

Flour Milling Process



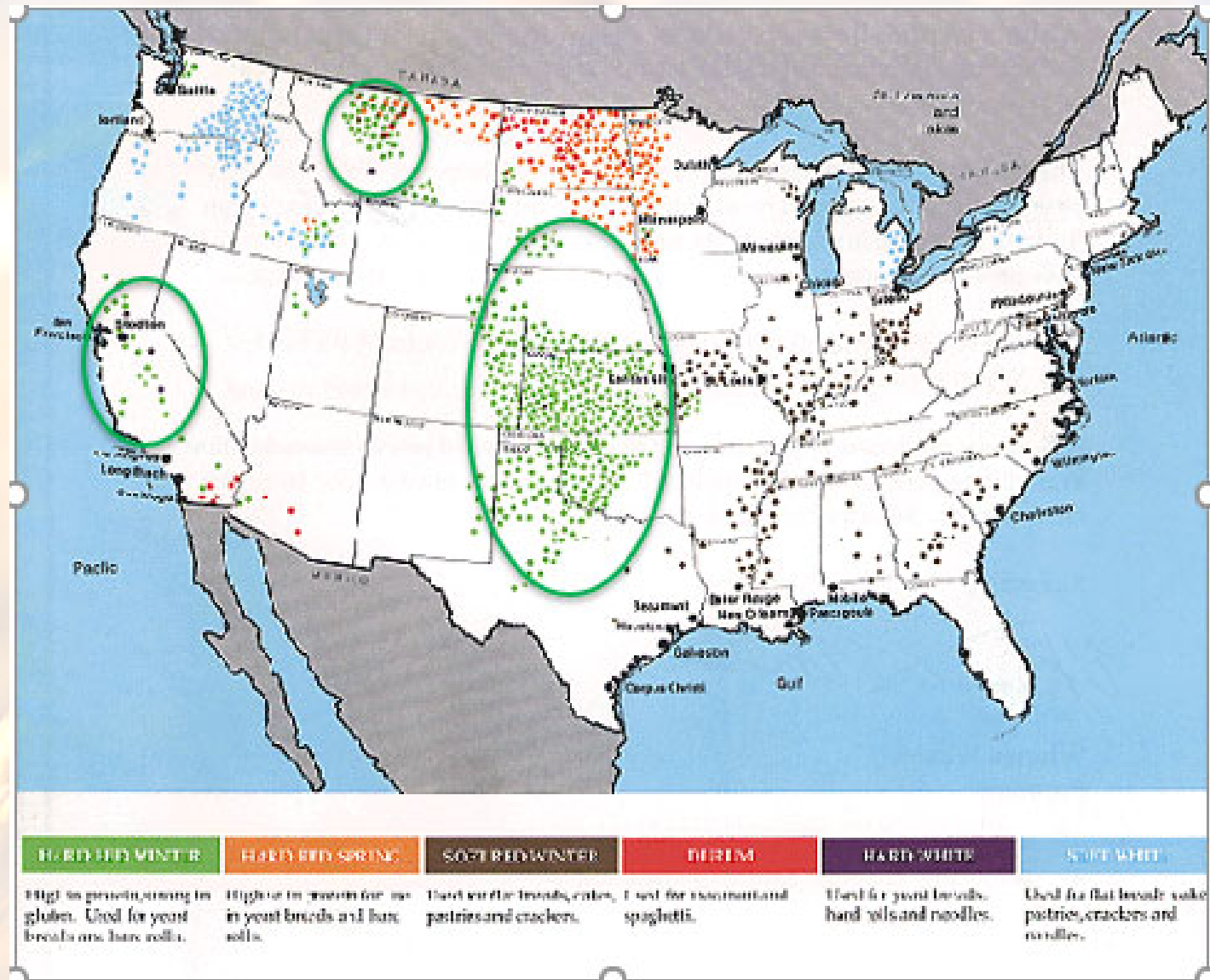
Strategically Located 6 Mills



US Wheat Production

Hard Red Winter Wheat:

