My name is Marc, Marc Breugelmans. So, I'm going to spare you the last name so just call me Marc. I'm an AEC technical specialist based in Belgium. Today I'm very honored to be here, present for you, and even the first sessions of AU so I may kick off AU for you. Today I wanted to present a business case that we have today in Belgium, still ongoing, but it's a very interesting one concerning interoperability between several Autodesk applications.

What we're all going to focus on today is, we're going to see a extended structural steel workflow which starts in Plant3D and we will pass on information between several other Autodesk environments like Advance Steel, Revit, also Robot Structural Analysis. The main focus is keeping the data alive, transferring information, adding information in each environment. This is a business case that we are doing now for one of our customers who has really some challenges on keeping data alive. Let's say, it's a BIM workflow where the I in BIM is the most important part.

So what we will have as objectives for today's session is that we will produce a very early stage steel structure in Plant3D, and use the different environments to optimize that, and add some extra information, like steel connections. We will also optimize a steel structure in Robot. With the main focus of using the tools that we have today between all the Autodesk solutions to exchange import/export information forth and back between these different environments. And have the possibility to also synchronize that information.

This should give you a good image of what the possibilities are of these extended workflows, and maybe you can pick out some ideas that you can use in your firms or for your clients, to use in your daily work. So that's my main objective today.

The case that we will look at is this type of structure. So our client is specialized in self bearing steel structures. In fact, steel silos that they developed themselves. So they made the They go even up to production and execution. So they have their own teams. That's also the strong part in this story, that they have the whole workflow in their own hands. So that's an advantage for us. But what I will combine is steel structure, plate design, but also piping and mechanical. So they have several disciplines that they have to put together on drawings or in the 3D model. And if all goes well, use that information to execute the project.

So their actual workflow-- and that we see so often is drawing based. So the main software
they use is AutoCAD 2D. That's not strange because it's still the most popular platform. They now have a workflow with structural analysis done by an external partner. In this case, luckily one that also has Robot. So that's an advantage.

To give you an idea. In Benelux, where I'm based, main structural analysis software that has been used, or is being used, is CI Engineer. So that way they already have a problem when they have to do the structural analysis with another partner using that software, exchanging information is becoming already difficult.

The mechanical equipment they do an Inventor, so they have already, let's say, a 3D-based workflow, but they're really on an island. And they use Inventor for mechanical equipment, but also sometimes for some of the piping they are doing. And that's in combination with 2D, so that's not practical. Sheet metal, also Inventor, and the worst part for them is that the coordination is still being done by 2D drawings and that's what they now facing.

It's becoming very, very difficult because they have quite a lot of points on the tension and I think this is a common denominator worldwide that project times are decreasing because they are really specialized in this kind of steel structures, steel silos. They now have the advantage that they really can develop one, produce one, and execute one in a very short time notice.

But what they are also facing is that the projects are becoming more complex. So where they were used to have only steel structures-- and I'm talking about the steel structure itself, but also steel-based platforms that they were used to have. They now face that much of those clients are asking a mix of concrete and steel. So it's is a little bit out of their comfort zone but what can you do? You have to proceed. It's the customer, his wish, so we will do so.

But on that part they now see that with the complexity of these kinds of projects they have more errors doing construction, which generates higher costs but also they lose profits because every mistake they have on the side they have to pay for themselves. So now they're facing that where they had-- or used to have, a very comfortable time to execute a project from A to Z, with a limited time that they now have they are facing some problems.

So they asked us, well, can you take a look at our workflow? And what can Autodesk offer with his solutions to streamline our workflow but with the main focus on interoperability? So they asked, maximize the interoperability presented to us, and OK, we will take a decision with the main goal to improve coordination at the construction site because that's where they really
lose money now, today.

So for that goal we will use 3D models because this gives the best idea of the project, contains a lot of information, and you can derive a lot of information out of them. With also maximum control and coordination in execution phase. So that was our main goal.

So we started to investigate what possibilities were for them. And we came to the conclusion that, for them, a Plant Design Suite was an ideal starting point because they have piping, steel structures. The combination of both, and those are two things that are really standard in Plant Design Suite.

So if we go see what they have as an actual workflow is that they will now try to create a 3D structure in very early stage using Plant3D. They exported steel as a DWG to the Robot structural analysis environment which is not that handy because we haven't integrated--or let's say, a workflow that can optimize this system. But at this moment they are still working very traditional, that we say, guys, we have an alternative that you can use. That way you don't need to make re-work in Robot and with each change in the steel structure have to make sometimes a complete new structural analysis model.

So let's take a look at that part because when we start out in Plant3D we go on to create a very early stage steel structure and use that one to migrate it to another environment. So in this case they have a lot of legacy 3D stick-model drawings that they used to create--to communicate for instance with Robot traditional way, or with CI Engineer, which is a competitor software of Autodesk. But when you can offer a 3D stick model, you can very fast create your steel structure based on the lines in a 3D DWG which communicates very well in Plant3D.

