Archer Oiltools Cflex

AADE March 2016
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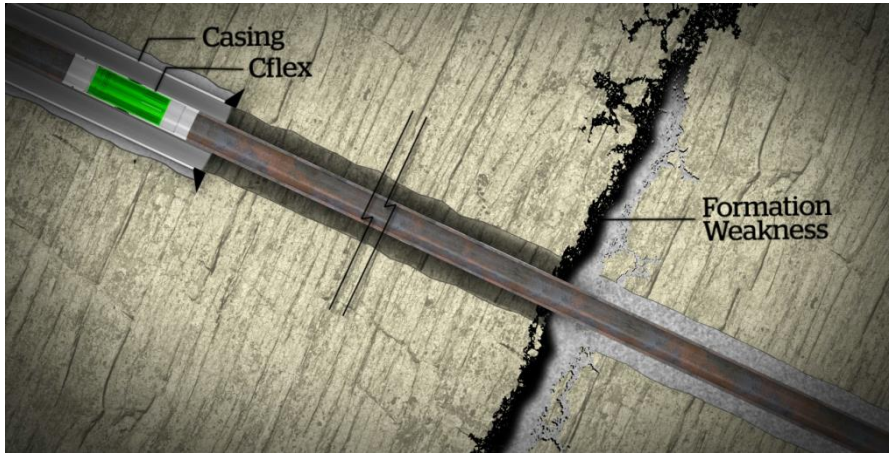
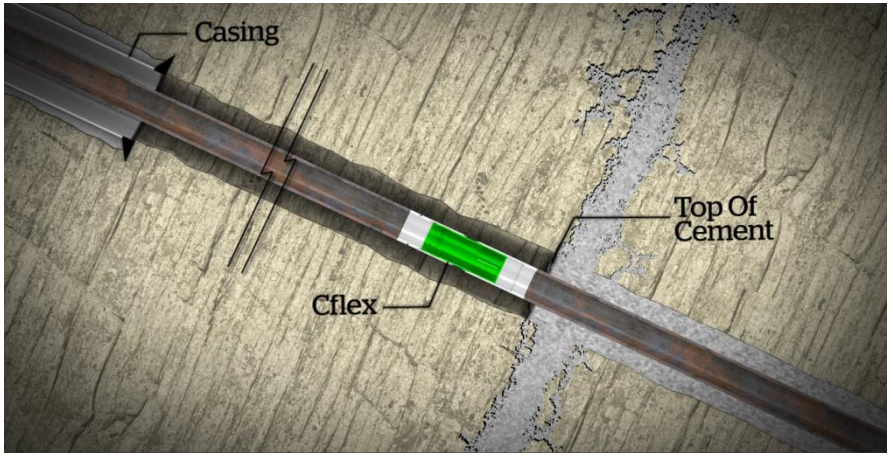
Archer
The well company

Challenge - cement placement

- Weak zones
- Narrow window between fracture and pore-pressure gradients
- Too high ECD
  - Long sections
  - Tight tolerance between liner hanger and casing
  - Swelling
- Barrier requirements (legislative and company internal)





