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MARCH/APRIL 2014

CONSTRUCTION

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DOWN TO THE DETAILS

Anatomic Iron seeks to revolutionize the industry with its design-detailing process.

FOR ALL SEASONS

Winter Park Construction prides itself on exceeding client expectations.



BRINGING DOWN BARRIERS



ANATOMIC IRON IS OPENING UP THE LINES OF COMMUNICATION TO SPEARHEAD A NEW COLLABORATIVE DETAILING PROCESS THAT REDUCES CONSTRUCTION TIME.

With the advent of social media, share sites and BIM collaboration, communication technology in modern society is evolving at a dizzying pace. This is driven by progressive professionals everywhere, who are constantly looking for more efficient ways to manage their projects and communicate with their teammates and clients. This causes construction professionals to question how the construction industry will change as these technologies develop, and more importantly, how to benefit from them.

One of the most beneficial changes for the overall construction team is a new communication and contracting process called “design-

detailing” that Anatomic Iron Steel Detailing has developed.

This new process directly benefits the engineer of record, general contractor, fabricator and project owner by breaking down age-old barriers and bringing considerable financial and schedule savings to the project. The result of this process is a much cleaner project which has steel standing months earlier than in the traditional method, with far less paperwork and far less management overhead.

Flaws in the Current Process

Mike Young and his sons Cliff and Kerry Young from Anatomic Iron Steel Detailing have decades of experience in the steel business, so

they know only too well what any construction team faces on a typical steel project today.

Kerry Young, vice president of production, explains that “conventional communication protocols in the steel detailing and construction process are slow, fraught with problems and totally ineffective. All of our questions have to go through a long and drawn-out formal RFI procedure involving several different offices. This derails the project almost every time.

“As the detailer, I am not permitted to contact the EOR directly when I discover a problem. My RFI goes first to the fabricator, who then forwards it to the GC,” he continues. “The GC processes it, and forwards it to the EOR or architect. From there, the architect and the

EOR each process it, provide an answer and then return it. The answer then makes its way back along the same communication path until it finally reaches my desk, usually weeks later. To make matters worse, the RFI has been processed by so many people that the original question is often modified along the way, which results in an answer that doesn't address the original problem. Thus, I have lost three weeks on a fast-track job and have received an answer that can't be used."

Considering that any sizable steel job will have dozens (if not hundreds) of RFIs, it's easy to see how an entire steel project can and often does become hopelessly derailed. The painful thing about it for the detailer is that most often, a direct phone call with the EOR would resolve the issue very quickly.

"We have similar problems with the approval process," Kerry Young explains. "Our paper approval drawings are forwarded along the same communication path, with each party adding comments, often on the same set but sometimes on multiple different sets, resulting in an extremely long, complicated and drawn-out approval process. To make matters worse, often the comments from the various parties don't agree with each other, and critical questions we raised on the drawings have been overlooked. This results in more RFIs, all the while with the GC and fabricator desperate for shop drawings."

Anatomic Iron came to a simple conclusion: The EOR is the entity who provides the vast majority of its technical direction while detailing a job, so why not just go straight to the source?

A New Process is Born

This simple conclusion led Anatomic Iron to develop the "design-detailing process," whereby they work directly under contract to the EOR to complete the steel detailing contract. In this role they develop the steel model at the same time as the design is developing, thus helping to resolve conflicts that would traditionally become RFIs after the design is released. Furthermore they communicate directly with the EOR and

Anatomic Iron Steel Detailing

www.anatomiciron.com

• *Headquarters:* Vancouver, British Columbia

• *Employees:* 70

• *Specialty:* Structural steel detailing

"This detailing process has torn these barriers down, resulting in a more efficient and more profitable construction process."

—Cliff Young, CEO

resolve most detailing issues before the GC is even selected.

After more than four years and over 10 successful steel projects using this process, Anatomic Iron now firmly believes that this is the future of steel detailing.

From start to finish, design detailing is completely different from the current mainstream detailing method. Rather than the detailing kicking off after the bidding process is complete, Anatomic Iron begins developing a detailing model when the design is only at 40 percent completion.

