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## High Efficiency, 1 MW, 1 MeV Accelerator for Environmental Applications

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We present design of a normal conducting, high efficiency linac that would provide a CW beam of 1 MW electrons at 1 MeV energy for various environmental applications. For example, when a flowing sheet of wastewater is exposed to such a beam, various radiation-induced reactants are generated that lead to water purification by decomposing the chemical and biological pollutants therein. The implemented linac could treat 24 million gallons of wastewater per day with an ample dose of 1 kGy. Our design is based on three accelerating rf cavities operating at 476 MHz. The shunt impedance of each cavity is optimized according to its position in the linac. A compact rf distribution manifold is designed to split the power from a 1 MW klystron in the appropriate ratio and phase for each accelerating cavity. The beam capture efficiency is 80% and the rf to beam efficiency is 94%. The total length of our accelerator - including the 30 keV gun, the buncher cavity, and the accelerating cavities - is 2 m. In this paper, we present the corresponding beam dynamics, the implementation of rf couplers and feeding manifold, the thermo-mechanical simulations, and the fabrication and test plan.

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