

INTERVIEW



Overcoming the challenges of artificial lift in horizontal wells.

Jeff Saponja , CEO,
Production Plus Energy Services Inc.

Despite the downturn in oil prices, many companies are still finding success by increasing efficiencies and decreasing operating costs, often through the use of innovative new technologies or the re-purposing of existing ones. With that in mind, Shale Gas International spoke to [Production Plus Energy](#)

[Services Inc.](#) CEO, Jeff Saponja, about how their new Horizontal Enhanced Artificial Lift System (HEAL System™) can help operators resolve the challenges associated with artificial lift in horizontal wells.

Monica Thomas (Shale Gas International): What is artificial lift? What kind of artificial lift is usually used with unconventional?

Jeff Saponja (Production Plus Energy Services Inc): The majority of wells that produce some liquids – be it water, oil, or condensate – from a reservoir, will at some point in their life require some form of artificial lift. What that means is the reservoir will not have enough energy to naturally flow its fluids to the surface as a result. In these cases we need to assist the well in being able to produce these fluids by what is called artificial lifting.

What that means is simply putting a pump near the bottom of the well, where the reservoir is, and that pump will assist in lifting the fluids from the bottom to the surface.

MT: What are the challenges of artificial lift with horizontal wells?

JS: Basically, all of the artificial lift systems were designed, and have historically been run, in the vertical part of a wellbore. In recent years, with the explosion of horizontal drilling, we've been trying to position these pumps that were designed for vertical conditions around the bend and into the horizontal well, so they're now lying on their side. As a result they've become highly inefficient and highly unreliable – meaning they fail a lot.

MT: Can you explain - in layman's terms - what is unique about the HEAL System™? Why is it so innovative?

JS: The main reliability problem with artificial lift systems is to do with the fact that pumps have moving parts. And these moving parts don't like being on their side. As a result they break down frequently and they cannot lift as efficiently as they should.

The whole premise of the HEAL System™ is to allow that pump to remain in the vertical. What we do is we allow the pump to be positioned in the vertical, where it's happy, and the HEAL System's™ job is to get the fluids from the horizontal, up around the bend, up into the vertical, and then give the fluids to the pump.

In other words we've figured out the way to do two things: to get the pump out of the horizontal and into the vertical and to get fluids from the horizontal into the vertical - and we're doing it with no moving parts.

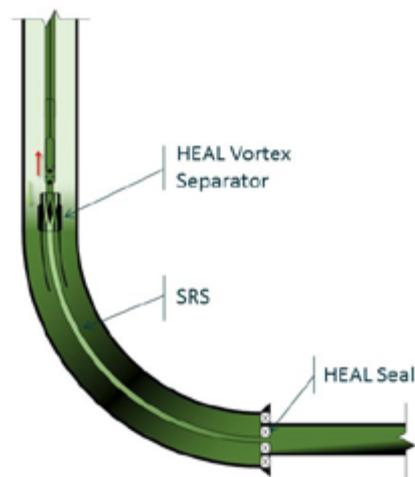
Now, what is really important to understand is that in order to maximise production, the pump needs to be placed at the lowest point in the well. That way we can maximise the pressure difference between the reservoir and the wellbore. The larger that difference is, the greater the flow coming into the wellbore.

In the past, the only way to achieve that was to force these pumps right into the horizontal part of the well.

With the HEAL System™ we have discovered that we could lift fluids - gas and liquids - from the horizontal and into the vertical by conditioning the flow. We have achieved that by reducing the cross-sectional flow area around the bend between the horizontal and the vertical part of the well. What we have discovered is that when you make the flow area smaller, you have gas and oil flowing at a higher velocity. When you do that the flow regime changes the density of the flow. Think of it as a change from liquid to mist.

How we did that was with special plastic linings. All wells have jointed tubulars, each of them about nine metres long, that are threaded together and run from top to bottom. In some of those joints - say 30 of them at the bottom, for 300 metres or so - we have this internal plastic lining put into them to create this desirable flow condition that we want to give us a lift.

We can vary the thickness of the plastic lining in response to the varying conditions in the wells. All wells have different producing conditions, so we have to adjust the well, using the incredible versatility the plastic gives us, to the different conditions.



The patent pending HEAL System™ is placed down-hole below traditional artificial lift in a horizontal well and is comprised of a seal, a sized regulating string, and a HEAL Vortex Separator.

MT: I understand that facilitating the flow of hydrocarbons from the horizontal part of the well to the vertical is not the only achievement of the HEAL System™. Can you tell us more about the other problem it solves - the problem of messy flow?