So that's the starting point for this presentation. They have a lot of legacy drawings. And the benefit that we have with this kind of project is that they have certain types of silos that they can use to start their project from because the concept they sell, it remains practically the same. Maybe two, three different types of silos but the main part, principles remain the same. So that is also an advantage that we can use in this workflow.

So if I turn over to Plant3D and I've already loaded a stick model drawing into Plant3D. You can just copy that drawing into your project. You can use the Plant3D structure items, which I personally like them very much, especially for an early design of a steel structure. You can very fast add members, also other information like railings stairs and gaged. You have a good
impression of your steel structure without a lot of detailing.

To show you how you can use this. You see that we have a stick [INAUDIBLE] model with certain colors. You'll see also in the documentation that I uploaded, there’s an entire script so you can play yourself afterwards. You can try it yourself. But each color represents a starting steel profile type. So we are in a very early stage.

We are going to make assumptions, OK. It will be approximately that type of profile. They have a lot of experience so they can make a good guess what it can be.

So to add steel members, especially with a stick model like this, you activate the comment line. You have two options where under settings you first have to choose your profile type.

So you have a lot of libraries. You will see that many libraries I use are the European ones. But you're free to use other libraries because they're all integrated. And in this environment you will choose a profile type in a profile section.

What can you also define in this dialogue box? Well, they have also already material standards integrated. You can choose a material code. At this early stage, probably, the material will be altered along the process. When you make your analysis in Robot for instance, you can also alter the material type in your analysis and put that back into your project. So this is, let's say, also an assumption. You can't say none so you have to choose one, but it's not a definitive choice of material. So that we can also analyze and migrate.

Other possibilities are orientation positions. So if you have another orientation of your section you can make all these kinds of decisions in this dialogue box. I go along with the HEA-280. Accept it. Choosing line you can easily select a crossing. You accept with enter and it will position the steel members.

If I change the visual style I have a clear impression of the members that have been added. If you should play the long and you don't have these kind of shapes present in your model, you have the shape model option which allows you to have different representations of your steel structure in your project.

So for that matter, if you have a complex piping project, sometimes the visibility of the pipings of the elements, when it's not that clear, they make a stick model also of the steel structure to have a clear understanding and view. But you can change that dynamically. It's all integrated
in the program.

So basically that's the way you can use a stick model very fast to create a preliminary design of a steel structure. Now in this case we have legacy. You can make your own structures of course by defining a work frame, create [? axe ?] definition, level definition, and add the profiles manually. That's a little bit more work, but works also perfectly in Plant3D. And the end of the stick model will look approximately like this.

So the quality of this stick model, or let's say this early stage structural model, is key. Because if we here make already mistakes in positioning the elements they will migrate that information over to our first step at final steel. Don't worry, you can change that back in that final steel but it's always the same as you guys are used to.

If you have a good 2D or 3D drawing or model that's the best start you can make. If it's crap, now you have to rework it and you invest some time in it. The same here. You can make a very fast early stage structural model but the quality depends on your work. That remains the same.

OK. So when we have this then we have, in fact, the base for our project workflow. This is the starting point. This is also the structure that will remain in Plant3D environment until we have optimized the structure and recreated, let's say in Advance Steel, and connected it to our Plant3D workflow. So this structure will be substituted in the later phase of the project.

So for communication we will now use the export to Advance Steel option. So I think two versions ago we had the first possibility to directly connect Plant3D with Advance Steel. Both are very strategically aligned that every kind of steel structure can be migrated directly. Well, I say semi-directly to Advance Steel to make their-- the rework, add some structural connections, and elaborate your steel structure. So this is really a strategic link.

You will notice that to communicate with Advance Steel they've created a new file format-- exchange format, called SMLX. It's a new file format based on XLMS, so they changed the order. It's very confusing at the start.

But you can create steel exchange files with that and you will see and notice that this is really a red line throughout many other solutions. So it's really a strategic exchange format that we will encounter in several environments and that we can use also to exchange import/export and synchronize information.
For those who use SDNF, it's still available because this is a format that is often used to communicate steel structure or steel information. If you use SDNF out in your comment line, it still works, it's still there. But the main focus now lies on that SMLX format.

Where can you find it? I go back to my project and to my steel structure. Now you will see that on the structure ribbon it is positioned as an integrated workflow in the ribbon. And that way you can access the dialogue. So if I open up the dialogue-- very straightforward. It asks a logical name, this is not a logical name, but. You select the objects and you export them. Of course, also a logical location that you can find your file back. And that's it. So what he has done now, he has translated our complete steel structure into an XML file that now will be used to communicate with Advance Steel, and to recreate the file as it was created in Plant3D.

So the next step in the workflow is to import this file into Advance Steel. And then you will see a first example of how this SMLX file will work for you in the Advance Steel environment because it's also integrated directly into the software in the application. This is a way that we now can import the steel structure from Plant3D directly into Advance Steel. And with conservation of properties.

So it's not just migrating, let's say the 3D solids, but it's also migrating information. And you will see they are still working on the exchange format to embed even more properties that can be exchanged.

So would that matter if I now open up my Advance Steel environment. Now you will also notice that we have an export and import tab in our ribbon structure. You see a lot of possibilities. So even with Revit you can synchronize our import/export informations based on the same SMLX format.

