PRODUCTION AND ARTIFICIAL LIFT OPERATIONS WITH TELEMETRY

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Introduction

The Oil and Gas industry is currently attempting to automate its operations in the field to assure that accurate, detailed, first hand information is received in an efficient manner. This has led to the evaluation of various telemetric devices in the field. The results of these evaluations has been mixed between good and dismal.

The telemetry systems have varied from valve flow indicators to gas measurement. The requirements for usage of such concepts have usually required power supplies that are of at least 120 volt which meant having a power line run to the well by the local utility service at a very high cost. This was enough of a cost to have most operators curtail or totally veto the use of a telemetry system.

The advent of the low power consumption type of processors has made the evolution of the electronic system with low power consuming components a reality. This has taken the telemetry system into being a totally stand alone device. The advent of the cellular phone network has created a low cost method of communication for this concept.

Concept of the Telemetric System

The telemetry system required for use in the oil and gas industry had to be extremely reliable and able to operate at optimum levels with an available low power supply. The use of the components must be in conjunction with these requirements and not need excessive operating parameters to perform.

The following criteria must be met by the telemetry system to assure it can perform successfully in the well and give a complete overview to the operator of the well at the computer. This criteria is not listed in order of importance as all items are important.

A]. The individual pressures of the well must be seen accurately and regularly. They must show the operator updated pressure on the Casing, Tubing and the Flow line or gathering system. This is required during the flow portion of the cycle to assure the operator that the well is producing. This information is also used to develop trends of the well's characteristics.

B]. The telemetry should indicate the valve status and the time status of the well. This is accurately indicate the actual period of flow as well as the total open segment of the cycle.

C]. The time of the opening of the valve to the liquid of the well is removed should be noted by when the plunger arrives at the sensor on the surface. This allows the operator to determine the well's flow rate and be warned of excessive liquids. This allows the operator to adjust for changes.

D]. The total of valve openings and plunger arrivals shows the failure of the plunger to travel. This is an indicator of problems in the operation.

E]. The well must operate reliably through the controller even when there is no contact from the operator. There must be a "stand alone" system that is capable of total operation even if the link to the telemetry is lost. This includes separate power supplies to the controller from all other peripherals. The result is assured operation of the well.

F]. The controller on the well must maintain a history of past events upon telemetry contact of the controller. This will give the computer operator an overview of the events leading up to the present conditions. This allows a pattern to be developed to accurately change existing parameters.

G]. The communication between the well and the computer should be a smooth transition of data both ways with no error messages or problems in the language of communication.

H]. The commands and changes should all be able to transmit to the well at one time. The operational program for the controller should be able to download also.

I]. The controller display on the computer screen should include all of the settings of the controller on one screen to assure the settings are proper and non-conflicting.

J]. The computer should allow for a complete change of the controllers program via downloading to produce a differing method of operating the well to be utilized. The "Help" file should also change with the downloading of the new program.

K]. The Power supply of the system should be rated to the requirements of the individual components in their most demanding conditions and should be reliable for a high percentage of overkill.

The Specific Operations of Telemetry

The telemetry system can perform most operations of maintaining production of a well. This is currently being done by pressure differential systems on wells with a very high degree of success. The addition of the telemetry requires several additional hardware items to indicate various events at the well. This assures the computer operator that the well is performing as required and that a certain sequence is occurring.

The following items are critical to knowing the operation of the well is within certain limits.

1. Pressures of the casing, tubing and flow line.

2. Level of liquids in the gathering tank.

3. Position of the motor valve i.e. closed or open as indicated.

4. The efficiency of the plunger and its relative rate of flow.

5. The history of the operation and the various indications of its operation.

6. The power requirements of the equipment on the well are being supplied and maintaining the operation.

7. The graphing of the retrieved information should be standard.

Why Telemetry for Marginal Wells?

The use of telemetry on any well is best determined by the results obtainable from applying the system. The most accurate evaluation is based upon cost of the operation for the production received. It is a fact that marginal well require more attention.

The use of artificial lift falls into this same evaluation procedure and its pros and cons are weighed against the amount of additional revenue it will generate. The use of telemetry is an extension of the artificial lift theory. The application of such a system can add the production control that was only previously attainable by having a qualified engineer travel to each well and evaluate its operation.

The engineer or technician can now view a well's performance and operation in the time it takes to walk to his vehicle from his office. He can, in that time, have the total overview of the pressures and flow times as well as the settings of the controls on the well. There is enough time to actually make the corrections to the settings to enhance the well production in that same period.

