DEVELOPMENT OF AN AIR KNIFE TO REMOVE SEED COAT FRAGMENTS DURING LINT CLEANING Carlos B. Armijo Derek P. Whitelock Sidney E. Hughs Marvis N. Gillum USDA-ARS Southwestern Cotton Ginning Research Laboratory Mesilla Park, NM

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<u>Abstract</u>

An air knife is a tool commonly used to blow off debris in a manufacturing line. The knife may also be used to break the attachment force between a lint cleaner saw and a seed coat fragment (SCF) with attached fiber, and remove them. Work continued on evaluating an auxiliary air knife mounted on the first grid bar of a saw-type lint cleaner. A high intensity sheet of air exits the pressurized plenum and is directed at the juncture of the grid bar and lint cleaner saw. High velocity air is distributed along the grid bar, and exerts a force on fiber tufts (some with attached SCF) that are being dragged on the grid bar. The air velocity from the air knife must be enough to cause the fiber tufts/SCF to break away from the saw and be deposited with the trash. The pressurized air plenum is 66 inches long (the same width as a Continental Lodestar lint cleaner) and contains 124 holes that are 0.0625-inch in diameter. There is an adjustable deflector on the air knife to direct air flow. The knife is powered by a high volume (90 to 120 cfm), low pressure (50 to 150 inches of water) six horsepower industrial blower. A two-inch diameter globe valve adjusts the air delivered to the knife. The air knife is currently being tested on a bench. A formed piece of sheet metal represents the 16-inch diameter lint cleaner saw. Air flow patterns of the air knife are being evaluated using two methods. The first method uses a pipetting needle to measure total air pressure exiting the knife. The second method uses a smoke pen placed behind the air knife. Air flow patterns shown by the smoke trail will be documented with both a still and high-speed video camera. Preliminary findings show that air flow patterns from the air knife are very sensitive to both the position of the knife with respect to the grid bar, and the position of the deflector on the knife. Total pressure exiting the air knife is being measured at three plenum pressures: 50, 100, and 150 inches of water. Air flow from the blower at each of the plenum pressures is also being measured. After testing is complete with the pipetting needle, testing will begin the smoke pen. Once there is a better understanding of how air flow patterns are affected by placement of the air knife in relation to the grid bar (angle and distance), as well as the position of the deflector, the air knife will be installed in the lint cleaner for formal testing.