

RECENT PERFORMANCE OF THE FMIT RFQ *

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In April 1984 the FMIT RFQ was ready for the start of rf conditioning after some modest redesign and rework that was dictated by difficulties experienced during the initial stage of operation. The outgassing and thermal problems that had dominated the original attempts to achieve cw operation at full rf power were notably absent. Except for a few gas bursts at the outset of conditioning the pressure in the RFQ stabilized at 2 to 3 x 10⁻⁶ Torr; the frequency of operation varied only for a few kilohertz with the variation attributable to fluctuations in the cooling water temperature; and except for two of the slug tuner bellows being heated to 200° F both the external and internal temperature monitors indicated that the structure was thermally stable. Sparking was minimal and allowed the conditioning to rapidly progress from a low duty factor pulsed mode to higher duty factor thence to cw operation at 80 to 90% of full rf power in a time span of 5 days. The RFQ was operated at this level for about 12 hrs before the power in the RFQ core was raised to 240 kW (209 kW in the core tank is expected to be the operation requirement). These stages of operation were characterized by extremely stable performance of the structure with infrequent VSWR trips of the rf power system. For two hours following the increase of the rf power to 240 kW there was no change in the operation; however,

this period was terminated abruptly by the destruction of the single convolution bellows at the high energy end of one of the vanes. The most probable cause of this failure is believed to be the delamination of the copper plating on this stainless steel tubing thus exposing it to rf fields causing excessive heating.

Inspection of the slug tuners showed that the three slug tuners that had been fabricated by a vendor experienced some surface erosion in the area behind the slug tuner. Two of these slug tuners had some melted straps. A leak at a stainless steel to copper brazed joint in the back of the slug tuner is believed to have caused a glow discharge in this area of the tuners and thus the erosion that was noted. The prototype slug tuner that had been fabricated at Los Alamos had a welded joint and was in mint condition.

Also of significance, the gold plated copper wire that forms the rf seal between the vane bases and the core tank was in excellent condition for all four vanes. No deterioration of the vane tips due to sparking was evident and, in fact, less surface discoloration than had been observed at the end of the first testing session was present. After the repair of the RFQ is completed we expect cw operation with beam to occur within a week or so of the start of rf conditioning.

* Work performed under the auspices of the United States Department of Energy, Office of Fusion Energy

For more detailed information see: "Status Report on FMIT", Session E