

## **Modular Construction In Oil & Gas - The EPC Perspective**

Interview by **Tim Haidar**, Editor, **Oil & Gas IQ**

*In this exclusive podcast, we speak with Fred Haney, Executive Director, Design Engineering at Fluor Corporation and the inventor of 3rd Gen Modular Execution about modular construction from the EPC viewpoint.*

**Oil & Gas IQ** Hello and welcome. This is Tim Haidar and today I'm speaking to Fred Haney, who's the Executive Director of Design Engineering and Modularisation at Fluor. We're going to be speaking today ahead of the Modular Construction and Prefabrication for Oil & Gas Summit which'll be taking place from 15th to 17th September 2014 in Amsterdam, the Netherlands. Fred, thank you so much for joining us today.

**Fred Haney** I'm glad to be here.

**Oil & Gas IQ** I wanted to ask really what kind of role modularisation is playing in the major oil and gas projects you're involved in at present.

**Fred Haney** Well, currently I'm involved in several projects on a global basis. I can tell you that in Canada all projects that are executed in the oil and gas industry are modularised based on the issues we have with the cost of labour and availability and other appropriate reasons to be modular. But modularisation itself on a global basis is growing, quite extensively. Where projects used to be stick-built around the world they're now being considered in a modular execution mode.

So, I'm currently engaged in several projects in Europe, Asia, Australia, North America and we're now looking at projects in South America as well in the oil and gas industry.

**Oil & Gas IQ** Now, Fred, is it just with regard to manpower costs and logistics that more and more projects across the globe are going modular?

**Fred Haney** Yes. The availability of quality labour in locations where it used to be available – the availability isn't quite there and of course the cost of labour's going up and obviously the more remote the site, the productivity can tend to be affected in a negative manner more than in a site that doesn't have the remoteness to it. Also weather conditions will have a bearing on the issue of productivity and whether it being in the north, Arctic-type conditions or being in the hot climates and environments.

The primary reason for going modular is labour and having better certainty on what we can achieve with the labour force that is available in the different regions so if we have a labour area that productivity can be low, resources obviously are increased in order to get the work done. Then it's more cost-effective and more schedule-friendly to move all that labour into an off-site arena and that requires modularisation.

**Oil & Gas IQ** Do you think that going modular with construction projects onshore is going to be more prevalent simply because of that great crew change which is coming up where so much of our skilled workforce is going to be retiring in the next five to ten years? Do you kind of cancel out the need for certain degrees of skilled labour when you've prefabricated something and we're only talking about installation?

**Fred Haney** Well, you bring up a great point in regards to the labour force and the fact that, yes, the highly experienced labour force that we have now is in the mode of retiring. They're our most experienced labour force and there has been a gap created, mainly due to the ups and downs created in the industry but there has been a gap in the labour force and then we have a very young force coming up.

When you move off site you can do it using less labour because you're more productive and it doesn't require as many hours as would have been required at the locations so it takes less resources. And that's one of the other reasons why you'd want to try and move it. The other one is move the off-site work to a location where there is plenty of skilled labour and that's another possibility. So definitely, the labour situation and the fact that we have a retiring workforce has a big part to play in why you're seeing a lot of move to modular construction.

**Oil & Gas IQ** Obviously that's not going to change for the foreseeable future and will be exacerbated in the years to come so interesting in that regard.

**Fred Haney** That's correct. I expect in the next couple of decades – it may take one or two generations before you see a change. A lot of projects in oil and gas are being executed in more remote locations so that has another bearing on it. You know, you're finding that the easy locations where it's easy to obtain those type of resources; that's no longer true. We're now looking at oil and gas in more remote locations and that also drives the need to modularise.

**Oil & Gas IQ** You bring up a good point, that it's going to be pretty difficult to stick-build in the Arctic, for example, and then as we go deeper and deeper beneath the sea as well to remote locations that we're going to be thinking about shipping larger and larger modules out to effectively the middle of nowhere.

**Fred Haney** That is correct, that is happening now so some of these projects will never proceed unless they do use a modular-type execution approach.

**Oil & Gas IQ** Now, Fred, just speaking about... What lessons can be learnt within the onshore modularisation from the offshore construction world as we are moving out into more inhospitable onshore locations as well?