But strangely, and maybe that's something that's will change in the near future, when you export the XMLS out of Plant3D it will be only possible to communicate with Advance Steel. So the XMLS out of Plant3D doesn't communicate, for instance, at this moment with Revit. So you need Advance Steel as an in between step. But my opinion that will be also altered in the future.

So when we go to the export and import tab and we use the import, then we can select the SMLX file. They're all prepared so if you take a look at the data set it's also described. This one was created from the early stage steel structure in Plant. When we open it up, you will see
that he recreates every structural member that we made in Plant3D. So this avoids that we have to do it— all the job manually all over with the risk that if something changes in Plant3D in the next couple of hours that you have to rework, or remake your complete structure.

I change the visual style to have a better understanding. And now you will notice that when you go to the advanced properties— so right above the menu you can enter the advanced properties. Now you will notice that he will recognize the profiles that you've added— that we have added to the structure.

And you'll see also that if they need changes, we have a lot of libraries standard present in Advance Steel. It's really huge what they ship with Advance Steel. So you can now start altering it manually. But in our process workflow we will use Robot Structural Analysis to optimize this structure.

So a lot of information is taken over into Advance Steel. If you recall that we have also a material that he will also detect. So it's not just a transition of 3D solid information. You will also recognize properties like material. So interesting point.

To see what he has brought over from Plant3D we have a model browser in Advance Steel. It's quite similar like the project browser in Revit, for you guys who know Revit. And here you will see a list of all the structural members that have been put over to this side. It will make a list of every action you will take in the model, and it will document that in the project browser— sorry, in the model browser.

A lot of properties can be taken over. For instance, positioning, naming, et cetera, et cetera. Check them out. It's a really huge list. So you can filter out very direct, or you can search very direct to some properties that have been added to the steel structure. So you have quite a good search field.

You see that some of the structural members have already received a model role. And that is now our next step because now we will use Advance Steel as, let's say, the central platform where we will gather information. Where we will also make the update the optimization of the steel structure at structural connections. So this becomes our central platform where we will now distribute information towards other environments, like Revit or Robot.

For that matter, and that's a technical issue in Advance Steel. In Advance Steel we work with structural members, structural framing. So a column is also a framing— a framing, stage of
framing. But you can really define roles to the structural members.

And this is quite important because, for instance, when you should migrate this directly towards Revit without changing the model role, he will detect all structural members as a framing member. So as a beam.

In Revit we can use filters on the lists of objects that make, let's say a list of columns, a list of framing. Therefore, it's important that the model role is also defined in Advance Steel.

So this is the first step that we will add information to the structure. Not really information that change the structure, but defines the roles of the members. Role definition also important in Advance Steel. When you should apply drawings, for instance, then you can use model roles to retrieve the right template that really drives the creation of the drawings. So for that matter it's important to organize your structure.

How is this done? Well, very easy. You can select, for instance, several structural framings. Reapply the right mouse menu advance properties, and now you see here under on their fabrication-- no, sorry, naming the model role. And you encounter a large list of roles that you can define. So in this case I will stick to a beam role. Once applied they will appear in the list. If it doesn't appear automatically just make a refresh, we will sort them out and now you see that the four beams are defined as a beam. So that will be also detected in Revit.

For Robot it's even more important when you do a buckling analysis of the structure. Now, you will have other buckling properties or parameters for columns and beams. So with this you can also make a difference between, let's say, a wind bracing, or a column, or a beam. So that's our first step, organizing the model.

When we have done that we use the same workflow as in Plant 3D. We go back to the export and import and we use this file to export all the data towards a new XMLS file because that one we can use to communicate with Revit.

Can you use the same one? Yeah, in fact you can do it. You can override every time the same file, or you can decide, OK, I want the sort of history what I've done, I've been doing in my structure. And now you can make per iteration and new SMLX file. That's your own decision. Both systems work so you could stick to one file if you really like that or want that.

So once the export has been made we open up our Revit environment. I'm going to stick with the PowerPoint. So the export out of Advance Steel, same principle. After the export has been
made we encounter several possible workflows.

So to be very clear on this, do you need the workflow with Revit? In fact, not anymore. The first of November they released a very good tool that makes it possible to communicate directly from Advance Steel with Robot but before that, if you wanted to optimize a structure in Robot Structure Analysis you really had to create a Revit file as an in between file. And from there on you could communicate bi-directional with Robot, update the model, and update the steel model in Advance Steel using the updated Revit model. For now, that’s another workflow that you can use. So this is one that’s optional.

What’s quite important is that you see that we here have back a triangle that we used to have with AutoCAD structural detailing. I don’t know, are there people that have used AutoCAD structural detailing in the past for steel-- No? OK. Nice to see.

So that was also a triangle that could be used to communicate between different environments. This one is more powerful but we see that we have one communication using the SMLX method and the other one is a bidirectional that can retrieve directly from Revit to Robot and back.

So I’m going to show you the boat just to give you an idea, an impression, of what the possibilities are but in fact there are two possible workflows that you can use. Very important, the choice of workflow depends on some criteria.

