As wind turbines continue to grow ever larger to reduce the cost of energy, their blades follow suit, with the largest commercial blades extending past 100 meters. Mammoth blades such as these raise key transportation and manufacturing challenges. Segmented blades are one solution to these problems and are garnering increased industry and research interest. A variety of types of segmentation joints exist, and they will inevitably vary in cost, spanwise location, and physical characteristics. This work examines the sensitivity of wind turbine LCOE to a variety of these parameters, using the open-source wind turbine design code, the Wind-Plant Integrated System Design and Engineering Model (WISDEM). Next, a detailed joint model and segmented blade cost model are integrated into WISDEM. This enables the design of a wind turbine with 100-m segmented blades using WISDEM, and OpenFAST is used to verify that blade modes and deflections are appropriate. This wind turbine design is compared to other machines with monolithic blade designs, including blades designed for rail-transportability and blades designed without consideration of transportation constraints. The designs are compared in terms of turbine capital cost, annual energy production, and LCOE, and will inform large turbine blade design choices. Finally, the integration of segmented blade capability into WISDEM will facilitate future segmented blade research.