

THE ENGINEERED AG BUILDING

As today's farm buildings get bigger, they also get better

If today's builder wants to stay ahead of the curve, he'd best respect the new demands of the modern ag building. These long and lean facilities are engineering marvels if done right, and today's farmer, with hundreds of thousands of dollars invested, expect it to be done right.

Lee Bergum, Minnesota district sales manager at Energy Panel Structures says, "I tell guys, 'it's not your father's pole barn anymore. It's a totally different building all the way around. It used to be round poles and galvanized steel. Now we have to determine how big of a laminated post to use, special bracing, sheer loading, wind loads, all that has to be put into consideration."

Recent Hall of Fame inductee Steve Pohl, an ag engineer for South Dakota State University (related article on page 6), agrees. "It used to be that 14 feet was a standard sidewall in the post-frame industry. And now it's generally 16 feet and often 18 feet sidewalls. We're also dealing with larger machinery and wider door spans. We might have end doors that open 40 feet



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wide or wider, and we have to make sure those buildings can structurally handle that."

Denny Morgan, an award winning builder and owner of Morgan Building & Equipment, Wells, Minn., has witnessed the evolution of ag buildings first hand for several decades, from the old two-story wooden barn, to pole barns, to hybrid remodelings to the recent development of mega barns. Rather

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than buildings that once tried to fit all needs, buildings today are engineered for specialized uses.

“We use to do finishing barns that maybe held 200 head. And now it’s got to be a barn that holds 1,200 head or they won’t even look at it,” he reflects.

Right now, the building trend is in heated workshops for machinery. “A well insulated shop where the farmer can basically open the big bi-fold door and drive their equipment in and close the door behind them,” Bergum describes. “They want the convenience of the building that’s easy for them to heat, easy for them to use. Drive that combine in without taking off any attachments and start working on machinery.”

With corn prices still high thanks to Ethenol, crop farming has also expanded to the point where farmers can afford to own a nice building. With the cost of today’s equipment, they can’t afford not to keep it protected.

Farmers today also expect more out of a building. Says Bergum: “They research what they want. They’re trying to get a better return on their investment. They aren’t demanding, but they want to make sure they get what they pay for and have a good building when they’re done.”

Morgan looks at it this way: “We need to give these guys something good if they’re going to hire us to build a building. It has to be designed to accomplish their goals and their needs.”

Thus enters the era of ag building engineering.

Engineered ag buildings, such as those made by EPS, are becoming more standard. And while a well-engineered building may cost more up front, in the long run it pays.

“Unfortunately, there are still a few builders who don’t understand the importance of engineering, and they ‘just put stuff together’ and don’t think about it,” Pohl says. “When you’re putting something up [from scratch], that building should have at least some engineering done, someone to make sure everything is done right, especially now that we’re going to much wider spans.”

“That’s the biggest thing we see in the market: people trying to build things for the bottom dollar. You don’t want to sell the price, you want to sell the quality of

the building. And a lot of people gloss over that,” Bergum believes.

He continues: “Engineering has changed greatly since EPS started in 1981. Buildings are engineered more thoroughly. It’s a complete unit when we’re done, it’s not just different components. We do it as a package. I think that’s what has changed most through

the years, instead of selling individual pieces—trusses, things like that—we’ve streamlined the entire package.

“What we’re trying to simplify now is the construction part of it for our builders, eliminating steps.”

The reasons for that are many, but bottom line it comes down to making sure that a well-engineered building is

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Connie J. Reinert, EPS

built to engineering standards.

At EPS, “buildings are built to code,” he continues. “Contractors are trained to our system so that way they are able to put it up correctly.”

EPS now precuts a lot of the lumber their builders need, selects the proper hangers and the company is working on simplifying its drawings so the process is as flawless as possible when it’s handed off to the builder. Engineers are on staff when a builder confronts a special need.

The benefits of predictability are many, especially as both herd and machinery sizes have increased substantially.

Mother Nature has also played a hand in the recent call for engineering. An increase in damaging tornadoes, hurricanes, heavy snowfalls and forest fires has alerted consumers to the need for buildings that don’t topple so easily. Morgan remembers when it was primarily up to the contractor and owner to decide the best location of a building, the best materials and the best building method. “We looked at where the building sat on the property and what the wind currents were hitting it and

what buildings were surrounding it,” he recalls. “We looked at spacing the buildings apart for disease control, for livestock flow and for allowing bigger machinery to move through between buildings.” While all those factors are just as important as ever, the addition of an engineer trained to identify potential problems can greatly reduce their occurrence and streamline the planning-through-building process.

“You’ve got to look at the job and decide what kind of system is going to be the best and what that particular farmer’s management styles and goals are and kind of balance that out,” says Morgan. The engineered buildings of today have taken a lot of the guesswork out of the equation.

Computerization has certainly led to many of the advances in engineering. As Pohl reflects, “Back in the ‘70s and ‘80s when I was with Great Plains Supply, computers were starting to be used for calculation, later for cutting lists and plate design. But, as it has evolved, it’s amazing what these truss plants can do now. In the truss industry, we started

with plywood gussets and have now gone into the metal stress plates. I think the adaptation of computer design has made a huge difference in that. You can look at different scenarios so much easier now.”

