Dryeration boosts efficiency

Farm Energy

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AS harvest draws near, grain drying efficiency is a top priority. If your drying equipment has enough bin capacity for intermediate "steeping" and cooling between drying and storage, an energy-saving strategy such as dryeration is possible. Dryeration requires a little extra time and equipment, but it can increase your drying capacity and reduce your fuel bills during harvest.

In the dryeration technique, the drying process in the high-temperature dryer is stopped before the grain reaches its final moisture content. By doing this, total drying capacity increases because the dryer can accommodate more bushels per hour. Since the delayed cooling requires less total fuel to finish the drying, this technique can increase your fuel savings by minimizing LP consumption. With the fluctuations in LP prices earlier this year, this opportunity to save energy is worth considering.

Delayed cooling is key

In a high-temperature drying system, the dryer may create a bottleneck. Moisture is removed from corn kernels faster than it can equalize within the kernels, explains Mark Hanna, ag engineer with Iowa State University Extension and Outreach. At the end of the drying cycle, more moisture is concentrated at the center of the kernel rather than around the outside edges.

By implementing dryeration to delay cooling by four to 12 hours, moisture within the kernels has time to equalize. More specifically, the delayed cooling allows a lot of that excess moisture at the kernel's center to move toward its surface, where the moisture can be removed more easily. Cooling the corn after this resting period of "steeping" or "tempering" removes an extra 0.2 to 0.25 point of moisture from the corn for every 10 degrees of temperature change, according to Shawn Shouse, another ISU Extension ag engineer.

When compared to immediate cooling, dryeration can remove an additional 2 to 3 total points of moisture in a typical high-temperature drying system. Hanna and Shouse explain that drying capacity can increase 50% to 70% using the dryeration technique. In addition, drying fuel savings can increase total energy efficiency by 15% to 30%. Delayed cooling also reduces stress cracking of kernels during cooling.

Equipment for dryeration

High-temperature drying systems designed for dryeration must be able to transfer hot grain from the dryer and hold it for several hours before cooling. This is best done in a dedicated cooling bin with full floor aeration, says Shouse. Because condensation accumulates on the bin sidewalls and nearby grain during delayed cooling in cold weather, using storage bins for delayed cooling is not recommended.

For batch loading and unloading, an ideal system has two cooling bins: One bin is loading, while the other bin is steeping and cooling. Cooling bins can be sized conveniently to hold one day's drying capacity. Cooling fans should be sized to cool the bin in about 12 hours. This requires about 1 cubic foot per minute of airflow per bushel of grain to be cooled (cfm/bu). The design and maintenance of drying equipment is critical for dryeration.

To implement dryeration, transfer hot grain from the high-temperature dryer at a moisture content 2 to 3 points greater than the final target moisture, says Shouse. Let the first grain into the cooling bin steep for at least four, and preferably six to 12 hours, before starting the cooling fan.

When grain is cooled, transfer it to storage bins. Continue to monitor the final grain moisture content and modify drying times as needed. Avoid immediate bin cooling since this removes 1 to 2 points of moisture than delayed cooling with dryeration and does not provide as much protection against cracking.

More information is available from ISU Farm Energy at *farmenergy.exnet.iastate.edu* and on Twitter *@ISU_Farm_Energy*.

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