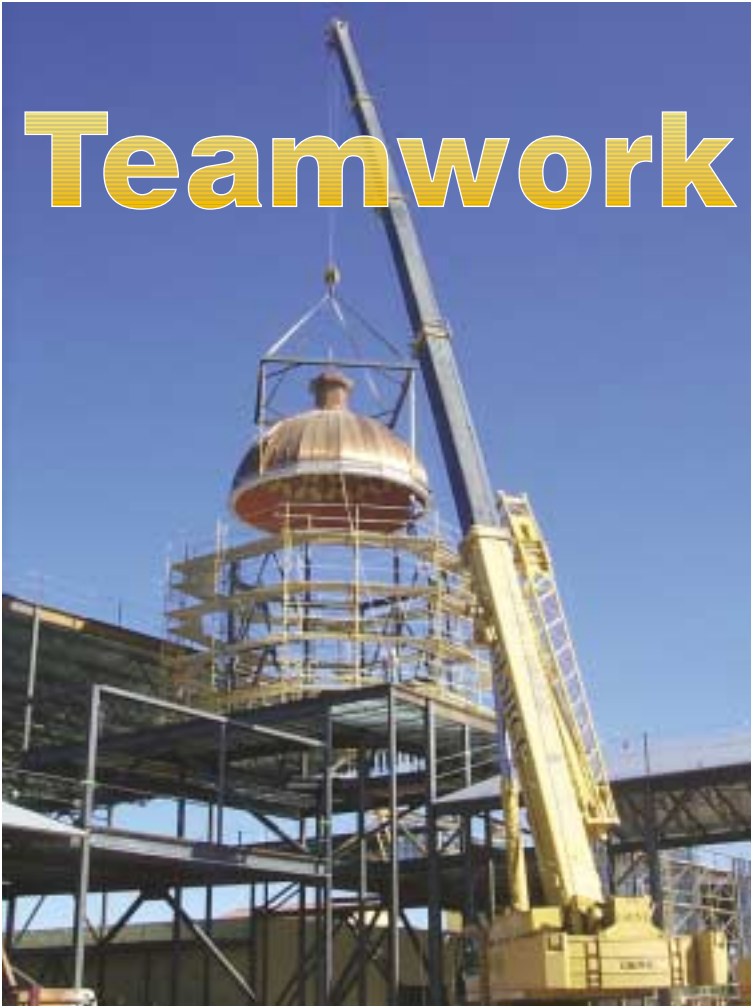


Teamwork Works

Casino Del Sol (Tucson, Arizona)



The design-build method of project delivery promises to benefit project costs, speed and quality. In practice, where does that leave the steel fabricator and the structural engineer?

Design-build has evolved from the sphere of fully integrated design-build firms, to partnerships between a prime designer and a prime constructor, to the point today where teams of design and construction professionals work together to address project needs. Where does that leave the structural engineer and steel fabricator? How can they best work together?

To explore those questions, AISC Marketing's southwest regional engineer, Robert (Bob) Pyle, chatted with Chris Youngblood, P.E., president of Chavez-Grievies Engineering, a structural engineering firm in Albuquerque, New Mexico, and George Dilks, vice president of dtl's Inc.

Pyle: What is your background as a structural engineer?

Youngblood: I've been practicing structural engineering here in New

Mexico for about 10 years. I am currently president and a principal structural engineer at Chavez-Grievies. I am very involved in many technical and professional organizations, and I'm one of the managing partners of a company called eSteel Design-Build Group.

Pyle: What trends do you see impacting structural engineering?

Youngblood: In my opinion, structural engineering is being viewed more and more as a commodity, particularly in the design-bid-build market. Structural engineers bring tremendous value to construction projects, but I see a trend of clients and owners using structural engineers less and less as a resource. Instead of engaging structural engineers early in the project development process, where we could have a significant impact on the construction cost of the project, clients only bring them in after critical decisions have been made. Many times this is done to reduce the scope of their work

and minimize their fees. Also, fees are negotiated based on hours needed to perform a task or a percentage of construction cost, instead of the value engineers bring to the project. This is not something that happens everywhere or on every project, and certainly not with our best clients, but I am concerned that this is a developing trend.

