

## 101 Fiber Optics Training Course – 10<sup>th</sup> – 11<sup>th</sup> March 2021

### Program: Fiber Optic Sensing in the Oil and Gas Industry

Session 1: Wednesday, 10 <sup>th</sup> March 2021						
Serial	Activity	Activity Details	Presenter	Timings		
				CST (Houston)	GMT (UK)	CET (Europe)
Welcome & Introductions				08.00 – 08.15	14.00 – 14.15	15.00 – 15.15
1	<b>Basic Level Knowledge of Optical Fibers and Fiber Optic Sensing Techniques</b>					
a)	<b>Overview / Introduction to Fiber Optic Sensing in O&amp;G</b>	<b>Context to Fibre in O&amp;G</b> <ul style="list-style-type: none"> <li>History</li> <li>Basic Physics</li> <li>Optical Fiber Types and Design (SM / MM)</li> <li>Light Transmission</li> <li>Scattering</li> </ul>	Halliburton (John Maida)	08.15 – 09.00	14.15 – 15.00	15.15 – 16.00
b)	<b>Fiber Optic Basics</b>	<b>How are fiber optics made and how does this affect how they are used?</b> <ul style="list-style-type: none"> <li>Manufacture of Optical Fibers</li> <li>Coatings</li> <li>Specialty Optical Fibers</li> </ul>	AFL (Doug Norton)	09.00 – 09.30	15.00 – 15.30	16.00 – 16.30
c)	<b>Fiber Optic Sensing Technologies #1</b>	<b>Optical point sensing and multi-plex/ multi-parameter</b> <ul style="list-style-type: none"> <li>Bragg Gratings</li> <li>Multiplexed sensors</li> </ul> Multi-parameter (P, T, etc. – combined with DTS/DAS)	Halliburton (Michel Le Blanc / Crispin Doyle)	09.30 – 10.00	15.30 – 16.00	16.30 – 17.00
<b>Tea/ Coffee break</b>				10.00 – 10.15	16.00 – 16.15	17.00 – 17.15
d)	<b>Fiber Optic Sensing Technologies #2</b>	<b>Distributed sensing</b> <ul style="list-style-type: none"> <li>Fundamentals of distributed sensing</li> </ul>	Halliburton (John Maida)	10.15 – 11.00	16.15 – 17.00	17.15 – 18.00
2	<b>Fiber Optic Sensing Components for Upstream / Downhole Applications</b>					
a)	<b>Fibre System Components #1</b>	<b>Cables/ Umbilicals</b> <ul style="list-style-type: none"> <li>Cables</li> <li>Wellheads</li> <li>Clamps</li> <li>Umbilicals</li> </ul>	Silixa (Garth Naldrett)	11.00 – 11.30	17.00 – 17.30	18.00 – 18.30
b)	<b>Fibre System Components #2</b>	<b>Connectors</b> <ul style="list-style-type: none"> <li>Technology types – demonstration/explanation of how it works within its oil and gas application</li> <li>Installation history</li> <li>Challenges facing future subsea installations.</li> </ul>	TE SEACON (Sergio Mendez)	11.30 – 12.00	17.30 – 18.00	18.30 – 19.00

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				CST (Houston)	GMT (UK)	CET (Europe)
c)	<b>Fibre System Components #3</b>	<b>Architecture</b> <ul style="list-style-type: none"> <li>Completion schematics (SEAFOM architectures)</li> </ul>	Operator (Steve Hirshblond)	08.00 – 08.45	14.00 – 14.45	15.00 – 15.45
d)	<b>Fibre System Components #4</b>	<b>System Installation Overview</b> <ul style="list-style-type: none"> <li>Issues, costs, etc.</li> </ul>	Operator (Steve Hirshblond)	08.45 – 09.15	14.45 – 15.15	15.45 – 16.15
3	<b>Monitoring Applications</b>					
a)	<b>Fibre Applications #1</b>	<ul style="list-style-type: none"> <li>PT Gauges and Flowmeters</li> <li>Multi-parameter Sensing PT/Flow/DTS/DAS</li> </ul>	Silixa (Garth Naldrett)	09.15 - 09.45	15.15 – 15.45	16.15 – 16.45
b)	<b>Fibre Applications #2</b>	Distributed Temperature and Acoustic Sensing <ul style="list-style-type: none"> <li>Flow profiling</li> <li>Leak detection</li> <li>Seismic (VSP, 3D and 4D)</li> <li>Frac monitoring</li> <li>Microseismic</li> <li>Cross-well strain monitoring</li> </ul>	Silixa (Garth Naldrett)	09.45 – 10.15	15.45 – 16.15	16.45 – 17.15
<b>Break</b>				<b>10.15 – 10.30</b>	<b>16.15 – 16.30</b>	<b>17.15 – 17.30</b>
c)	<b>Fibre Applications #3</b>	<b>Distributed Temperature Sensing/Distributed Acoustic Sensing</b> <ul style="list-style-type: none"> <li>Pipeline</li> <li>Flowline monitoring</li> </ul>	Silixa (Garth Naldrett)	10.30 – 11.00	16.30 – 17.00	17.30 – 18.00
4	<b>Summary</b>					
a)	<b>Operator experience</b>	Case study <ul style="list-style-type: none"> <li>Examples from an operator on system configurations, what was measured and value added</li> </ul>	Operator (Steve Hirshblond)	11.00 – 11.30	17.00 – 17.30	18.00 – 18.30
b)	<b>Future applications</b>	<ul style="list-style-type: none"> <li>Future of fiber optic monitoring</li> </ul>	Operator (Steve Hirshblond)	11.30 – 12.00	17.30 – 18.00	18.30 – 19.00
<b>Closing Discussion &amp; Feedback</b>				12.00	18.00	19.00