College of Engineering
Department of
Mechanical & Industrial Engineering

The Sidney E. Fuchs Seminar Series

3:30-4:20pm, Friday, April 11, 2014
Frank H. Walk Design Presentation Room

Mechanical Innovations for Smarter Oil Well Placement and Control to Increase Production and Lifetime

by Martin E. Poitzsch*

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Today's modern oil wells are much more complex and costly than those drilled in past years, due to the increasing depth and inaccessibility of the reservoirs that are being tapped. A deepwater well can cost over $200 million to drill and complete; so it is imperative that production rates and lifetimes be great enough to pay off this enormous investment. In addition, safety and environmental concerns are very significant, making it more attractive to get as much hydrocarbon as possible out of each drilled well.

Accurate 3-dimensional well drilling has been one of the most important drivers of well productivity over the past couple of decades. It is now possible to place complex well trajectories within accuracies of a few meters over distances of up to 10 km; and wells can also extend horizontally for 10 km from a land-based rig out under the sea or can follow precisely a long, horizontal reservoir for maximum production. A Schlumberger innovation, "GeoSteering" actually uses near-bit sensors based on nuclear, electromagnetic, and other physical principles to "sniff" the reservoir quality and adjust the drilling path to keep the well in the most productive zone.

While these techniques involve sophisticated sensing, they also represent examples of very advanced and challenging mechanical design and innovation. Given the high level of activity in the US and international oilfields, it is hoped that these topics will be of interest to tomorrow's mechanical engineering innovators!

* Martin Poitzsch holds an A.B. from Washington University in St. Louis and a Ph.D. from Harvard University. He also spent three semesters at the Technische Universität Berlin as a Rotary Scholar and an extended internship with Siemens AG. After Harvard, he was an NRC Post Doc at NIST in Boulder, CO, where he constructed the first liquid helium temperature RF ion trap for stored-ion frequency metrology. In 1994, he joined Schlumberger's Logging While Drilling engineering department in Houston, where he worked as an R & D physicist on low-frequency electromagnetic imaging, navigation, and nuclear measurements. From 1996 to 2001, he led the NMR While Drilling product development team and then the Magnetic Resonance (both product engineering and manufacturing) department in Houston. From 2002 to 2004, he was the Wireline R & D Portfolio Manager based in Paris and Houston, overseeing over $100M in physics-related "downhole" measurement technology projects in eight centers around the world for Schlumberger. Since 2004, he has been the Research Director for Sensor Physics at SDR in Ridgefield, CT, and now Cambridge, MA. Martin's department consists of about 50 researchers working on a wide range of experimental physics-based measurement technologies being evaluated for possible exploitation as geophysical/petrophysical reservoir probes. His work also involves extensive collaboration with Schlumberger engineering centers and with external partners, mainly at universities, where his department is supporting almost two dozen exploratory research collaborations.