# Summary of 5th technical meeting on CCDTL production

F. Gerigk, Snezhinsk, 21.07.2010

# Presentations

- Linac4 Project Status (M. Vretenar),
- General Status & Progress, BINP (A. Tribendis),
- General Status & Progress of CCDTL Cavity Manufacturing Cycle, VNIITF (Yu. Kretinin),
- Results of 2nd Welding Test (F. Gerigk),
- Coordinate Systems & Metrology (F. Gerigk),
- Design of Modules & Support Frames (D. Vavasov),
- Schedule of Operations (A. Tribendis)

# Status at BINP

- rough machining of drift tube body parts is done, cooling channels of centre part are done to 50%,
- brazing of drift tubes starts in August,
- stems parts are being machined now, brazing of stems starts in August,
- drift tube alignment tools ready, dummy drift tubes (Aluminium) ready,
- waveguide parts for RF measurements are being machined,
- production sequence was discussed,

# Status at VNIITF

- presentation of production sequence: it was optimised to minimise any deformations of the half tanks,
- procedure for drilling of the cooling channels to avoid any leftover metal chips on the inside,
- 2 half tanks are rough machined and have the cooling channels already welded,
- 18 half tanks are already pre-machined,
- transport packaging has been defined,

# welding of cooling channels I

- 2nd welding tests have been analysed at CERN,
- they do not completely fulfil ISO 5817, level B, but they are considered as adequate for the CCDTL water channels,
- improvement is requested to avoid oxidation at welding roots: solid copper pins have been used to remove the heat from the cooling pipes and keep the pipes in place: one idea is to use hollow copper pins, which allow circulation of protective gas (e.g. Argon) to avoid oxidation,

# welding of cooling channels II

- on the inside of the machined tanks one can see traces of the welding of the circular cooling channels,
- a photo is requested so that CERN can discuss whether this will have any influence on the copper plating,
- it was decided to reduce the welding thickness for the cooling channels from 3 to 2 mm, for the remaining pieces,
- the first module will have cooling channel welds with 3 and 2 mm, and it will be baked after Cu plating, which should reveal if there are any problems with the copper plating on the inside of the welded areas,
- CERN agrees that the welding works can continue and CERN will give an answer quickly after reception of the photo,

# Coordinate systems & metrology

- the proposed coordinate system was agreed and the needed metrology data points were defined,
- **exception**: the origin of the coordinate system will be defined as the centre of the beam pipe opening on the outside of the cavity (instead of being the centre of the cavity with respect to the diameter),
- the outer surface of the beam pipe connection will be machined with a precision of 20-30 um, important are: parallelism to vertical axis and centre position of beam pipe, less important is the actual diameter of the beam pipe,

# Copper for fixed tuners

- CERN has sent by accident ETP copper for the fixed tuners instead of OFE copper,
- BINP has confirmed that only OFE copper was used to cut the pieces for the drift tubes,
- A brazing test will be done with ETP copper to see if it can be used for the tuners,
- if not CERN will prepare a shipment with the correct copper.

# water manifolds & support jacks

- 3D drawings of the foreseen jacks have been transferred to BINP/ VNIITF,
- 2D example drawings of the water splitters (and their supports) which are foreseen for the PIMS were transferred and discussed,
- for the CCDTL there will be two 4-fold splitters mounted on a central support next to the modules (pending a verification that the pressure drop for a 1/2 module is <4 bars),
- CERN will clarify the material choice for the pipes of the splitters: so far 316 L is mentioned on the drawings, which seems excessive,
- CERN will clarify the type of connectors used on the manifolds (most likely SERTO),

# water connections

- samples of water connections were brought by CERN,
- flexible "rubber" hoses are the preferred solution,
- CERN will verify the specs of the "rubber" type: radiation hardness, max. water pressure, and which type of tool is needed to fit the clamped connectors,
- 1st module will be mounted with "test" hoses & connectors at BINP. This will define the amount of hoses. CERN will then order radiation hard hoses and send them to BINP for the remaining modules. The hoses for the first module will be exchanged at CERN,
- CERN will provide information on industrial availability and on how to use this type of connector:
- can also be produced at BINP.

# Support frame

- thickness of steel bars was increased to 11 mm,
- maximum distortion of the (longest) frame is now at 0.05 mm instead of 0.1 mm, assuming equal weight distribution on all points,
- stiffness of the cavities was not considered but will probably decrease the distortion of the frame,
- further simulations will be done at VNIITF of "worst cases" to ensure that forces at the coupling cell flanges are < 112 MPa for tensile forces, and < 170 MPa for bending forces,
- "worst case" scenarios should simulate conditions, which may arise during transport of the complete modules (e.g. uneven support)

# planning for support frame

- we assume that the present design is valid,
- VNIITF will send preliminary 3D drawings in September, a final version together with further simulation results is expected for October,
- CERN will then launch the 2D production drawings and organise construction of the 1st frame.
- The first frame has to be ready for the assembly of the 1st module: January 2011.