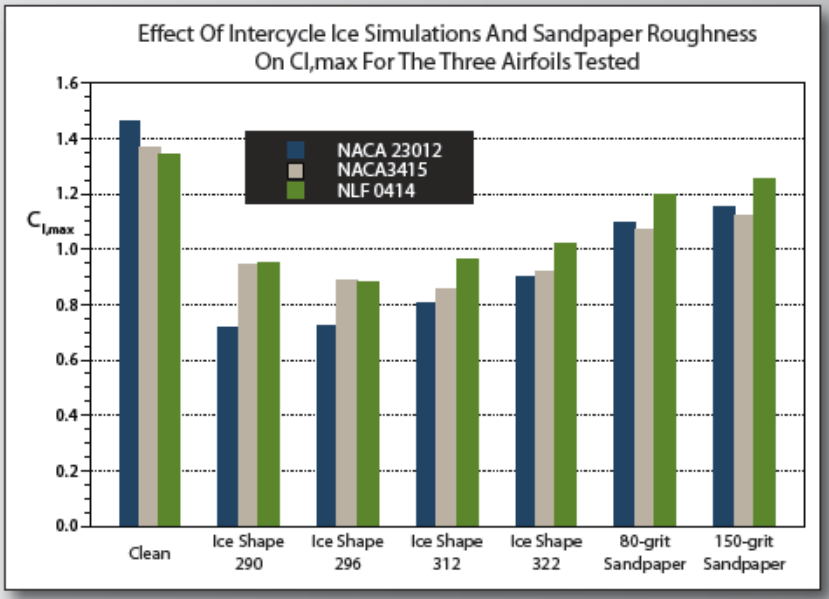
Ice Shape-Testing Results

The FAA study cited in this article, "Effect of Airfoil Geometry on Performance With Simulated Ice Accretions, Volume 1: Experimental Investigation," included the chart at right, which summarizes the simulations' effect on each airfoil and was adapted from the study.

As the chart demonstrates, the intercycle ice simulations had a more severe effect on maximum coefficient of lift (C_l, max, or ability to produce lift—higher is better) for the NACA 23012 airfoil. "The effects for the NACA 3415 and the NLF 0414 airfoils were similar and less severe."



The study concluded "an airfoil's load distribution plays a signal role in its sensitivity to ice accretion, particularly in the first 20 percent chord where ice is most likely to accrete. The results with SLD ridge-type ice simulations generally indicated that more front-loaded airfoils tended to be more sensitive to these types of ice accretion. Of the three airfoils tested, the NACA 23012 was the most front-loaded and had the largest performance degradation due to spanwise ridge ice accretions...." The NLF 0414 airfoil, which was the most aft-loaded of the three airfoils tested, was the least sensitive to SLD ice simulations. The NACA 3415 had a pressure loading between the NACA 23012 and NLF 0414 airfoils. The results of this study further showed that the performance penalties with the SLD ice simulations were also between the other two airfoils. This trend was also generally true for the other two types of ice shapes tested."