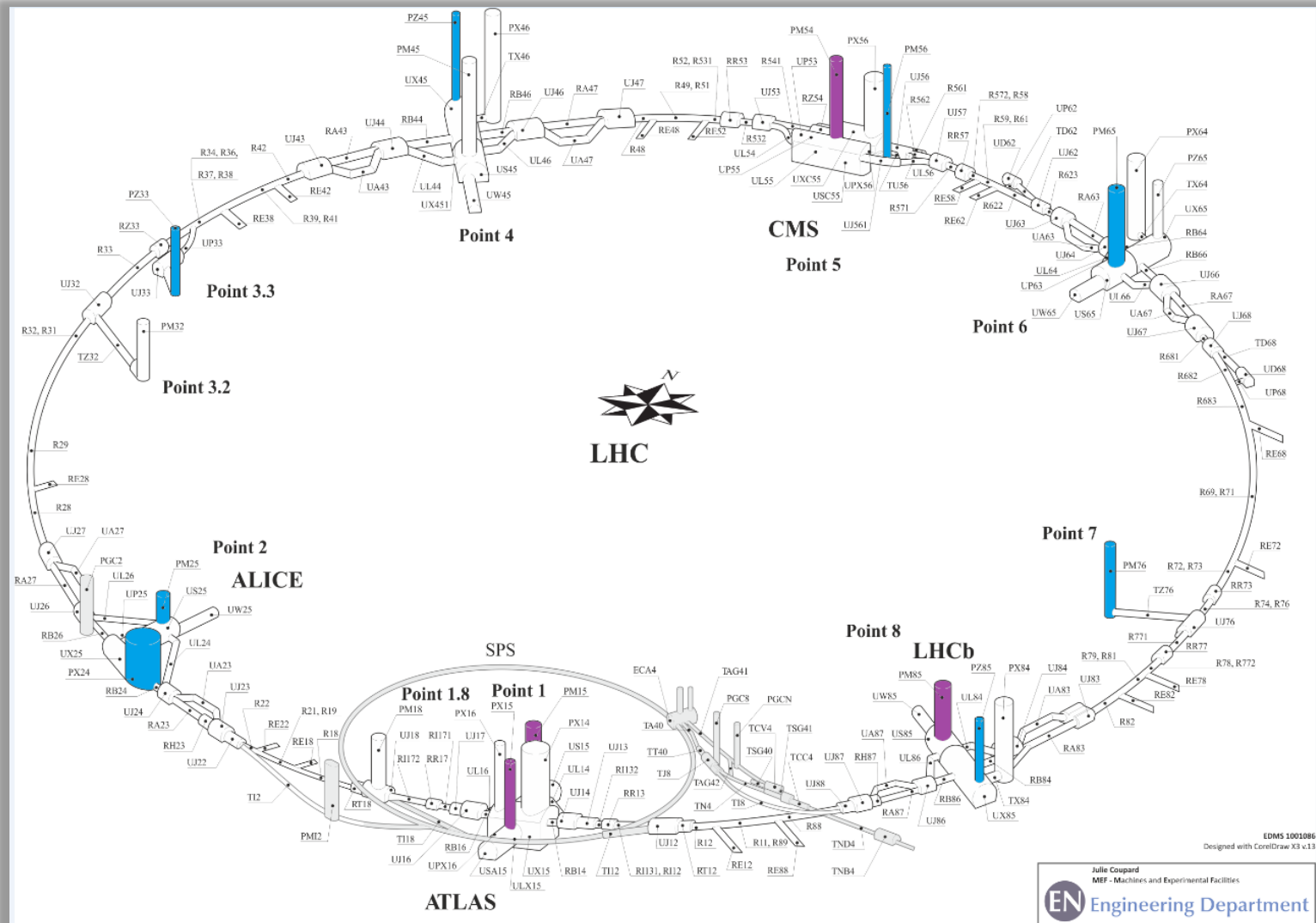
- L2, PSB and PS cranes are all consolidated
- SPS BB4 and BB5 done, ECX5 polar crane in EYETS (SPS beam dump)
- North and East area finished. EHN2 in LS2
- LHC experiments (LEP cranes): SX2 and SX8 done, UX85 in EYETS and SX4-UX45 (HL cryo) in YETS. A second crane in UXC55 is foreseen in YETS as well to improve logistics in the CMS cavern.

Only new project for LS2 is the modular crane for the PS switchyard.

On top of other tertiary buildings as b. 311 and FLEX (and several smallest).