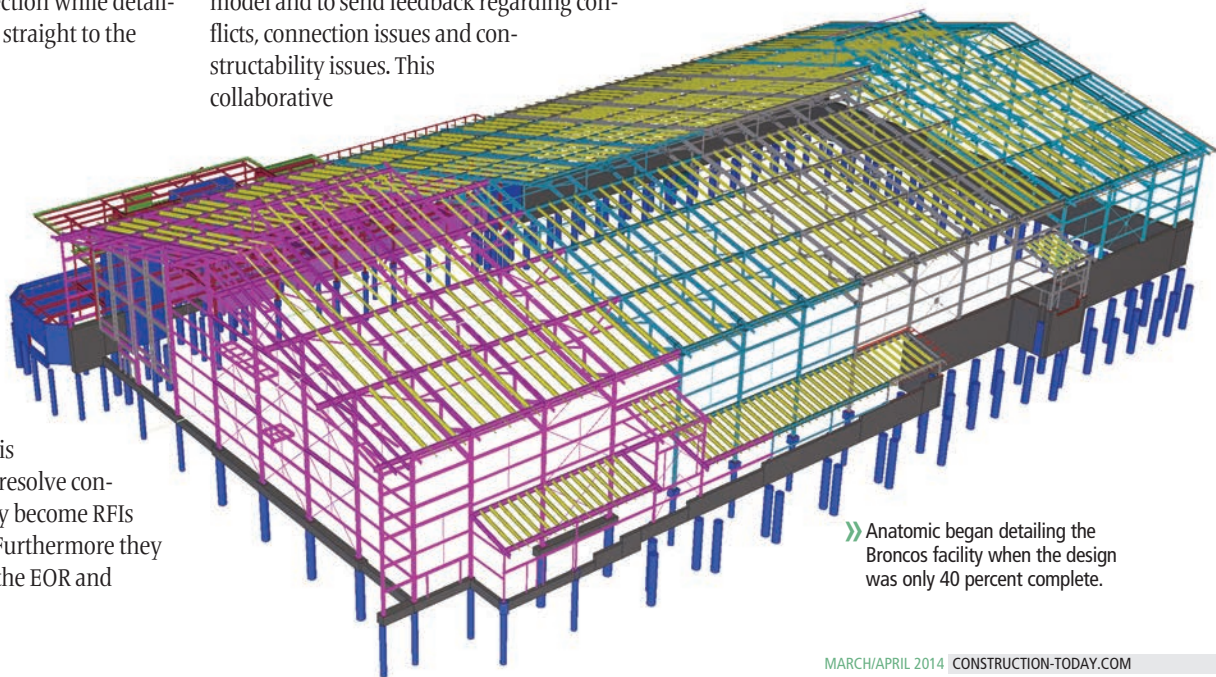
"Using this system, we work directly for the engineer of record and are under contract directly for them," Kerry Young says. "As the EOR develops the design, he feeds me bootleg design pages, Revit models and instructions. My team uses this data to build the Tekla model and to send feedback regarding conflicts, connection issues and constructability issues. This collaborative

process merges the design and the detailing paths, and all takes place behind closed doors before the rest of the construction team is even involved in the project. By the time the design set reaches 90 percent and is ready to hit the streets for bidding, most if not all of the conflicts usually picked up by the detailer and dealt with by RFI have already been resolved."

"Then while the design drawings are going through the bid process, our Tekla model is sent to the EOR, who model-reviews the completed steel and approves it before we even produce paper drawings," he continues. "This means that when the fabricator is selected, all we need to do is gear up for his standards, export all the shop drawings from our EOR-approved Tekla model, and we are ready to go for fabrication."

This system is much more efficient, and significantly reduces the pressure on the various members of the construction team, because there are no urgent and long outstanding RFIs to resolve while simultaneously trying to construct the project.

"Basically, in addition to directly controlling the detailing process, the EOR also has an opportunity to resolve detailing issues while the design is ongoing, instead of during the rush of construction," CFO Cliff Young says. "Furthermore, the fabricator gets the for-fabrication shop drawings literally one week after project award and doesn't have to manage the RFI stream, the GC gets his steel in the field much sooner without needing to be involved



» Anatomic began detailing the Broncos facility when the design was only 40 percent complete.

in the RFI process, and the owner is rewarded with a significant improvement to the project schedule, and thus lower overall costs. Everybody wins."

Leveraging Existing Technology

Most general contractors and design teams now accept electronic PDF approval drawing sets and mark them up using Adobe or Bluebeam software, then send them back without printing them. Although the days of sending six printed copies of approval drawings by snail-mail are finally over, this electronic replacement is actually not much better. On a typical medium-sized steel project, this method still involves the processing and reviewing of thousands of shop drawings, even though they are not printed.

