

# ProMax FRAC BHA System

Business Development Manager



# The next Gen of Fracking (Perforate and Frac) in one single BHA up to 10 stages



- Field-proven option to stimulate new and existing completions
- The system works by punching holes in production casing and cement ring by mechanical perforator, flushing the created holes using jet force (acidic/non-acidic) and performing hydraulic fracturing through these holes, all done in less than 15 minutes
- The assembly is flexible in terms of combinations; Hydraulic Fracturing assembly with several options and mechanical perforator with 3 options.
- The combinations of the assembly would depend on the reservoir type, production casing limits, hole conditions (temperature, pressure, etc), hole geometry.
- Up to 10 intervals/stages perforated and fracked without pulling out of hole in 1 run. The number of holes in 1 stage depends on client requirement.



# The BHA with single axial packer and mechanical perforator

- The BHA consists of :
  - ✓ The hydraulic perforator to create holes in production casing and in cement ring. Flushing the area that needs to be fracked is done through the knives of the perforator.
  - ✓ An axial packer to isolate the lower part of the well during frac operation.
  - ✓ A mechanical casing collar locator for accurate depth control.
  - ✓ A mechanical anchor for connection locator
  - ✓ The frac port for pumping frac fluid via these ports to stimulate the zone of interest
- Advantages of the BHA :
  - ✓ Perforation and Fracturing in 1 Run.
  - ✓ The effect of the technology has been proved with industrial tests and more than 100 successful stages downhole.
  - ✓ No Explosives.
  - ✓ Simple execution; ability to rotate, circulate, options to add any additional tool to the BHA.
  - ✓ No depth limitation.
  - ✓ The increase of production level.
  - ✓ Significant reduction of time and cost comparing to any other technology.

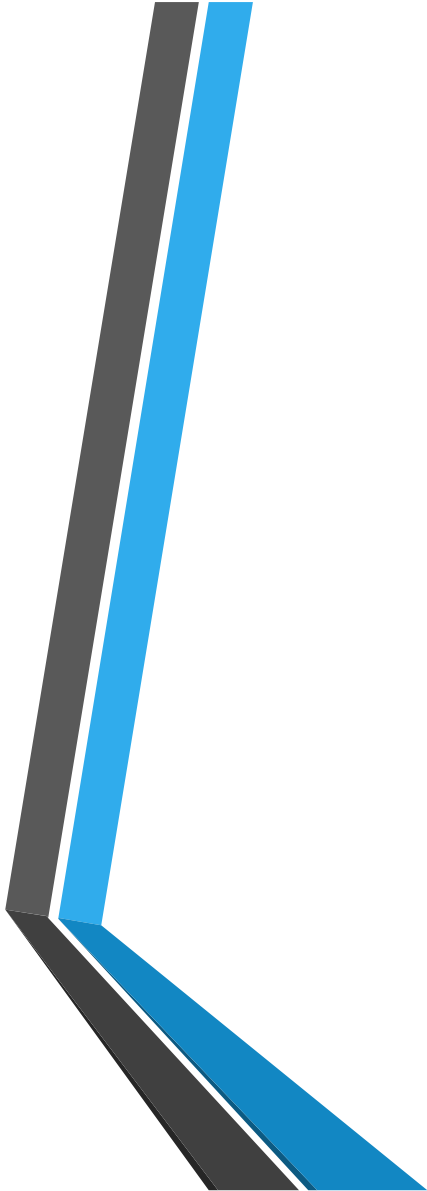
## The BHA with cup packers and mechanical perforator



- The BHA consists of :
  - ✓ The hydraulic perforator to create holes in production casing and in cement ring. Flushing the area that needs to be fracked is done through the knives of the perforator.
  - ✓ Cup to cup packers to isolate the holes made by perforator during frac operation.
  - ✓ A mechanical casing collar locator for accurate depth control.
  - ✓ A mechanical anchor for connection locator
  - ✓ The frac port for pumping frac fluid via these ports to stimulate the zone of interest
- Advantages of the BHA :
  - ✓ Perforation and Fracturing in 1 Run
  - ✓ The effect of the technology has been proved with industrial tests and more than 100 successful stages downhole
  - ✓ No Explosives
  - ✓ Simple execution; ability to rotate, circulate, options to add any additional tool to the BHA.
  - ✓ No depth limitation
  - ✓ The increase of production level
  - ✓ Significant reduction of time and cost comparing to any other technology