VENTILATION AND MOISTURE/ VAPOR CONTROL

Putting lots of animals into confined spaces has its challenges for builders. In addition to making sure that those big spaces can keep a roof on, there are animal health factors to take into consideration. Manure, disease, and mold all need to be addressed and controlled in the building design. And the building itself needs protection from the elements.

Bergum has his own priority list. “Putting it on a scale of one to ten, where ten is most important, I would have to put ventilation at a 10 and wind loads and snow loads at 9 1/2. With livestock you have problem with ventilation. Improper ventilation can destroy a building from the interior out faster than anything else.”

Hand-in-hand with ventilation is condensation control. EPS uses DripStop. They also produce SIP buildings, now widely used in hog and poultry operations for condensation control. SIPS is also very popular now for heated machinery shops because of its energy-efficiency.

Morgan, who has done a lot of hog barns in his area, often uses SIPS from EPS in livestock buildings. “In farrowing and in nurseries, where it’s heated, we’re using SIP for that. If it’s a tunnel



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Connie J. Reinert, EPS

ventilation barn, we try to use SIP on the sidewalls, because your end wall is frame – a 2 x 6 wall and open so you can let air come in. Then the other end is all fans, and that's framed in.”

Pohl puts ventilation at the top of his priority list as well and has helped sponsor ventilation workshops for producers in the Midwest. “It's what we call the

Four State Ventilation Group,” he says. “We've done probably over 100 workshops and we've had over 3,000 producers and tech people go through those workshops.”

BRACING FOR SNOW AND WIND

Improper bracing is another common issue, Pohl cautions. “If you look at posts, when you look at the additional height in

post frame, where we might be using a 3-ply 2x6 post, maybe we should be using a 3 ply 2x8, or even a 4 ply. That gets back into the engineering to make sure those are where we need them to be,” he says.

In areas where snow is an issue, today's guidelines are changing. Pohl suggests that builders in the Midwest need to reevaluate their truss bracing. “Our truss failures are due to lack of bracing,” he says. “The truss is adequately designed, but it's the lack of truss bracing; not paying attention to that bracing. We find that in all types of farm structures. We use to design a lot of buildings at 20-pound snow loads here in the Upper Midwest, but we were dealing with structures at the most 60 feet wide. I would recommend in our part of the world, today, 30-35 pound snow loads.”

Morgan agrees with that, and cites the new underwriting requirements of the Reinsurance Association of Minnesota for new construction of agricultural buildings. “Their guidebook now says that

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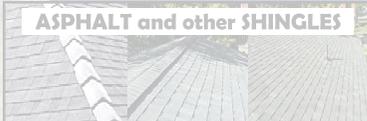
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all new farm buildings or additions are required to be signed off by a registered engineer certifying that the building meets or exceeds RAM'S requirements."

Among their requirements: buildings must meet or exceed a top chord live load of 35 pounds per square foot; buildings must have a pitch of 3.5/12 or greater; buildings must meet or exceed a wind load of 90 mph or greater; and buildings must have a footing depth of no less than 42 inches below grade and bearing capacity no less than required for soil type.

While many builders might bristle at the rules, Morgan embraces them. "To me that's the greatest thing to come out because it gets away from someone trying to cut corners," he says.

Bottom line that means safer buildings and a better image for people who build them.

Although today's ag consumer is more knowledgeable and demands more quality in a building, it is still up to the builder

to help parlay good engineering information to the consumer. One farmer Pohl recently spoke with was concerned that if he built a pole barn, the posts might rot off. "I told him, with the treatments we use today and the knowledge of having the correct treatment levels, that problem is fairly nonexistent."

While it is true that the engineered ag building is becoming more the norm, there is still some disconnect with some independent contractors and Pohl believes it has to do with what's going on in the academic level. "Part of the problem we've got, is that we really have a lack of ag engineers today [on the university level]. We're getting a lot of gray hairs out there. I think here in the Upper Midwest we're still very blessed with instructor-type ag engineers: Iowa, Minnesota, Nebraska, South Dakota, Illinois, Wisconsin and Indiana. It used to be that you could go to your extension service and the county educators or

agents would have access to an ag engineer. I can't say that anymore."

Pohl saw the need for greater education about ag buildings many years ago. In addition to the Four State Ventilation Group mentioned earlier, Pohl and a fellow professor at the University of Minnesota developed the Minnkota Agri-Builders and Equipment Supplies Association. That organization offers workshops to contractors in a five-state region to help them stay abreast to the latest in ag building technology.

Pohl suggests that if your state doesn't have an ag engineer available to you through an extension service, try to make a connection through a company you deal with, or with a structural engineer who may not specialize in ag buildings, but can still provide the basic structural information you need.

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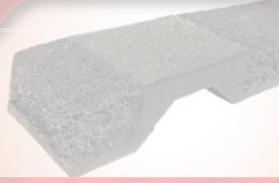
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