So project needs, in this case, they need every phase of the project internally. So they can use every step. But they have full control because it’s an internal workflow.

Project organization. If you have a project where you have to communicate with external partners sometimes it isn’t possible to communicate directly with the native files, that you have to protect them by law sometimes. So that depends on the needs.

Also responsibilities. If you’re responsible for part of the data you’re not that happy that you have to share your data. You want to protect it. So depending on these necessities in the project it can be quite possible that one of the steps in the workflow that you can’t use it.

So the optional workflow, I call it optional because I want to show you some advantages of using Revit structure, but entirely up to you.

A model in Revit is very useful for project coordination. Revit can combine multiple disciplines
from itself. It has architectural, structural, and MEP discipline that you can make but it's also quite flexible in using external information. Native one or, for instance in this case, with Robot. You can join information in a Revit model, use that for coordination, it's often used. But also some other aspects are, for instance, that you can update and optimize information that comes from Robot directly into Revit and update your entire structure. And that's a very powerful one--

What will we send over? Because we have the steel structure but Robot is working on analytical information. So before I send it over, going to show you what he also has done in the background. Because the analytical model is a direct part of the Revit structure members, but also floors and walls.

So you see that he has generated a stick model in Revit. Platforms are represented as a plane, and that will be used to make the analysis in Robot. Don't have to do anything for it, it's integrated into structural members. But you need to create a correct structural analytical model and that's quite different than a structural model.

For that matter, you can alter the stick model and the faces into Revit itself. So if you select one of the members you can make an adjustment, so it can really change the position of the elements, make a correct analytical model in exchange, [INAUDIBLE] back to Robot but there you also have the choice. You can do, let's say, the analytical streamlining also in Robot, so that depends also on the workflow but it's possible in Revit to upgrade your Revit project to create also a correct analytical model.

So in this case we are not going to use that one. But when we migrate information you have the Robot structural analysis link. And they have several options. You can send over the model, update the model, and update the model and results. That we will do later on because that's a nice one to show also.

You can do it in two ways. So they have a direct integration. So I've got Robot on my system. We will detect that and open Robot, and actually put from Revit the entire structure back into Robot to make the analysis. If you encounter the situation that you don't have Robot on your system, you can also use an SMLX file as an intermediate file to communicate with your partner, or your third party who will make the analysis. So that's also something you can decide yourself.
Going to send the model over, and now you will see that he will make also a list in the background while the way I encounter of all members. He will also check position of those members. If there is, for this, a load definition made in Revit structure you can also migrate that to Robot. That's also something that you have to decide yourself.

He will recreate a report saying that-- OK, my settings are not set to United States. OK but, don't worry, it's not a problem.

And in the background he has opened Robot and he has migrate the entire structure directly from Revit. So if I activate, for instance, the real position and dimensions of the structural members then you get something like this. You see the floors are present. Underneath the footings are also indicated with a symbol. So every information has come over to Robot.

To show you what we can do now in Robot, so that was the exchange.

A very short movie clip about how we can optimize now the steel structure because now we have the need to work up, let's say, the structure, optimize it. And for that reason we need to add information. Most of the time all the information is added to Robot.

So first he will detect all the lines that represent the structural members. He will also see the steel profiles that are now present. So first thing that we need to do is to define the connection between the structural members.

So for instance, what is release definition? For instance, the degree of the liberty of moving. So you can make a really fix connection, or with a certain degree of freedom that the framing can move. That's one definition.

Other definition can be loads. So we will add some loads. That load is the whole weight of the structure but we can add life loads, other debt loads, let's say machine that's positioned on the floor. So you can add as many information as you want. Even make the load combinations. It's very powerful in Robot.

And one feature that is really neat to see but also very powerful is a wind load generator. So even in a very early stage that, for instance, you don't know what kind of wall type you want to use in your project. If it's concrete, or steel cladding, you don't know. Even then you use a wind load generator to analyze the behavior of the structure on a certain wind pressure.
So what you do is create a neutral face, activate the wind load generator and you will see it's CFD-based technology. It's very cool. It's unique in our analytical world. Based CFD technology. But the beauty is you really see, with color mappings, how the pressure is divided over the wall. And you will see that the wall pressure will also influence the structural members that are behind the wall and that's how your stick model has been defined. A lot of gain of time is that he also automatically curate all wind loads that are necessary. So you don't have to put them into your project manually.

Once that we have all this information we can go on to see the results. So in Robot you have certain possibilities to view the results. Diagrams projected on the structural members, later on, also the floor definition with color mapping, minimum/maximum values, you name it. You can all use them in tables, but also visually. And that's one of the powerful aspects of Robot.

For instance, here we will use the color mapping to see how, for instance, forces are distributed along your floor. And it's very powerful because the colors, they give a very precise overview of where you have, let's say, sometimes points of attention in your structure. So once that you have this, all the results are also integrated it in your Robot project. And that even on structural member level. So every member also has all the information of the analysis in it. And that can now be used to optimize a structure.

