

Icing Research Tunnel boot replacement



The Icing Research Tunnel (IRT) at NASA Glenn Research Center was built at the end of World War II in order to develop and test ice protection systems for aircraft. The seven-foot propeller blades are made in England. They are made from laminated Sitka spruce from Alaska, and have basswood tips. According to Elmer Bartels, who worked in the Tunnel years ago, the original specs for the blades required that the spruce have a straight grain, no knots, and no bear claw marks. (The Isle of Sitka in Alaska is full of brown bears, who like to sharpen their claws on trees.)

On the leading edge of each blade is an estane rubber boot, for protection. Unfortunately, accidents happen, such as when a worker left a ladder in the Tunnel. When the propeller was started, the intake pulled the ladder into the blades. Not only was the ladder chopped into pieces, some rubber boots were left in shreds.

Boot removal had been performed in the past using MEK (methyl ethyl ketone). As the Environmentally Preferable Purchasing (EPP) program kicked in, alternatives were selected for testing. Several products were tested, with no success. In the meantime, Goodrich changed the way the boots fastened onto the blades, using a self-stick type of glue. When the time came to remove a new boot for the first time, what began as an EPP project became a desperate situation, as the MEK failed to remove the glue. The Icing Tunnel work came to a halt.

Dave Justavick drove to a store and purchased Krud Kutter, Goo B Gone, and several other off-the-shelf products. The EPP product researcher tried finding acetone and NMP. Dave also borrowed 100% methylene chloride from the Hangar, but was too worried to try it since it is a carcinogen. One of the products Goodrich had suggested to remove the glue was Peerco 321, an 80% citrus oil product. But 100% limonene had been tried, with only minimal success, so there was skepticism that Peerco 321 would work.

The Peerco 321 vendor shipped the product overnight; and, by the next day, the Tunnel was back in business. The best news is that a biobased, recycled-content product with very low health risk (skin irritation, with possible sensitization without gloves) turned out to be the best performer.

Work continues today in the Icing Tunnel, investigating deicing and anti-icing fluids and research on aircraft, including certification of ice protection systems for military and commercial aircraft.