LHC lifts replacement Overview



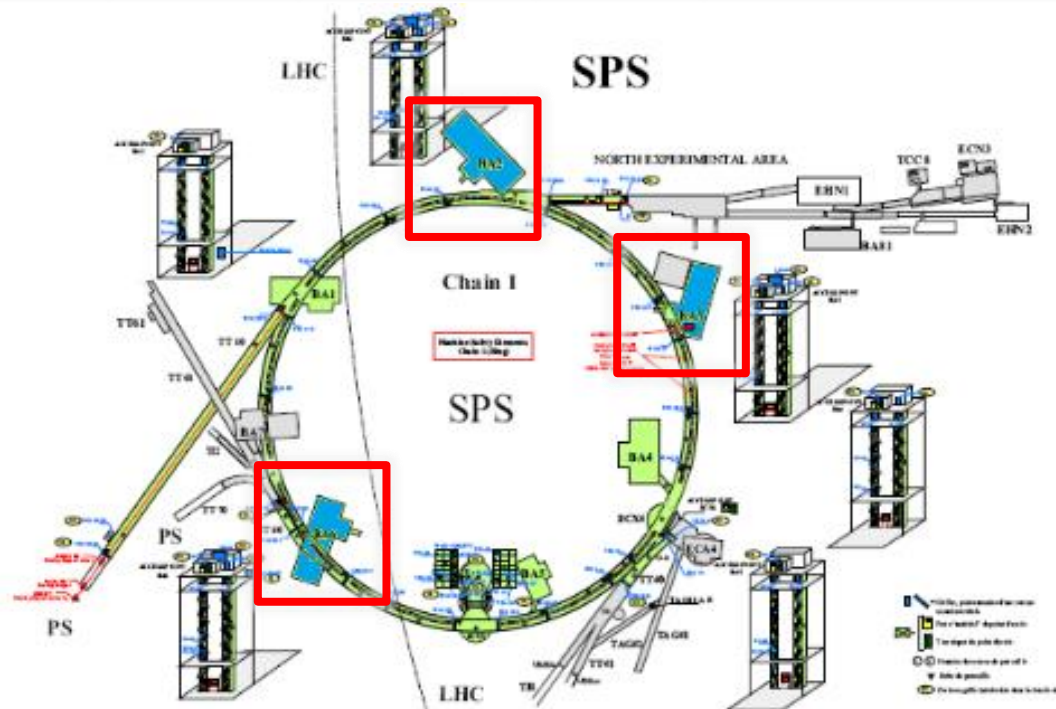
LHC lifts replacement overview

Location	Capacity (t)	Travel Height (m)	Floors	Current usage (Aug. 2015)	Replacement timeslot
PX24 (ALICE)	0,63	51,21	3	733'000	Dec. 2016 - Feb. 2017, EYETS
PZ85 (LHCb)	1	103,67	2	1'058'000	Jan. 2017 - Mar. 2017, EYETS
PM54 (CMS)	3	97,05	4	847'000	Sept. 2017 – Nov. 2017, Run 2
PM85	3	99,56	2	1'030'000	Dec. 2017 – Feb. 2018, YETS
PM15	1	82,5	2	343'000	Dec. 2018 – Feb. 2019, 1st of LS2
PM25	1	45,35	2	236'000	Feb. 2019 – Apr. 2019, 2nd of LS2
PM76	3	97,18	2	829'000	Apr. 2019 – Jun. 2019, 3rd of LS2
PZ33	3	99,25	2	1'074'000	Jun. 2019 – Aug. 2019, 4th of LS2
PZ45	1	143,54	2	330'000	Aug. 2019 – Oct. 2019, 5th of LS2
PM56	1	90,01	2	1'078'000	Oct. 2019 – Dec. 2019, 6th of LS2
PM65	3	94,8	2	697'000	Aug. 2020 – Oct. 2020, Cooldown of LS2
PX15 (ATLAS)	3	91,81	3	883'000	Dec. 2020 – Jan. 2021, Last of LS2

10 weeks interruption of service for each intervention

SPS 25 t lifts refurbishment Overview

Location	Capacity (t)	Travel Height (m)	Floors	Replacement timeslot
BA2	25	47,5	2	Dec. 2016 - Mar. 2017, EYETS
BA3	25	62,4	2	Sept. 2018 - Jan. 2019, LS2
BA6	25	40,5	2	Mar. 2019 – May 2019, LS2