So you see we made an assumption and you saw a lot of red. So that is not that good structure. So we need an optimization. And therefore we can use the steel optimization environment in Robot, which is very powerful. Mainly what are you doing, you can do it on structural member level, or you can group members in a certain groups that can be optimized.

You can use parameters just like, for instance, weight is often used because that's very important in the bidding of your project. And that way you can optimize your steel structure. Your limit on the steel libraries that he can use, and he gave some profiles that you can use, optimize them, and now you see that there are other profiles present.

Next step, and that's especially important when you use Revit as a coordination platform. You can even go further on to make steel connection design. Steel connection design, that can be checked co-checked, and reported. Now this is only on the standard, or let's say, the integrated steel connections that are present in Robot. So user defined connections, he can't create a report. That's logical because these reports are also driven from lab tests. So they're really official reports that can be used. In Europe we are now obliged to also foresee this kind
Now at this moment steel connections are not available in Revit. So if you have this workflow that also integrates Revit and you need to steel connection checking, you have to do it in Robot. Later on we will see another also very interesting workflow between Robot and Advance Steel.

So that way we now have a complete optimized structure. So Robot has also indicated some profiles that can be changed. We have accepted them. You have seen that our list of profile tabs has become a little bit larger. For that reason I'm going back to my Revit environment. I'm going to open a 3D view.

Maybe also a column schedule. And files those views into my project. Voila. Now if we zoom in and we reuse the analytical--

A little bit more space. And we reuse, for instance, the analytical information. Then you will see that the annotations and so on will change. So with both sessions open we can now go back from Robot to Revit and we can update the model and the results.

So now he's going to make connection with Robot. He has a reference list that he's now going to check, and he says that report is fine. OK. OK. OK. Close. That he has changed something but he doesn't show it. That's strange. Let's do it once again.

Update model results.

Oh yeah, yeah. My mistake. It's perfectly normal that he doesn't do anything because it's my first file. So I need to-- no. I need the results file. So here we have the other profile types. OK. So if I do it now again and we update model with the results. Voila.

He will create a result package. So it's a similar way of using the SMLX file, and this way you can also keep your two models alive. So he can make today first optimization, put them back into Revit. You say, OK. I'm going to alter this, and this, put it back into Robot and you can use this kind of packages, or in between files, to keep those boat models alive and optimizable.

That's something very powerful because now the reality a lot of our firms are facing that with each iteration they have to recreate the entire analytical model. They don't have the time. It's
also error sensitive because I think all of us encounter the pressure today's market. So this is a fair, straightforward way to have a controllable migration of information.

I'm going to deactivate to the required reinforcement because it's not in it. Also naming convention is important if you want to keep several packages alive. And now you will see that he makes a reference between the starting model and the new model. And you will see that he will alter. And here you see already a new profile type, IP280, will also appear in our profile list. You see that he has added loads from Robot into Revit.

So even that kind of information will be integrated. Not all information because some of the results will be part of Robot and won't be migrated towards Revit but he will make an update of the results. The analytical results and the structural optimization. The actual members that we are using in our project.

So after that he has done this we can also have the possibility to investigate the results. And we can even document the, into our project, which is sometimes very handy because that way you can really motivate why you took some project decisions while you change in that profile, and why it was needed.

So he has detected that some constraints need to be removed. That's correct because I aligned some of the profiles with the [? axe ?] definitions. He changed the profiles. So he can't keep the constraints but he will show it. It will pop up. So you can also, if you want, to see what constraints are not satisfied. You can even highlight them in your project. But now you can see that he has altered the annotations. He has added some information. And also on schedule level he indicates the new profile type that has been added to our project.

Another thing that we can investigate if I activate the analytical model, for instance. Now you see that you have a results manager. So you saw that he was also migrating some results. If I open up the resource manager. Now you see the package that we have created is still available.

If we will add two or three more packages then you will also see that some of the packages become out of date. You have the history but only one can be up to date. And that's a good thing because only one contains the correct information.

Next thing you can do is also explore all information directly in Revit. Now you see that the loads that have been created are taken over from Robot. So depending on the type of loads
you will find it back in the list. And then you can, for instance, see for results for the members that we want to have an overview of the moments in a certain member types.

And now you can-- going to change the scale. And now you have the diagrams directly into your project. Scale that indicates the forces or the reactions that are present into this project.

Also for the surfaces, for instance, the color mapping can be used. And this way you can even use this kind of information to document project decisions. You can discuss with a structural engineer or your client that you had to take a larger profile and that costs will increase, for instance. But you have proof. That's why we did in. That's the situation. It's your decision.

So all this kind of information can be going back and forth with Revit. With now the optimized steel structure, we need to create a new file that communicates-- so an export file for Advance Steel because we have new information. I've created already one based on this model. So now with base model open this is our starting structure that we use to communicate with Revit. We can now use the import tools but we won't do an important because we already have information present but we can synchronize the project. And that's a beautiful one because with synchronization he will make a reference between the two SMLX files that have been created.

So the actual situation output will be checked against the new situation and then you will make a comparison. Now you see that-- we'll make it a little bit larger.