Components

Cflex

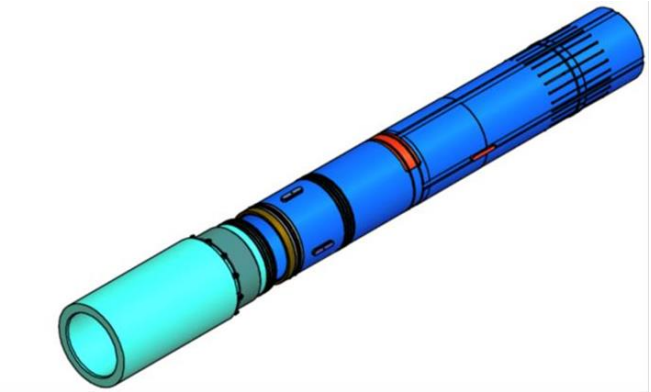
Cementing tool

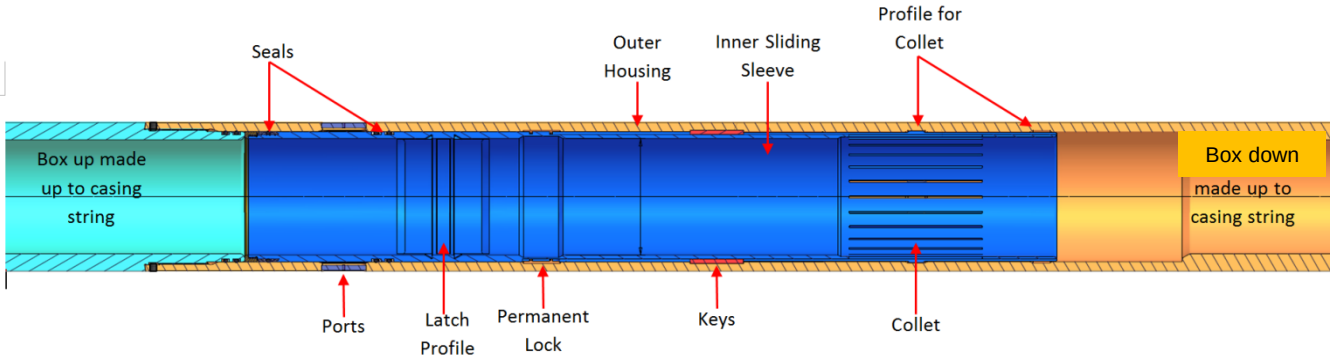
Dart catcher

Dart

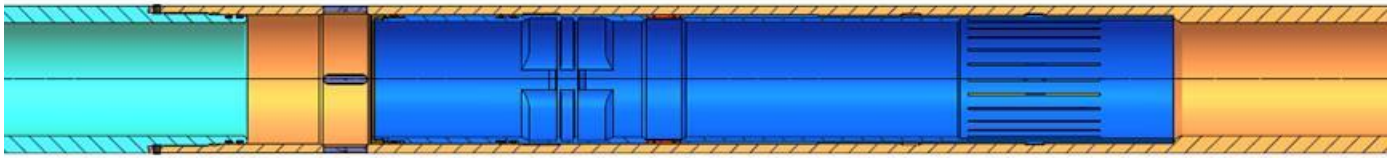
Cflex

- Conveyed as part of casing string
- 80 / 20 latch profile with emergency release
- Full bore ID and slim OD
- Permanent lock system
  - Can only be accomplished with Cementing tool latched into Cflex
  - Overpull and pressure required to activate