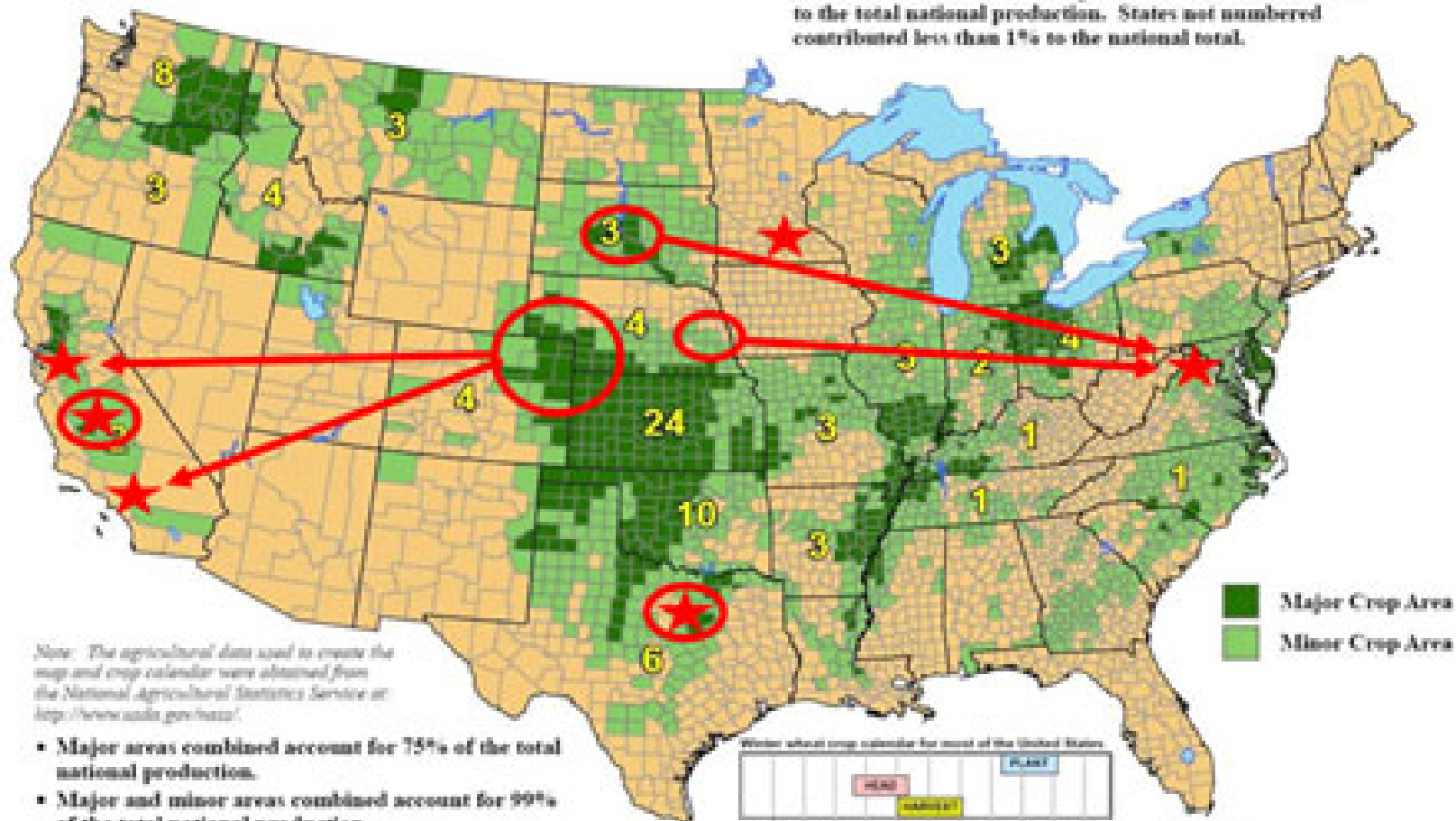
- Planted in the fall in areas where the winters are mild and dry.
- Growth begins in the Fall, dormant in the Winter. Plant matures in the spring and is harvested in the early summer.



