



# SPE Aberdeen Well Late Life and Well Abandonment Conference

## 27<sup>th</sup> & 28<sup>th</sup> June 2018, AECC

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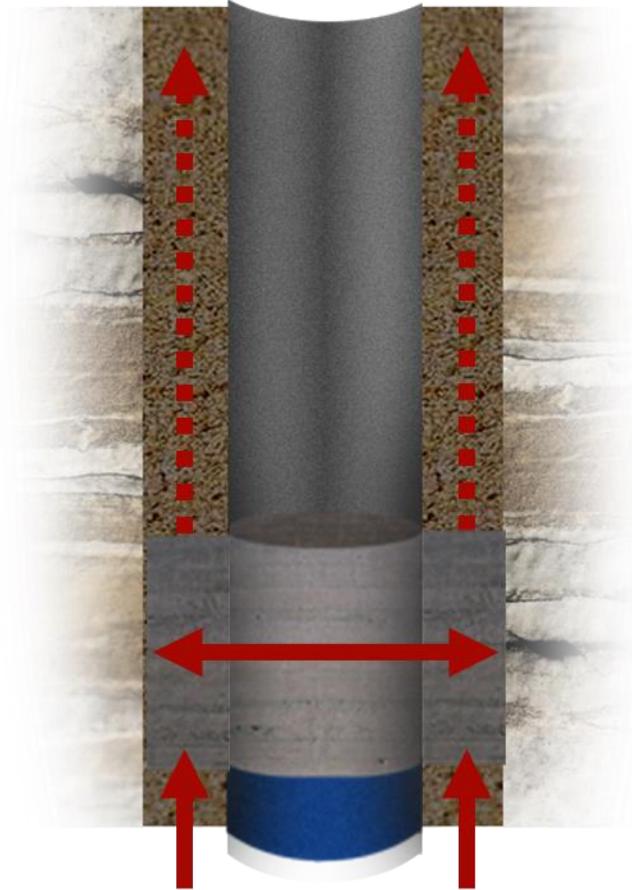
“Managing Late Life Wells to Maximise Value & Optimise Abandonment”

## STEP CHANGE IMPROVEMENTS TO PWC Perf-Wash-Cement®

Arne G. Larsen  
VP Business Development

***HYDRAWELL***  
***INTERVENTION***

# *ROCK TO ROCK BARRIER*



## P&A

- PERMANENT
- SLOT RECOVERY

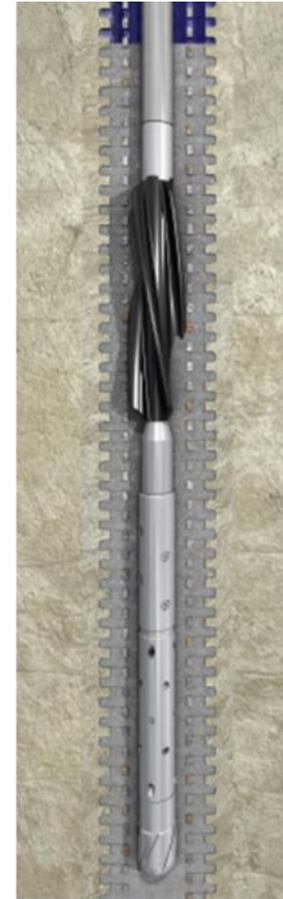
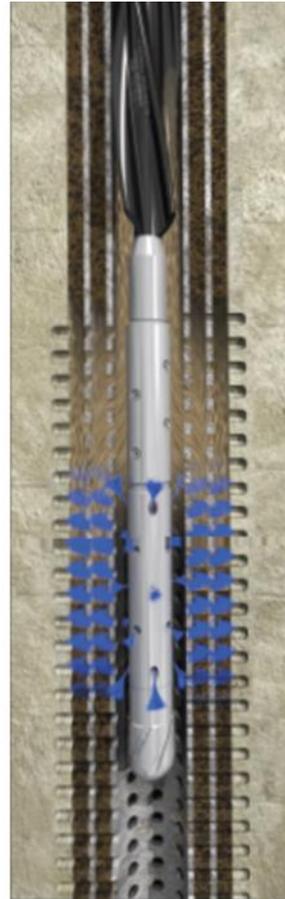
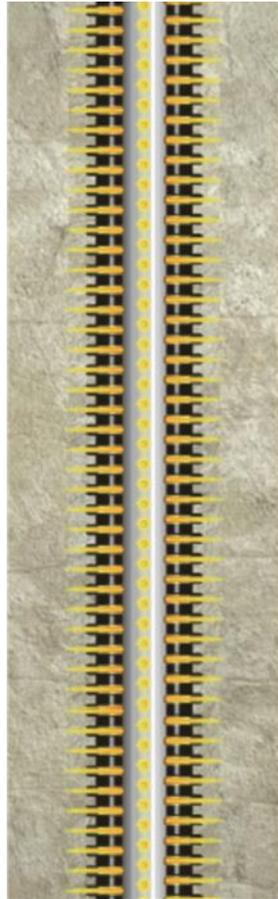
## WELL REPAIR