Using the design-detailing method, the structural approval process is model based, not drawing based. Using a Tekla Structures platform called "In-Model Reviewer," the EOR has all the inquiry and comment tools that he needs to review the steel by reviewing the 3-D model instead of the 2-D drawings.

"Looking at how rapidly BIM clash detection and other model-based collaboration is taking over, it's clear that in a few short years shop drawings will be a thing of the past," Kerry Young says. "Here at Anatomic we recognized back in 2006 that someday soon we would have a model-based, drawing-free approval and even fabrication process, and have been preparing for this ever since."

"In addition, model approval is really required in order for the design-detailing process to work," CEO Mike Young explains. "We can't generate the shop drawings until we know the fabricator's shop settings, which is at the end of the detailing path when using this method."

However, In-Model Reviewer did not exist back in 2010 when Anatomic started using the design-detailing process with its first EOR client, SA Miro, a Colorado-based EOR. So, the Miro-Anatomic team developed an internal system of model swapping and comment sheets using a Tekla viewer model to achieve a model-based approval process that was carried out before the shop drawings were produced.

Momentum Fueled by Success

Anatomic's first significant project using the design-detailing process was in 2010 with the detailing of the University of Colorado Health and Wellness Center.

"We had already carried out a few smaller jobs with Miro using this system, but this one



DIA demonstrates Anatomic's design detailing success on a project exceeding 2,000 tons of steel.

was the first one over 600 tons so it was an opportunity to put the new process to the test." Mike Young says.

"The project was medium sized at 610 tons but it was a great success and allowed us to really develop the process," says Joe Rapp, the engineer of record at SA Miro. "We shaved two months off the schedule, and the fabricator was very happy as they received the shop drawings without any headaches."

The real test came in 2013 with the detailing of the Denver International Airport South Terminal Redevelopment project, also with SA Miro. The project features a new hotel, and two awe-inspiring and very large canopies – one freestanding and spanning more than 120 feet above the train platform and the other larger canopy extending under the hotel itself with arches above it to support the hotel. The larger canopy, measuring 205 feet, extends out on the north and south sides of the hotel as well as running continuously under it. The canopies are constructed using moment-welded diagrid technology, which like an eggshell transfers the load across the surface of the canopy down to its massive abutments. Box beams made from fabricated A-709 fracture critical plate extend around the edges of these massive canopy structures, and due to the shape at the edges the box beams twist and roll, following a non-constant and non-parabolic ever-changing radius.

"This project is an extreme example of the

advantages in using the design-detailing process," Kerry Young says. "The geometry at the leading edges was beyond the capability of Revit design software so the EOR and architect were working closely with us to figure out the dimensions and angles using a mixture of Tekla and 3-D AutoCAD."

Additionally, the plate in the leading edges, along with many of the plates in the internal box beams, were all special fracture critical plate, grade A-709, that was special order and required testing at the mill, which is a process that takes several months.

"Because we were on board several months before the design was complete, we were able to carry out the several thousand hours of advanced modeling that was required to determine the plate requirements – and were able to do this months early, thus greatly offsetting the construction delay presented by the A709 plate procurement problems," Kerry Young says.

Lastly, the complete joint penetration (CJP) welding in many of the diagrid joints on this canopy involved multiple different internal stiffeners that needed to be CJP welded at skewed and strange angles, often converging on each other in rather impossible ways.

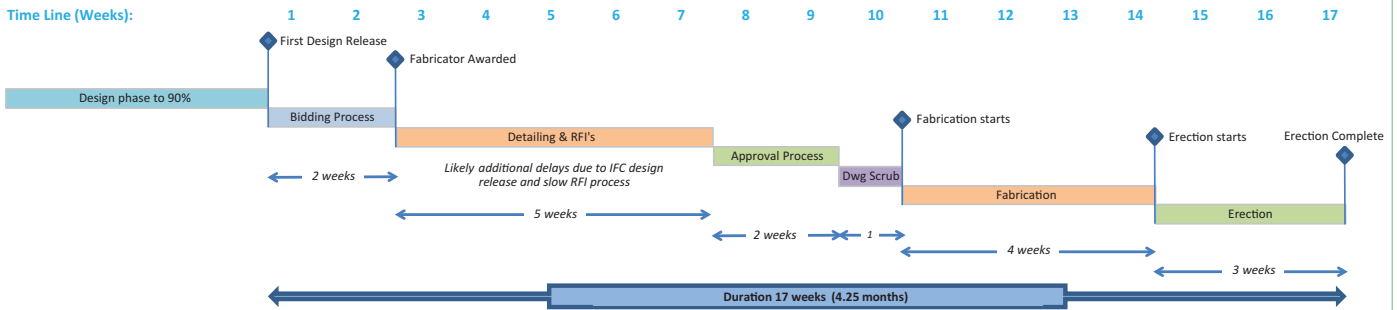
"We pushed the AWS manual to its very limits on this job," Kerry Young comments. "Had we tried to run all those connection issues through the team using the traditional RFI communication path, I'm convinced that