9 weeks interruption of service for each intervention

Lifts – consolidation

- All lifts in the shaft (of some importance) will be consolidated during LS2.
- Lifts deserving the underground accelerator can be consolidated only during long stops, in the same moment when their availability is crucial for the shutdown (except PM54 that is always available)
- Some will be done in EYETS and YETS but only minor lifts (like BA2) or where there is a back up lift in the area (PX24, PZ85, PM85).
- Unavailability of the lifts is an important driver for LS2 logistics and planning

Handling machines

- The consolidation of all (historically) handling machines is under way.
 - Locomotives and train components for PS magnets (1961)
 - Dumont (1974), Chariot a Loehr (1997), Tortue (1974), Pratt (1976) et Hubtex (1978) for SPS
- Additional are in provision for increase of the rates (one unit more of same vehicles) and redundancy : Hubtex (7t lateral forklift in SPS that is an unique machine)
- Improvement of existing machines to make them 'more remote' (ALARA approach of optimisation): Palfinger crane for LHC collimators, Pratt for Splitters
- New handling machines (from scratch) not expected before LS3 (HL triplets for ex.)
- We intend to be ready with all that before LS2

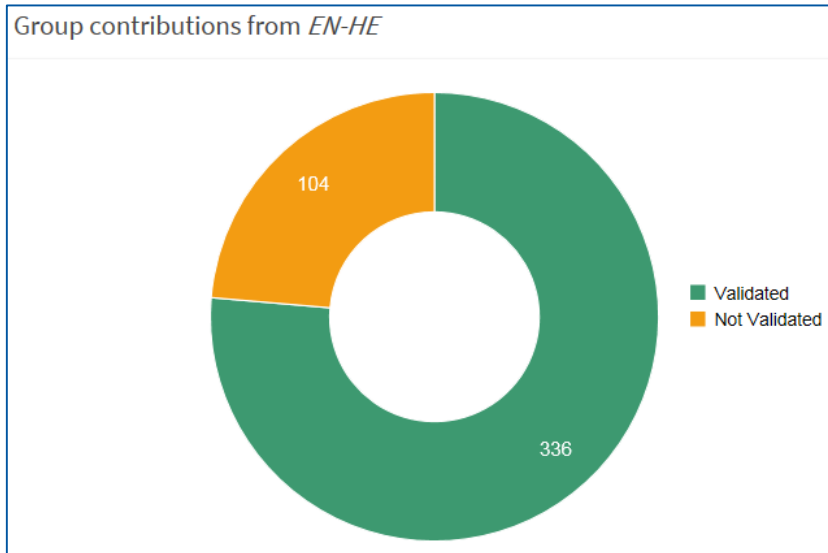


Road vehicles

- In the frame of cons., all our vehicles will be renovated to be compatible with the LS2 transports requirements
- A special attention is given by the more restrictive standards to be applied on the intersites transport of RP goods with the procurement of ADR oriented vehicles and containers. Ex.: second extra low-bed vehicle with type A box for transport of medium weight accelerator components (up to 3t, ie collimators etc)



Transport support (Heavy handling)

