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## The Effects of Dryer Temperature and Moisture Addition on Ginning Energy and Cotton Properties

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Damage to cotton fibers during ginning can be reduced by minimizing dryer temperatures and restoring moisture to over-dried fibers. This paper reports the effects of seed cotton moisture conditioning on fiber quality and gin stand energy consumption. Dryer temperatures were varied, and humidified air was added to seed cotton above the extractor-feeder. Each test lot concluded with a 227-kg (500-lb) bale. The addition of moisture with humidified air raised the final lint moisture content from 4.55% to 5.08% (5.3 g/kg or 2.7 lb/bale). This increase was estimated to be 10 g/kg (5 lb/bale) lint or more at the gin stand feeder apron, so some of the added moisture was lost before reaching the bale. Increasing dryer temperatures by 50 °C (90 °F) decreased the final moisture content by 0.81% (8.1 g/kg or 4.0 lb/bale). Changes in gin stand energy consumption were related to moisture addition, dryer temperature, and lint moisture. Moisture addition reduced energy consumption from 21.4 to 21.1 MJ (5.94 to 5.86 kWh) per bale (1.4%), regardless of dryer temperature or the moisture content of the cotton. As dryer temperature increased and lint moisture dropped, energy consumption initially increased, but energy consumption began to decrease at higher dryer temperatures with lint moisture contents below 5%. These changes were attributed to changes in fiber strength and cohesive properties of the fiber, though these were not measured during ginning. All HVI and AFIS fiber length properties were improved by adding moisture with humidified air and reducing dryer temperature. The addition of humidified air improved gin turnout, HVI strength, AFIS neps, immature fiber content, and maturity ratio, but it increased AFIS trash levels, nep size, and the number of seed coat neps. Increasing dryer temperature improved HVI and AFIS trash properties and reduced seed coat neps, but it reduced HVI strength, increased AFIS neps, increased immature fiber content, and reduced maturity ratio. Dryer temperature did not change gin turnout or micronaire.