Laminate devices have the potential to lower the cost and complexity of robots. Taking advantage of laminate materials’ flexibility, a high-performance jumping platform is developed. The platform is designed by simulating variable leg dimensions first with a simplified single-mass, variable-force model and then through a full dynamic computer simulation incorporating variable lengths, densities, and flexibilities. The leg design parameters are chosen to optimize jump height. The platform’s jumping ability is then tested and analyzed in comparison with the simulation results. An embedded force sensor is used, in conjunction with laminate materials’ inherent flexibility, to enable force-feedback control of the platform.