Looking into the future with

Pete Miller, National Oilwell Varco

By Linda Hsieh, associate editor

PETE MILLER IS chairman, president and chief executive officer of **National Oilwell Varco**.

DC: Broadly speaking, when the industry's designing new rigs in 5-10 years, how will they differ from current designs?

Pete Miller

MILLER: It's very simple — they will require fewer people and be lighter.

DC: Lighter in terms of weight?

MILLER: Yes, it will pay in the long run to make rigs lighter. For instance, much of the cost associated with the larger rigs today is steel. There's also the weight of risers. The reason a deepwater rig is rated to only 10,000 ft is because it only has the capacity to hold enough riser to drill to 10,000 ft. If it could hold more riser, it could drill in deeper water.

DC: Is NOV working on that already?

MILLER: Absolutely. For example, NOV's Rapid Rig is a 3-person land rig. It has a pipe handler and Iron Roughneck, and we've been able to reduce the required crew size from 5 to 3. We're also making a lot of improvements on electronics. On all NOV rigs, the driller sits in a chair and controls everything through joystick control and computerization. That's what the future will be about — electronics, weight and reducing the number of people.

DC: Some have said they don't believe more automation means more efficiency or safety. How do you respond to that and what role do you see for automation in rigs of the future?

MILLER: Automation hasn't equaled safety or efficiency up to this point because the workers aren't being properly trained. The fact is that automation and mechanization *does* improve safety and efficiency. If drilling contractors didn't believe that, why are they buying these rigs?

You can't tell me a worker isn't safer and more efficient controlling the rig from a chair than he is on the rig floor pulling slips and making tongs bite. Automation does help safety. We have customers buying NOV Iron Roughnecks and mechanized slip operators for their land rigs. Why? Because they make rigs safer. Now their employees don't have to pull slips or make tongs bite because it's all automated.

If you ask me, can a company do these things a little faster with a very well-trained crew but no automation? Most likely for a period of time during the tripping process — but experienced crews are becoming more difficult to find, and when you factor in crew fatigue — quite frequently you'll see a mechanized rig perform as fast and considerably safer than a traditional rig.

I would argue with anybody that said automation doesn't enhance safety and efficiency; it absolutely does. If it doesn't, it's because they haven't trained their people appropriately.

DC: The computer consoles on your rigs almost feel like a video-game set-up.

Q: Why do some say automation doesn't equal safety or efficiency?

A: Automation does improve safety and efficiency. If not, it's because workers haven't been trained properly.

MILLER: Absolutely, and it's a much nicer working environment for the crews. This is critical when fewer and fewer people want to work in this industry. There's no doubt that people will choose an industry with good working conditions.

Everything today is going the way of automation, with joystick control, PLC, etc. Anybody who says that doesn't enhance safety or efficiency is wrong.

DC: What are some rig technologies under development to meet the issues and challenges in drilling wells of the future?

MILLER: For deeper water, for example, the industry's working on things like the much-lighter aluminum riser, and hex pumps that are 30% lighter than traditional mud pumps.

One very exciting thing coming out on NOV rigs is the permanent magnet motor. For a given horsepower, these motors exhibit tremendous energy density and are considerably smaller than an AC or DC motor with the same rating. I think this will have a broad impact on everyday things in homes and on cars, and it has the opportunity to revolutionize what we're doing in the drilling industry. It's part of the advances in AC technologies we'll be seeing, and it really enhances efficiency while reducing fuel usage.

DC: So you don't think we're going to go towards bigger and bigger rigs?

MILLER: No, I think we should be doing just the opposite. For deepwater rigs, the industry needs to find different ways to allow it to go deeper without getting bigger. Bigger is not better. I think that's a mistake the industry's made. We need to concentrate on making it smaller but being able to pack a bigger punch.

DC: The permanent magnet motor you mentioned, is that on NOV rigs already?

MILLER: They're on some, and I expect they will be a real breakthrough. There's more to be done with it yet, but it's a great piece of equipment. As a matter of fact, the drums on some NOV drawworks and winches will soon incorporate an integral permanent magnet motor. We'll put the motor in the middle and let it wind and unwind the wire rope

that drops the drillstring. The drawworks' braking functions will also be performed by these motors, eliminating wear on the mechanical brake pads.

DC: Was the permanent magnet motor developed for another industry and we're bringing it in?

Q: What's an example of something exciting coming up in NOV rigs?

A: Permanent magnet motors. They will be a real breakthrough.

MILLER: Yes, and NOV has done a lot of work on it for the drilling industry. Outside the industry, they're just starting to catch on, and I think they will catch on all over the place because it packs so much punch in such a small package.

DC: What are some technologies or ideas that are may be farfetched now but perhaps we can look forward to in the future?

MILLER: I don't think there will be any game-changers. There will be incremental advancements that make things better, then 10 years later the industry will wake up and realize how much better we're doing.

The permanent magnet motor is as a big game-changer as there is, but it's still only incremental. I think we will continue to utilize electronics and computers to the best that we can to reduce the size of the rigs and to make them more efficient.

DC: What parts of the rig must we focus on improving in the next decade so that we can further reduces costs and increase efficiency for operators?

MILLER: Power generation will be important in terms of generating as much horsepower as possible by using as little fuel as possible. The mud system is supremely important, as are hydraulics and hoisting capability. And the ability to continue mud circulation while making pipe connections will evolve as we drill more difficult hole formations. Further advances in pipe handling technology will also occur. There's not any one particular area, but these are all issues NOV concentrates on everyday to make the rig better for the operator.

