

ULTRASONIC INTELLIGENT SENSORS

ClampOn Operation Support

THE FULL ARRAY OF RESOURCES



Monitored and Supported by ClampOn

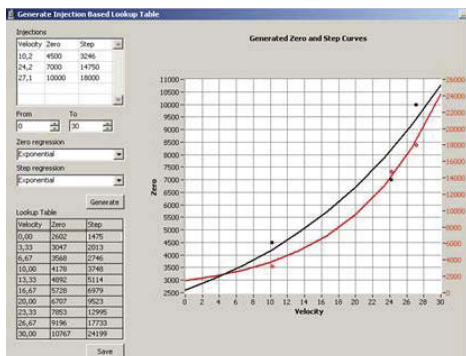
Every factory owner or operator wants to operate their plants as efficiently and profitably as possible. Oil and Gas wells can be regarded as a factory where our services and instrumentation give operators the best tool for maximizing profits. For almost 15 years ClampOn has supplied services to the oil and gas industry all over the world. More than a thousand wells are protected by ClampOn systems. ClampOn services are well known. Our team of experienced and dedicated field engineers are working hard to keep all systems operational, many of them in extremely remote places.

New communication solutions have made it possible for ClampOn to improve our service further, this makes us able to monitor and maintain our sand monitoring system from the ClampOn office.

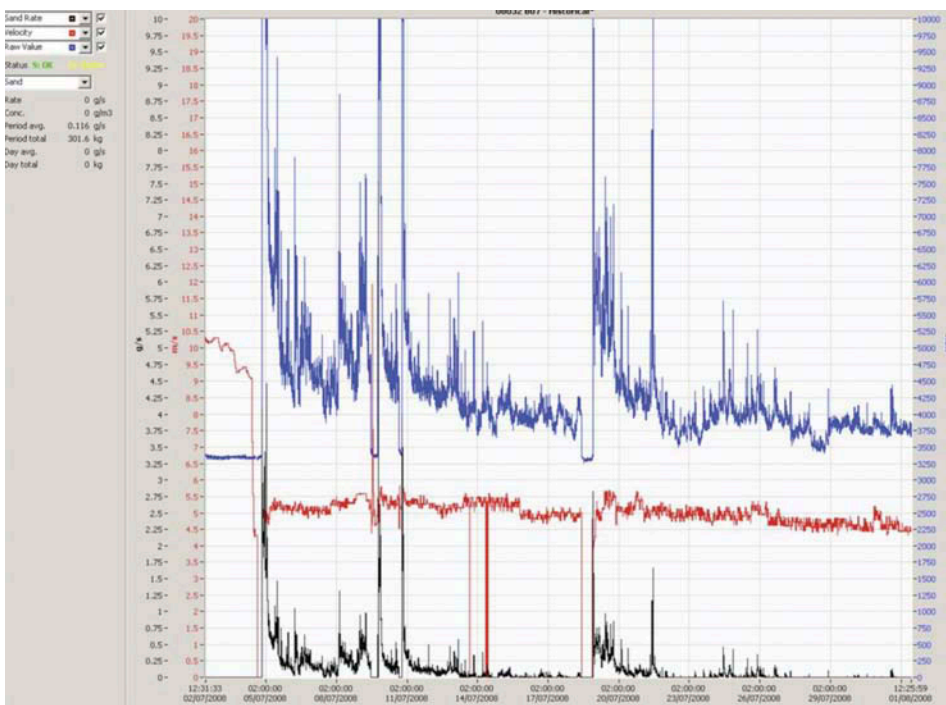
More than 200 wells are monitored on a daily bases by our team of support engineers, giving ClampOn unique experience in analyzing and understanding sand production and sand monitoring.

Sand Monitoring

In some cases the total amount of sand produced over a long period is the only information required. A well-designed, well-configured and properly maintained ClampOn system can easily give this information. The oil and gas industry is however changing and production is becoming more complex. Reservoirs are deeper and more complicated. Demand for high recovery is increasing and instrumentation is becoming increasingly more sophisticated, while access to maintenance is difficult and expensive. All these factors are leading to the requirement for better sand management. Close to fifty percent of all oil and gas wells producing from a sand reservoir have to limit production due to sand production issues caused by inadequate information. ClampOn Services and instrumentation assists the operators to achieve relevant and correct information for the wells. Only a minor increase in the accuracy of sand management could lead to a huge increase in production.



Calibration summary.