JS: When we are doing our lift stage, there are two things that we are looking for. One of them – which I have already mentioned – is creating the condition of a very low density fluid to mimic that low-pressure condition at the bottom of the well that maximises production. The other – and this was our big discovery that led us down the path of developing the HEAL System™, was that it also solved the problem of messy flow.

These big, long horizontals that go for a couple of kilometres, are actually very good natural separators of fluids. What happens, though, as a result of that is the flow that comes out of the horizontal wellbore, to where the pump is normally placed, naturally becomes unstable, inconsistent, and messy. And it is specifically a feature of horizontal wells.

What you have to understand is that with horizontal wells, the flow coming out may be straight gas for 10 minutes and then for the next 10 minutes it might be straight liquid. And for the next 10 minutes there might be nothing. The problem is that no pump likes messy flow.

What happened with the HEAL System™ is that as we studied the flow coming out of the horizontal, we have found that by narrowing the pipe around the bend, we create the unique benefit of smoothing the flow out so that the well no longer produces this messy flow.

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MT: Is it an expensive solution? What are the efficiencies that it offers in terms of productivity, time, and money?

JS: The plastic lining technology that is being used in the HEAL System™ has been used by the industry for a long time for other reasons, so the costs have been worked out through other applications. For us to now reapply those existing technologies differently was actually very cost-effective because the plastic lining technology already existed.

In terms of resulting efficiencies of the HEAL System™, we have around 60 installs now throughout North America and we are consistently seeing a 30 percent increase in production or better. Additionally, now that we've put the moving parts of the artificial lift system back into the vertical, where they're happy, we've achieved considerable savings on equipment. Typically, when you put moving parts and pumps into the horizontal, they may last only six months. When they're in a vertical condition, they generally last three to five years.

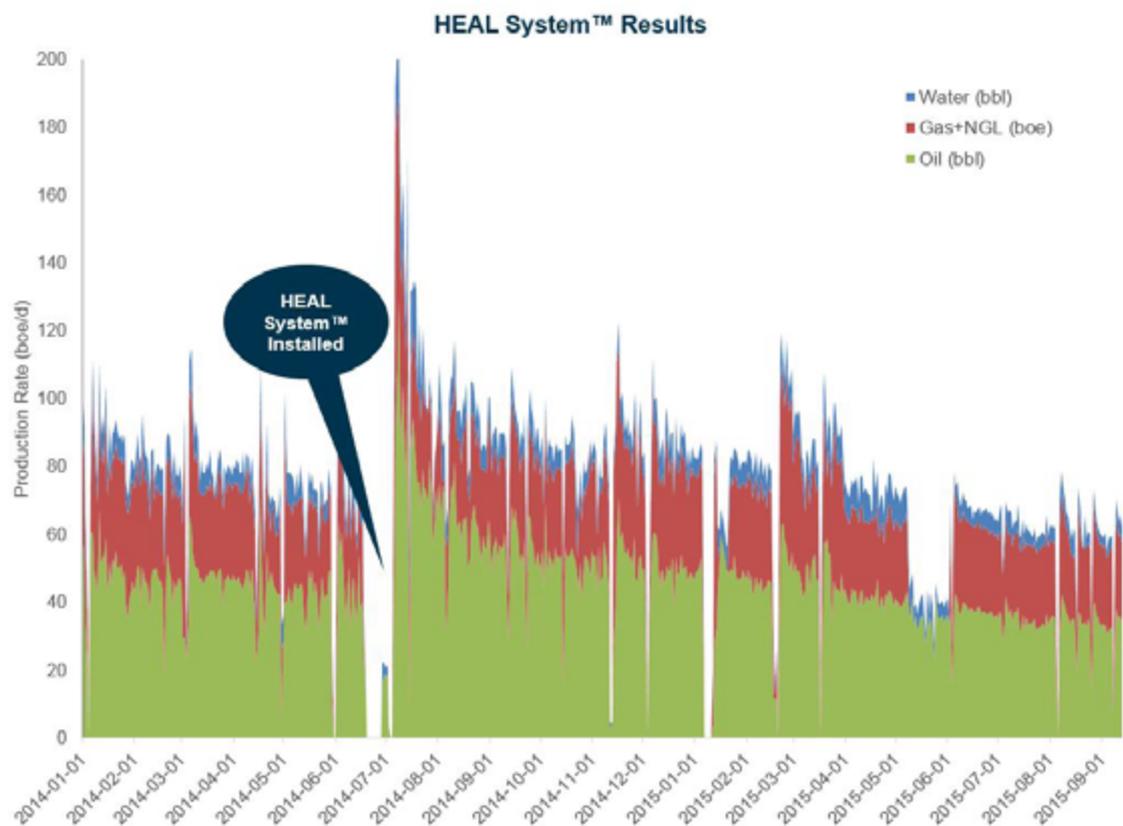


Figure 2. Well with the HEAL System™ installed in July of 2014. Over the past year, this well increased production an average of 34 per cent over the base decline rate resulting in an additional 6,735 BOE production volume.