DC: With oil prices staying in a healthy range and most people confident that they will continue to stay in that range for quite a while, what do you think that means for the industry and our equipment?

MILLER: It means you can and need to replace a lot of the old equipment. What wins today is the best equipment. The $60 to $70 oil is allowing us to reinvest in the industry. The rigs that are working are the ones that were built most recently. There's a reason for that – operators want the most automated and newest rig. Those rigs are efficient and safe. The industry didn't reinvest for almost 20 years, and people lived off the equipment they bought in the early '80s until they broke down. Now that equipment is finally getting replaced.

DC: So you believe this is a good time for replacement?

MILLER: Well, people can afford to do it. Everybody's generating a lot of cash. What do you do with that cash? You have to decide.

Depreciation is real. Everytime you work something, you're deteriorating it. If an E&P company has a certain number of reserves and they never find any more reserves, then at the end of the day they don't exist anymore because they've already produced all of their oil. If drilling contractors don't reinvest in equipment and run everything until it's out of date or dilapidated, then there's no company anymore. We're all reinvesting, and that's the beauty of the money we're making today. For the past 20 years, it wasn't that we didn't want to reinvest; we just didn't have the dollars.

DC: In your opinion, what are the biggest limiting factors on a rig that are keeping operators from going where they want to go, whether deeper waters or deeper wells?

MILLER: People.

DC: Not the equipment?

MILLER: No, it's all about the people. The equipment will get there. Equipment could be a problem for 4-5 months, but that's self-correcting. The problem today is having the skilled people that can run the equipment out there. You can have the finest race car in the world, but without a good race car driver, it won't do any good. If you have a brand-new rig with all the bells and whistles but an untrained crew, you can bet they will have problems.

People is the biggest limiting factor for all of us. We have to get people, and we have to train them properly. As an industry, we haven't done a very good job of that.

DC: Do you think people will continue to be the biggest limiting factor in the next 10 years?

MILLER: Yes. How many kids today want to be in the oil business? Not many. We need to project a better image of ourselves in the mainstream world so people know this is a good business.

This people issue also makes rig automation that much more important — it reduces the number of people needed on rigs. On one hand NOV is finding ways to reduce the need for people, and on the other, we're working to make rigs safer and a better work environment so we can draw more people into the industry.

DC: Do you think the industry would be drilling 20,000-psi wells now if we had the well control equipment? How soon do you think it will be before we're ready for 20,000 psi wells and what are the biggest obstacles preventing us from getting there?

MILLER: The industry's not ready to drill 20,000 psi wells. I'm sure we can design that equipment, but I'm not sure you can show me a real demand for it. Just because a few people want to drill 20,000 psi wells doesn't mean it's a good investment on the equipment side. Show me the demand for the 20,000 psi series of wells, and I'll show you an industry that will develop the necessary equipment.

DC: So you don't think the demand is there yet?

MILLER: I think if the demand were there, we would've already done it. This industry has a tremendous record of developing equipment based on demand. Back in 1949, we could barely drill offshore. Today we're drilling in 10,000 to 12,000 ft of water. Because the demand was there, the industry did everything to get there. This is a tremendously resilient industry, and we give the marketplace what the marketplace wants.

DC: Do you see any innovations in the way rigs will be maintained in a decade?

MILLER: There better be. The new electronics and lighter equipment will require more care. I think the industry needs to do a better job taking care of its equipment.

DC: Can you name any specifics? What kind of maintenance?

MILLER: Any kind of maintenance, and it comes back to people and training. If you have people who don't know much about a rig or how to maintain a rig, then the rig deteriorates rapidly. For example, some of the control and power systems used on newer rigs have fiber optic cables that send signals back and forth. That fiber optic cable can't be rolled up very tightly; it needs to be rolled up in a bigger band or the fiber optic will break. If the crew isn't trained to do that, you have to buy new fiber optic cables everytime you rig up.

DC: Looking over the past decade, what have been some revolutionary advances in rig equipment or design?

MILLER: Without question one of the biggest products that ever came out is the top drive. It's enabled us to do phenomenal things with directional drilling. Also, the ability to drill with higher pressures has been critical, as has self-elevating masts. The use of pipe-handling equipment has allowed us to do things like use 6 5/8-in. drillpipe, which humans can't pull. The use of continuous circulation systems on rigs allows the mud pumps to continue running while making a connection, which provides a smooth, uninterrupted flow of drilling mud through the wellbore to maintain formation stability and prevent pipe sticking. All of these things have combined to allow operators to do more and to drill deeper, faster and higher pressure wells. They have allowed us to go on long directional wells we couldn't have done years ago.

DC: What revolutionary advances do you predict for the coming decade?

MILLER: Like I said earlier, there will be incremental changes: using different metals and composites; being able to get higher pressures without pulses in the flow; automation; the ability to computerize things. That will all play into the future.

Again, I'd challenge anybody that said rigs aren't safer and more efficient today than they used to be. This industry's much safer than it's ever been, and it's drilling more efficiently than it ever has. In general, the industry has a lot to be proud of, and many times we don't take time to reflect on the things we have gained. I think the industry's gained tremendously on all these fronts, and anybody that says differently isn't looking at the same industry I'm looking at.

Pete Miller graduated from the US Military Academy, West Point, New York in 1972 with a degree in applied science and engineering and earned an MBA from Harvard Business School in 1980.