The graph below describes two important parameters of Target Magnets whose field profile ramps from 15 T at \( z = -50 \) cm to 1.5 T at \( L = 4.2 \) m, 4.5 m or 5.0 m. As in the study of 11/19/2013, the Target Magnet has only two solenoids: a main one surrounding the target region and a subsidiary one near the end of the field ramp. If needed for field homogeneity, the upstream coil is notched near its midplane. The current density is 18 A/mm\(^2\) in the main coil and 45 A/mm\(^2\) in the subsidiary one, much like comparable coils in “Target15to1.5T5m1+5.xlsx” of 6/18/2013. Iteratively adjusting the ends and outer diameter of each coil (and of the notch, if any) minimizes the megamp-meters of conductor while attaining a chosen field homogeneity over the target region from \( z = -100 \) cm to zero. In addition, the optimization program adjusts the inner radius of the downstream coil, in order that the ramp bottom out at the chosen distance.

The lowest-cost system has a field homogeneity of 4% and tapers to 1.5 T at 4.2 m. It uses \((182+400) = 582\) MA-m of conductor; the inner radius of its downstream coil is 94 cm. To increase \( L \) to 5.0 m requires \((223 + 400) = 623\) MA-m of conductor (an increase of 7%) and a downstream-coil I.R. of 171 cm.