StruSoft®

White Paper April 2018

BIM for Precast

Introduction

BIM is a word that means different things for different people. I will not try to define the word in this article as too much time has been spent on that already but I prefer to think that there is a silent M after "BIM(M)" that is read out as "Management". Because BIM is about managing multi-disciplinary processes (companies/people), that connect and sometimes overlap, and share data on a high level.

When discussing BIM it´s of course hard to narrow down and focus on precast but I think that's the first step to a successful implementation of BIM for a precast company ("Precaster"). To look at "what's in it for me"? The precast structure is of course only a part delivery of the whole building project. But if you see that as a process that you bring data into and at the end delivers more high level out from. You can start to make the Precast process fully BIM so that within in that process, which sometimes is controlled by one company (different departments) or several companies, all the people share their data in a real time environment. Maybe the involved parties have different interfaces or apps but they are all having the same mother of information.

What is BIM for StruSoft?

BIM is a way of working not a software. That's why we believe that the software should support the way of working and not the other way around. To get to a high level of BIM absolutely you need to adopt to a new way of working and have a software that supports that new path.

We think that the precast process (once the project is won by a precast company) has three main legs/sub processes. The three legs of precast is design, production and project. The different legs have different priorities and needs. If you can expose the information of those sub processes for all the other parties involved (in the precast process), in real time, so that for instance the production can see the planning of the project and vice versa there is a lot of time and effort to save.

The design is giving birth to the structure of the precast process with the 3D model. First on a rough level and later on more detailed one. by reversing the process so that we start with the planning of the erection on site and step backwards to the time for production and the time for delivery of detailed shop drawing all three legs get the correct priority for the main process the project on site. By doing this you can setup your production to "just in time delivery" and then the design to deliver precast detailed design (finalizing production drawings) in time to fulfil the needs from production. To come to this doesn't require the same mindset for all legs of precast; it does however require "BIM for precast".

The input for the "Precasters" today (if it´s digital) comes from many different formats that is born in software packages like ArchiCAD, AutoCAD, Revit, Tekla etc. Industrial Foundation Classes (IFC) is a great format for the exchange of BIM data. But there is one weakness with it and that is that the object information in it needs to be converted to native objects (if not only use as reference) inside the software package of the "Precaster" and by doing that there is a great risk that this conversion will make something different with the data than what was intended. To be able to take the data in at a higher level with less risk of conversion problems, we believe in making plugins into the software were the information was born and then with user control import the data from the source.

The Precast process could be illustrated similar to a relay race with parallel teams that run towards a common goal (the ready structure of the building on site). Handover of the stick (information) is done within the teams as well as between the different teams. The information provided with the stick changes constantly. Good logistics is the key to success and if the things are not in the right place in the right time, the work becomes more complicated not only within the own team but for all the other teams as well.

In the light of that we see a common storing of data and exchange in real time as the base of BIM for Precast. The change of data happens so frequently during the precast process and if manual (snapshot) exchange of data should be the way of communicating you will lose time and quality. The precast process is iterative that's why you need to have all the corresponding data updated all the time to make the right decisions.

In the precast world outsourcing has come to stay. In that view the need of a common language between the different stakeholders in the project, whether they are in the homeland or abroad, is the key to success for the "Precasters". The base structure in that language is the 3D model. We can then bind all information needed to the model throughout the process. Then you can sit on the other side of the planet and understand the priorities of the project.

Another thing when we talk about BIM is that the output is relevant and present for each person involved ("right information at the right time") in the process. That, for instance, means that the production picks the material take off data directly from the BIM database based on their own selection (maybe the planned molds of the week) not based on what design pass on in their offline delivery. To have the production and design to operate on the same data (real time database) is essential for a successful BIM integration.

How can StruSoft tools be used in the BIM context today?

Our customers today use a mix of taking the information in as reference AutoCAD or on a higher level through our Revit and Tekla interfaces. We have AutoCAD, Revit and Tekla plugins into the native software that interacts in real time with our BIM database.

Inside the precast process our customers interact between their departments by using different interfaces to our BIM database.

Design starts by making a rough 3D model in AutoCAD, Revit or Tekla with our plugins. Rough means that not all element connections are solved (yet) and no shop drawings are produced.

Project then continues to make the rough planning on the design structure. They start by setting the planned erection date (erection sequence) and then steps backwards through the planned delivery date, planned storage date, planned production date and planned drawing date. They have functionality to simulate in time and also check against cranes. This they do on a model based software (Project Manager) that interacts directly with the BIM database. The Project Manager is a common platform for both design, project and production.

The planned production date gives Production the time frames they need to deliver the manufactured elements and the planned drawing date gives the Design the information when the drawings needs to be ready so that the Production can produce in time.

Production then starts the detailed planning based on the project data. They plan their molds and beds to be as effective as possible and coordinate this with storage and transportation. As a support they use both the Project Manager (Project focus) and the Resource Manager (Factory focus). Throughout

the whole process the status chain on the elements gives an instant visible feedback for all the stakeholders in the project of the current situation.

Mobile apps (also connected to the BIM database) gives a remote connection to the BIM database for people working out in the storage or at the erection site. With that application in their phones they can, in real time, add information to the database such as storage location, transport information etc.

The most common output from our customers today to parties in the bigger outer process of the project is IFC models for clash control (clashes in space).

What is the future of BIM as StruSoft sees it?

Different perspectives need different interfaces/apps. We see a future where an extended toolbox of apps for different needs will be joined together with multilinked cloud based databases. “The internet of precast” if you like.

With that online functionality the designer that makes the detailed design can for instance directly communicate with the mesh machinery and check the producibility for the reinforcement mesh and then in real time receive the response in his 3D model for correction.

When we talk about clash control the obvious thing is to detect clashes in space but the future is to use BIM too see clashes in time as well. Sharing time information between different systems will be possible by communicating cloud databases. The IMPACT BIM Cloud database directly communicates with real time interfaces to the main process time schedule.

Outsource and let your consultants connect directly to your data (the precast manufacture) in an environment controlled by you in the cloud. With this you will be able to check the progress of your consultants and let them see the data needed for making the right decisions for you.

With 6D BIM the environmental footprint of the precast concrete structure will be visual for everybody in the project. Let your customer (of the precast manufacturer) see the result, follow the progress and see the planning ahead in a cloud based environment mastered by you.

Ask the reinforcement vendor for price and time to deliver reinforcement stirrups or reinforcement mesh for the whole project (or parts of a project) by online communication with the vendor cloud based system. Instantly let your vendors system give you the expected delivery time and check the producibility of your data. If the vendor fulfils your expectations, accept and place the order directly. Ask the vendor of steel plates in the same way.

Holograms in the moulds combined with “naked eyes” is used to place and control the items in the mould. This will speed up and increase the quality of the manufacturing process and make the production paperless. The holograms can combine the element model with step by step procedures (data displayed in sequence not all at once) on how to manufacture and item like for instance a reinforcement cage which will make it easier to produce advanced components with a less experienced workforce. When more of the workforce can do complicated task, it will be easier to remove bottlenecks in the production. The holograms collect the data directly from the database information and is always updated and the risk for production on an outdated paper drawing will be avoided.