We have a list with all profiles and information that has been altered. So some of them have been changed position rotation, material position. So every piece of information that has been changed, also material, will be marked as a change. So we’ll filter it out. You see that the slabs that we created in Revit, the concrete slabs, you can put them also as a reference back into Advance Steel. He won't keep track of them but sometimes, like the footing sort of slabs, if you need them as a reference, you can even migrate that kind of information back to Advance Steel. Let's say an opening that you need to support by extra framing that you can use that as a reference to add extra framing. So very useful, very simple way to communicate between those two environments.

So if I go to the back of the list and I take these four columns. I think they will be the columns here. And I select them and check that I approve the new situation. Apply all actions. He will alter on synchronization my Advance Steel file. So no need to cross reference with drawings with a marker.
OK. That we have done. No, file based, and you make a reference and update it directly from one environment to another one.

If you should have added already drawings in your Advance Steel environment, you say, oh no, he has altered the 3D model but not the drawings. No sweat, he does that too. So Advance Steel is very powerful, also on documentation level. And he will track down the changes and make, let's say, a remark that some drawings are not up to date. Some schedules are not up to date. So he keep track of all changes during the process.

What I like, especially with this workflow-- have to make a test, check all of them, and he will create sometimes an entirely new structure. Sometimes when it's fairly complex structure it's very useful that you can really check parts of it. Synchronized parts that you have full control.

What has he changed? Visually you see things changing. You can check your drawings. And that's one I really like because if something goes wrong you know you can pinpoint where it went wrong. So that's something very useful.

So this way we can retrieve information from Robot, over Revit, to Advance Steel with the advantage that we now have an extra project coordination model in Revit but it's an optional workflow. Because when-- we go back and to our PowerPoint.

So that's the update we just made via SMLX. Now we have now good news. We have a graduate because from the first of November-- I had still alter my PowerPoint because it was fairly new.

We now also have the interoperability directly between Robot and Advance Steel. And that's also a very good one because it communication is, as we have seen already multiple times, bi-directional using SMLX files. But what is really neat is that Advance Steel is a very good, easy three code checker. So the connection-- steel connection checker is very powerful, very good. And he has much more connection types integrated in Advance Steel then in Robot. So for that part this is really a huge step forward.

Especially when we see that-- so that we could move back and forth results from Revit to Robot. Well, with Advance Steel and Robot we have fairly the same possibility, but then on the note level. So if we have the communication between Robot who made the analysis and we will now use that file to optimize the same structure then you will see that he will add some
extra information into our Advance Steel project.

So I'm going to open up-- let's see which one it is. No. No. That's a start one. That's not the right one. This one. And the same way I will now-- I've prepared already a synchronization file that comes out of Robot.

Containing the results. The same results as we had in Revit. Only thing I did was making an SMLX file of it. When I open it now you'll see that he does the synchronization with one big exception that he also has note information inside it.

So if you remember the analytical model Revit. When I turned on the analytical adjust you saw the bullets that were positioned towards your structure. Those are the notes that made the connection between all structural members and that can be defined. So the beauty of it is now that-- where we used to do this manually we now have a direct connection with the results in Robot.

And what is taking over to Advance Steel? Well, forces, reactions, and moments in those notes. That can be used to make steel connection design.

So if I accept-- and at this time I'm going to accept them all.

Now you will see that little flags appear in our Advance Steel model. And if I double-click one he will open up a member definition. But also integrates forces that can appear in this case. No forces appear may be another one. Shows a little bit more. Voila.

Here you see some forces, some reactions, and some moments. This information is now present and can directly be used to make your structural connection design. And that's quite important because earlier on in the early days we had to make a manual input which is always dangerous because you can make an error. So this is also a direct workflow and when I open a project where we also have, let's see, some--

Some connections present then you can see that all details have been added. Using the connection folds. Won't go dive deep into that but Advance Steel has a really large library of connections that can be used, and you can make your own connections. Using that will add these connections but then you have added a connection out of your library or directly from Advance Steel.
But you still don't know, is it a good connection because is it suited for this note? So if we go to
the connection side and-- to the connection-- and I use the advanced properties then you get
an idea, or an impression of how the connection design is made. So you can make all kinds of
decisions which kind of bolts, position, how many rows, et cetera, et cetera, plate, plate
thickness, as you desire. But a beautiful part is that you have also a possibility to make a joint
design.

So in this case the connection was added but it's not already calculated. We see that the
grayed out fields have some values. So they come directly from Robot. They’re grayed out.
You can alter them but why should you do it? Because there are real results of your analysis.

Using a design module is good. We use that once. You made the check and he says--

AUDIENCE: [INAUDIBLE].

MARC Excuse me?

BREUGELMANS:

AUDIENCE: [INAUDIBLE].

MARC Yeah. This one?

BREUGELMANS:

AUDIENCE: [INAUDIBLE].

MARC OK.

BREUGELMANS:

AUDIENCE: [INAUDIBLE].

MARC Excuse me. Where do you mean?

BREUGELMANS:

AUDIENCE: [INAUDIBLE].