- ANNULUS INTEGRITY

## ZONAL ISOLATION

- WATER/GAS SHUT OFF

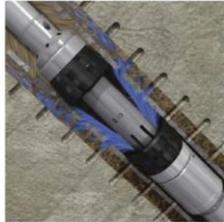
# *PERF-WASH-CEMENT*



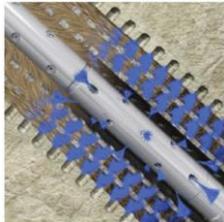
# PERF-WASH-CEMENT

## TECHNOLOGY DEVELOPMENT

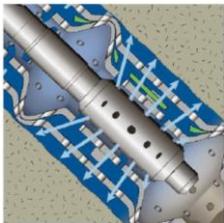
GENERATION 1 HydraWash



GENERATION 2 HydraHemera



GENERATION 3 HydraArtemis



## CONTINUOUS IMPROVEMENT

10.5 days

Section-milling

1.5 days  
250 plugs installed

## GROWING FOOTPRINT



# ***PERF-WASH-CEMENT***

## **QUALITY**

**PLUG  
SUCCESS  
RATE:**

**97.5 %**

## **COST EFFECTIVE**

**SAVINGS:**

**4.5 RIG YEARS**

**> 300 MILL USD**

**12 000 meters  
SECTION MILLING**

## **EXPERIENCE**

**250 PLUGS**

**16 OPERATORS**

**10 COUNTRIES**



# ***STEP CHANGE IMPROVEMENTS***

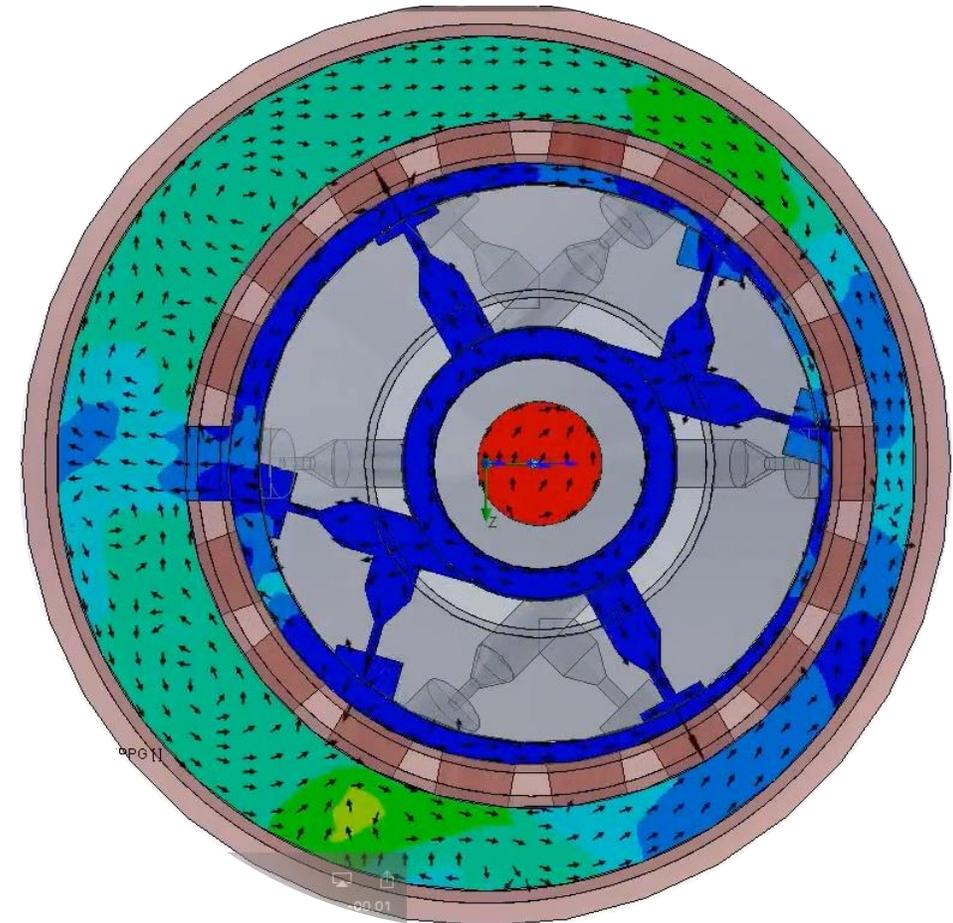
# ***ENGINEERED BARRIERS***

## **CFD Computational Fluid Dynamics**

**Understanding Fluid Dynamics**

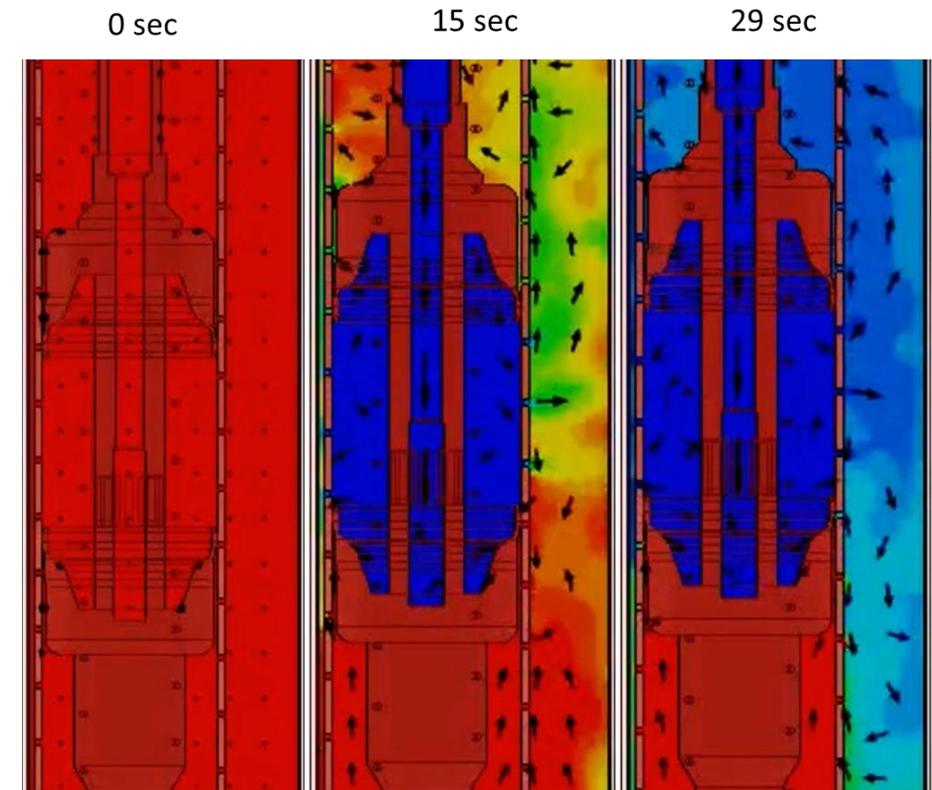
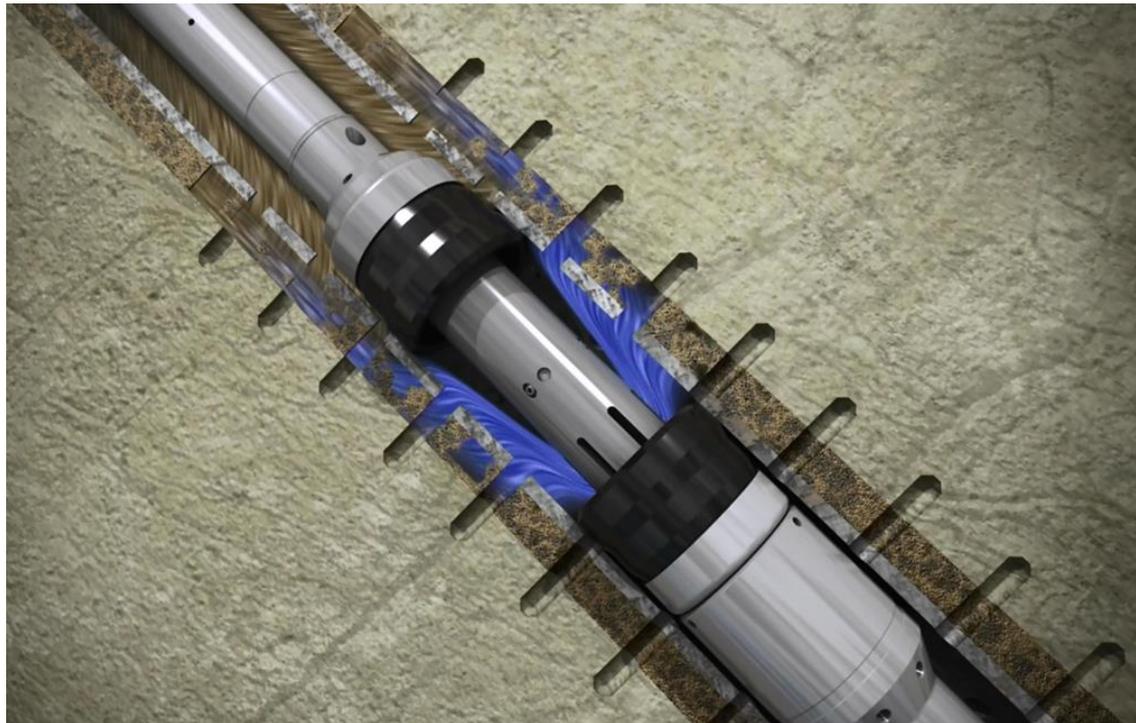
**Verifying Design Integrity**