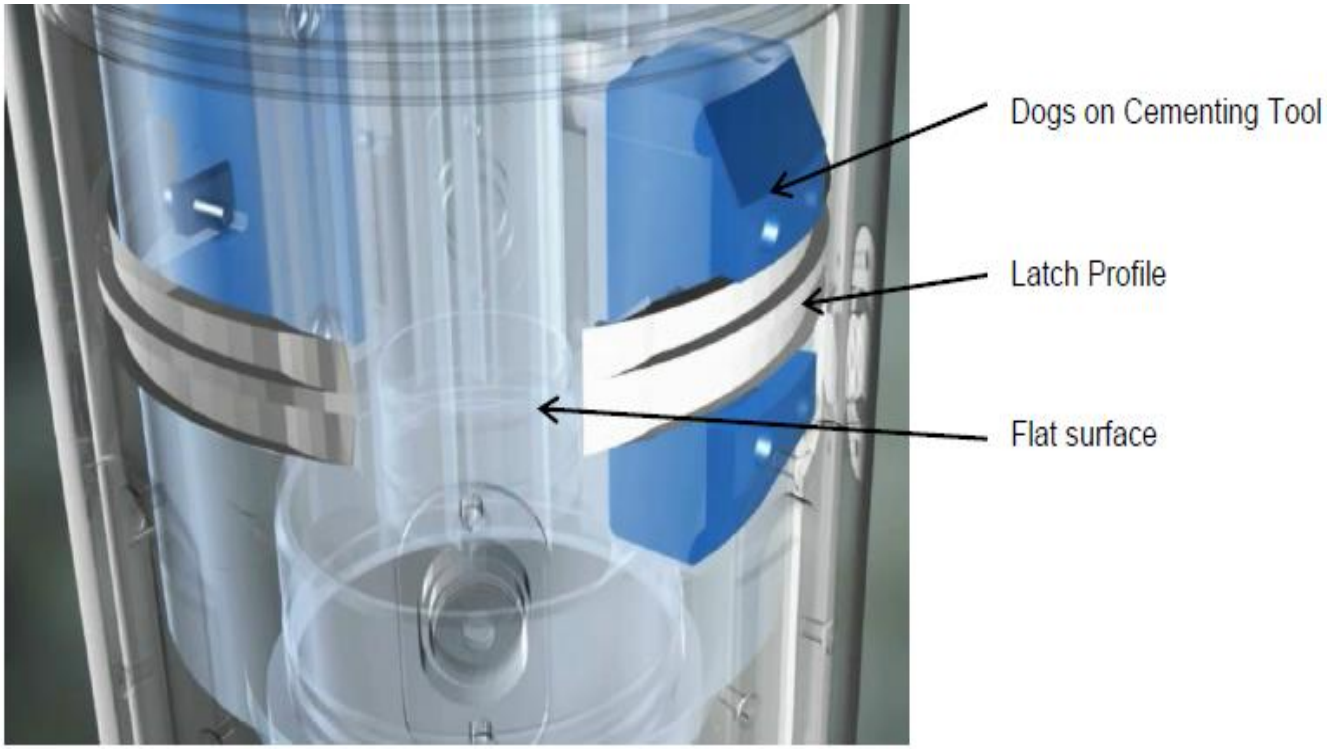
Closed position



Open position

Latch profile

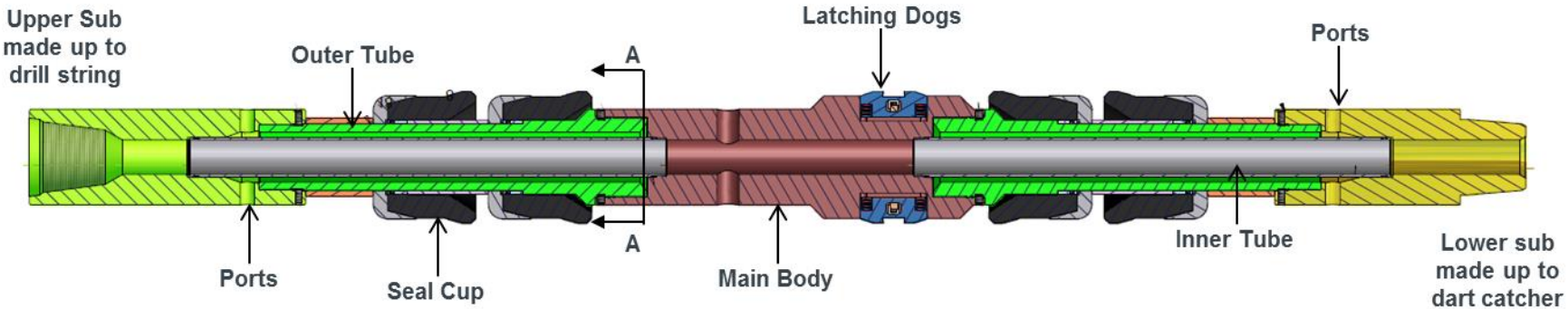
- 80/20 latch profile allows for release of Cementing tool
- Incorporates emergency shear release

