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Technical Management: Part 2 Design to Increase Profits by Mike Kozlowski, E.I., Structural Engineer, Apex Technology, based on his BCMC 2002 presentation

As a structural engineer at Apex Technology, I have spent many years trying to streamline our design work for maximum profit. One way we've gauged our design efficiency is by creating a benchmark in which to compare our design time on different design projects. In my seminar at BCMC 2002, "Design to Increase Profit," I provided a step-by-step outline of the amount of time, as a benchmark, that it takes to design tract homes, custom homes and everything in between. I encourage you to use this as a comparison to your staff's design efficiency with respect to the components you provide.

DESIGNING TRACT HOMES

If you have any experience with tract homes design, you know that the design work tends to be very repetitive. You can really save time in this process by creating a few master designs, saving them and then modifying them only when necessary. Designing tract homes can almost turn into a clerical task if you use this plan.

TRACT HOME WITH FLOORS SUMMARY

- 10 minutes to input walls
- 3 minutes to cut in the planes
- 30 seconds to input the ceiling conditions
- 15 minutes to layout the roof trusses
- 15 minutes to design 26 roof trusses
- 15 minutes to layout floor trusses
- 10 minutes to design floor trusses
- 7 minutes to size 2 beams

Total design time: 43 minutes and 30 seconds for the roof + 32 minutes for the floors = 1 hour, 15 minutes, 30 seconds.

SECOND TIME HOME BUYER HOME DESIGN

The next most time consuming design work is what I like to call "Second Time Home Buyer Design." In my market, these homes are a little different in that their roof systems are a bit more complicated than the average tract home. These homes will be anywhere from 2,500 to 4,000 square feet and, on average, they will cost between \$150,000 and \$200,000. They generally have taller ceilings and may even have more than two types of ceiling conditions.

SECOND TIME HOME SUMMARY

- 10 minutes to input walls
- 2 minutes to cut in the planes
- 10 minute to input the ceiling conditions
- 45 minutes to layout the roof trusses
- 30 minutes to design 56 roof trusses

Total design time: 1 hour, 37 minutes

DESIGNING CUSTOM HOMES

As a structural engineer, I enjoy designing custom homes the most. The designs can be very complicated and may take one or two full days to complete the truss design. One thing you'll find is that this is an area in which the quality of the architectural plans you receive will be the determining factor in the variations in design time. Electronic drawing files that can be imported into the truss design software may be helpful, shaving hours off the total design time.

In my market, these homes will generally be 4,000 square feet or larger and will fall in the price range of \$400,000 to \$2,000,000. They may have more than three types of ceiling conditions, more than one story and greater roof pitches than the two previously outlined types of homes.

CUSTOM HOME SUMMARY

- 2 hours to input walls for roof and floor
- 1 hour to cut in the planes
- 1 hour to input the ceiling conditions
- 3 hours to layout the roof trusses
- 1 hour to layout the floor trusses
- 3 hours to design 124 roof trusses
- 1 hour to design 15 floor trusses
- 2 hours to size 13 beams

Total design time: 14 hours

DESIGN QUALITY CONTROL

Barry Dixon of True House, Inc. introduced the concept of our internal design quality control process in the May 2003 issue of SBC Magazine in a review of his seminar, "Maximizing Design Time While Minimizing Mistakes." I reiterated the importance of checking our technicians' work in my seminar and also explained the structure of our QC checks. The reason for this is simple: if a truss doesn't fit in the field, it can cause a series of unintended consequences downstream.

The flow of our internal design QC system has three crucial steps. The design goes from the original technician to the department manager and finally to the structural engineer. Each party

checks the design for different details. We've even created a checklist of tasks for each step along the way.

OUR TECHNICIAN CHECKLIST

First, the technicians check their own work for the major things that could be problematic if they are not caught before going into the field. Specific items on the technician checklist include: elevations, interior bearing, ceiling conditions, new codes and overall dimensions. An important function of this task is that this process gives technicians a sense of pride in their work. After they are satisfied that the design is satisfactory, they pass it on to their manager for his/her review.

If a technician has spent a considerable amount of time on one design, that person has a greater chance of overlooking a mistake that could be costly. You may want to consider enlisting the help of a fresh set of eyes to check the work.

MANAGER'S CHECKLIST

The manager's list is a bit more detailed than that of the original technician. Their list includes: interior bearing, elevation, hangers, special loads, deflection, codes and maintaining the truss repair log.

STRUCTURAL ENGINEER CHECKLIST

The buck stops here! This is the final check in the quality control process. The structural engineer is responsible for the final review of all the information supplied by the technician to ensure that all engineering details have been accounted for. After this review is complete, the structural engineer will seal the design.

Question: If a mistake is found in the internal QC process, does the design go back to the original technician for correction?

Answer: Yes, for two reasons:

- In the interest of minimizing interruptions, it should be the responsibility of the technician who made the mistake.
- Design mistakes should be viewed as educational opportunities. The person needs to learn from their mistake. Once they make the same mistake a few times, they will never forget again. Over time, you'll have a seasoned technical staff.

The PowerPoint® slides for this session are available at www.bcmshow.com. The complete audio visual presentation of this session is also available for purchase on the web site.

SBC HOME PAGE

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