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2019 Distributed and Single Point Fiber Optic Sensing Systems Forecast

Description:

The distributed fibre optic sensor market report has been expanded to cover single point sensors and extended to 2023. The distributed fibre optic sensor market stood at \$651 million in 2014 with 49% associated with the oil and gas market segment. The overall market contracted through 2016 due to the fall in oil prices. Modest recovery occurred in 2017 until late 2018. Then another oil price drop has impacted the market. By 2023, the forecast shows the oil and gas market segment will increase in value, but due to growth in other segments, it will decrease to 19% of the distributed fibre optic sensor market.

The total distributed fibre optic sensor market that was projected (January 2017) to be \$1,008 million in 2021 is now projected to be \$821 million in 2021 reaching \$1,033 in 2023.

The point sensor market is dominated by the fibre optic gyroscope market segment which is very dependent upon government spending. From 2013-2015 reductions in government spending impacted the market. From 2016, an up-turn in government spending has had a positive effect on growth. As fibre optic sensors become more cost-effective and technology advances, the industrial and medical markets will expand for point fibre optic sensors.

The combined distributed and single point fibre optic sensor markets are projected to be over \$1.3 billion in 2023 according to an updated and expanded market survey report conducted by the Photonic Sensor Consortium and published by the author.

The expanded report provides much greater detail for how the market is forecasted for specific technologies. Data is provided in graphic and tabular formats. The market is broken down for DTS, Bragg grating, DAS, interferometric and Brillouin scattering technologies in relation to the various market segment applications (oil and gas, military, homeland security, smart structures, etc.). In addition, the three dominant technologies (DTS, DAS, and Bragg gratings) show relative market share by the major suppliers.

Distributed fibre optic sensors are an enabling technology that creates smart systems in a variety of applications. The initial commercialization efforts focused on military applications. However, the need to

function in harsh environments and the development of optical fibre technology that can survive in these applications has significantly impacted the oil and gas industry. These smart sensing systems provide benefits throughout the life of a well from exploration to drilling and completion, production and reservoir management. There is no other technology that can provide critical process control information spatially throughout the well in real-time over long periods. Without smart well technology, fracking monitoring and analysis and applications like steam-assisted gravity drainage (SAGD) would be very difficult to implement effectively. Fibre optic sensors are proven technology and applications are expanding over multiple markets.

In a manner similar to the distributed fibre optic sensor forecast, the point fibre optic sensor market is broken down by market segments and by specific technologies.

There are several characteristic advantages of fibre optics that make their use especially attractive for sensors:

- Nonelectrical
- Explosion-proof
- Small size and weight
- Allow access into normally inaccessible areas and harsh environments
- Immune to radio frequency interference (RFI) and electromagnetic interference (EMI)
- Solid-state reliability
- High accuracy
- Can facilitate distributed sensing

Most physical properties can be sensed optically with fibres. Light intensity, displacement (position), temperature, pressure, rotation, sound, strain, magnetic field, electric field, radiation, flow, liquid level, chemical analysis, and vibration are just some of the phenomena that can be sensed.

Fibre optic sensors have been used successfully for many years in military gyroscopes and hydrophones. However, their use in smart oil wells has been the key to enabling North America to be on a path to energy independence.

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3. Survey Overview

- The last survey responses were from companies with sales of less than \$5 million to companies with sales well more than \$30 million
- Estimated sales growth in 2018
- Projected annual sales growth in 2016 - 2023
- Most companies use multiple technologies
- The most prominent barrier to growth is the price of oil and the uncertainty of oil pricing the near-term future. Efficiencies are driving down the threshold price at which non-conventional wells can produce profitably.
- Sensing system cost is the second leading barrier with competing technologies (non-fiber optic) identified as the third leading barrier.
- Most companies address multiple market segments, but energy is the dominant market and its drop is having a significant negative impact related to outside investment
- Most sensing companies indicated that distributed acoustic sensing (DAS) is having significant market penetration and is compatible with DTS systems using the same fiber optic cables
- The internet of things (IoT) will have a positive impact on sensor technology and will impact both distributed and single point market applications

4. Sensor Forecast Methodology

- Review and update existing forecast data base established from 2003 to 2018
- Review each market segment and factor in survey and market intelligence for 2018 sales and growth beyond 2018
- Survey input
- Direct contact with suppliers and end-users
- Track related market trends
- Track government support and funding
- Track legislation that may impact the industry
- Track venture capital investment
- Track industrial investment and acquisitions
- Track oil and gas industry pricing and investment
- Compare with forecasts for optical instrumentation and associated trends

5. Sensor Forecast Coverage

6. The forecast covers distributed fibre optic sensing systems including sensor elements, fibre optic cables, interrogators and software. It does not include installation. The markets covered are defined below:

- Worldwide market excluding China
- Market segments covered
- Oil & gas seismic
- Oil & gas in-well
- Oil & gas pipelines
- Wind energy turbines
- Geothermal
- Utility power lines
- Military – hydrophone
- Military – security
- Military – shipboard/avionic
- Homeland security – intrusion/chemical
- Infrastructure
- Industrial process control

7. Distributed Fiber Optic Sensor Market Forecast

- Distributed Fiber Optic Sensor Forecast
- Comparison of January 2017 and December 2018 Forecasts for Distributed Fiber Optic Sensors
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- Smart Grid
- Smart infrastructure
- Military
- Homeland Security
- Industrial

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15. Several factors have impacted the distributed fibre optic sensor market growth.

- On the positive side
- On the negative side

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- AP Sensing
- Baker Hughes
- CGGVeritas
- 4DSP
- FAZ Technologies
- FBGS
- Fiber SenSys
- Fibersonics
- FISO Technologies
- Fotech
- Halliburton
- IFOS
- Intelligent Optical Systems
- IXBlue
- LIOS Technology
- Luna
- Micron Optics
- Moog (Insensys)
- Northrop Grumman
- NP Photonics
- Opsens
- Optasense (QinetiQ)
- Optiphase
- OZ Optics
- Petrospec Engineering
- PGS
- QinetiQ
- Schlumberger
- Sensornet
- Silixa

- Smartec (Roctest Group)
- Smart Fibre
- TGS
- Weatherford
- Welldog
- US Seismic Systems, Inc. (USSI)
- Zeibel

17. Mergers and Acquisitions

- Sensa
- CiDRA (Fiber optic sensor business)
- Luna Energy
- Smartec
- Optoplan
- Insensys Oil & Gas
- WavefieldInseis
- Insensys (Renewable Energy)
- LxData
- Stingray
- Qorex
- Optiphase
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- Baker Hughes
- 4DSP
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Companies Mentioned:

- 4DSP
- AP Sensing
- Baker Hughes
- CGGVeritas
- CiDRA (Fiber optic sensor business)
- FAZ Technologies
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- FISO Technologies
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- Micron Optics
- Moog (Insensys)
- NP Photonics

- Northrop Grumman
- OZ Optics
- Opsens
- Optasense (QinetiQ)
- Optiphase
- Optoplan
- PGS
- Petrospec Engineering
- QinetiQ
- Qorex
- Schlumberger
- Sensa
- Sensornet
- Silixa
- Smart Fibre
- Smartec (Roctest Group)
- Stingray
- TGS
- US Seismic Systems, Inc. (USSI)
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