

SAVE TIME AND MONEY WITH SURVEY ON CONNECTION™

XPulse's *Survey on Connection™* provides rig operators a fully functional directional survey system allowing the operator to receive directional survey information.

The XPulse has a *NET ZERO™* effect on the drilling time when used on a jointed pipe application, and only incurs a 1 minute delay for surveys when utilized on a Coiled Tubing Rig. This means less time spent shooting surveys and more time available for drilling.

In addition, normal drilling operations are not affected with the survey transmission. The data is automatically decoded, displayed and networked around the location with no operator's involvement.

Historically a 15-minute time limit was used to calculate the amount of time it took to take a directional wireline survey. In figure 1.0 which is compiled from real field data, there is a considerable difference in the actual time opposed to the accepted industry standard of 15 minutes.

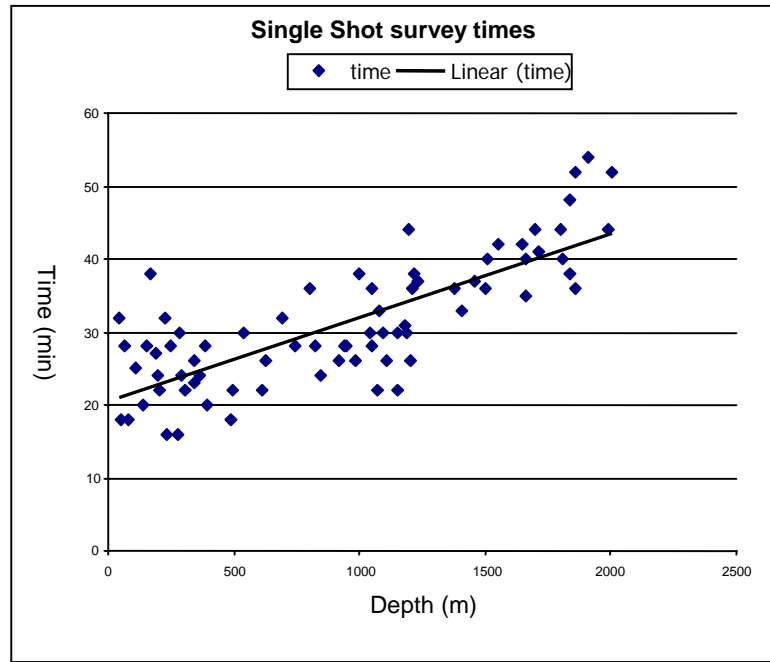


Figure 1.0

The information in fig 1.0 was compiled from 12 different wells with various profiles and depths. The time window of measurement was from when bit stopped drilling on bottom, drill string was worked and the well bore circulated, survey taken, connection made and bit placed back on bottom drilling. No other operations such as rig service were included in the time

Applications:

- Placement of critical wellbores
- Monitoring vertical oil & gas wells where crossing a boundary is not an option
- Drilling down to kick-off point before Directional Services are required & drilling ahead after Directional Services are released
- Monitoring doglegs to ensure logging tools & production casing can easily be deployed

Features:

- Stand Alone – no operator required other than initial set up
- Efficient – surveys are stored automatically when making a connection & transmitted to the surface during regular drilling operations = *NET ZERO™*
- Accurate – detailed Inclination & Azimuth information
- Reliable – deployed with coiled tubing or conventional joint pipe operation
- Integral – Reduces non-circulating time while surveying in critical wellbores
- Proven – reduces drilling time & operating costs

The following page demonstrates how XPulse can impact drilling operations.



Assume a project spread rate of \$40,000 per day and 3 surveys taken @ 1968 feet (600m), 2460 feet (750m) and 2952 feet (900m) over a 24 hr period in a jointed pipe application.

Drilling Cost Estimate: \$40,000 / 24 hours / 60 min = \$27.77/min

<u>Cost using data from figure 1.0</u>	<u>Cost using XPulse Tool</u>	<u>Savings</u>
(@600m) 30min X \$27.77 ~ \$833.00	(@600m) 0 min X 27.77 ~ \$0.00	\$2,722.00
(@750m) 33min X \$27.77 ~ \$917.00	(@750m) 0 min X 27.77 ~ \$0.00	
(@900m) 35min X \$27.77 ~ \$972.00	(@900m) 0 min X 27.77 ~ \$0.00	
Actual Cost to Survey = \$2,722.00	Total Cost to Survey = \$0.00*	

The survey costs are more than 5X versus what would have been calculated using the XPulse *Survey On Connection™ (SOC)* system. As depth increases so does the actual time to survey and cost to survey, using conventional methods. ***XPulse on the other hand provides data every time a connection is made without adding any rig time or additional costs.***

Assume a Survey is Required Every 100 or 50 meters for a 1000 meter well

<u>Conventional Surveying at 15 Minutes</u>	<u>XPulse SOC™</u>	<u>Savings</u>
10 Surveys @ 15min X \$27.77 = \$4,167**	10 Surveys @ 0min = \$0.00*	\$4,167
20 Surveys @ 15min X \$27.77 = \$8,333**	20 Surveys @ 0min = \$0.00*	\$8,333

*Daily tool price not included

**Based upon "rule of thumb" time allocation for a survey

The cost savings of the XPulse SOC system compared to that of a single shot directional survey run on a wireline can be seen in Figure 2.0. The depths and survey times are actual using a wireline single shot directional survey tool over a 5-day interval. The cost considers time to survey, equipment rental and rig time costs.

Risks associated with wire line surveying are also factors to consider. An unscheduled event such as a broken wire line would cause a trip to recover the lost instrument. Depending on depth the trip would be a minimum of 2 hours or greater or an additional cost of \$3,324.00 of lost time based on the \$40,000 project spread rate.

