

# RADIUS TRUSSES

## Present Unique Challenges in Design, Manufacturing

by Libby Maurer

**Material handling for long-span trusses requires special safety and labor considerations.**

**F**or Builders FirstSource (BFS) in Freeport, FL, there's nothing unusual about a complex component order for a custom home. In fact, custom homes—some “good and cut up”—make up 95 percent of the plant's work, said Sam Alford, truss technician for BFS.

However, one job the company had earlier this year, raised the bar to say the least. BFS supplied roof and floor trusses for a 22,000-sq.ft. luxury home in the Fort Walton Beach area of the Florida Panhandle. To achieve an aesthetic that would fit this homeowner's extravagant taste, the massive project called for long-span double radius trusses.



The 68-foot trusses presented some unique design and manufacturing challenges for Alford, who performed the design and layout of the trusses, design manager Eugene Watts and plant manager Allen Valdez. The radius trusses formed the roof of the home's attached gymnasium, complete with full basketball court and a bowling alley. The fact that the trusses were curved on the top and bottom chords, or a “double radius,” made the job particularly challenging. This was the plant's first experience working with a double radius shape.

After the architect defined the specific radius of the trusses, Alford went to work. First, he input mock walls in the shape of a circle into the design software. This formed the perimeter of the gym. Next, he cropped the walls to fit the desired height of each truss. To arrive at the exact radius of each truss, he then broke them into small “panels,” dimensioning each individual panel (length and height) along the top and bottom chords. “I had to break [the roof trusses] up

into 4-foot panels in order to design the roof according to the architect's specs,” he said. Finally, he input the panels manually into the engineering software to form the full trusses.

Adding to the complicated and tedious design process, not all of the radius trusses were the same shape. Some of them had a curved top with multiple-step bottom chord, shown at above. Alford explained that the unlike some radius trusses, the arched top chord shape did not require cutting a subtle curve into the wood. “The longer the span, the more gradual the arc...we could get that nice curved shape without cutting the top chord down any,” he said.

Alford said this is the first time he's designed something this complex. “I haven't done anything of this magnitude,” he said. “These things [trusses] were just unreal!” said the ten-year technician.

### at a glance

- ❑ A massive custom home in the Florida panhandle called for long-span radius trusses that were designed and built by Builders FirstSource.
- ❑ The job was especially challenging because the 68-foot trusses were curved on both the bottom and top chords.
- ❑ The BFS team took special precautions when building the trusses to prevent workers' injuries and damage to the trusses.



### Long-Span Handling

As for the shop, said 20-year veteran Valdez, “It wasn't the biggest job we've ever done, but it was definitely the most unique.” Not much had to be rearranged to make room to assemble the radius trusses. “We were already set up perfectly,” he said. A grouping of four tables (totaling 120' in length) was just the right amount of space for the job. However, Valdez had to shuffle three crews around to cover all the bases. Two crews combined to work at the table station and the third were assigned to stacking duty in the yard.

If anything took time, it was setting the jig in place perfectly, Valdez said. “It took an hour to set that jig up, but once we got it up, it went together fine.” He said this was to be expected since it was the shop's first double radius long-span job. To get the long-span set-up in place, Valdez got the measurements for each panel point, and the crew began by laying out the bottom radius in 4-foot sections (the same metric Alford used during

the design phase). When the bottom was complete, the crew started on the top chord. Then they filled in the web members. “Once we got that first truss in place and nailed to the table, they spray painted the outline of the truss,” he said. This outline served as the crew's guideline for the next 120 double radius trusses they would build over the next month.

### The Family Is Everything

Knowing how to “family” a long-span job such as this is as important as anything else. By this Valdez means how to break up the trusses into sections that will make the most efficient use of materials and labor in the shop. “What we do,” he said, “is spend some time looking at the layout of the house, and decide how you're going to batch sections of the roof. We call this a ‘family’ of trusses.” On a large project like this, using a grouping method like this helps to organize the materials, crew and lead times.

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### Radius Trusses

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After they've been familled, sawyers proceed with cutting the pieces for only that grouping. The cut lumber is stacked by size on buggies, which then go directly to the tables for assembly. Valdez knows exactly how many pieces can be safely transported on one buggy. He said in his experience, when you take the time to figure them out on the front end, covering all of these fine details makes a big difference in executing a flawless job.

### Special Considerations for Safe Material Handling

Valdez said for a job requiring so much material on the floor at one time, there are certain safety concerns he pays spe-

cial attention to. For normal jobs, he said, all the truss plates are picked at one time. But for this job, he asked that the number of plates stacked on the tables be kept to a minimum. "When there's a lot of plates laying out, there is more chance of injury especially with more workers in one concentrated area," he said. Instead, plates were picked as needed which minimized unnecessary stacks on the tables. He also noted when there are a lot of cut pieces around, it is important to remind workers not to block the aisles with materials.

Lifting the finished trusses off the table was Valdez's primary safety concern. Because of the trusses' length, two men were required to operate air lifts on either side of the table in perfect coordination. "They had to time it just right so the truss was lifted on both sides at the same time. In this case, utilizing workers' longevity and expertise paid off. Valdez said, "I had to put my two most experienced guys on those air lifts, and they worked it out just right."

Loading the trucks required the careful maneuvering of three forklifts spaced equally among the truss bundles. Bundles were lifted slowly onto the truck bed one at a time.

### Special Delivery

Valdez said the most challenging part of this job by far was the delivery. The location of the jobsite—in an older, built-up neighborhood—didn't help.

First, getting to the site was difficult. "[To get to the site] we had to drive through downtown Fort Walton—a high traffic area," he said. Because of the over-sized load, front and rear escorts were required to accompany the fleet on each trip. Valdez remembered that once the caravan entered

the subdivision, the front escort had to go a couple blocks ahead and stop traffic in order for the truck to make the tight turns. "It was pretty tedious," he said.

The drivers repeated this process six times to deliver loads of the long-span double radiuses. An additional six truckloads carried floor trusses and beams. The jobsite was so small that there was only room for two loads of components at a time.

Watts said the company's close working relationship with the engineer and builder made for few problems or hold-ups. "A coordinated team effort made a job of this size and complexity run smoothly," he said. **SBC**

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