Full-Wave Imaging: Acquisition and Applications

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Innumerable barrels of oil have been recovered around the world using traditional 2-D and 3-D P-wave seismic images. But the challenge of finding and maximizing the economic value of our reservoirs is ever increasing, and the demand for hydrocarbons is ever growing. To take us to the next level of exploration and development, we need a step change in technology.

Full-wave acquisition is a technology that is ready to go now and will be a major ally in battling our toughest imaging problems. Full-wave imaging, for all its promises, is no small task. The recording of full wave data requires a new level of precision in order to obtain a reliable representation of true ground motion. By making use ofMicro Electrical Mechanical Systems (MEMs) technology, it is possible to create a digital sensor that is sensitive, has high vector fidelity, has axes that are highly orthogonal to one another, and is tilt-insensitive. The features of this sensor make it possible to record and isolate all of the signal and noise that the earth returns and minimize many assumptions from the processing and interpretation of the data.

Accurately recorded full-wave data can assist in finding additional reserves in existing fields by returning better P-wave images and making use of Converted Wave (PS) and Split Shear Waves (S1 and S2). A few examples of how this information can be applied are: fracture/anisotropy imaging, enhancement of low-impedance reservoirs, and monitoring fields undergoing enhanced recovery programs. Overall, fullwave is going to make a significant contribution to our geophysical and geological understanding of our reservoirs and therefore can have a positive impact on our economic reserves.