A Pulse Forming Network (PFN) was built and optimized using an Algorithm based on theory and experimental data. The target load for the PFN was a Helical Electromagnetic Launcher. The target application of the launcher is Environmental Testing – mechanical shock – time domain replication. The new Algorithm that was used combines time, frequency, and energy domain methods to restrict the solution space before optimization. As in many other applications, the final optimization was done through experimental trial and error. The PFN ultimately met the repeatability and uncertainty targets specified by environmental engineers.