FracOPTIMAL2

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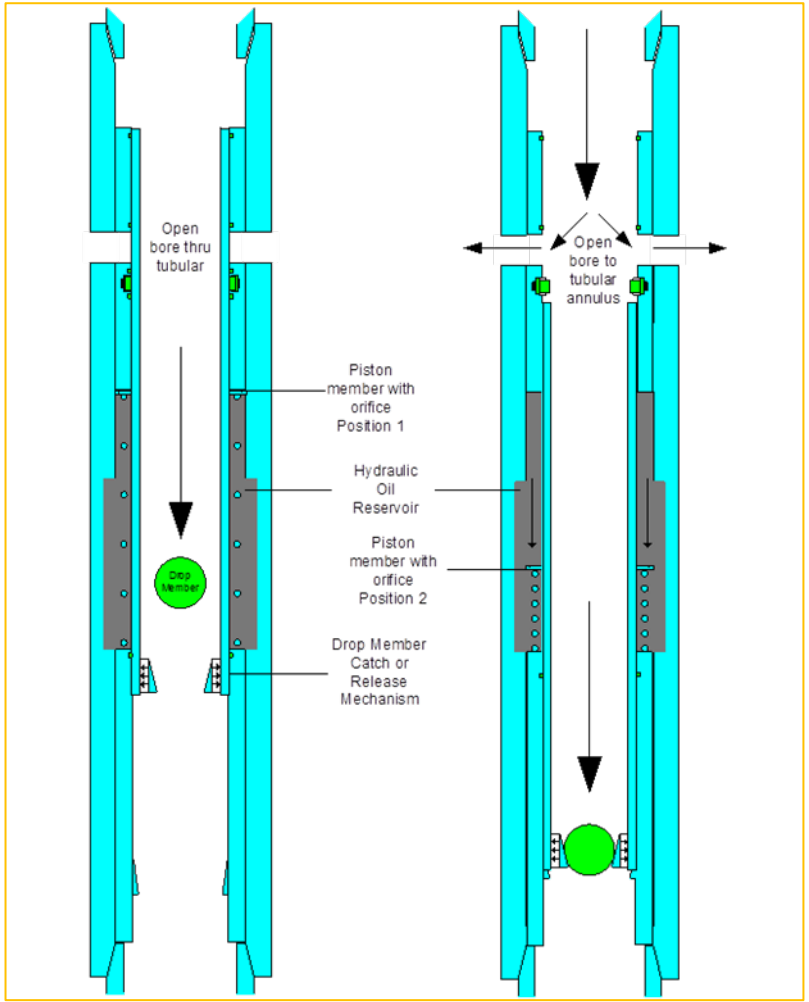
Mines & Tejas RE Partnership

- Colorado School of Mines
  - Premier Research Institute
  - Focused on Earth, Energy and Environment
  - Student Design Teams

- Tejas RE
  - Premium tool design and manufacture
  - Frac Sleeve design expertise
  - Flow loop and testing facilities

FracOPTIMAL2 – Where is the Sizzle?



1. Challenge Plug and Perf economically
   - Longer laterals and urban environments
2. Less expensive, quicker, more reliable
   - Simple – HPHT “shock absorber”
3. Allow more stages and better diversion than perf clusters
4. Eliminate drill outs in ultra-long laterals
5. Shorter time to first production

What is so special about FracOPTIMAL2?

The first ball passes at high pressure

The second ball actuates at low pressure. Fluid “meters” across piston

The fingers of the sleeve land in a profile. The ball cannot pass. Frac!

Two Pressures to operate

- a high pressure
- a low pressure
- *and time*

A dissolvable, single sized ball

And that is it

Lets look at the tool

Accomplishments to date

(12) **United States Patent**
Fleckenstein et al.

(10) **Patent No.: US 8,991,505 B2**
(45) **Date of Patent: Mar. 31, 2015**

(54) **DOWNHOLE TOOLS AND METHODS FOR SELECTIVELY ACCESSING A TUBULAR ANNULUS OF A WELLBORE**

(75) Inventors: **William Winfrid Fleckenstein**, Lakewood, CO (US); **Todd Lance Flaska**, Louisville, CO (US)

USPC 166/318, 332.8, 332.4, 334.4, 383, 373, 166/305.1, 194
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

(12) **United States Patent**
Fleckenstein et al.

(10) **Patent No.: US 9,562,419 B2**
(45) **Date of Patent: Feb. 7, 2017**

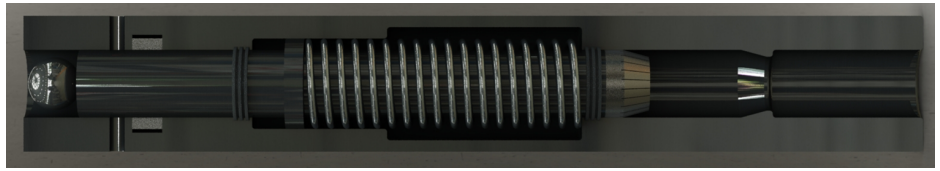
(54) **DOWNHOLE TOOLS AND METHODS FOR SELECTIVELY ACCESSING A TUBULAR ANNULUS OF A WELLBORE**

(71) Applicant: **Colorado School of Mines**, Golden, CO (US)

(72) Inventors: **William Winfrid Fleckenstein**, Lakewood, CO (US); **Todd Lance Flaska**, Louisville, CO (US)

