Meeting Minutes

Linac Multi-Wires in the Momentum Dump Line

Bungalow Meeting Room
Thursday, December 16, 2010
10:00 am to 11:00 am

I. In Attendance:

Fernanda Garcia, Linac Head and meeting chair
Daniel Schoo, AD/Instrumentation Engineer
Allen Franck, AD/Controls Engineer
Jianming You, AD/Controls Front-end Programmer
Junye Wang, AD/Controls Application Programmer
Rob Reilly, AD/Mechanical Support
Ben Vosmek, AD/Mechanical Support
Craig Drennan, AD/Proton Source

II. Introduction

The meeting was called to discuss the design and installation of two multi-wire, beam profile devices going in before and after the spectrometer magnet in the 400 MeV momentum dump line. The SPEC multi-wire is a standard ceramic split multi-wire going in upstream of the spectrometer magnet. MWIRE5 is a wide aperture multi-wire, of a new design, going in downstream of the spectrometer magnet, just before the momentum dump.

III. SPEC Multi-Wire Discussion

Fernanda stated that Linac Mechanical Technician, Ben Ogert, had received and repaired the can assembly for the SPEC multi-wire. Ben had observed the wire plane assembly was hitting against the bottom of the can housing. The assembly is now with the alignment group, who will insert the wire planes and survey them into the can assembly. After this, the assembly will be stored, ready for the opportunity to make the final installation into the beam. Mechanical stands are available for the installation. Wire scanner electronics are also available for this device. The SPEC multi-wire is expected to be available for installation by late January.

IV. MWIRE5 Discussion

Fernanda began the discussion with a description of how MWIRE5 would be used and the need for it having a wide aperture and a wide area of coverage by the wires. An initial wire plane (paddle) design had been laid out by Dan Schoo. The design included 140 wires spaced 1 mm apart with electrical connections off the paddle provided on 3 each 48 position connectors. Both the vertical and horizontal wire planes would be of a similar or identical design. Dan stated that he had sent the design of the wire plane to CoorsTek Inc., a manufacturer of precision ceramic components, for their consideration.

Dan described a signal cable adapter box that would receive the 48 right side wires, the 48 center wires and the 48 left side wires from both the horizontal and vertical paddles. The adapter box would direct a selection of 96 of the wires to the horizontal and vertical channels of the scanner in twelve wire blocks. Horizontal and vertical paddle signal wires would be combined in parallel either inside the vacuum can if both are in one can or from can to can if there is only one paddle per vacuum can and two cans are installed one for vertical and one for horizontal. As the initial configuration, the centermost 96 wires will be selected as output from the adapter box to the 96 channel wire scanner electronics. If it is later found that the 22 mm on either side of the center 96 mm needs to be instrumented, the adapter box and the other downstream equipment could be modified without having to modify the wire planes and associated mechanical assembly.

The 96 channel wire scanner electronics are typically allocated as independent 48 channels of vertical profile and 48 channels of horizontal profile. The current VME front-end electronics and ACNET user application software is currently written for this configuration. The new configuration would involve seeing all 96 channels as either a single horizontal profile or a vertical profile, or neither depending on the status of position switches on the multi-wire assembly.

Jianming described that with the standard wire scanner beam profile applications, that the Front-End software would compute beam profile parameters such as means and sigmas. These parameters computed in the Front-End are typically displayed on simple ACNET parameter pages. With the new scanner configuration for MWIRE5, the existing computations would not be correct.

Junye described some of the data handling and logging available at the ACNET application software level. The means and sigmas and other parameters computed in the Front-Ends could be computed in the new application for the 96 wire profiles. Fernanda did ask if there was a

way to get all the wire data for download into a personal computer application like Excel. Junye described the manner in which this kind of data is available currently.

Fernanda did decide that Jianming could forgo rewriting profile parameter computations in the Front-End and will rely on these parameters being computed in the new profile application for MWIRE5.

Jianming also mentioned that if using the center 96 wires did not prove capable of covering the beam position range and more than one 96 channel wire scanner needed to be employed, the issue with his Front-End code would be managing the time stamps from the data sets from each wire scanner.

Rob Reilly brought preliminary drawings of the assembly that would house the wire plane paddles and support the motion control. Rob and Dan described the arrangement as two paddles (like on a paddle boat) at 90 degrees to one another with the pivot to the side of the beam aperture. By rotating the pivot, one paddle, or the other, or neither could be swung into the beam aperture. It was mentioned that this arrangement would not have any of the problems encountered with a similar MTA device.

Rob Reilly mentioned that he could include a port in the bottom of the multi-wire housing so that the paddles could be accessed for servicing or replacement. Dan raised the issue of alignment. In multi-wire applications that require a high degree of accuracy, the wire planes are carefully surveyed into the housings. Fernanda stated that the accuracy of the wire placement need only be to +/-0.25 mm. Dan said that with this tolerance that the planes could forgo the additional surveying and be changed without having to remove the whole assembly from the beam pipe.

Fernanda asked whether there was something that could be done if the paddles get stuck in the assembly. Dan described an external knob that was available to manipulate the paddles manually. Dan also described briefly the arrangement of the motor and clutch assembly. He described that the actuators and switches could be observed to understand the position of the paddles.

Jianming asked Dan about how the position status of the multi-wire was to be managed in the Front-End. Status consists of Horizontal In, Vertical In or Nothing In. Dan offered that this application, with regard to this status, was like Booster multi-wire applications.

Junye asked whether the high voltage status was important to monitor at the profile and parameter display application. It was decided that this status was unimportant. It would be obvious looking at the profiles that the data was not valid if the high voltage had failed. It was

mentioned that the high voltage status may aid in troubleshooting. High voltage is used with SWICs and not with multiwire detectors such as MWIRE5 so high voltage status is meaningless.

Allen Franck did ask whether an alternated mapping of the wires that covered the full aperture, but provided 1 mm spacing in the center 52 wires, was an option. This was considered briefly. Fernanda brought up the historical collection of profiles and it was seen that center of the beam at the momentum dump appeared over wide range. It is expected that we will need uniform coverage over at least the 96 mm that will be setup to start.

Further meetings were not set at this time. Rob Reilly estimated that he will have a complete multi-wire assembly design within 2 months, after which components could begin being procured, machined.

The meeting adjourned at 11:00 am.

Recording Secretary was Craig Drennan