Typical graph showing sand production recorded on an automatic system.

Operators have realized this and are sharpening their focus on sand management. Accurate sand monitoring requires time, experience and continuity. Time is expensive and continuity sometimes difficult in an operation. The support and monitoring offered by ClampOn can be a profitable alternative, saving money and resources for operators by securing maximum production.

Single Point of Contact

A corner stone of ClampOn's sand management and support work is our single point of contact. Regardless of the size of operation, we will assign an engineer to the contract. We recommend regular meetings between the ClampOn support engineer and the operational milieu, further on we involve our engineer deeply in the operators sand management issues. Participation in internal sand management meetings, seminars or training courses is a good way of doing this. All our support engineers are certified to

travel offshore, hence meetings offshore and minor field service work can also be done by the same person. Having a single point of contact as a sparing partner concerning sand production issues makes operations easier and more effective.

Day-to-day sand monitoring, planning and coordination of sand related activities during well testing, routine maintenance, repairs, modification and upgrades are all examples of operations where the support engineer will be useful.

Quality of Sand Monitoring

Sand monitoring by means of acoustic detectors is in principle relatively simple. The challenge is to understand exactly what takes place down in the well and maintaining the high accuracy required takes time and effort. Looking at the bigger picture from time to time is also important. Any engineer who studies sand data from the same field every day for a period will gain the necessary

experience. Knowing that this well will always produce some sand for the first days after a start up, or that another well will produce sand if produced at a high rate is information that makes analyses faster and more accurate. The high rate of personnel turnover in operator companies can make it difficult to maintain the required level of experience and focus over time. This is something a ClampOn support contract can solve.

The knowledge that someone is keeping your sand detectors under surveillance and will notify you if something occurs is an important insurance.

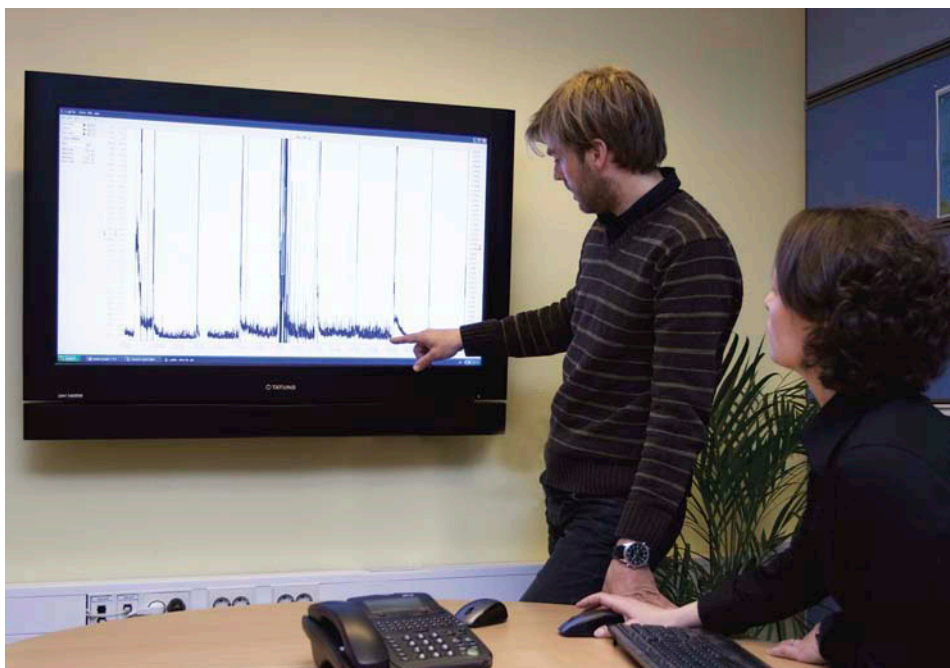
Maintenance

Many users of sand monitoring equipment are investing considerable resources in routine maintenance and calibration of the system. With a missing ownership of the system there is an increasing risk that these investments are not being utilized in the most efficient way. A sharp focus on the system for some weeks a year can be sufficient to report any technical or operational failures. However an ownership will make sure that action is taken to secure the needs of the operator. When there is a support engineer with «ownership» of the system, maintenance will be optimized and necessary improvements or recommendations will be followed up. Close planning and follow-up of the maintenance reduces costs and improve quality significantly. A proper sand management system goes «hand in hand» with the increased focus on HSE in the industry!