Grain Origination

United States: Winter Wheat

Yellow numbers indicate the percent each state contributed to the total national production. States not numbered contributed less than 1% to the national total.



Note: The agricultural data used to create the map and crop calendar were obtained from the National Agricultural Statistics Service at <http://www.nass.usda.gov/nass/>.

- Major areas combined account for 75% of the total national production.
- Major and minor areas combined account for 99% of the total national production.
- Major and minor areas and state production percentages are based upon averaged NASS county-level and state production data from 2000-2004.

Winter wheat crop calendar for most of the United States



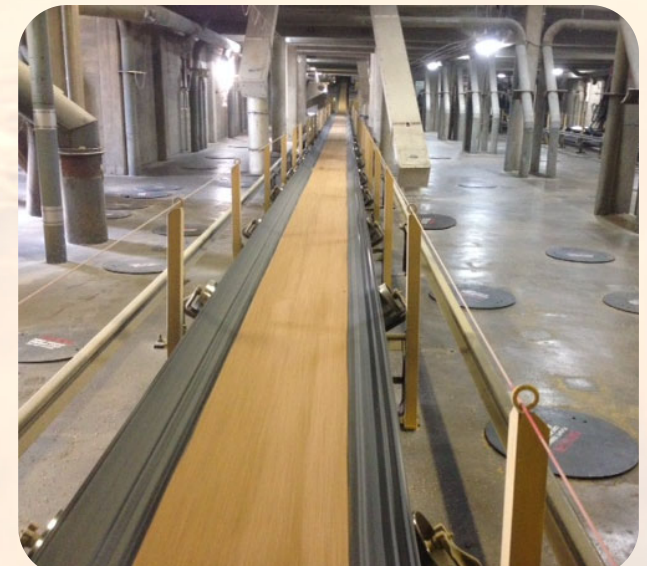
Crop calendar dates are based upon NASS crop progress data from 2000-2004. The field activities and crop development stages illustrated in the crop calendar represent the average time period when national progress advanced from 10 to 90 percent.

Flour Milling Process



Grain Receiving

- ❑ Hard Red Spring / Hard Red Winter / Soft White Winter
- ❑ by Railcar = 3,400 bushels (90 ton)/car
- ❑ by Truck = 900 bushels (25 ton)/truck
- ❑ Grain Storage = 1.1 million bushels (27,700 ton)