The actual time frame to study the well and evaluate and change the programmable settings is three to five minutes. The time frame required to gather the history of a well is less than 2 minutes. This allows the technician to view 30 to 40 wells per hour and gather the history. He can make changes to 20 wells per hour and operate the changes for several hours and recheck them prior to ending his day.

The economic value to this concept of telemetry is the reduction of lost production time waiting for records and the presence of the field man to correct the problem. The problem is discovered and corrected before the field man can be told where to go and what to do.

This also allows the organization to plan the itinerary of the field personnel to wells with problems and not just to verify the operation of every well. There is an indicator operates in real time in the controller to verify the field man's actual presence at the well.

Why Modular Telemetry?

Ease of repair is possible with the well and the system as the use of telemetry will immediately give the computer operator indication of the systems problems.

This immediate response allows the loss of production to be minimized with the direction of the technician to the problem well. The correction of the problem may simply require a change of the current settings operating the well. The ability to instantly shut in the well and await the technician with the pressure building in the well bore is a major benefit to the operator as this off times prevents further problems.

The ability of the production head to view the activity of the wells first hand is bound to become the most popular item for them to attain accurate information. The reality of the well's progress is apparent and not overstated or subject to error by the pumper. The ability to graph and display comparisons of the well brings the true and accurate view to immediate view.

Low cost of replacement and updating of the telemetry or to the telemetry system is an advantage for the well operator. The installation of the system on the well can be completed in as little as 3 hours. The use of the cellular system will require an addition of a 12 volt deep cycle battery plus a 12 high output solar panel to maintain the power required to continually operate the cellular phone. The additional items are specified or can be supplied by the manufacturer

The production of the well is the main reason to consider the possible use of the telemetry on a well. The use of the telemetry with a plunger or intermittent gas lift and a plunger in a well will show immediate increases in the production of the well.

The increase will occur due to immediate response ability and the well not setting loaded with no flow. The overall increase of a well that has not been performing reliably can be 100s over free flow of the well.

Protection of other devices and equipment on the well is now possible as the pressure limits of the equipment is clearly shown on the computer screen. The use of the "spot monitoring" can be effective in eliminating a failed system. The immediate shut in of the well can eliminate the possibility of a costly spill.

The use of telemetry can create a drastic reduction of operating costs in the field by the direct, daily assignment of the field personnel to specific locations and avoid the random roaming of field personnel to all wells.

This assignment of personnel does not reflect the major benefit of the use of telemetry but can be a substantial cost savings when applied over an annual period.

Conclusions

Telemetry is cost efficient, effective, responsive, immediate, productive, successful.

Cost efficient in that the cost of the installation is sufficiently low and operation expense of the well is reduced.

Effective in that the changes made to operation of the well are evaluated and changed before any problems result in losses.

Responsive in that the changes or corrections are made in less time that it takes to explain them.

Immediate in that the first sign of problems is corrected at that same moment rather than after locating someone to go back to the well before going off duty.

Productive in that the combination of the response to problems and the immediate changes to improve the well insure optimal production from the well.

Successful in that the combination of optimal production and reduced operating costs permit more dollars per man hour and per mcf of production.