MARC OK. Thank you. So checked, OK. And if necessary also a report can be created. Similar as we
saw in Robot but with the big difference that we have a much more extended connection
library present in Advance Steel. So it’s quite a powerful way that we can use to create
structural connections based on Robot analytical results. Very powerful.
If drawings should be already present because now we have also structural connections, one of the extras that you have in Advance Steel also a lot of pre-defined drawing templates that generate automatically types of drawings. You can also make your own. If we should now alter this connection you will also have a notification that some of the drawings needs an update, and some of the lists too. So it's also a very dynamic system.

So going back to the presentation. The code checking in Advance Steel, it's really good. So this workflow can really have a lot of benefits. Other things, automated connection design is standard functionality in Advance Steel. Shop drawings and fabrications data, but especially the code checker is a real large advantage.

Other things that we can make. Bill of materials, CNC file. So for the bill of materials in Revit you have general lists but here they are really accurate because it's production, it's fabrication data. So they have more accuracy than Revit files. So here you can also decide which information you will use in which phase of your project.

OK. That was in fact the workaround. Some little small things but very useful because we work Advance Steel is a DWG platform, an AutoCAD platform and Plant 3D. Also you can use the foundation directly as an Xref in both environments.

So if you make your design of your steel structure and you have need to have references of your plans equipment-- yeah, I already preloaded it. But if I reload it that he will position a vessel and the piping and a little pump I think that's also part of it. It's not to underestimate these easy workflows because Xrefs are very powerful.

The only thing that we come to is use them here in this environment as class detection. We'll see later on that we can mix all kind of information. Perform a class detection in Advance Steel but it will only work on the structural members, on the steel members. Not as in a Navisworks on all types all information. So that way we can use Xrefs to migrate information from one environment to another one.

Very small chapter plate design. What we also saw in this firm they used to make plate design. So you can use also Advance Steel for that but when you have more complex sheet metal design still have need to use Inventor because has more possibilities and can also generate more complex plate design.

But the beauty of it is that if you should use Revit as a coordination model that even that plate
design can be transferred back to your Revit model, positioned at the correct base point of your project and show the exact form of the steel sheet metal. And that's something new because that's very powerful.

You could use Revit for a coordination, collaboration, or maybe also a clashing model. So even that kind of information we can put back into every environment that we want. Same happens in Plant when we have Plant 3D.

We should-- and we should-- have the same vessel and piping here. Then we can also use the Xref of the Advance Steel project. And reference it back into our project. And this I think it's very cool.

Because we started out in Plant 3D. He took over the base point-- project base point of the Plant 3D project and migrated it towards all the other environments. So if all goes well, he should keep the same position, 000, going to accept it. OK. And now you see that he has found the same position.

You see also that the visual style has changed and now some of you will be horrified, oh so much details in my steel structure. Because that's one thing to take in an account that the level of detail in your plans-- sorry, in your Advance Steel project will be also used in your plans project. So if you say, this is OK. It's a small structure. Maybe it's still OK. But if you have a large structure, a lot of details, especially the bolts, you can deactivate in your Advance Steel project. You decide the level of detail.

Migrate it back or make a reload of Xref and then he will lose all the bolts and the other information. So that's a possibility but I think it's quite a good workflow because this way you can reference your steel back to your Plant project and your Plant project back to your steel. So you can use both of them to improve your project, to see that you don't have interferences visually. Because it's an Xref you don't have the same capabilities of Navisworks which is really the platform to make clash detection interference control which allows also integrated a lot of different formats on a very intelligent matter.

So the same we will do here is to create a new Navisworks project. I will append all the types of information. So the skate order vessel. Yeah. No problem. It can. The Advance Steel structure. And the Revit project.

So the Revit project I've stripped a little bit down. You can take-- well, I can take platform NWC
directly. And then you have things like this.

What I especially liked about Navisworks is you’re directly confronted with, oh yeah, I have a problem. It’s obviously a clash. But imagine that you have a large steel structure, a large plant, then you don’t always will be confronted directly with this kind of clashes. Therefore in Navisworks a clash detective we can add a new test.

Not going to bother too deep with all the settings. Just, we’ll reference all against each other. Hard clashing. Run test. And the he will generate a list. It will definitely find this one. So we have the clash detection complete list.

So now it's pointing at what-- in which file can we retrieve this information. Where can it be found because now it's easy, straightforward. But for the same matter you have ten of files that you can choose of.

Therefore a-- I'm going to close down all the project because I want to show them how far he can search. I'm going to open a blank structural template. And under the add ins I'm going to activate the Navisworks switchback possibility. So what he's going to do is now make a connection with Navisworks and when I go back to my Navisworks clash detection I select the wall. Activate my right mouse menu. And use switchback. And he'll go on searching where he can find the wall in the project.

And you see that my Revit environment has found something. And it creates automatically in Navisworks switchback. View. 3D view. Which shows us the wall that causes the problem. So he can retrieve that information directly from one environment to another one. Really powerful.

The same we can do for our Advance Steel project. And I'm going to do the same. I'm going to close the projects to show you that he really is going to search for the proper drawing. Start a new drawing. Go back to my Navisworks and finding a clash, for instance, this one where the structure clashes with the floor.

