



Wireless Completion Solutions

Brandon Behm; Golnoosh Zilabi; Dyson Benko; Cody Craig; Taylor MacEachern; Pranzee Battulayan Schulich School of Engineering, University of Calgary



This abstract presents a new design for a downhole completion tool that aims to reduce the costs of completions by removing the wireline from wireline perforating

INTRODUCTION

•The Wireless Completion Solution concept reinvents the way wireline companies can perform plug and perforation operations.

•By integrating today's technology into our design without wireline the goal is to reduce

METHODS AND MATERIALS

•ASTM A572 Grade 42 Carbon Steel

•HH019 Magnesium Alloy

•Barlow Equation for Hoop Stress

CONCLUSIONS

•Dissolve time limitations

•Resolve dissolve time with acid and scour

Frictional loss limitations

completions.

The proposed tool incorporates a top-down completion style with several innovative features, including an internal design allowing for the quick release of tools while locking into place, a robust sealing mechanism to withstand sand and erosion, and an enhanced design to remove wireline from completions to save on costs and improve efficiencies.

Additionally, the tool is designed to be compatible with various wellcompletion techniques, such as hydraulic fracturing in an array of well-size designs, and can be deployed in both vertical and horizontal wellbores. The new design aims to enhance the overall performance of downhole completion operations, reduce costs, and minimize environmental impacts. Further development and testing of the new tool are needed to validate its performance and reliability in realworld applications along with further mechanical analysis for internal motions and depth-sensing technology.

overall costs.

•The design incorporates a top-down completion method compared to the standard bottom-up method.

•Further analysis required. Requires field testing to check feasibility.



Material and Pressure:

- Based on Duvernay with 19.1kPa/m gradient
- Thin design margins
- P110 production casing analyzed
- HH019 Magnesium Alloy Dissolvable locator
- Integrated recess into the casing

Locator Tool (HH019 Magnesium Alloy):

- Magnesium Cost = \$1.763/kg
- Cost Per Locator = \$64.32

Casing Tool (A572 Grade 42 Carbon):

- A572 Carbon Cost = \$0.746/kg
- Cost Per Tool = \$105.04

•Bernoulli's Equation for Pressure Drops

Erosion Equations for Material Erosion

•Solid Works 3D Modelling

•Flip-a-Clip (Animated Video)

AccuMap

DISCUSSION

•The importance of this project was to compare cost savings of wireline vs. new concept.

•Based on results, the concept would require further analysis and field implementation to prove concept.

•Concept requires further mechanical design work to design spring and latch mechanism.

•Cost comparisons vs PNP & OHBD

•24-48 hours potential time savings/well

•Observed cost savings to Tier 1 Energy

•Range of pressure firing options

Conceptually designed

Design not complete – time constrained

•Design of depth sensor technology required, currently pressure reliant

REFERENCES

- [1] "Dissolvable Magnesium Alloy | Wingoil," www.wingoil.com, Aug. 05, 2022.
- https://www.wingoil.com/dissolvablemagnesium-alloy/ (accessed Mar. 21, 2023).
- [2] "MatWeb The Online Materials Information Resource,"
- www.matweb.com.
- https://www.matweb.com/search/data sheet.aspx?matguid=a1c75a2df3d44 7c08a8a18ea7be65902&ckck=1

Locator Tool Dissolve Time: TTD = 24.82hrs/tool/stage – scour/acid

Savings:

- Cost of wireline unit + Wireline
- Daily fuel costs
- Daily manpower + bonuses
- Completion days

Cost Variance Per Well Completion Type



•Major assumption of tool getting to desired locations. Fair assumption based on current technology.

•Future possibilities to integrate collar sensing technology for depth tracking.





(accessed Mar. 21, 2023).

[3] M. E. Mohyaldinn, M. C. Ismail, M. Ayoub, and S. M. Mahmood, "Examination and Improvement of Salama Model for Calculation of Sand Erosion in Elbows," ICIPEG 2016, pp. 687–696, 2017, doi: https://doi.org/10.1007/978-981-10-<u>3650-7_59</u>.

CONTACT

Golnoosh Zilabi Email: golnoosh.zilabi@ucalgary.ca Linkedin:https://www.linkedin.com/in/gol noosh-zilabi-07005b256/

Variable Cost Fixed Cost

Cost Comparibles of PNP vs. Capstone Design



Attached (Running) Position



Released (Seated) Position

