The wellbore similitude device was created in order to examine the conditions of fluid and particle flow within a wellbore at various angles. Through examining fluid dynamics principles, prior research was conducted to create equations based off factors such as geometric, dynamic, kinematic and rheological similitude to develop a theoretical foundation for the device. The construction of the wellbore similitude device required careful planning, designing, and assembly. At the time of completion, the device will be able to represent various conditions of flow within a wellbore in the field and provide an understanding of fluid and particle flow behavior. These conditions will be measured by a Coriolis Meter and pressure sensing equipment.

Overview:

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Objectives:
The objectives for the wellbore similitude device are as follows:

• Assemble the device efficiently and correctly.
• Ensure that accuracy and precision are used during assembly.
• Use critical thinking to eliminate error and to overcome obstacles.
• Troubleshoot any unknown variables and unsuspected occurrences.
• Fully assemble and operate the device without any malfunctions.

Materials and Methods:

Materials:
• Fastening Hardware
• Stainless Steel Pipes
• Pump with Motor
• Electrical motor and linear actuator
• Water hosing and reservoir
• Coriolis Meter
• Electrical and Wiring components
• Power supply and Electronic measuring devices

Methods:
• Order all parts and equipment.
• Begin assembly onto aluminum framing.
• Assemble and wire water pump.
• Finish top assembly with motor, pipe and electronic measuring equipment.

Results:
The device is almost fully assembly and is not fully operational as a result of delays with obtaining parts, finding a suitable environment to test the device, electrical wiring, as well as many other outside factors. However, a near finished product has been produced and will be completed by the beginning of the Fall of 2023. Additional testing is needed to ensure that all components are functioning correctly and can be operated safely.

Conclusions:

Overall, the project has been successful and went according to plan. Even though there were some obstacles such as delays and learning curves, the device is on its way to being completely finished and operational. This project required a great deal of hands-on work, critical thinking and analysis, as well as the ability to troubleshoot. As a result, changes were made to benefit the compatibility and functionality of the device.

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