

Congressional Notification Profile

DEEP TREK PROGRAM SOLICITATION THE PENNSYLVANIA STATE UNIVERSITY

Background and Technical Information: Research entitled “Improved Economics in Deep Well Drilling.”

Penn State will develop a continuous microwave process to make seamless coiled tubing and drill pipes efficiently and economically. Improving the performance, life cycle and rate of penetration of these materials would allow deeper wells to be drilled. Drill mud, which contains drilling fluids, causes erosion and leaks that weaken conventionally welded drill pipes, causing them to fail.

Contact Information:

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Congressional District: 5th District County: Centre

Financial Information:

Length of Contract (months): 36 months
Government Share: \$ 1,150,000
Total value of contract: \$ 1,820,000

DOE Funding Breakdown:

Funds: Phase 1 \$ 400,000
Funds: Phase 2 \$ 400,000
Funds: Phase 3 \$ 350,000

PUBLIC ABSTRACT

A Novel Method Utilizing Microwave Technology for Producing Cost-Effective and Improved Drill Pipe and Coil Tubing for Deep Well Operations

New developments (and innovative ideas) in the area of materials processing have the potential of casting the most profound and wide-ranging impact on the demand for better performing and cheaper products. This is especially true today as industry and government are focusing on new joint goals: better (improved overall performance), faster (improvement in process-cycle time), cheaper, and greener (environmentally friendly). One emerging technology for meeting these goals is high temperature microwave technology for the sintering of materials, especially the metallic materials. This proposal aims to exploit the recent developments in microwave technology for producing certain components of a deep trekking system used for oil and gas exploration so that the well/hole can be made deeper and cheaper.

The limits of conventional methods for deep well construction for oil and natural gas have been well recognized. One of the components of a drilling system and also proposed for high-pressure jet drilling systems is drill pipe (for vertical drilling operation) or coiled tubing for horizontal or directional drilling operations. It carries the drill bit assembly underground, functions as transport paths for the mud and drilling fluids, housing sensors etc. However, at high pressures the conventionally made welded drill pipes tend to fail due to erosion and leaks caused by abrasive drill mud. It is very important that the drill pipe and/or coiled tubing must remain mechanically stable and chemically inert while in a very hostile environment underground, so that a deeper well/hole can be penetrated, and also the time at the bottom of the hole is extended. In order to accomplish this, an improved material/process for drill-pipe/coiled-tubing is sought after. Our concept for improved performance of drill-pipe/coiled-tubing is based on newly emerging technology utilizing microwave energy for processing of steel powders.

The main objective of the proposed research program is to improve the rate-of-penetration in deep hostile environments by improving the life cycle and performance of coiled-tubing and/or drill-pipe. This will be accomplished by developing an efficient and economically viable continuous microwave process to sinter formed/extruded steel powder for the manufacture of seamless coiled tubing and drill-pipe. The goals of the project are to manufacture economically coiled tubing with improved performance under hostile underground and marine conditions.

The program will be carried out in three phase involving: (i) a feasibility study, (ii) building a prototype microwave continuous sintering and extrusion system, (iii) determination of optimum sintering conditions, (iv) plan for the commercialization of the technology, and (iv) cost analysis of the new technology and economic viability with respect to the existing technology. It is expected that the performance of coiled tubing and drill-pipe made by microwave process will have superior quality and performance to the standard product.

Sponsoring Organizations and Principal Investigators:

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