Schedule comparison Traditional Detailing versus Design-Detailing method

Traditional Approach

400 ton Project

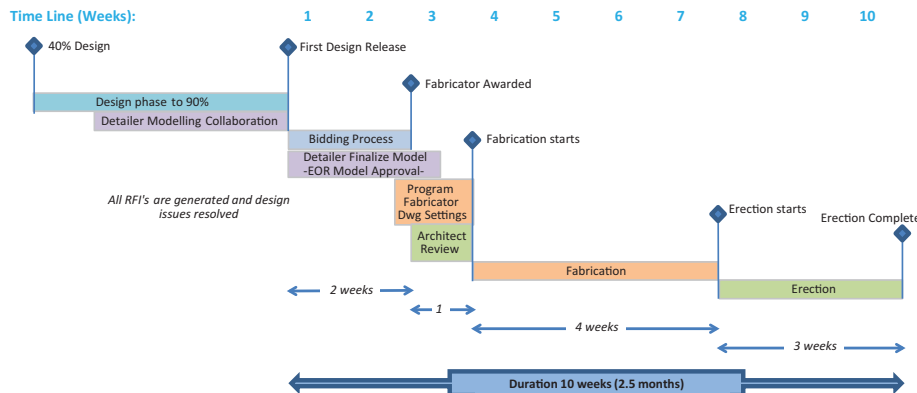
Typical schedule for a 400 ton project using the traditional detailing and fabrication approach:



Design-Detailing Approach

400 ton Project

A typical schedule for a 400 ton project using the design-detailing approach:



Benefit schedule using the Design-Detailing process

Benefits to Owner

- Building occupancy much sooner, thus investment starts to generate revenue sooner;
- Less extra cost claims from detailer and construction team for changes, less accounting and procedural overhead;
- Far less delays and project problems, thus less overall investment risk;
- Accurate material reports available for the bidding process, taking the guesswork out of contractor estimates.

Benefits to EOR

- No formal RFIs thru the GC, detailer-EOR communication much more efficient;
- No time-consuming conference calls with the GC and construction team;
- No pressure from the GC to answer detailer RFIs during construction;
- Design drawings QC'd by detailer for conflicts and constructability issues during the design development;
- Direct control of the detailing process.

Benefits to GC

- No RFIs from the detailer, far less paper processing overhead, much more efficient communication;
- Accurate material reporting available for the bidding process;
- Construction path shorter, lowering overall field operating costs;
- Detailing and design issues and/or questions are referred to the same office;
- Far less extra cost claims from the detailer and fabricator for changes;
- Far less delays and project problems.

Benefits to Fabricator

- Fabrication can start soon after award;
- No RFIs from the detailer, far less paper processing overhead and PM management overhead;
- Accurate material reporting available for the bidding process;
- Detailer conforms to fabricator's drafting standards.

we would still be working on the first shop approval submittal instead of admiring the steel that is now standing in the field."

Joe Rapp, EOR for the project comments, "The project was an exceptional success. Having the 3-D model and collaboration available with the Tekla team working for us was a great asset to the project. The schedule benefitted greatly by having Miro carry the detailing contract."

Another successful project using this method was the new Denver Bronco's Practice Facility project in Colorado completed with Martin/Martin Consulting Engineers. This project is a large sports facility with an indoor training field and consisted of 1,250 tons of structural steel. Detailing commenced when the design was at about 55 percent complete.

Shane Ewing at Martin/Martin Inc. says, "The project schedule was accelerated by more than two months as a result of Anatomic completing the detailing under our contract. We collaborated on a daily basis and generated the shop drawings at the same time as the final design set and as a result could deliver the IFF drawings to the fabricator only a week after they were awarded the steel contract. It was a great success."