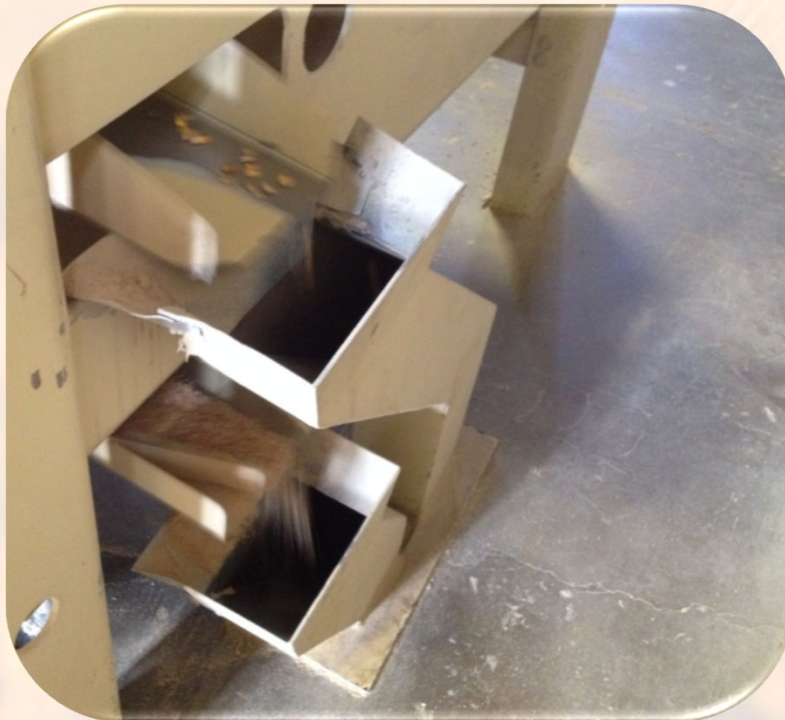
Grain Cleaning & Tempering

- ◆ **Recycler aspirator removes particles lighter in density**



Wheat Cleaning Process

- ◆ Grain separator uses two screens. One larger screen to remove larger than wheat pieces and one smaller screen to remove smaller pieces



Wheat Cleaning Process

- ◆ Scourer rubs wheat on wheat to remove dirt from the outside of the wheat kernel



Tempering Process

- ◆ Water is added to the surface of the wheat in a mixing conveyor
- ◆ Wet wheat is held in bins for 12 & 16 hours



Post Tempering Process

- ◆ Wheat passes through a magnet
- ◆ Intensive scourer breaks up weak & cleans wheat kernels
- ◆ Recycle aspirator removes remaining light particles



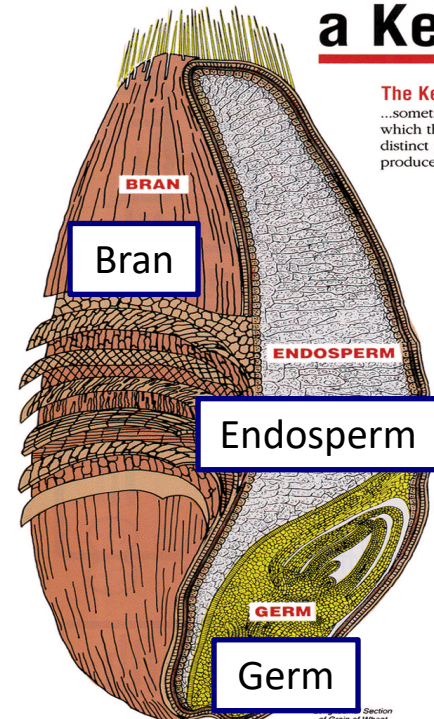
Milling

- ❑ Milling is continuous automated process to grind wheat and to **extract white endosperm from the wheat kernels.**

- ❑ A mill
 - ❑ 9,000 cwt/day (562 t/day)
 - ❑ White Flour – Hard/Spring

- ❑ B mill
 - ❑ 4,500 cwt/day (280 t/day)
 - ❑ White Flour Hard & Soft

a Kernel of Wheat



The Kernel of Wheat
...sometimes called the wheat berry, the kernel is the seed from which the wheat plant grows. Each tiny seed contains three distinct parts that are separated during the milling process to produce flour.

Endosperm
...about 83 percent of the kernel weight and the source of white flour. The endosperm contains the greatest share of protein, carbohydrates and iron, as well as the major B-vitamins, such as riboflavin, niacin, and thiamine. It is also a source of soluble fiber.


Bran
...about 14½ percent of the kernel weight. Bran is included in whole wheat flour and can also be bought separately. The bran contains a small amount of protein, large quantities of the three major B-vitamins, trace minerals, and dietary fiber — primarily insoluble.

Germ
...about 2½ percent of the kernel weight. The germ is the embryo or sprouting section of the seed, often separated from flour in milling because the fat content (10 percent) limits flour's shelf-life. The germ contains minimal quantities of high quality protein and a greater share of B-complex vitamins and trace minerals. Wheat germ can be purchased separately and is part of whole wheat flour.