Pyle: Do you think this is impacting the image of the structural engineer?

Youngblood: Many clients now think that all we have to do is push a button on a computer keyboard and out comes a structural design. From an owner's perspective, technology greatly simplifies our job and reduces the number of hours required to complete the project, so they believe our fees should be reduced proportionately.

What technology really does is reduce the time needed for repetitive tasks, which gives us the time to come up with more creative and cost-effective structural solutions for a project. In

the end, that's what provides the owner with the greatest value for their construction dollar, not saving 0.1 or 0.2 % of the total cost of the project by reducing the structural engineer's fee.

Pyle: How did this happen?

Youngblood: We really only have ourselves to blame. Structural engineers in general do not do a good job of selling themselves and the value that they bring to the table. Structural engineers do not want the limelight, they simply want to do a good job. But this hurts the profession. We need to become more creative on selling ourselves and the value we bring to our clients and owners.

Pyle: Do you think these trends can be turned around?

Youngblood: We'll have to work at it. I hope we are heading in the direction of involving ourselves more in the total process, toward collaboration with other members of the industry, to demonstrate the value that structural engineers bring to the design and construction process. I also hope that we become more involved in marketing ourselves to the general public.

Pyle: What has been your traditional relationship with steel fabricators?

Youngblood: We have had the privilege of working with steel fabricators all over the Southwest and have always viewed fabricators as partners in the process. We look to them to help improve our abilities in the construction process.

Pyle: You are now involved with an innovative company known as eSteel Design-Build Group—what's that all about?

Youngblood: eSteel Design-Build Group provides guaranteed maximum prices and schedules for all of our services, sometimes with as little as a napkin sketch of a building. We can provide these guarantees because we have a structural engineering component, a steel detailing component, and a fabrication and erection component. Our structural engineering component is Chavez-Grievies Consulting Engineers, Inc., our detailing component is

dtl's, Inc., and our fabrication component is AmFab, Inc. All three firms are located in Albuquerque, New Mexico. Mark Mosher is the managing partner of both dtl's, Inc. and AmFab, Inc. Mark is one of the major architects behind our partnership and the eSteel process.

Pyle: Isn't it hard to keep three firms all headed in the same direction?

Youngblood: Communication is so important in our process that dtl's, Inc. is in the same office building as Chavez-Grievies. Over the last 11 years, we have completed projects as a design-build group in 13 states.

With our process, there are four distinct areas in which we offer our clients an increased competitive advantage.

"The key to a successful design-build project is selecting a team that has pre-established relationships..."

These are: faster schedules; lower cost; fewer problems; and lower risk. In today's market, owners usually can only realize one, maybe two of these advantages on any given project. These usually come at a cost to the other two. An owner might be able to select a team that will provide faster schedules, but this means higher costs, more problems and increased risk. With our process, we have successfully been able to deliver all four advantages to our clients on each of our projects.

Pyle: How do you achieve faster schedules?

Youngblood: We achieve faster schedules through the use of technology and by taking advantage of our established relationships. Technology, specifically computer programs and Electronic Data Interchange (EDI) has given us the ability to digitally take structural steel projects from design all the way through detailing and fabrication. We are the only design-build group in the country who is successfully accomplishing this. EDI allows the information in our design software to be transferred into our detailing soft-

ware and then sent to our production facility in the form of a CNC file. We now can sit in a room, design a building, detail it, e-mail a file to the production facility and fabricate structural steel — all without producing a single sheet of paper or leaving the room.

In our process we do not do this — we still follow the standard procedures for shop drawing submittals and review. We do, however, use the technology to solve problems between the structural engineering, detailing, fabrication and erection on a "real-time" basis. On most projects, we have weekly review meetings. These meetings include the general contractor, the engineer, the detailer, the fabricator, and the erector, and we solve problems before they become issues. We will use this meeting to create a complete cartoon set of drawings of a project, with input from all parties, before we design a single member. This inclusion of all parties in the process saves time and effort, and all parties become vested in the project.

