

Support and alignment of Linac4 accelerating structures, 24 August 2009

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F. Gerigk presented [?](#) the current status of alignment and support for the Linac4 accelerating structures.

1. Decisions and facts:

- The support of all elements between DTL tanks and PIMS cavities will be done on L-shaped supports, which are fixed on one of the cavity end-walls. All elements on these intertank supports will be positioned with reference to the cavity/module axis, using "blocks" or "wedges" of precision machined material. This method was preferred to having alignment tables on the L-shaped support, since the alignment will only be done once. The alignment of quadrupoles will be done outside of the tunnel with reference to the cavity/module axis. The position of the diagnostics with reference to the cavity/module axis will also be measured outside of the tunnel. Quadrupoles and diagnostics should be positioned with dowel pins or reference sockets. The pins and the surface on which these elements are mounted have a known position with reference to the cavity/module axis, which is measured before installation in the tunnel and which will make it easier to exchange these element, should it become necessary.
- In order to align intertank and inter-module elements outside of the tunnel all elements have to be equipped with suitably positioned reference holes/sockets for laser tracker target holders. These holes have a diameter of 10 mm a depth of 11 or 12 mm, and are at the centre of a flat surface (50 x 50 mm). These reference surfaces are also needed on all parts of the accelerating structures (e.g. 2 on each half tank of the CCDTL, 2 on each PIMS cavity, 2 on each DTL segment, 2 on each buncher cavity). In addition to the 2 reference surfaces with target holder sockets, a third reference surface (without hole) for tilt measurements is needed. Elements, which are physically too small to accommodate 3 reference surfaces, can be treated differently (e.g. by using 4 laser tracker targets paired in 2, which would also allow a tilt measurement). These cases should be discussed with M. Jones.
- Quadrupoles will be aligned precisely, while for pick-ups it is only important to know their position with respect to the axis. Pick-ups do not need to be aligned with the same precision as quads.
- In the DTL pick-up and steerer will be combined elements. In all other areas they will be separate.
- The distance between PIMS cavities is not restricted for RF reasons. If the cavities need to be shifted with respect to their present position, the impact of this change has to be verified with beam dynamics and the civil engineering integration team.
- The elements between CCDTL modules will be supported on the CCDTL frames. This means that we have to give values for the increased length to our Russian collaborators, so that they can prepare the drawings for the support frames.
- It was decided not to use alignment tables to support the inter-module and inter-cavity elements but to use "blocks" or "wedges" as for the inter-cavity elements of DTL and PIMS. Also here there should be dowel pins to position the elements transversely/longitudinally.
- PIMS cavities will be aligned using alignment tables on each support foot. A similar system to the one used in Linac2 will be used. This was agreed with metrology and the vacuum group. example drawings, more drawings at: G:\Departments\TS\Services\Old Drawings\LINAC 2\PS029, sketch by J-M. Lacroix: presentation
- For RFQ/DTL/CCDTL the alignment will be done with LHC type jacks, which are studied by A. Tambwe (B. Riffaud). sketches. Originally it was foresee to cast the housing of the jacks, but G. Favre suggested to machine the casings out of bulk material. This should reduce the cost for a small series. A first cost estimate amounts to 2 - 2.2 kCHF per jack. With respect to the first sketches the jacks will become slightly larger (transversally). This is a consequence of having the access for all adjustment mechanisms on one side. Once there is a revised sketch available from A. Tambwe, it has to be checked with metrology, vacuum, and integration that these jacks can be used.

- The integration of the DTL (and in fact also of the CCDTL and PIMS) inter-tank regions is stalled by missing information on the pick-up dimensions. This also stalls the definition of the CCDTL support, and the civil engineering integration of the complete linac. Information on the EMQs is presented tomorrow in the Linac4 Beam Coordination Committee [↗](#)

2. Action list:

action	person	status/result	completed
define length of CCDTL support to include inter-module elements and communicate values to A. Tribendis	R. Maccaferri, F. Gerigk	pending	
revise drawings of alignment jacks to allow access of all adjustment mechanisms from one side	A. Tambwe	pending	
define length of inter-cavity pick-ups	L. Soby, D. Steyaert, follow-up: R. Maccaferri	pending	
define size of EMQs	T. Zickler	maximum dimensions are defined presentation ↗ , optimisation is pending	2009-08-25
after the length of pick-ups is known continue inter-cavity integration for all structures	Y. Cuvet	pending	
dimensions of inter-cavity PMQs	A. Lombardi	done sketch	2009-09-04

-- FrankGerigk - 2009-08-24

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