In this work a 2D CFD solver has been used to optimize the shape of a leading edge slat with a chord length of 30% of the main airfoil which was 40% thick. The airfoil configuration was subsequently tested in a wind tunnel and compared to numerical predictions. The multi-element airfoil was predicted to achieve a $C_{l\text{ max}}$ of 3.1 based on the main airfoil chord length, which was confirmed in the wind tunnel campaign. Using wake rake traversal and wool tuft flow visualization wall interference effects were investigated, which were found to be a source of considerable uncertainty when measuring on thick airfoils.