Our existing relationships with steel joist manufacturers and raw material suppliers are also critical to achieving faster schedules.

Pyle: How do you lower project costs?

Youngblood: When I say lower costs, I am not talking about a lower cost for the steel package. What our process provides is the structural system that leads to owners receiving the best overall value for their construction dollar. By having control over the structure from design through erection we can achieve the greatest efficiencies in the structural system. All of our pricing is done on a real-time basis. It's based on the current market prices, and we design for whatever is the most cost-effective system. We never go into a situation with a preconceived notion of how we are going to design and build a particular project. The way we are designing, fabricating and erecting buildings today is not the way we were doing it six months ago, nor is it the same way we expect to be doing it a year from now.

Pyle: How does the process actually work?

Youngblood: The first part of the process is to select a structural scheme. Typically, eSteel will not select the scheme, but a team will. This team is typically the general contractor, their subcontractors, the architect, and the rest of the design team. eSteel brings information to the table so the project team can make an educated decision when selecting the structural system for a project. Usually the team does not select the cheapest or lightest steel package. Instead, it chooses the system that is the best overall for that particular application.

In our process, the team consider five major criteria when selecting a structural scheme: 1) the architectural requirements; 2) constructability (of the entire project not just the steel package); 3) mechanical, electrical and plumbing requirements; 4) material and labor prices; and 5) availability of components.

An example would be a recent design-build hospital project. After the initial meeting with the project team, we came back one week later having analyzed and priced 25 different scenarios for how to frame the elevated floor systems. We evaluated everything from steel bar joists at 3' on center to composite wide flange beams at 10' on center.

For a type 1FR building, fireproofing requirements were a concern. For every possible framing scenario, we evaluated achieving the 2-hour rating for the floor three different ways. First, by using a minimum slab thickness and spray-fireproofing the underside of the deck. Second, by varying the thickness of a normal weight concrete slab on not spray-fireproofing the underside of the deck; and third by varying the thickness of a light-weight concrete slab on not spray-fireproofing the underside of the deck. Each scenarios was designed and input into our cost model, including the costs of spray-on fireproofing and the different types and thicknesses of the concrete floors. This information was presented to the project team.

The system that the team selected was not the cheapest steel package. The decision was driven by the complex mechanical distribution system, the fireproofing and the vibration requirements, and the system chosen was the most economical overall for that project.

Pyle: That's got to happen early in a project.

Youngblood: You're right, we bring the most value to a project when our team is brought in during conceptual design.

Pyle: George, how has your business changed with respect to EDI and the partnership with the eSteel team?

Dilks: The opportunity to be involved in the early stages of design has given us more control and has sped up the process of receiving an accurate and complete set of structural drawings. With the EDI transfer we can complete our shop drawings in a more timely manner.

Pyle: At what point in time on a project do you actually start to get involved?

Dilks: We get involved in the early stages of design, attend the team meetings and give input on both framing schemes and connection design.

Once our engineers have an accurate model in their engineering software, we can get a jump on the project while the contract documents are being completed. When contract drawings are finalized, we compare the documents against the completed model and notify the team of any discrepancies.

Pyle: George, for years we have realized a problem of design drawings not being complete because owners demand fast-track schedules and make it very difficult to detail a job. I know that you moved your firm into the same building as Chris' firm. What has this done for your company?

Dilks: Since many of the projects we do are with Chavez-Grievies, we determined that it would be in our best interest to be in close contact with them. The old-school method of sending documentation through the fabricator to the contractor, who forwards it to the architect who in turn forwards it to the engineer, takes up to a week to get a response. Being part of the team with the contractor and the architect lets us work directly with the engineer and get an on-the-fly answer. Then we forward the data to the contractor and keep the entire team informed of the status of the shop drawings. This has eliminated

delays and made our office more efficient and productive.

Pyle: Thanks, George. Chris, as a structural engineer where do you see advantages of such a level of participation?

