PANDA CM22/1+2 (v. 1)

MEC Session

Updates on the mechanics of the Forward Endcap EMC (Thomas Held, RUB, Claudius Schnier, RUB)

The Side and front cooling are finished and installed. On the front lid the Polyamid hose is thermally shaped and the fine tuning of shape is achieved by lead blocks prior to glueing, using UV ray (thermal) curing, radiation hard, high-λ adhesive. The connections of the front cooling to supply/return lines inside the cold volume (T-distributor) are foreseen via flex pipes. Some details of the Supply lines (feeding, return) are still in preparation. The Front and back lids are finished, the parts used laser welding, and rubber seals are installed.

Mounting the cooling lines requires more knowledge of cable trays and supports between the magnetic feed-throughs and the racks. Proposal of the pipe radiators (with associated electrics) positions on either sides of the solenoid. The possibility to store cables on the floor or ceiling of the rack platform would be helpful. At FZ Jülich, the Manipulator arm has been adapted to ensure submodule assembly from both sides, the right and left of the beam axis.

Measurements of the Positions of the Detektormodules of the EMC FWEC (Christian Hammann, U-Bonn, HISKP)

Using a lastertracker and T-Scan equipment (Leica AT960) The Geometry of individual submodules of the EMC forward endcap were measured. Measurements wrt a backplate mockup were performed which show that the position of submodules on the endcap can be determined by the front face of the alveole. To determine the EMC Forward Endcap position in the hall several reflectors are foreseen with reflector mounts needed in the front of the endcap to measure the alveole faces, as well as reflectors visible from the back which are needed to determine the position of the endcap.

Extended design of the mounting device for the Forward Endcap (Stefan Koch, GSI)

A special device has been designed, as presented in previous MEC sessions, for the installation of the FEW EMC into the Target Spectrometer. With the new design, the mounting device is no longer on a separate support platform. Instead, the device and rail system are attached directly to the floor of the PANDA hall. The difference in height is compensated by a greater vertical stroke of the device. The design is extended by base frame and lifting frame, a spindle drive system and a cross guide system. A CAD-based movie of the installation showed all features of the extended design in action. Next steps are to calculate to stress and deformations during mounting and define mechanical interface to use the same mounting device for the GEM Tracker.

Prototype CSF (Stefan Koch, GSI)

The prototype Central Space Frame (CSF) is made out of four carbon composite parts of hollow profiles, with local reinforcements in places of high stress. The weight of all 4 carbon parts is about 2 kg. Various brackets and fixings, made of aluminum via 3D printing, are used to interconnect the carbon parts. In addition, aluminum connectors for roller and three sections of aluminum support structures for the MVD services are produced.

Using a Support frame with Hard anodized aluminum shaft for movements, the CSF prototype fully assembled has been subjected to load tests, similar to the weight distribution of 160 kg MVD electronics and cooling supplies. The load test was successful and showed in principle, that such light weight structure is capable to carry the load of the MVD services. Various further tests are planned by including the target pipes and the detector frames.

Leakless-Cooling Operation for Electronic Racks (Daniel Glaab, GSI)

A Test Set-Up for Cooling with Water under sub-atmospheric pressure is needed to measure, verify and validate leakless cooling operations wrt the requirements for PANDA. The design of the set-up includes considerations of air ventilation in racks, circulation of air flowλ implementation of heat exchanger typeλ water pressure in the return pipes and a programmable control circuit for connection of actuators and sensors (PLC). All basic components have been identified and the design of the platform is being advanced. Work is in progress to complete the platform and to receive the permits to build and operate the set-up at GSI.

Changes of the leakless rooting system (Daniel Glaab, GSI)

Cooling hoses originally are running through the drag chains between the two detector positions. But, the chains are to small to meet bending diameter of 50 mm for the hoses so an alternative option has been presented. The idea is to replace the hoses in drag chains by fixed elongations outside chains (attached to floor) and these elongations will serve as main access route to the Beam Area. With standard components and couplings, PVC hard-soft hose can be realized and allows for swift interaction if failure occurs along the hoses. Checks are needed to verify that the PVC blended hoses prove to work out fine, and if so would be a low-cost solution and leaving plenty of space for other media lines inside the drag chains.

Barrel DIRC – Bar Box Prototype (Andreas Gerhardt, GSI)

The mechanical design of the bar box for the Barrel DIRC consists of two identical L-shaped elements, with a well-defined gap to ensure a high fitting accuracy and sufficient space inside for buttons to support the radiator bars. In case of the prototype bar box the mechanical design included also the tool development and manufacturing. After several optimizations and adjustments in the production process the prototype bar box with acceptable results arrived at GSI in April 2022 and tests are due to start. The essential goals for prototype testing are the design and integration of buttons to support the bars, to verify the stability of the box filled with “dummy” bars, handling procedures of the fully equipped box, design of endcap modules (mirrors and lenses) and the implementation of nitrogen purging.