**Optimising Operating Envelope**



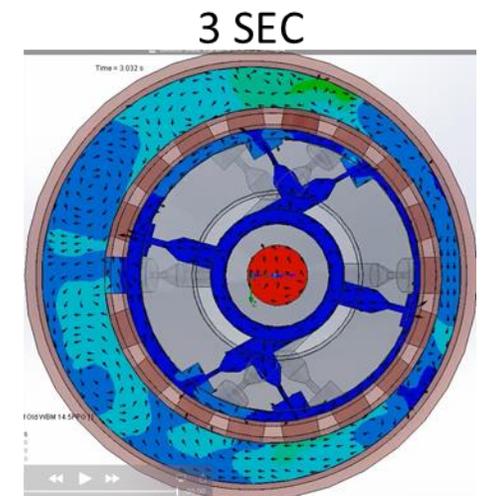
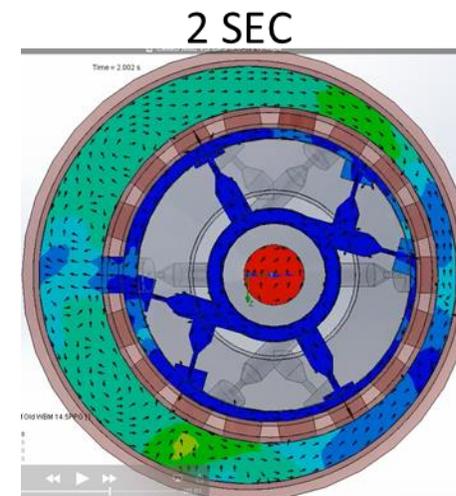
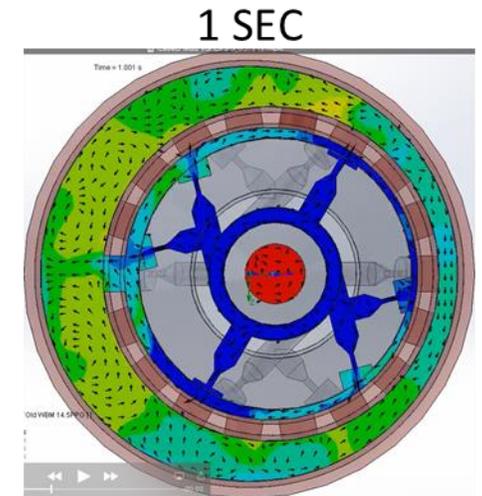
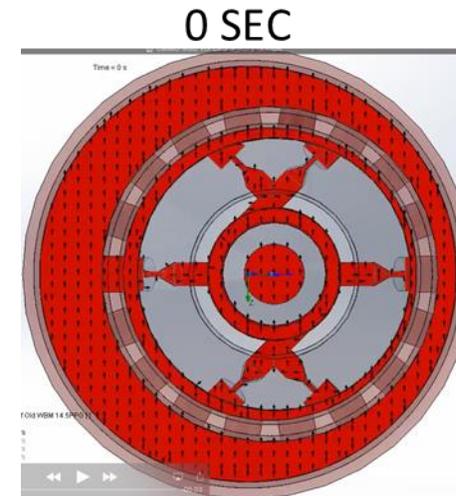
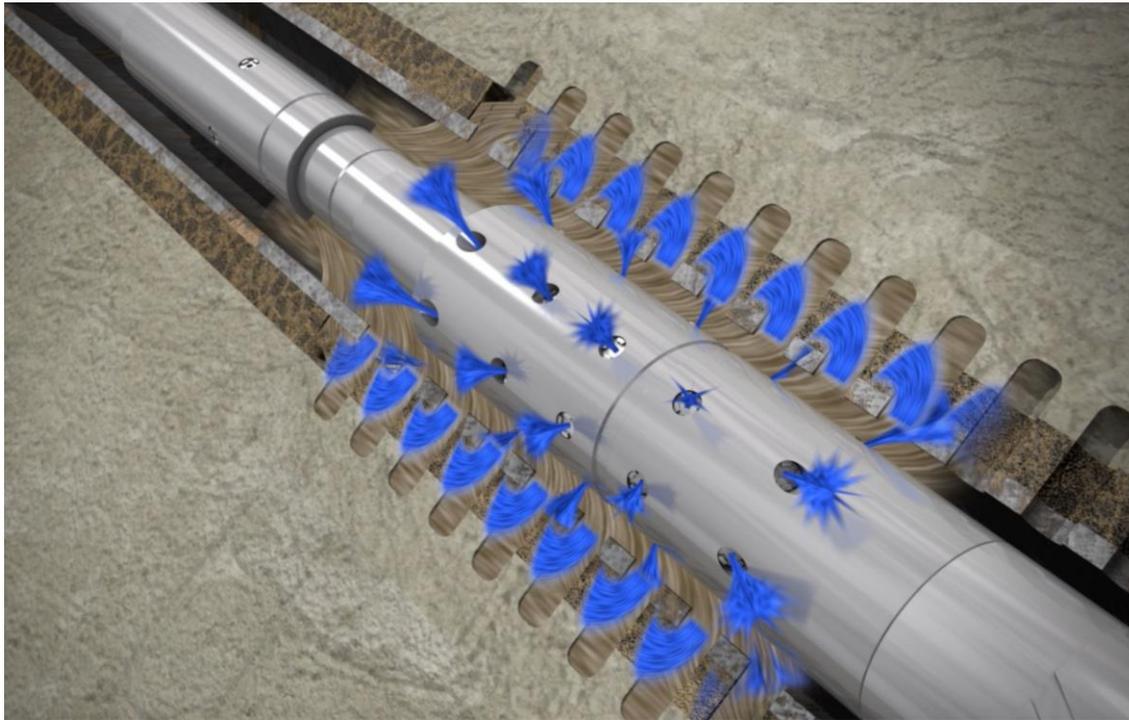
# ENGINEERED BARRIERS

## Generation 1 HydraWash



# ENGINEERED BARRIERS

## Generation 2 HydraHemera



# ENGINEERED BARRIERS



## DESIGN DEVELOPMENT: OPERATIONAL IMPROVEMENT:

### HydraArchimedes Cement Assurance Tool

Optimized design  
Increased RPM

Washing efficiency  
Spacer displacement  
Cement displacement

### Spray Cementing Valve

Optimized nozzle configuration

Increased pulling speed

### HydraHemera

Optimized nozzle configuration

Increased washing speed

# ***ENGINEERED BARRIERS***



**HydraArchimedes  
Cement Assurance Tool**

**Spray Cementing Valve**

**HydraHemera**

**Operating Parameters**

**Rig time**

**Quality**