Youngblood: The goal of all of us in the industry, both on the design side and the construction side, should be to meet the architectural requirements of the project while giving the owner the best value for their construction dollar. Anything that we can do to provide a better avenue to accomplishing these goals is a true asset to the owner, allows us to add value to the process and helps us to establish long-term relationships with owners for partnering on future projects.

Relationships are everything in this business. When we put together a team at the conceptual design phase that involves all entities involved in project design and construction, those entities have pre-existing relationships, it is advantageous for all involved. It reduces the risk of each firm involved, and it gives owners the best value for their construction dollar.

This provides an avenue for structural engineers to demonstrate their value to the team. It is this type of effort that can lead us to reversing the trend of being viewed as a commodity.

Pyle: Do you see more owners moving toward a design-build solution for their projects?

Youngblood: Yes — industry statistics tell us that. The key to a successful design-build project is selecting a team that has pre-established relationships with all of the entities involved. Design-build projects that have been disasters were projects where prior relationships did not exist between the design and constructions components.

Pyle: Do you get irritated when a fabricator sticks his nose into your design?

Youngblood: Absolutely not! I do not get upset anytime that anyone attempts to add value to a project. Our firm isn't perfect, so we keep an open mind and listen to the ideas of those who will be building the project. Whenever members of the construction team can provide input, especially at the conceptual design phase, it has the potential to benefit the project.

Pyle: How has this cooperation impacted your firm?

Youngblood: I believe it has lowered our risk.

Pyle: Where does EDI fit into this mix?

Youngblood: EDI is a new powerful tool in our toolbox. It has given us the ability to take a project from the beginning of design through detailing and fabrication digitally. It has reduced the opportunity for human error. The point I stress is that EDI can be dangerous if used without the proper relationships being established.

Pyle: I have heard through the industry that structural engineers are very reluctant to give fabricators their structural design models. How do you feel about this issue?

Youngblood: I agree completely. I would not give a structural design model to a fabricator unless a relationship, trust, and quality assurance procedures had been established. In the eSteel process, dtl's and AmFab provide another quality assurance review for the our models. This electronic exchange saves time between our engineers, our detailer and the fabricator, and improves the quality and accuracy of our systems.

Pyle: How do you handle changes that occur during design and construction and how does this affect quality?

Youngblood: Before EDI, our engineering component would perform a frame analysis and work down to the base plates, anchor bolts and foundations. This is the first information that needs to get to the fabricator and job site. We would then start the detailing for the anchor bolt placement drawings. As we would continue the structural design, the detailer would follow us back up the frame, detailing as we finalized design. One of the inefficiencies of this approach is it is very difficult to manage changes that come from the owner or the design team as they occur.

Our process has changed due to EDI, 3-D computer detailing and automated fabrication equipment. These tools greatly reduce the detailing and fabrication time, and give the entire design team more time so they can get

more accurate and complete information before proceeding. And we still complete projects with much faster overall schedules. On a recent project, we provided structural steel to an out-of-state job site for an 85,000 square foot casino, 19 days after we finished design on the primary structural system. This reduced the project's construction schedule by 16 weeks. This approach allows owners to generate revenue sooner, reduces the interest on their construction loans and reduces the risk of the entire team.

Pyle: Do you think this works for all types of projects or are there specific niches where this project approach is most applicable? The reason I ask this is because there is a mindset that EDI will only work for simple box-type structures.

Youngblood: First, our process is not applicable to all projects. Projects that have budget or schedule problems are the best fit. Second, I guess I have never had that mindset about EDI. The limitations of EDI are not the complexity of a project. The key to making design-build work is to maximize the benefit of tools like EDI across the relationships of all team members.

Pyle: Chris if you could send a message to other structural engineers about the early participation of fabricators on projects, what would it be?

Youngblood: For my firm, having a fabricator as a partner has allowed us to increase our competitive advantage, differentiate ourselves from our competition and add value to our projects, all while substantially lowering our risk.

Pyle: It has been a pleasure talking with you. Thank you!

For more information about design-build, contact AISC's Steel Solutions Center at 312.670.2400.