**Fred Haney** Well, you ask a very good question in regards what we can bring from offshore designs to an onshore environment. Fleur has developed a methodology called "3rd Gen Modular Execution". It's a methodology that has really pulled some of the plus attributes of offshore designs and put it into an onshore design facility and by doing that and using those techniques we can improve the amount or percent of modularisation that can be achieved on some of these designs. And that's a key element when you're talking about remote locations, is maximising the move of effort off site and to do that we need to use some of these methods.

So, you'll see a move from most design companies and owners to maximise the amount of work and use these type of design methods. That's going to be a change that's going to be required by design companies such as Fleur to be able to implement these effectively. You're going to need to design methods and guidelines and practices to be able to accomplish this so you're going to see, like I say, a move towards this and it's happening as I speak.

You'll see a move towards standardisation as well. Standard designs and replicated designs are the future of the oil and gas industry. A lot of this is entailed in trying to improve the capital cost outlays for some of these projects as some of them are so capital-intensive and sensitive to make the projects proceed and by implementing modular execution and standardisation you can see a reduction in overall capital cost outlay similar to the manufacturing industry who have been using modular components and standard components for years and that's how they've been able to improve their productivity as a whole.

**Oil & Gas IQ** Now, Fred, what are the key considerations that you as an EPC company and your client as an operator have to take into account when you're deciding to modularise a project or not?

**Fred Haney** Okay. I'm going to answer that but it'll require more than one type of response. The first element of any modular project is understanding the transportation envelope of the modular you can ship so if I'm landlocked what will the infrastructure allow me to transport on road, for example, or rail? Because that'll determine the size of the module

and it'll have a direct impact on the type of design that can be achieved in regards to the modular facility.

If you have water access it's a different story. If you, for example, have either ocean waterways or river waterways, somewhere where you can land and offload large modules it provides an easier design method to modularise your facility and it gets into the scenario that the module size – bigger is better. It's easier to design big modules. It's much more difficult to design smaller modules so there has to be a good analysis up front on any project at the beginning on what are the exact limits of the module envelope size and dimensions and the weight permitted to be transported. And that's the first element of any project: understanding that concept and those constraints.

The next is when you execute a modular project you have to do more work up-front in order to define the modular design. In reality, what you're doing now is because you're moving a tremendous amount of work off site you have an execution curve that is actually two curves. Normally you have a construction curve. Now you have a construction curve and a fabrication curve and the fabrication curve will drive engineering to do work earlier.

So your front-end effort will be more than what's in a traditional stick-built project and saying that, the key element that owners need to take into account is then your long-lead equipment list will be larger than what you traditionally will see and the need to procure these components earlier than what's on a stick-built design is required. So, there's a direct impact on vendor-supplied equipment.

Then the next one is when you consider that you've tackled that aspect you need to, at the end of FEED, have a very complete design so you can proceed without changes. When you're talking about modular designs it's not as change-friendly as a stick-built design, so at the end of a front-end or the seed of a project you want to make sure you're at a complete approve-for-design status and that is a challenge for some owners and some EPC companies.

**Oil & Gas IQ** Great, so that's kind of three things that every EPC company should bear in mind when they're interfacing with their operator partners. Now, you spoke about the trend towards standardisation in modularisation. Do you see, from your perspective, any other trends in modularisation that are coming down the pike?

**Fred Haney** Well, I mentioned standardisation and also mentioned replication. Replication or templating of designs is something that many owners now are looking at. Otherwise you might have heard the term design one, build many or in that frame. So that's another aspect and trend. There's a great desire from owners to now look at having one typical design for a facility and replicating them elsewhere around the world so that's another trend where we're headed and obviously modular designs facilitate that extremely well because a modular design really tackles your above-ground facility which can be easily templated to be able to be installed in global locations.

So, you have a combination of modularisation, standardisation and templating or replication. This all facilitates and really enhances the overall cost of these facilities and improves overall productivity that is achieved in this industry and puts us in the framework of what the manufacturing business is doing. So we're moving towards more of manufacturing facilities than constructing facilities.

**Oil & Gas IQ** Fred, thanks so much for your time today and we look forward to welcoming you to the conference later this year.

**Fred Haney** I'm looking forward to seeing everybody there and hope it's very successful

*Fred Haney will be speaking at the Modular Construction and Prefabrication Summit for Oil & Gas, taking place 15<sup>th</sup> – 17<sup>th</sup> September 2014 in Amsterdam, The Netherlands.*

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