MT: Would you say that your solution filled a void when it comes to artificial lift technology?

JS: Correct. Up until this point, no other artificial lift solution was dealing with how the flow comes out of the horizontal. Because no one was actually dealing with the root cause of the challenge of making these systems reliable. They were just dealing with the symptoms. Once we sorted out the messy flow, artificial lifting became easy. This is a completely revolutionary, patent-pending approach. Hence the rapid adoption of our technology, even in a downturn.

MT: On the subject of downturn, the CEO of Capstone was recently quoted saying that “the silver lining to the slowdown in the energy industry is customers now have more time available to evaluate and consider cutting edge new energy solutions.” Would you be able to comment on that? What is happening to the technology sector in the current price conditions?

JS: I would narrow that statement to those technologies that can offer an efficiency solution or an operating cost reduction solution.

The operating cost is basically “what does it cost me to produce a barrel of oil?” You have to look at what is the equation of operating cost. On the top side, the numerator of that equation, is lifting cost – in other words; what does it cost me to get that barrel from the bottom of the well to the tank? And in that cost there is reliability, energy, electricity, pump-efficiency – all the things that the HEAL

System™ is all about. If you can lower these costs, your operation costs will go down. Now let's look at the denominator of that equation, which is production volume, because the easiest way to lower operating costs is to increase production volume. You want technologies that will increase the production volume because that way you attack both the top and the bottom of that equation. Therefore, my view is that technologies that can increase production but also lower the operation costs are going to be rapidly adopted.

I think that is the reason why the HEAL System™ has been so successful - because we benefit both the top and the bottom of that equation.

MT: Once the oil and gas prices have picked up - and they will eventually - what will the E&P landscape look like? What will be its legacy?

JS: I think you will see incredible innovation in efficiency. If you look at the development cost for a barrel - the full cycle of drilling, completion, and production - cost per barrel will continue to be dramatically reduced. I think we were already on that path as an industry, but I think that we are going to continue on that road - even in a price-recovery - and as a result production efficiency will improve dramatically over time.

However it has to be noted that it is a double-edged sword because we're getting so efficient that it is also creating the excess in production.

The current developments - the LNG Terminals coming online and, possibly, the ban on crude exports being lifted - will balance the differentials between different producing areas. As transportation infrastructure gets more efficient, you will have less discrepancies between the West Texas Intermediate and Brent Light Oil. But ultimately it comes down to "what does it cost to produce a barrel?" and the winner will always be the one who can produce at the lowest cost per barrel.

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MT: And how low, do you think the production costs can go?

JS: I think that in terms of the breakeven equation we're at it now, in a \$50-range. You go below that and your return on investment is just not there.

MT: Production Plus Energy Services is a company based in Canada, but I understand that you have expanded in terms of sales into the USA. Are there any plans to go beyond North America?

JS: The major basins across North America, which are the oil-producing basins, all have the same artificial lift challenges, because if you look at a horizontal well, at what it looks like around the bend and into the horizontal, they are all the same. All these wells have the same bend radius and the same artificial lift challenges. So when we talk to operators in these other basins – like the Permian Basin, like the Eagle Ford; these big U.S. basins – they all have the same production challenges. As a result, this system can easily be taken from a Canadian horizontal well to any other similar well in any geographical location and the adoption is very straight-forward. In this respect we are also very fortunate because we don't need to have a bunch of different combinations of systems - we only have three systems: one for a 4.5 inch casing, one for 5.5 inch casing and one for 7 inch casing – the three standard casing-sizes for wells.

What is interesting about the HEAL System™ is that it was developed by an operator – where I was the CEO –and as an operator we were trying to solve our own problems with artificial lift. Since we were not getting solutions from the industry we attacked the problem ourselves and we were successful. What we then realised is that our problems were not unique and so we made the decision to share this technology and make it commercially available for all. And that's when – just over a year ago – Production Plus was born. The first HEAL System™ installation was in March 2014 and it has already been installed in 60 wells.

Obviously, the key thing is that it wasn't a "lightbulb moment" in 2014 but we were developing this solution for six years. During that time we were experimenting and testing the product in our own wells, which is probably the biggest challenge for all technology services companies out there – the fact that they don't have the luxury to test in their own wells.

Now the plan is that we are going to be in every major oil-producing basin in the United States by the end of this year, and there will be a logical next step when we will begin to offer the technology outside of North America, once those areas are reasonably established.

It's a step-wise process to manage our risks and to continue to develop the technology in a controlled manner.

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