**PREMP report 1st April 2020**

Achievements

* IK TA with CEA for majority of SE systems (gas, liquid, clamp and PE) has passed CEA legal review. Aiming to sign in April.
* With a move towards operational scenarios, PREMP completed blowout tests of a PE press in the Utgård laboratory. Provisions included a full implementation of procedures described in the PREMP Systems Operation and Maintenance Manual (hereafter PSOMM) including:
  + Individual risk assessments for each item of equipment
  + Implementation of “pressure testing Checklist”
  + Following all procedures for Burst Testing as defined in PSOMM

The output of the blow tests was a full quantification of physical hazards related to PE cell, when used with liquid/solid samples. These include measurements of peak decibel levels and velocity/momentum and penetration depths of gasket shrapnel

* PREMP is in the process of updating the PSOMM in light of testing and a proposed contract with the Swedish defence research agency (FOI). A key ongoing piece of work is the detailed design of the proposed pressure-testing facility (PTF or “bunker”) for the E03 lab in which we are also engaging FOI.
* In preparation for move to the E03 lab later in 2020 electrical and utility requirements have been refined and the procurement process for a roof crane initiated.
* Technical content of the main PREMP TA covering gas cells, liquid cells, clamp cells and PE cells, and several other significant ancillary items have been finalised and agreed with all partners. Further, TA has been reviewed by CEA legal team. However, COVID-related lockdown in Paris has created uncertainty on start date. This will be accommodated (somehow) into the legal agreement.
* The procurement process for an automated hydraulic pump (core component of the PE-cell system) has been completed with the tender process awarded to VINCI. However, following this, VINCI warned that their facilities are closed during COVID-19 outbreak with resulting in an unspecified delay.
* Significant progress has been made on (software) integration of the main stress Rig for BEER, which has been constructed by NPI in Prague. After detailed discussions on timing requirements, it looks to be a good test case for high speed (1kHz) sampling of SEE parameters. Initial testing of the hardware to achieve this is complete and we are moving towards the next step of EPICs integration. Meanwhile, Robin Woracek will ship his (small) stress rig to Utgård providing a local possibility to implement and test the higher-level controls (i.e. using NICOS, via EPICS).
* PREMP has also been developing some new anvil prototypes for the PE press, with the aim of increasing angular aperture (critical for implementation on DREAM and MAGIC). A PE press will be used and a design for an anvil assembly that includes a load gauge, a new seat design has been developed. Parallelism of the PE press has been tested and found to be good, however, this will now be measured under load with an optical technique. Raw WC material has been procured as a cheap way to test the geometry and this will be followed with tests on sapphire, ZTA and AlON. To enable shaping of anvils, PREMP has procured a specialised grinding device.
* Progress has been made on the standard mounting system for SEE at ESS, with the design of the interface for floor-mounted L0,L1,L2 finalised and agreed with stakeholders in a CDR (Nov 2019). Meanwhile, a second round of detailed design on the top-loading L1 flange prototype is complete and plan to move to procurement in 2020Q2. Initial design work has also started on the top-loading L2 flange, which will be the primary interface for MIRACLES and is also likely to be the most commonly used SEE flange.

Risks and Challenges

* Retroactive crane installation in upstairs lab of E03 requires exterior lifting and creating a hole in the wall impacting utilities layout. Will try to coordinate this work with installation of PTF and look for possibility to maintain permanent access for future eventualities.
* It seems likely that COVID-related actions, particularly in France will impact PREMP. Delay to delivery of the significant fraction of SEE planned to be delivered IK from CEA seems likely (current working assumption of CEA is 2 months). Also delays of the delivery of the VINCI pump may affect integration plans.
* COVID effects have already delayed the installations in the E03 building, so it is anticipated that operations will continue in Utgård for longer than planned. This creates a quite severe challenge in term of space, but should be manageable through prioritisation of tasks
* At present, activities at Utgård are dramatically descoped due to COVID related measures. This directly impacts hands-on development of hardware, primarily the on-going integration efforts (most critically on the stress rig) and the SEE mount systems, but also the PE-anvil project is affected.
* At the moment, there has been no immediate reduction in manufacturing capability in Skåne. However, if this were to be reduced in response to stricter government measures in the COVID crisis, it would impact the construction of the L1/L2 flange-mount prototypes. This would most directly affect CSPEC, which is currently trying to push out a tender for its sample tank, including the L1 interface. It would also likely delay the development and testing of ‘mechanical’ integration of SEE into the interface.

Mitigation strategies, back-ups

* Although the PREMP plan had been to deliver all SEE systems to relevant instruments for hot-commissioning, it seems prudent to introduce a prioritisation to guide the ongoing adaptation to the evolving scenario. The current idea for this is to focus on “traditional” SES, namely, gas cell, clamp cells and PE cells. This shall enable an initial tranche of early experiments by providing tools that are most familiar to friendly users. In addition, these systems will be most effective in early days when beam power is low. It will then be possible to ramp capabilities up in staged upgrades
* If delays to planned TA’s become un-sustainable it may prove necessary to move to direct cash purchase of some items of SEE. This should work most effectively for PE cells, which are commercially available, as are their driving systems. For gas and clamp cells, it may also be necessary to look beyond CEA for potentially suppliers, this could include other neutron facilities who also use such devices.
* If delays in availability of E03 extend beyond 6 months, then the prioritisation will necessarily be needed to cope with space limitations in Utgård. If these delays extend beyond 12 months, then some alternative solution may be needed, although this is undesirable as it would incur multiple moves of equipment.