Section of Grain of Wheat

U.S. dietary guidelines recommend 6 to 11 servings of the bread, cereal, rice and pasta group each day. Grain-based foods provide complex carbohydrates, the best source of time-released energy for our bodies. These foods are usually low-fat and provide fiber. Grain foods provide vitamins — especially the three key B vitamins (thiamine, riboflavin and niacin) and iron.

Food Guide Pyramid A Guide to Daily Food Choices

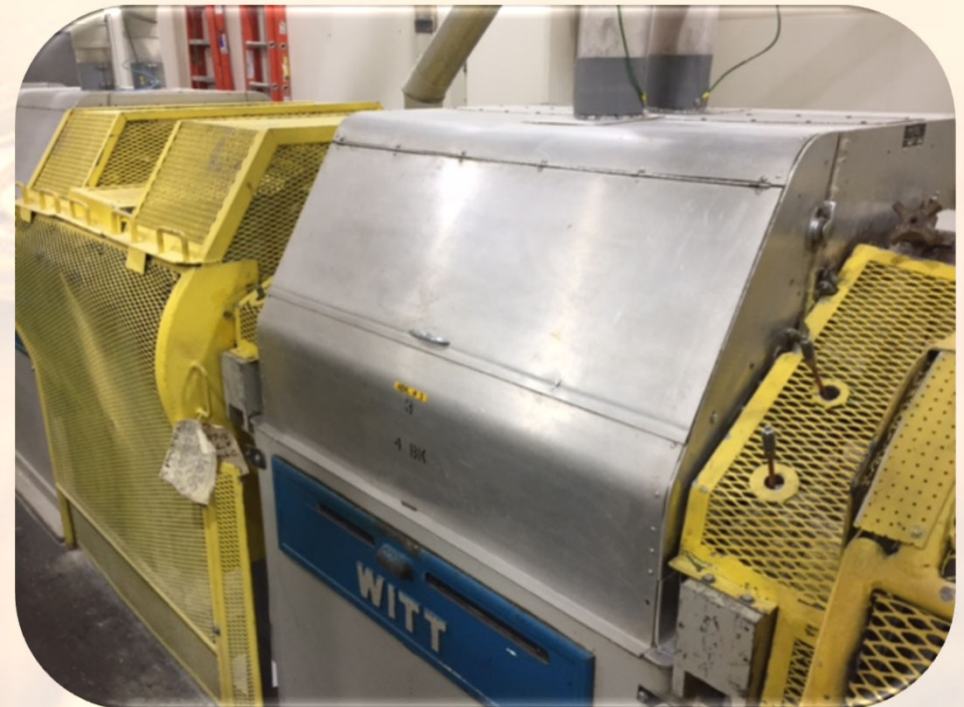


KEY
■ Fat, Oil, & Sweets
USE SPARINGLY!
■ Sugar (added)
These products show fat, oil and added sugar in both.

Food Group	Servings
Milk, Yogurt, & Cheese Group	2-3 SERVINGS
Meat, Poultry, Fish, Dry Beans, Eggs, & Nuts Group	2-3 SERVINGS
Vegetable Group	3-5 SERVINGS
Fruit Group	2-4 SERVINGS
Bread, Cereal, Rice, & Pasta Group	6-11 SERVINGS

Milling

- ◆ **Roller Mills: corrugated rolls break wheat into course particles. Smooth rolls reduce endosperm to flour**



Milling

◆ Pneumatics: Air used to transfer mill stock



- ◆ **Sifter: ground wheat is sifted through successive screens of increasing fineness**
- ◆ **Flour passes through a sifter & is collected in a screw conveyor**