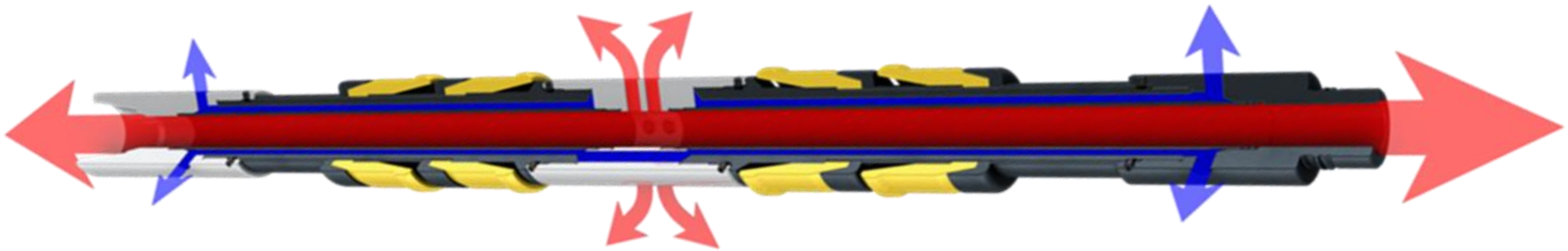


Cementing Tool and Dart Catcher

- Conveyed on drill pipe
- Spring loaded latching dogs with bi-directional profile
- Internal bypass prevents surge and swab and allows reverse circulation
- Circulation route controlled by dropping dart
- Dart catcher attached below but not shown here

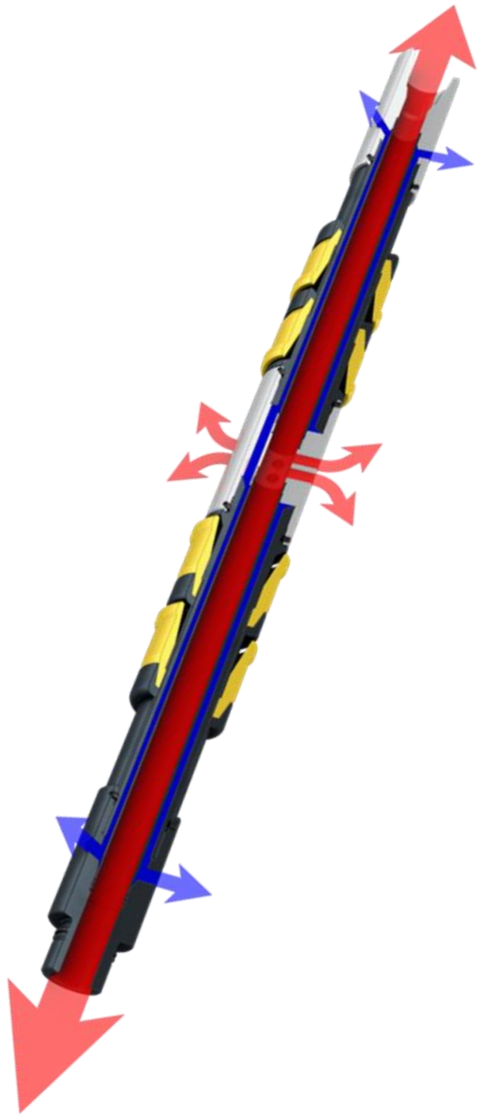
Section A-A





Cflex Operation

- Manipulation done by cementing tool, run on drill pipe
  - Swab cup assembly
  - Internal flow ports avoid swab/surge
  - Solid seat installed for injection test
- Cflex opened and closed with push pull
  - Latch in up/down weight
  - Unlatch rotate and pull up
- Dart to be dropped before spacer
  - All darts left in dart catcher
- Clean out
  - Possible to circulate long and short way
- Several Cflex in the string
  - Latch in and rotate through the Cflex



