Intensity modulation can be delivered by combining multiple static MLC segments. Different sets of segments could produce the same intensity modulated field, with some combinations yielding significantly longer delivery times. A time minimizing optimization algorithm that chooses the best among many parametrically generated leaf sequences was developed. The parameters are the coefficients and shapes of matrices whose linear combination equals the intensity matrix that represents the desired intensity modulation. The algorithm was tested on 100 random, 10 level, 15x15 intensity matrices and on 49 clinical ones with 3 to 20 levels and 5x5 to 17x18 fields (courtesy of DKFZ, UNC, NOMOS and UCSF). These represent 2 prostate and 9 head and neck cases. The algorithm was also tested for a variety of constraints such as the tongue and groove effect. In all of the 149 cases, and for all constraints, the optimized set produced the minimum delivery time and the minimum number of segments when compared to other leaf sequencing algorithms based on powers of 2, counting numbers and the "stop and shoot" sweeping window. Using a Siemens KD2 with an MLC, a 4 port, 10 level prostate plan that takes 18 minutes to deliver with the best of the other algorithms could be delivered in 12 minutes after optimization. Incorporating tongue and groove corrections increases these times by about 1 minute. With optimization, better quality treatments can be delivered in less time, improving patient care. Siemens Medical Systems supported this research.