

COMPACT LINAC SYSTEMS FOR MEDICAL APPLICATIONS

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Three compact linac systems for medical applications are under development at Linac Systems, based on the revolutionary Rf Focused Drift-tube (RFD) linac structure. This new linac structure resembles a drift tube linac (DTL) with rf quadrupole (RFQ) focusing incorporated into each “drift tube”. It promises to yield, smaller, more efficient, and less expensive linac systems for a variety of scientific, medical, and industrial applications. A prototype of the RFD linac structure has been built and is currently under test. The targeted medical applications include Isotope Production for PET, Epithermal Neutron Production for BNCT, and an Energy Booster for Proton Therapy. The isotope production unit is based on a 12-MeV proton linac with an average beam current of 120 μA , which can be directed onto any of three targets simultaneously. The epithermal neutron source is based on a 2.5-MeV proton linac with an average beam current of 10 mA, which can be directed onto a solid lithium target. The proton therapy unit is designed to boost a small portion of proton beams, in the energy range of 10-20 MeV, to the required energies of 70 and 250 MeV. The status of these designs and their readiness for production will be presented.

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DISCUSSION:

Tim Tewson: You claimed lower utility costs on your overhead for the PET accelerator. Now a problem that Ken (Krohn) didn't mention with their RFQ was that when you turned it off it usually took ages to condition it as soon as you turned it back on again, days and days if I remember rightly. The result was that they had to leave the system running continuously and its power consumption was not modest. This led to essentially a very high utility cost. Do other RFQ's have that same problem, or can they be turned on and off at will?

Joel Starling: Well our RFQ can be turned off at will and it takes basically, the time it takes to pump down the system, several hours, then maybe several hours of conditioning for us to run the RFQ again. Now I honestly can't answer your question for other accelerators, I'm not familiar with the experience that others have had. If anyone wants to comment that's fine, but for our particular RFQ, we have not had difficulty with conditioning. We are able to run it on as a needed basis.

Tim Tewson: But if several hours of conditioning are required, that means if you want to use it on a daily basis you have to leave it on all the time.

Joel Starling: Okay, I may be incorrect on the several hours, I'm just remembering the experience we had running our RFQ to date and I would actually like to defer it to Don Swenson if you want to contact him for specific information about conditioning of the RFQ.

David Schlyer: If I could just a comment on that Tim. On our RFQ, the one at Brookhaven, when you open it up to air then close it back up again, typically it has taken about two hours to bring it back into operation. However, if you leave it under vacuum pumping, it doesn't take long, a few minutes to bring it back up to operational readiness.

Joel Starling: Yes, I guess I was referring to opening it up to air and going through the vacuum pumping and the conditioning after you open it up to air, but that is a good point. Leaving it under vacuum helps with that situation.