

ABSTRACT

Remote control operated drilling rigs are becoming increasingly popular in the industry due to their ability to provide greater safety and efficiency during drilling operations. The project aims to showcase the use of a wireless Radio Frequency (RF) remote control to operate a series of solenoid valves for a drilling rig. The goal is to allow operators to remotely control the hydraulic system, thereby enhancing visibility, flexibility, and safety.

SPONSOR

REVOLUTION DRILLING

ACADEMIC ADVISOR Dr. Kartikeya Murari

REFERENCES

https://www.revolution-drilling.co

MOTIVATION

Vision is limited when controlling the drill from the control panel, as the drill's mast and structure block the view of the driller who is not able to see the operation being done. This is not only a safety issue, but a cost and production issue. It is a safety issue because the driller has to be moving back and forth from the cabin to the front of the drill when the drill is operating to check that the right connections are being done. This is also a cost issue because pipes can get damaged if the drilling accuracy is compromised. And lastly, a production issue because it takes a lot of time to get everything done. Our project consists in developing a wireless remote control system for the driller to be able to control the drill wirelessly from any position up to 200 ft apart. This will provide higher visibility, controllability, and will facilitate the operation being done by reducing work fatigue and injuries at a safe distance. The new system will also increase productivity and will reduce accident risk by providing a better vantage point for the driller.

PROTOTYPE

PIC24FV32KA301 We two used microcontrollers to transmit the data sent to the solenoid. To verify the values of the data being transferred we have placed an LCD on the receiver circuit. The prototype includes 5 push buttons. The buttons will control the direction of the cylinder (in or out). Four of the buttons simulate the control flow of the drill in practice. The other button is for emergency shut off. The prototype's control flow and design, does not match the actual design of the real product in the case of implementation and installation. The design choices are merely for demonstration purposes.

RF REMOTE CONTROL BERETTA T43

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BERETTA T43 DRILLING RIG



<u>Valve 1:</u> Drill Rotary Head (Up and Down)

<u>Valve 2:</u> Drill Rotary Head (Spin Left and Spin Right)

<u>Valve 3:</u> Top Jaw (Open and Close)

<u>Valve 4:</u> Top Jaw (Spin Left and Spin Right)

<u>Valve 5:</u> Bottom Jaw (Open and Close)

METHODS AND MATERIALS

To install an RF remote control system on a Beretta T43, several changes need to be made to the hydraulic valves. First, hydraulic solenoids should be installed to control the flow of hydraulic fluid through the valves. These solenoids are placed between the valves and the control unit with the receiver. Pressure transducers should also be installed. Because installation is out of our scope at the moment, to simulate a similar system to that of wirelessly controlling the valves in the hydraulic bank of the drilling rig, we have decided to use pneumatics for simplicity purposes to demonstrate how wireless systems interact with solenoid valves. The prototype the team has built consists of a RF system to control the direction of air in a 5/2 way solenoid valve. An air compressor provides the pressured air to the valve which controls the position of a double action cylinder with two movements (in and out). The objective of this demonstration is to show the functionality of our RF system in action.



RESULTS

In order to evaluate the wireless range and accuracy of the RF system, we performed a series of tests at different distances while also pressing the input buttons. To ensure the accuracy of the output and to test the control flow, we utilized an LCD display to showcase the anticipated data. Whenever we encountered discrepancies between the received data and the expected output or if the data transmission took longer than usual, we deemed the test as unsuccessful. The solenoid together with the cylinder also helped us test the operation of the system.