



“Often Imitated, Never Duplicated”

Energy Efficient Potato Storage

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Introduction

Efficiency has become the buzz-word in all aspects of the potato production system. Efficient use of equipment and labor, efficient use of fertilizer and pesticides, and efficient use of irrigation water are on the mind of nearly every potato producer. In order for a grower to survive in our modern potato industry, he must maximize the efficiency of each facet of his operation. One area that is ignored by many operations is energy efficiency in storage. Energy efficiency means maximizing your economic returns by optimizing the potato storage environment while minimizing electrical energy used by the ventilation system and related components. It does not mean slashing electricity use by any means possible or negatively impacting potato quality in an effort to “save” money on your power bill. Effort spent conducting a careful analysis of your storage ventilation system and storage management practices will translate into increased energy use efficiency and dollars in your pocket.

Ventilation System Components

All potato storages will consume electricity in order to maintain the desired environmental conditions for the potatoes. The big question is how efficiently are they utilizing that electricity? The largest energy users are the ventilation and refrigeration systems. Maximizing the efficiency of existing storages and any newly commissioned buildings starts with selecting the right components. Selecting premium efficiency fan motors for new construction, or replacement of existing motors, is a critical first step towards optimizing efficiency. Motors should be selected based upon efficiency ratings and performance data. Selecting a motor based upon the lowest initial cost may actually cost you more money over the life of the motor due to poor energy efficiency. Similarly, fan (propeller) selection can have a large impact on storage energy costs. You must objectively assess the performance differences between “comparable” fans from different manufacturers. It is critical to note that although two fans may seem virtually identical, in size, blade number, and appearance they can vary drastically in terms of performance. The best approach is to specify and select only fans that are performance certified by an independent testing organization such as AMCA (Air Movement and Control Association). This will assure you that your fan will perform as advertised. Do not attempt to save money on new storages or retrofits by purchasing cheaper, but less efficient fans. You must evaluate fans based upon efficiency ratings (cfm/watt) and AMCA certification, not simply initial cost.

Ventilation System Operation

Ventilation system operation is a critical factor regulating energy use efficiency as well as potato quality. Variable frequency drive (VFD) fan speed control can drastically reduced your power bill as well as minimize shrinkage. For example, a fan operating at 80% speed will give you approximately 80% airflow, but will cut your power use in half. VFD use yields improved energy savings compared with other methods of ventilation system operation including fan cycling (e.g. 12-hr-on : 12-hr-off) and shutting down one or more fans in a multi-fan system. Additionally, VFD use gives you increased operational flexibility throughout the storage season as well as while loading or unloading a storage. VFD's will allow you to provide just the right amount of airflow to match the changing raw product demands and potato volumes thus alleviating over- and under-ventilation. Gellert's automated VFD fan speed control system will help you to truly maximize energy efficiency by continually adjusting airflow based upon the specific needs of the potatoes in storage. Given the potential energy savings and reductions in shrinkage VFD's should be strongly considered for any new construction projects as well as most existing storages.

Pre-Season Maintenance

Regular pre-season maintenance can also help to improve the energy efficiency of your storage. Simple steps such as cleaning fan guards, louvers, ClimaCell media, and fan blades can help to reduce airflow restrictions and improve ventilation system performance and efficiency. The function of all louvers and fresh air doors should be checked to insure that they can operate across the full range of motion and are not limiting airflow. Pre-season service inspections are a great time to critically evaluate every component of the ventilation system and determine if each component is really making you money or costing you money.

Airflow Distribution

Another aspect of efficiency is the ability to uniformly deliver airflow throughout the potato pile. Airflow distribution will be enhanced by sealing joints between duct pipes with duct tape. The duct tape serves to seal the joints and promote uniform airflow distribution across the total length of each duct. Poor airflow distribution actually costs you money by "wasting" the work done by the fan on uneven air delivery throughout the pile. This poor airflow distribution can promote inadequate or uneven sprout inhibitor coverage and lead to hot-spots within sections of the pile. In short, the cost of duct tape is inconsequential compared to the increases in energy efficiency and product quality that you will obtain.

Summary

Storage is the culmination of the enormous amounts of time, effort, and money required to produce the crop. The impact of energy efficiency within the storage environment cannot be emphasized enough. This article has provided a variety of suggestions for improving the energy efficiency of newly constructed and existing potato storage facilities. Growers and storage managers who take the time to analyzer their storages and implement the changes required to maximize efficiency will reap the rewards of reduced power bills and improved potato quality. For more information regarding energy efficient equipment and storage management practice, contact the author, 1-888-GELLERT or nathan@gellert.com, or contact your local Certified Gellert Dealer.

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