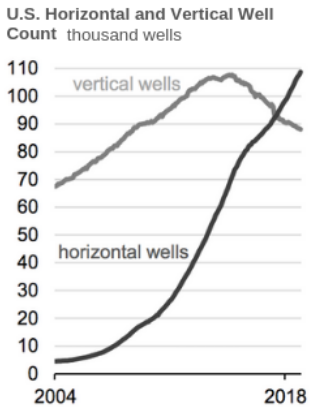
(2013.01); ***E21B 43/16*** (2013.01); ***E21B 43/26*** (2013.01); *E21B 2034/005* (2013.01); *E21B 2034/007* (2013.01)

(58) **Field of Classification Search**
CPC E21B 2034/005; E21B 2034/007; E21B 34/08; E21B 34/10; E21B 34/14; E21B 43/25; E21B 43/14; E21B 43/26
USPC 166/318, 332.8, 332.4, 334.4, 383, 373, 166/305.1, 195

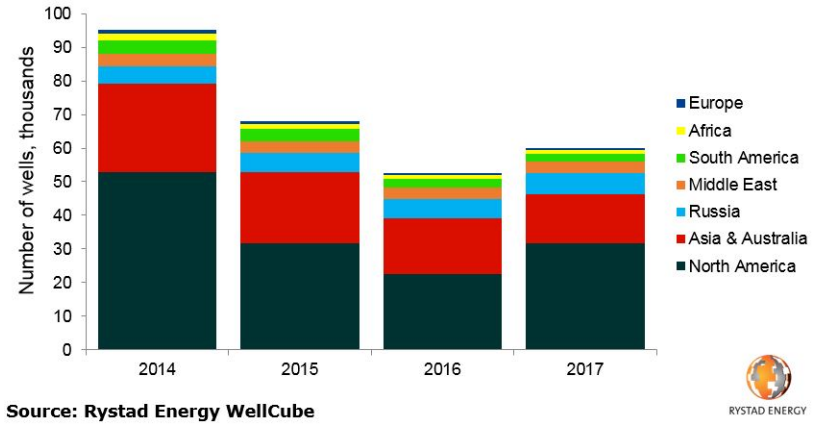


- Two patents issued
  - US 8,991,502
  - US 9,624,764
- Design
- Electronic Prototype
- Tool Mock-up

Our Market Opportunity



Source: EIA



Source: Rystad Energy WellCube

- An estimated 17,000 wells*, most horizontal, will be completed this year
- If 10% of this market could be penetrated, with 50-100 FracOPTIMAL2 sleeves per well at an estimated unit cost of $2000-5000 - *$170 - $850 million revenue.*
- **It is a big market.**

https://www.statista.com/statistics/965763/number-of-oil-and-gas-wells-drilled-in-the-united-states/

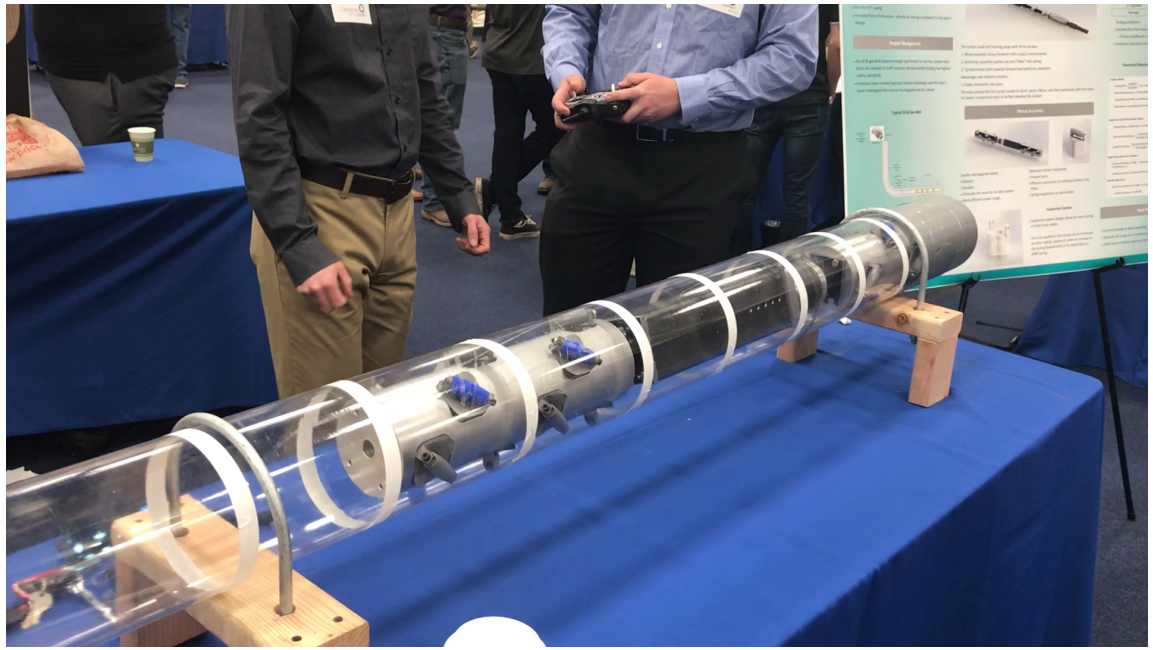
Short term plan - Funding

1. Total cost $900,000 to get sleeves built and field tested
   - If 9 operating companies are needed for the project the individual participant fees are $100,000 for a JIP. Other funding models welcome

2. Engineering and component testing – approximately $300,000
   - Test erosion, fouling, and other problems common to all sleeves
   - Test timing, finger functionality and other subcomponents
     - If the component testing fails, the project ends
     - If the testing is successful the project continues

3. Manufacturing and testing sleeves, including field testing in several wells is the remaining activity for the next $600,000.

This is our vision longer term



- Use commercial success to fund other student driven technology designs
- Tractors, EOR systems etc.
- We get the best engineers in the world before they graduate

- A great deal of opportunity

More information

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