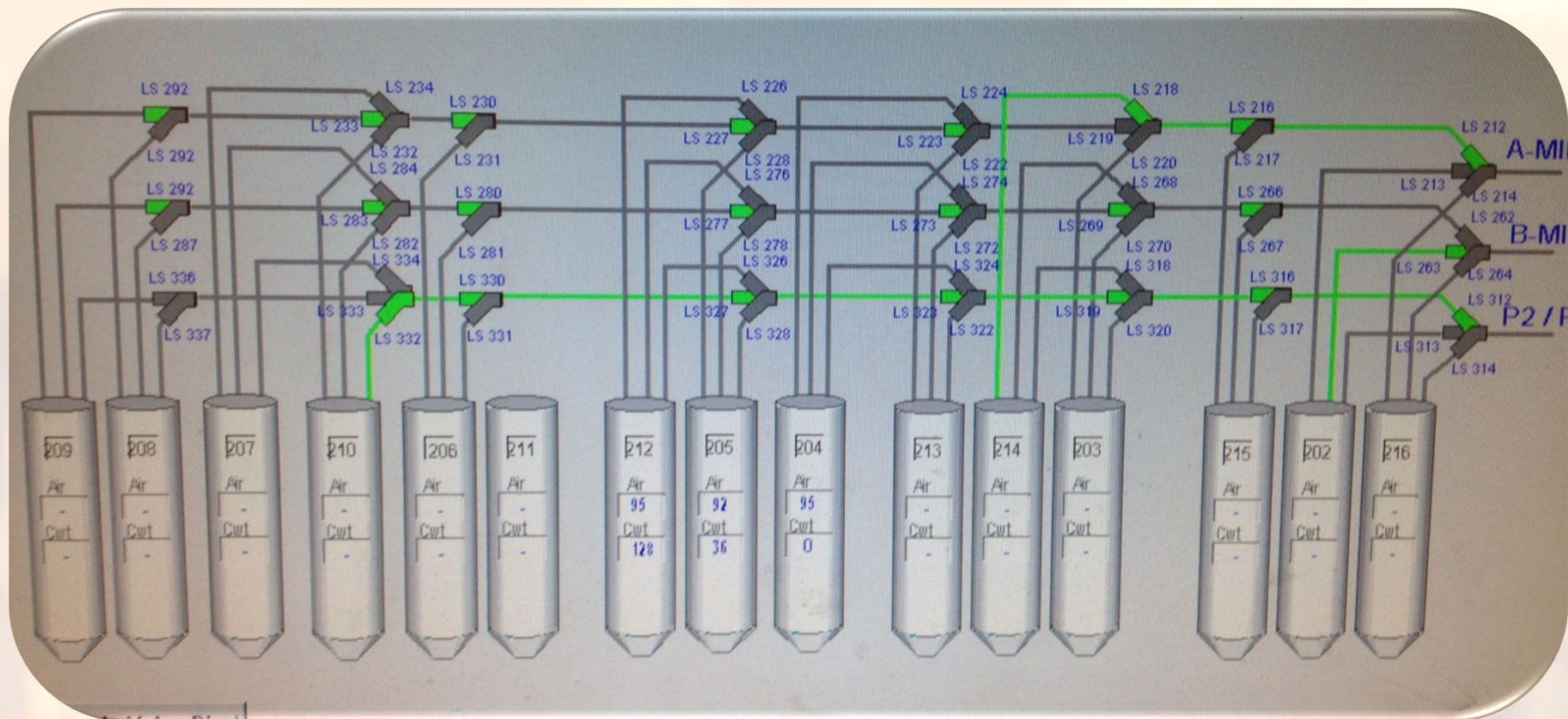
- ◆ **Purifier: air currents and sieves separate bran from granular endosperm**



