



HOW A TMR MIXER SCALE IS MADE

by Hoard's Dairyman staff



WHILE the number of pounds displayed on a scale monitor is important to us, it's the parts we don't see that do all the work. *Hoard's Dairyman* traveled to Digi-Star, right here in Fort Atkinson, Wis., to see how scale systems are made.

TMR mixers nearly always sit on scales. A basic scale requires only a set of steel shafts and tiny gauge that measure changes in weight.

- 1.** Load cells are what makes a scale a scale. They're usually made from a steel bar that is designed to fit the needs of the equipment. The load cells could be incorporated into an axle, hitch, or supporting bar of the equipment the scale will weigh. Steel for the load cell is checked to meet specific strength and hardness requirements. At Digi-Star, each load cell is machined and checked with a micrometer to very tight tolerances. This ensures the steel pieces fit critical dimensions and are neither too big nor too small. The inside wall of load cells vary from just 0.125 of an inch to over 6 inches thick.
- 2.** After ensuring the load cells conform to the perfect dimensions, they are thoroughly cleaned, then sandblasted to remove any oil residue and washed again.
- 3.** Next, the load cells enter the "clean room." Here, workers in hats and hairnets apply a strain gauge to the load cell. It needs to be adhered to an exact location on the load cell. Strain gauges contain a series of loops of a very small wire. The tiny loops of wire in the gauge stretch or compress as weight is put on the load cell. These changes alter the electrical output to determine the weight displayed on the monitor.
- 4.** The strain gauge is then clamped in place and put in an oven to cure the adhesive. Out of the oven, the entire unit is washed in cleaning solvents after wires are attached to the strain gauges, again with precision under a microscope. These wires run into a cable that eventually connects with the display.
- 5.** With the wires and cables attached, the load cell is ready to be calibrated. A known hydraulic load is applied to the load cell. Then, using a potentiometer (a device used to adjust electrical signals) and precision resistors, a worker calibrates the load cell to exact specifications by erasing a microscopic amount of copper.
- 6.** At this point, the load cell is ready for use. But it needs protective gear first, so a protective resin is filled around the critical components and left to set. The life of a load cell is dependant on the resin's ability to keep out moisture from the electronics.
- 7.** After a final test to ensure everything is still working correctly, it's time for the paint line. The load cell is now ready for distribution.
- 8.** The display box includes a motherboard with all the hardware and software needed to create an accurate display. The motherboard can be fitted with a radio, USB plug-in, remote display port, RFID, or GPS.
- 9.** At the Hoard's Dairyman Farm, we use one display in the tractor with another on the right side of the mixer. Our feeder uses the outside monitor as he dumps ingredients into the mixer and the inside monitor while he feeds. 