Cflex Operation Detail

- RIH with Cementing tool and dart catcher assembly to just above Cflex depth
- Cup integrity test to 1,000 psi
- Slack off and latch into Cflex
- Set down required weight to open Cflex
- Perform injection test and establish injection rates
- PU to close cflex and rotate with overpull to unlatch
- Pressure up on solid seat to shear and regain circulation
- Drop dart and pump cement per plan
- When dart lands, slack off and re-engage cflex
- Set down required weight to open cflex
- Begin squeeze operation
- Pick up to close Cflex, (permanent lock if desired) rotate with overpull to unlatch
- Pressure up to shear dart
- Reverse out any excess cement

Cflex design validation testing

Function test of Cflex

- Maximum tension/compression load
- Opening with 3,500 psi differential pressure

Full scale flow test

- Erosion test with WBM and API 10RF slurry with min 2% sand
- 3,500 bbls (total) at 10-19 BPM with 4% sand

API 11D1 V0 (ISO 14310/14998) qualification

- Validated according to the strictest validation grade in API 11D1 (ISO 14310) V0
- Under the V0 validation grade the tool undergoes internal and external gas pressure testing - while being subjected to axial loading and thermal cycling and zero-bubble acceptance criteria

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A Challenge

In a recent well, an overburden section with weak zones, faults and a shallow set 13-3/8” casing shoe represented a significant challenge to achieving annular integrity during well construction.

Solution - Equipment

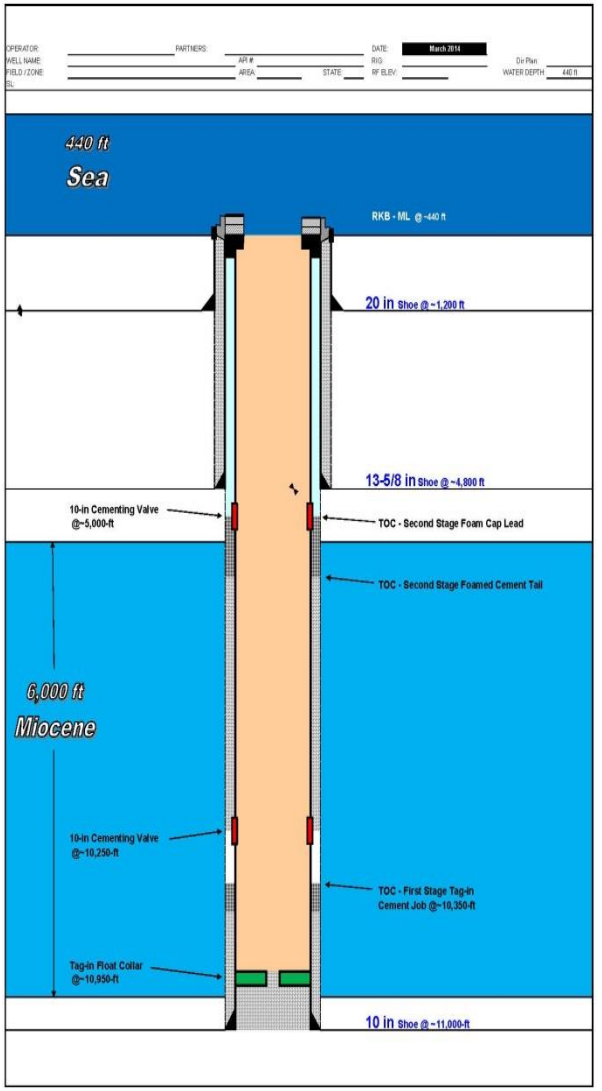
- Tag in float collar with auto fill
- Cementing Valve
- Tag-in adaptor
- Drillpipe Cementing Tool
- Pump down dart
- Latch down dart

A Solution

The chosen solution brought risks

•Historical ECD's proved challenging in all phases of construction, not just cementing

•Older fields, such as this, employ gas-lift for tertiary recovery. The chosen stage-cementing system would be in the production casing



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Thank you

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