This switch in the detailer/EOR relationship

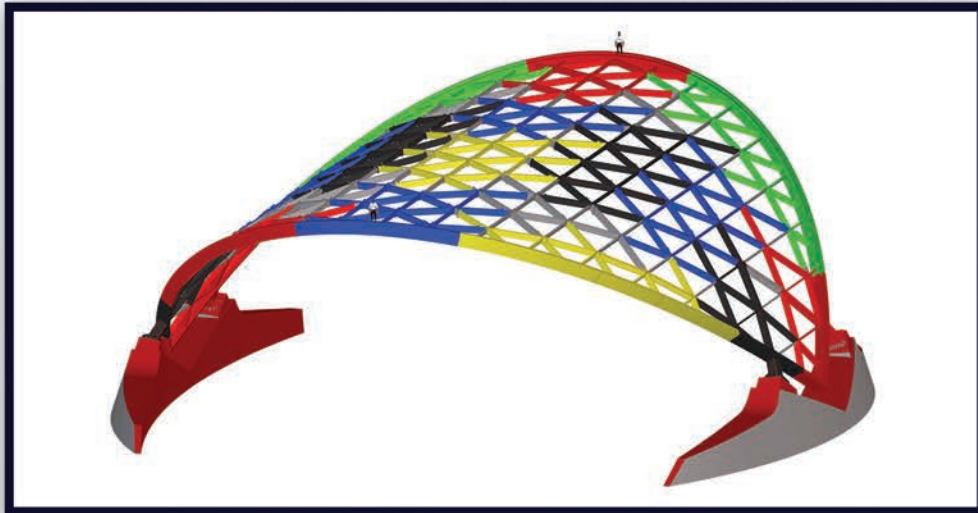
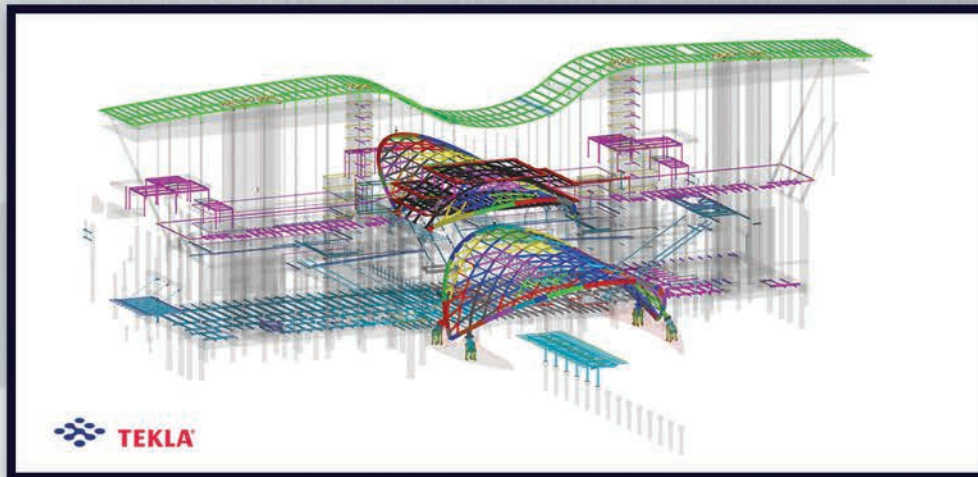
has worked well for Anatomic. If repeat business is the best indicator of whether or not something works, Anatomic's most recent partnerships with both SA Miro and Martin & Martin are evidence that the process is indeed working.

In total Anatomic has completed 10 projects using the design-detailing method since 2010. In looking back on the projects, Kerry Young says, "We have found that in each case there are fewer problems in the field, since the design is not revised as often during the fabrication period as is often the case in the traditional detailing approach. Simply put, this process works much better than the traditional method".

Social media and the Internet in general have done wonders to bring down the communication barriers between different groups of people. The design-detailing process is an extension of that trend in our modern society. "Five years ago it would be unheard of for the detailer to have such a close relationship with the EOR on any project" Cliff Young comments. "This detailing process has torn these barriers down, resulting in a more efficient and more profitable construction process for all trades involved in the project. Now that's something to be excited about." ♦

Anatomic IRON

Steel Detailing



ANATOMIC IRON STEEL DETAILING

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