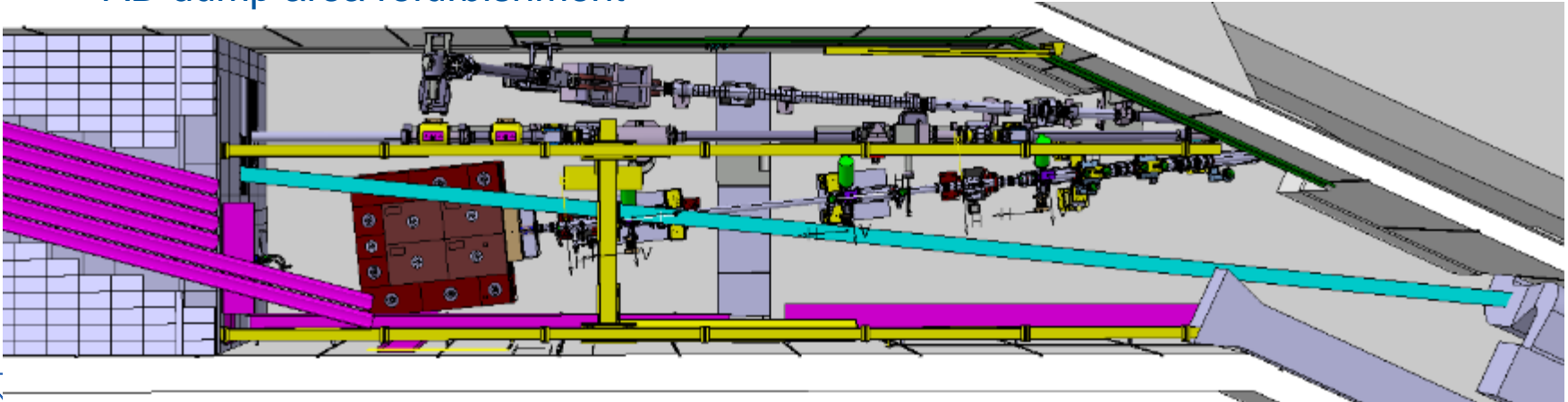


- 440 support requests received from PLAN.
- Spreading over a variety of projects (all CERN projects are represented)
- From minimal (install a single piece) to 3-5 years support

- For the moment, no specific showstopper identified.
- No surprises or completely unknown projects have appeared.
- For the time being, we foresee to increase the supervision team of 1 person (from 7 to 8) and to double the contractor team (from 50 to 100 FSU) during the whole of LS2. Making LS2 bigger than LS1.

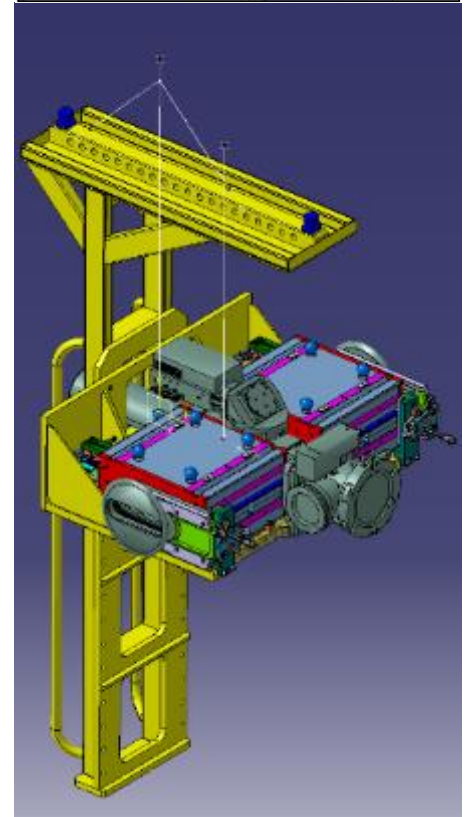
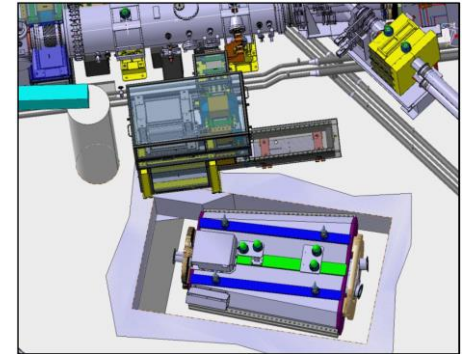
Major projects to be supported by HE

- Magnet campaigns in all injectors (LIU or Cons) like 50% of the magnets in PS, major refurbishment in the PSB for LIU, aC coating and magnet cons. campaigns in SPS.
Plus cryo-magnets (11T) into the LHC.
- SPS-LIUs: dump in BA1->BA5, extraction in BA2 and in particular RF at BA3 for which we need more information
- East Area renovation including extensive refurbishment of the whole beam lines and shielding in the building
- L4 interconnection with completely reshuffling of the area between L2 and the PSB
- HL-LHC support to worksites (surface and excavation)
- AD dump area refurbishment



Critical points

- Huge peak of design needs for handling studies and tooling in 2017-2018 for:
 - Handling of new components like LIU and HL elements including tooling design and procurement
 - Design and modification of a wide number of shielding walls (R2E in LHC, L4 connection, PSB wall modification)
- Availability of resources for supervision and operations during LS2 is under discussion
- Aggressive planning for consolidation of lifts in SPS and LHC, not leaving any contingency
- Dose to personnel for key supervisors and operators (for ex. SPS underground teams during ZS and dump campaigns) could be a limitation factor



Conclusion

- A lot of work, we think we can do
- We are currently reinforcing the group design office to cope with the peak request for studies
- All consolidation and procurement of cranes will be done in 2017-2018 to be ready at the beginning of LS2
- Almost all underground lifts (LEP and SPS era) will be replaced in LS2, giving stringent planning constraints for all intervenient
- Manpower increase to be foreseen (staff and contractor) with progressive steps to achieve the goal with no confusion