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Initial Results from the TCS Upgrade K.E. MILLER, H.Y. GUO, A.L. HOFFMAN, R.D. MILROY, Redmond Plasma Physics Laboratory, University of Washington — The TCS facility has demonstrated the robust ability to form and sustain FRCs in steady-state using Rotating Magnetic Fields (RMF). In past experiments, the plasma density was largely set by the RMF parameters, but the temperature was severely limited by impurity radiation. Since the FRC is a diamagnetic entity, its peak pressure $p_m = n_m k T_t$ determines its external magnetic field, $B_e = (2\mu_o p_m)^{1/2}$. Higher FRC currents, magnetic fields, and poloidal fluxes can thus be obtained, with the same RMF parameters, simply by reducing impurity influxes and raising the plasma temperature. TCS/upgrade has been built with a clean, bakable vacuum system and active means for the control of impurities to produce high temperature steady state FRCs. This will allow for the study of RMF current drive physics in a more fusion relevant regime, and in particular, will allow the issue of the impact of the RMF on the FRC's energy confinement to be addressed, an issue previously masked by the high radiation levels. Detailed description of the extensive upgrade of the TCS vacuum system and initial results from TCS/upgrade will be presented.

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