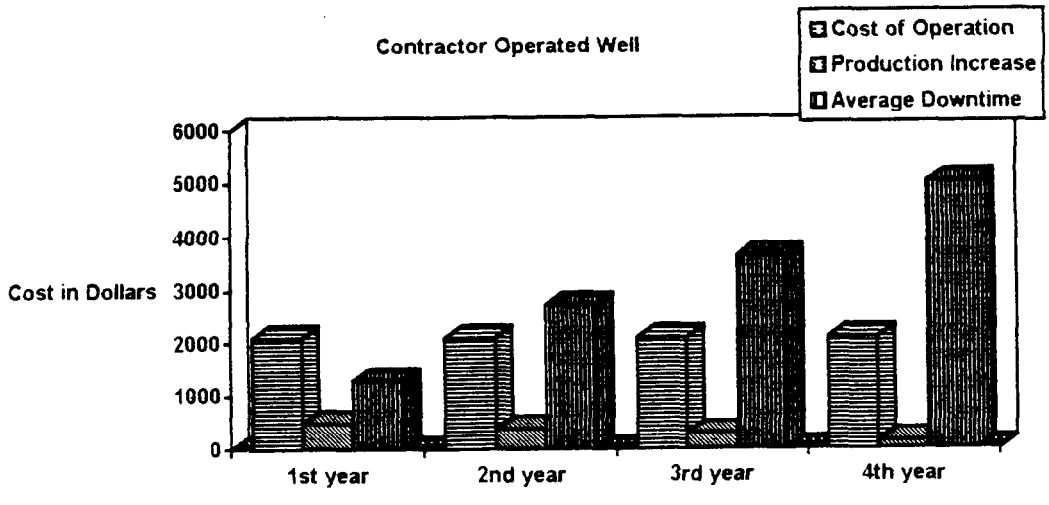
Bibliography

Brown, Kermit E., *The Technology of Artificial Lift Methods* Pennwell Publishing Company, Tulsa, Oklahoma 1984

Lamp, Lawrence., *TeleMax Telemetry Systems* Multi Products Company Millersburg, Ohio 1994

Ocklentz, Brian., *TeleMax for Windows* Multi Products Company Millersburg, Ohio 1994

Visual Basic for Windows™ Microsoft Corporation



All values stated in dollars.
Contractor rate is fixed.
Production rate is shown as loss due to liquids.

Figure 1 - Contractor Operated Well

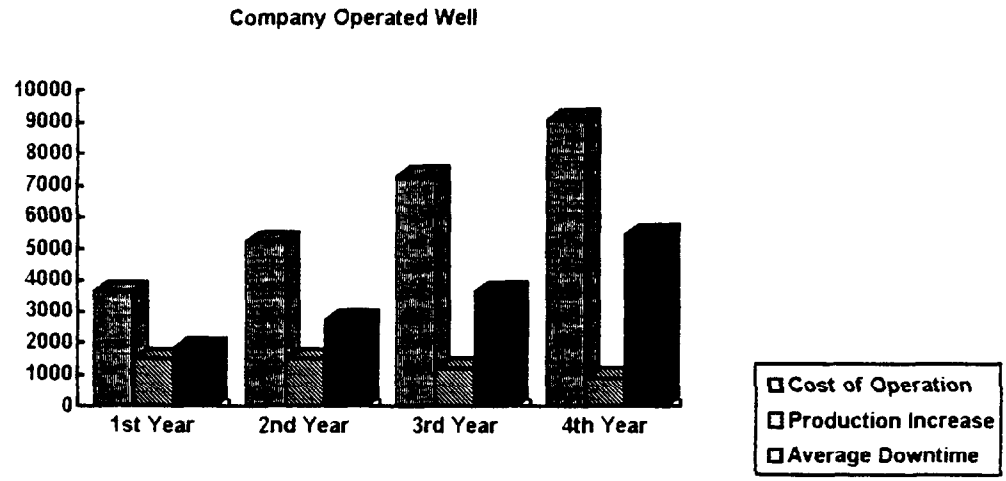


Figure 2 - Company Operated Well

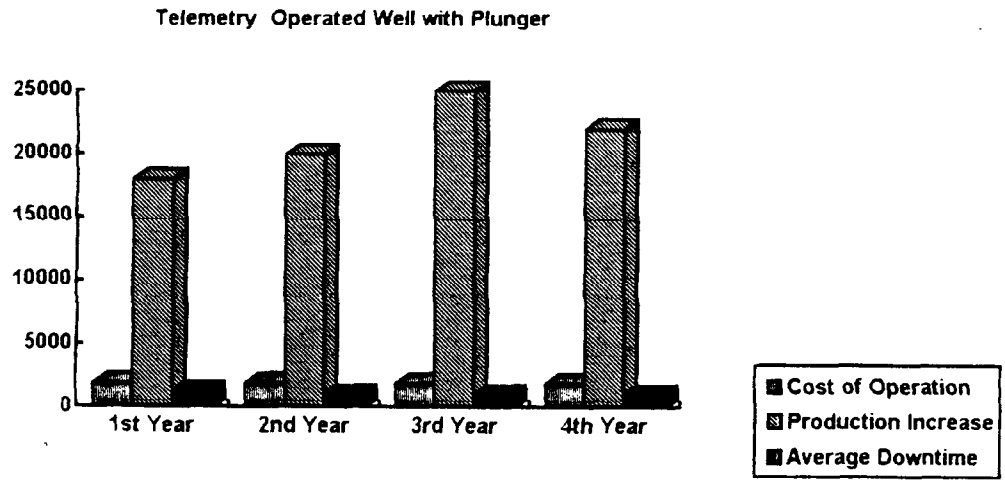


Figure 3 - Telemetry Operated Well with Plunger