Background Experience

Interpretation and understanding of the well behavior during production are key words in sand management, and sometimes limited resources are needed to achieve a better understanding of sand production. By working for operators worldwide ClampOn personnel have obtained unique experience in this area making them better able to approach the challenges correctly. As an ultrasonic instrument manufacturer we are able to supply the best solutions available on the market to the operator. As a service company our knowledge is a cornerstone for prediction and understanding of the well allowing us to operate it efficiently and safely.

We are currently (2008) monitoring 200 wells on about 25 fields on a daily basis, and this number is constantly increasing.



Real-time data analyzing.

Week 31 2008						
Well	Velocity	Zero	Suggested Zero	Calculated by SM3.0	Calculated by report	Comments
B02*	6,5	4667	3300	0	0	
B03	8	3497	3400	2	3	
B04	-	-	-	-	-	-
B05	0	-	-	-	-	-
B06	0	-	-	-	-	-
B07	4,5	4291	4000	215	301	sand
B08	0	-	-	-	-	-
B09*	8	20350	3900	3,5	1,7	
B10*	7	5300	4100	0	2,5	
B11	0	-	-	-	-	-
B12*	8	29500	3750	0	3,5	
B13*	4,5	5400	3700	0	5	some sand
B14*	10	4500	4700	26	16	some sand
B15	0	-	-	-	-	-
B16	0	-	-	-	-	-
B1A	0	-	-	-	-	-
S33	0	-	-	-	-	-
B17	5	4000	4000	1	1	

Sand monitoring report summary.

Technical Solutions

Providing efficient support is a different matter for each operation. In many cases it has been possible to give ClampOn direct access to all relevant data and systems. In other cases we depend on manual or automated email correspondence. There even exists a case where the processing equip-

ment for sand monitoring is located at ClampOn and the operator can access the data from ClampOn. Putting the necessary infrastructure in place is often what takes the most time when setting up a support contract. However, it is always possible to find a solution that works.

ClampOn - the leader in sand, pig and corrosion-erosion monitoring

ClampOn has since the beginning in 1995 grown to be the largest supplier of passive ultrasonic systems for sand/particle monitoring to the international oil and gas sector. All products supplied by ClampOn, particle monitor, pig detector, corrosion-erosion monitor and leak monitor are based on the same, well proven technology platform. Both the topside and the subsea instruments incorporate Digital Signal Processing (DSP), complete digitalization eliminating analogue filters, circuits and amplifiers.



The ClampOn Ultrasonic Intelligent Sensor processes all data in the sensor itself (patented principle), thus enabling the instrument to discriminate between sand-generated and flow-generated noise. This is of importance to the user since changes in flow rates and the gas/oil ratio will not affect the performance of the system.

A good signal to noise (s/n) ratio is vital for quality measurements of this sort, and ClampOn's sensors are the very best in this respect. With the new version, the external noise has been completely eliminated.

Subsea Sensors

The subsea sensors were developed in close collaboration with Shell Deepwater Development Inc. in Houston and FMC Energy Systems in Norway. The successful outcome of the project was a sand monitoring system

that combined an extremely long working life with excellent acoustic properties, offering reliability in the high pressure deepwater environment. ClampOn has since 1998 supplied approximately 1000 subsea sensors to the oil and gas industry. The subsea monitors have been under a continuous development in order to optimize quality and performance, and to meet the requirements in the market.

ClampOn DSP Pig Detector

The ClampOn DSP Pig detector is a Non-intrusive pig detection system designed to be a first stage alarm system for pig detection providing accurate and reliable registration of the time when pigs is passing, and transmits the signal to the operator. The detector can also indicate the amount of debris ahead of the pig during cleaning operations. Available for topside and subsea applications.

ClampOn SandQ™ & ClampOn DSP-06 Particle Monitor

All sensors are exactly alike and interchangeable, an advantage if sensors should be moved/relocated or in case of service. The DSP's increase in processing capacity enables the sensor to combine signals from several frequency ranges when analysing the flow. The ClampOn sensors are versatile, and are the only instruments on the market offering two-way communication between sensor and control system. This solution enables future upgrade of the sensor by a simple download of new software. When using digital output from the sensors, they can be installed in a «multi-drop» system. The sensor is installed after a bend, where the particles (chalk or sand) are forced out of the flow and hit the inside of the pipe wall, generating an ultrasonic pulse.



ISO 9001 CERTIFIED COMPANY



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