Oh, sorry. First I have to activate my Navisworks environment. Comment is NW load. And if it's OK, he will say, OK, Navisworks is ready. Select the column switchback. And if all goes well he will also retrieve that information and show in my drawing which column makes a clash with the floor. So it's very easy to use. It's integrated but it's very powerful, especially with complex structures and a lot of information that can be present.

So that way Navisworks can track interferences, make reporting coordination possibilities. You
can trace it back to the desired-- so Plan also works. If I should select the pipe NW load in the Plant environment he will also trace it back to the vessel in the piping.

Another little example of the power of a switchback environment is especially for this kind of project. That if you have these structures and now you see we've added stairs, railings, more details but it's still in a design phase. And they have added a pipe.

Because we use a design steel structure you saw that the bracings were connected at the nodes so they are disappearing into the floors but when the project becomes more detailed then you will have another type of bracing and you have another type of wall. And now you see that the wind bracing is pushed up and has now a clash with the pipe, also with the wall. Then you can use the same possibility. Make interference control.

For instance, they have pipe in wall. In this case bracing would have been better. But you can trace it back to the correct location. And this is also something that they are really confronted with. In an early stage you don't have a lot of details but once details are added and a principal of a steel structure and connection has been entered into your model then you can have quite a lot of clashes if you don't pay attention. So that way the switchback option is very valuable to trace back these kinds of disruptions.

And last thing I want to show you or make you aware of is that we now have a beautiful possibility to also reference directly Navisworks files into your project. So if we go back to my Advance Steel project and I use the Xref then I can attach now a coordination model which allows me to directly integrate the platform NWC of Revit into my project. Same situation. The base point remains the same and you will add all information of Revit into my Advance Steel environment.

Just to also make you aware that Navisworks is still be needed. We have a clash between the structure and the NWC file. So if I want to check out that into my project clash check, he will say there is no collision to be found because he can't detect in NWC as a structural member file. So therefore you still need Navisworks but as a reference it's cool stuff, and it's NWC so very light to enter into your project.

Other features that we want to discuss. Collaboration in the cloud. So there's now also a BIM 360 glue available. Some other firms are very interesting in this one because they can collaborate that way in the cloud but can also perform clouds clash checking using the power
of the cloud but not have to exchange all the information. Just put it on the cloud, use BIM 360 glue, and make the interference control.

And the optional workflow is to integrate also Infraworks if you want to position your project in the real life world. Sometimes very handy that you also need a visual check of how will it look in the real world. Sometimes also discussions with your neighbors you can use that also. It's not integrated in his presentation but it's one of the possibilities.

So that was my presentation. I hope you enjoyed it. Any questions? I'm still here two, three days. Yep. Sure.

AUDIENCE: But why does Autodesk not have these ice [INAUDIBLE] directly in [INAUDIBLE]?

MARC BREUGELMANS: I don't know. Don't know. It's a good question. I know there is a lot of discussion, debate, about integrating that kind of information directly into Robot. I think it's very important that you as a customer always also indicate it would be handy that that was integrated but the real reason I don't know. We see that on analysis platforms.

We now also have react structures as a new, let's say new, Robot. So the old Robot will still be alive, still exist. But we see that we now will become having a new platform react structures and maybe there is more of that kind of information or technology integrated directly but that we still have to wait what's the final form of react structures. But it's a good question but not-- can't think why they don't integrate it.

OK.

AUDIENCE: For your workflow, if I'm starting in Plant 3D, what was your recommendation to the client? To start in Plant 3D or to start in Revit?

MARC BREUGELMANS: Well it depends entirely on how they can, or which workflow they can use. So in this case for my opinion I would like them to start in Revit Structure because they have a lot of-- a lot more possibilities to really drive design with the conditions you can really alter all parameters that can be directly pushed over to Robot analyzed, optimized, and pushed back. So they are looking at the Plant 3D workflow because they directly want to use their piping in relation to their structures.

But my opinion, I think they have more benefits using Revit and then using the SMLX towards Advance Steel, and use that as a reference or the NWC file is also something they can use but
I think they’re really narrow-minded on that part and they say, oh we have to start in Plant because there’s also our piping. So it’s a question of awareness, but my opinion, no, they should use Revit because—

AUDIENCE: [INAUDIBLE] Plant.

MARC Yeah, exactly. Exactly.

BREUGELMANS:

AUDIENCE: [INAUDIBLE] taking time from Revit to do all the member [INAUDIBLE].

MARC Exactly. Yeah.

BREUGELMANS:

AUDIENCE: [INAUDIBLE].

MARC Because if we create now five types of this type of model they can, say play along with it, BREUGELMANS: everything is altered but they have let’s say their customer’s desires that they can directly check, for instance, the volume of the silos that they’re absolutely sure, OK, that correspond with the desire of our customer. I think that would give even more information, even more control over their project. But it’s a state of mind and that point they’re quite narrow-minded. So.

AUDIENCE: It’s always a downfall.

MARC OK. Thank you for my part. Enjoy AU.

BREUGELMANS:

[APPLAUSE]