

“Made It Myself” Grain Handling System Built To Last

By **Lorn Manthey**,
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Buying an efficient and high-speed on-farm grain handling system these days can easily run several hundred thousand dollars. “I really got a jolt when I heard those numbers,” says grain farmer Tim Kelly of Cokato, Minn. “That’s when my sons, Matthew and Shannon, and I started designing a system ourselves. We put it together using new and used components and a lot of our own labor.”

Kelly is an experienced do-it-yourselfer. In recent years, he’s built a high-capacity grain dryer, augers for grain handling, a lift mechanism for a 50-ft. door on his machine shed, a giant 60-ft. field roller, and a huge snow blade. “Everything I’ve made I could’ve bought,” Tim says, “but making things gives me a lot of satisfaction and saves money.”

The showpiece of Kelly’s grain system is a 120-ft. tall tower made of hot dipped galvanized steel. It has a 127-ft. belt and cup grain leg that discharges dry grain through 8-in. spouts into 4 bins. He plans to add a 70-ft. leg that will send wet grain directly into his dryer. A 7,000 bushel semi load-out bin stands on a 21-ft. tall steel frame between his new 95,000 bu. grain bin and the tower. Kelly also built a grain pit and a high-capacity conveyor that will dump a semi in 6 to 7 min. The electrical system, controls and office are in a 12 by 26-ft. building next to the tower with windows that overlook the pit and semi load-out.

“We thought a lot about how a system needs to work together before we started designing and building things,” says Kelly. “It took almost a year for design and another year to get it manufactured and installed. Making sure it functions properly is just as important as how much capacity it has.”

Kelly is quick to point out that everything he makes is built to last. He engineered the tower to have 1/2-in. deflection at 120 ft. and be able to withstand tornado-velocity winds. The tower has four 6 by 6-in. legs of 3/8-in. steel up to 60 ft. and the top 60 ft. has 5 1/2 by 5 1/2-in. legs. Diagonal braces on each 10-ft. section provide lateral support. A floor at the top of the tower is 2 ft. wider than the overall structure. All of the steel is hot dipped



The showpiece of Tim Kelly’s grain handling system is a 120-ft. tall tower. It discharges dry grain through 8-in. dia. spouts to 4 bins, including one with 95,000-bu. capacity.

galvanized. The tower is supported by a concrete pad 10 ft. square and 10 ft. deep.

“This tower looks like big grain legs on many farms,” says Kelly, “but it’s built stronger, and it definitely has one unique feature that others don’t have.” That would be the 28-in. square by 7-ft. tall man lift. The enclosed metal box rides inside 2 by 4-in. rails up one side of the tower. It raises and lowers as the operator manually pulls a continuous loop chain, aided by a counterweight equal to the combined weight of the box and the person riding. “We can get to the top of the tower in 15 seconds, which sure beats the heck out of walking up 120 steps,” says Tim.

Kelly had a local supplier build the tower and deliver it to his farm unassembled. He priced out having it erected on site, but that would’ve required extra man hours for assembling the lift. A few phone calls later, he located a 150-ton crane that could raise the completely assembled tower in place for several thousand dollars less. “I’m always happy to replace writing a check with labor,” says Tim, “so the boys and I assembled the tower in the machine shed.”

In the summer of 2012, the huge crane arrived and lifted the 27,000-lb. tower onto the pad in less than a day. They also used the crane to lift the frame and bin for the 7,000 bu. load-out. On that structure, Kelly made

the legs from steel tubes he bought from a salvage yard. The 10-in. diameter steel legs with 3/8-in. sidewalls are filled with concrete and re-bar. “A structural engineer told me that setup is stronger than I-beams and more resistant to weather and rust,” says Tim.

Part of this project also involved increasing the capacity of his home-built dryer by adding a third chamber on top of the two existing ones. He can expand the dryer by another chamber and also has room to build additional bins that can be served by the 120-ft. tower.

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They Saved Thousands On Grain System Components

Tim Kelly says it would’ve been easy to spend more than \$100,000 to equip his grain setup (see story above) with the parts and components that he and his son acquired used or built themselves for about a quarter of that cost. “There’s really no end to what a person can spend when it comes to a project like this,” Kelly says, “and it’s real easy to spend way more than what’s practical.” Fortunately, Kelly and his sons, Matthew and Shannon, are master do-it-yourselfers who, if they can’t find a good functioning used part, will build it themselves.

Matthew is a licensed electrician who often works on large commercial projects. With that background he was able to acquire several used parts for the electrical portion of his dad’s new home-built grain setup. He located good quality 2 by 4-ft. electrical boxes and breaker panels that had been removed from a commercial manufacturing plant, paying pennies on the dollar. He found fuses the size of a stick of dynamite, which cost \$1,500 new, for \$30 apiece. Two dozen capacitors were outdated for a large plant and would’ve cost several thousand dollars new. Again, he paid cents on the dollar. When the electrical system design called for a 10-in. square metal trough to run cables, Tim had a local metal shop make it for a few hundred

dollars rather than pay \$1,500 for a new one from an electrical supply company.

Tim got his biggest shock, however, when he asked the power company the cost for running 3-phase power to his farm. “I about fell over when they told me it would be more than \$200,000,” Tim says. “So the boys and I talked it over and we decided to build our own 3-phase system.”

They located a used 150 hp motor and built a converter that changes 7,500 volts of single-phase power into 1,200 amps of 3-phase power. A commercially available clutch to slowly engage the motor would’ve cost a couple thousand dollars, so Tim and the boys built a lever-activated version themselves that works great. Their only cost was to buy a few belts and spend a few hours to fabricate the device from used steel parts.

They also reduced costs by designing and building their own conveyor beneath the pit. The rugged truss-type frame is mounted on wheels so it can easily swing between one grain lift and the other. The sliding door that feeds grain onto the conveyor opens and closes through a clever chain, gear and lever mechanism that Tim designed and built. The control is mounted on a vertical pipe near the grain pit, which the semi-tractor driver opens and closes with the same wrench he uses for



Kelly and sons reduced costs by designing and building many components including this movable pit conveyor that’s mounted on wheels.

the lift gates on his grain hopper.

“We build things that make grain handling easier and more efficient,” says Tim, “and we save money in the process.” Other examples of that mechanical prowess are the grain deflectors that Tim made to fit inside the distribution pipes at the top of the leg. “Buying them from a supplier would’ve cost

about \$1,000 each,” says Tim. “I made five of them myself in a week from a few hundred dollars of scrap metal and they work just fine.”

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