Finished Product

Product Storage

- ◆ Flour is blown into one of 26 storage bins



Finished Product

Ingredient Addition

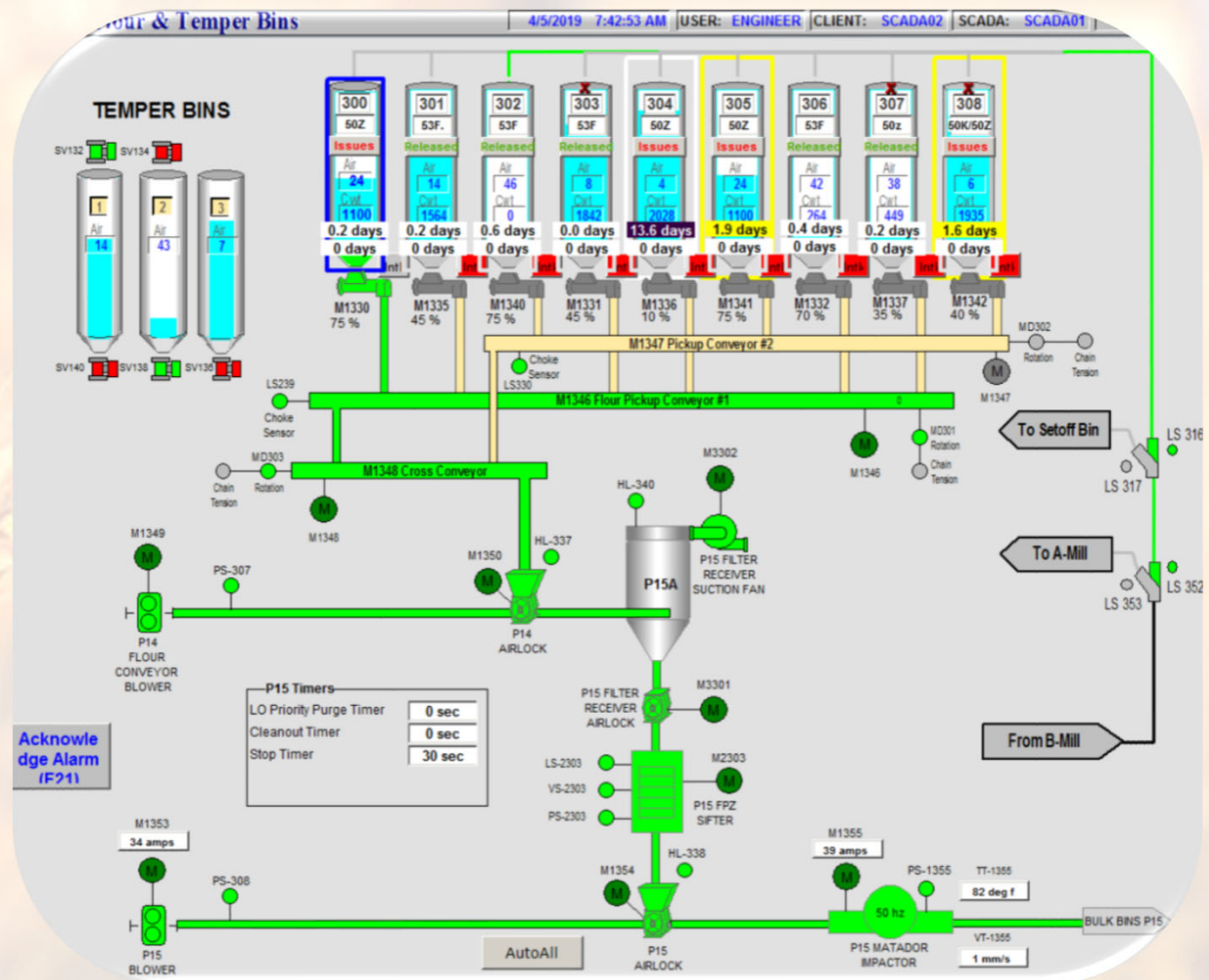
- ◆ Ingredients are added on loadout



Finished Product

Product blending and transferring

- ◆ Flour is pulled from the storage bins and transferred to the truck loading tanks



Product blending and transferring

- ◆ Flour passes through rebolt sifters. Tailings are collected & inspected for each load
- ◆ Flour then passes through an infestation destroyer, which utilizes impact as a means for controlling infestation
- ◆ Flour then passes through a rare-earth magnet



Product blending and transferring

- ◆ Flour passes through a metal detector

