



*Automation*





**Objective: Understand feeding automation systems that streamline the feeding process by understanding how they are utilized and whether automation is fully or partially utilized.**

Feed costs account for nearly 50% of the total operating budget on a dairy farm. The ability to reduce feed shrink is likely the biggest opportunity to reduce feed costs. Utilizing automation technology in the feed center can improve the traceability of ingredients and products, and most importantly, can help reduce feed shrink and waste.

**Bins:** Typically, the lowest inclusion ingredients are those that are the most expensive. Storing these high-cost ingredients in bins reduces the shrink associated with weather and other outside factors. In addition, the combination of flat storage and bin automation can increase the efficiency and consistency of the ration. Automation of the feed bins can be achieved through the implementation of an automatic batching system. Multiple feed bins are positioned over a mixer or a weigh box, and through process automation and feed formulation set, the measuring of each ingredient is controlled via a computer. With a fully automated system, the next batch can be prepared while the previous batch is being mixed in a properly managed system.

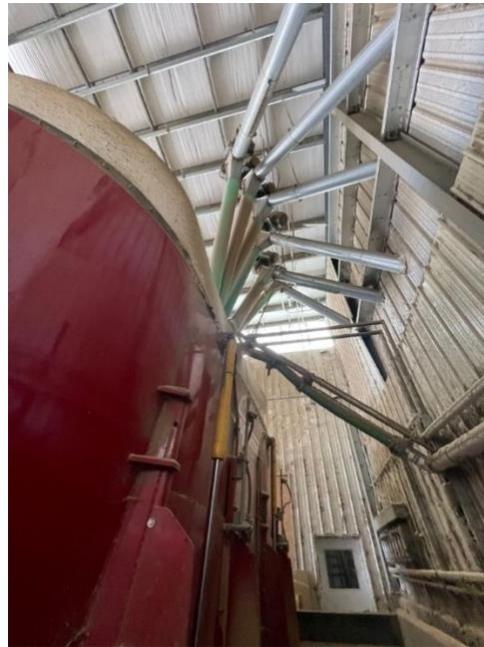
**Batching and Computer Systems:** Several companies can assist with implementing automation. Here are a few companies that can assist with your automation needs:

- Easy Automation: <https://www.easy-automation.com/>
- Trioliet: <https://www.trioliet.us/products/automatic-feeding-systems/feed-kitchens/feed-storage-for-automatic-feeding-systems>
- Milc Group: <https://www.milcgroup.com/>

**Dairies to Evaluate:** Please review the virtual tours for Farms 3 and 4 (included below) to get further information on automation technology.

**Bin Setup:** This example farm has 6, 52-ton (47 metric ton) bins for dry commodity storage. Dry commodities and liquids are transferred into the commodity shed and unloaded near the back of the mixer to avoid getting hit by the loader when loading forages. They use 10" (25 cm) augers and the farm has incorporated the Easy Automation system into their feed center to further automate their feeding process. This system automatically adds correct weights from their feeding software (EZ-feed) for automated commodity loading. The program works off the TMR mixer scale head so only one ingredient can be added at a time to get accurate weights. This type of automation system can be set up to integrate with other feeding programs dependent on if the program is willing to interface. It also tracks the remaining inventory left in the bins.

[Grain Handling Automation | Grain Handling Control System \(easy-automation.com\)](http://easy-automation.com)



**Left photo:** Bin setup outside of commodity shed

**Right photo:** Inside view of commodity shed where augers from bins come through.

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**Left photo:** Front view of mixers with augers. There is a T-splitter on the liquid manifolds.  
**Right photo:** Molasses tank; whey tank sits underground.

**Grain Unloading System:** In addition to the bin set-up, the farm has a drive-over unloading pit that is augured to bins. This allows for delivery with no disruption to the feed center. Corn is dried and stored on site and can then be directed to the roller grinder to be processed and added to bins as needed through legs.



**Top left:** Overview of grain unloading system

**Top right:** Close up of auger system

**Bottom left:** Window for grain unloading system to see grain/belt moving while unloading into dump pit

**Bottom right:** View of grain bin set-up

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**Roller Grinder:** The farm has an IFA roller grinder system. This system is more costly than a hammer mill at around \$40,000 USD. The advantage of this system is that it produces an excellent particle size, typically less than 500 microns and generally with less deviation. There is also more throughput than a hammer mill, at processing speeds of 8 tons/hr. Roller grinders can run rollers at variable speeds versus a roller mill where rollers run at the same speed. Overall, the roller grinder produces a high quality and consistent product.



**Top left:** Outside of grinder system

**Top right:** Inside components of grinder system

**Bottom left:** Debris removal for grinder system

**Bottom right:** Debris collection for grinder system, which produces a cleaner grind

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**GRAIN PARTICLE SIZE DETERMINATION**

TEST RESULTS:

U.S. SIEVE #	MICRON OPENING	WEIGHT (GRAMS)	PERCENT	PERCENT LESS THAN
4	4750	0.10	0.07	99.93
6	3350	0.10	0.07	99.85
8	2360	0.50	0.37	99.49
12	1700	1.70	1.25	98.24
16	1180	4.20	3.08	95.15
20	850	5.60	4.11	91.04
30	600	25.60	18.80	72.25
40	425	32.10	23.57	48.68
50	300	22.30	16.37	32.31
70	212	14.10	10.35	21.95
100	150	10.50	7.71	14.24
140	106	11.50	8.44	5.80
200	75	4.90	3.60	2.20
270	53	3.00	2.20	0.00
PAN	45	0.00	0.00	0.00
TOTAL		136.2		

ANALYSIS:

Relative Corn Index (RCI)	466.8
Mean Particle Size (DGW)	381 microns
Standard Deviation (SGW)	2.11
1 Standard Deviation Distribution	181 - 803 microns
Surface Area (CM <sup>2</sup> ) / Gram	157.6
Particles / Gram	167557

RANKING	PARTICLE SIZE UNIFORMITY ( standard deviation )
Excellent	< 2.0
Good	2.0 - 2.2
Average	2.2 - 2.8
Poor	> 2.8