# The BHA with dual packers and mechanical perforator

- The BHA consists of :
  - ✓ The hydraulic perforator to create holes in production casing and in cement ring. Flushing the area that needs to be fracked is done through the knives of the perforator.
  - ✓ Dual packers to isolate the holes made by perforator during frac operation.
  - ✓ A mechanical casing collar locator for accurate depth control.
  - ✓ A mechanical anchor for connection locator
  - ✓ The frac port for pumping frac fluid via these ports to stimulate the zone of interest
- Advantages of the BHA :
  - ✓ Perforation and Fracturing in 1 Run
  - ✓ The effect of the technology has been proved with industrial tests and more than 100 successful stages downhole
  - ✓ No Explosives
  - ✓ Simple execution; ability to rotate, circulate, options to add any additional tool to the BHA.
  - ✓ No depth limitation
  - ✓ The increase of production level
  - ✓ Significant reduction of time and cost comparing to any other technology



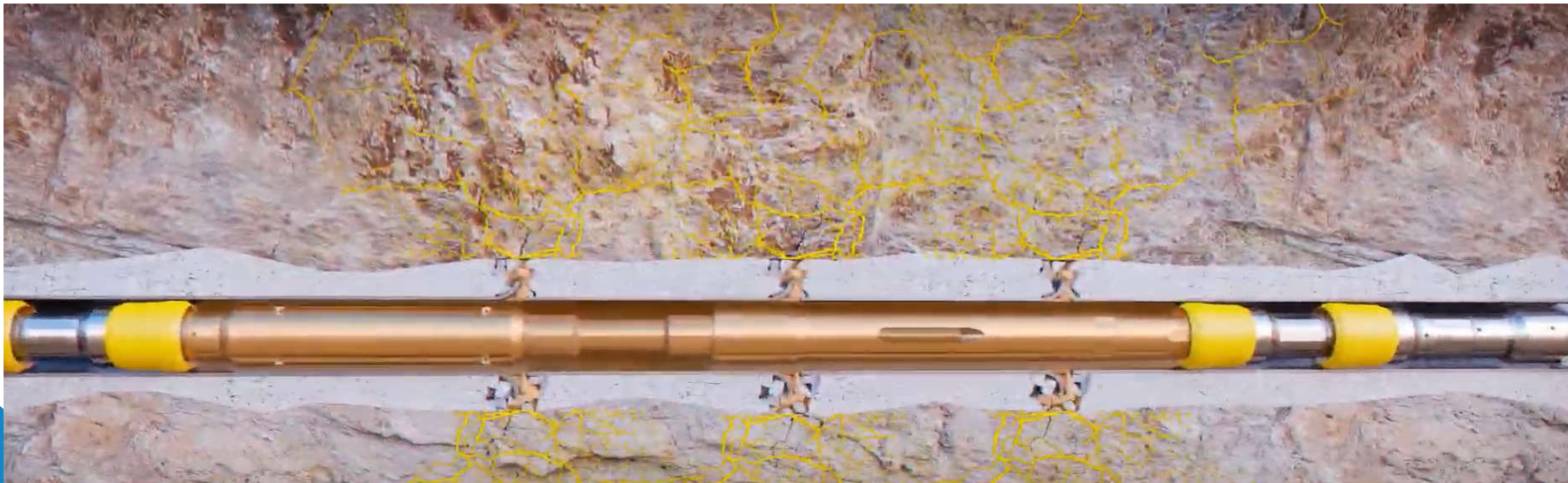
## Performing the JOB

- BHA runs in hole and reaches the lowest interval
- Pressure test is done to confirm the ability of cups to isolate the zone of interests
- Once the pressure test is done the perforator is located at the zone of interest and appropriate number of holes are done by punching the casing and cement ring with perforator knives
- Engineer monitors the pressure profile on surface and confirms the holes are made
- Once the holes in casing and cement ring are made the holes are flushed through the knives to make the holes deeper and wider



## Performing the JOB-cont'd

- After flushing the holes for 10-20 mins more holes are made as per the client requirement using the same procedure
- Once enough holes in the lowest interval are done the BHA is set in the interval as such the cups are to isolate the hole for fracking
- Once the zone is isolated, fluid is pumped down, using fluid pressure the cups are set and the formation is stimulated





## Performing the JOB-cont'd

- Once hydraulic fracturing of the lowest zone of interest is finished the integrity test is done
- Once the integrity is confirmed pressure BHA moves higher to perform pressure test in order to prove the cups had no leakage during stimulation
- Once the test is finished the BHA moves to the second lowest zone to perform the same; pressure test, perforate, stimulate the formation, integrity test and pressure test for confirmation



# Surface tests and Jobs performed



- Surface test were carried out with the presence of clients.
- The BHA was tested up to 10000 psi



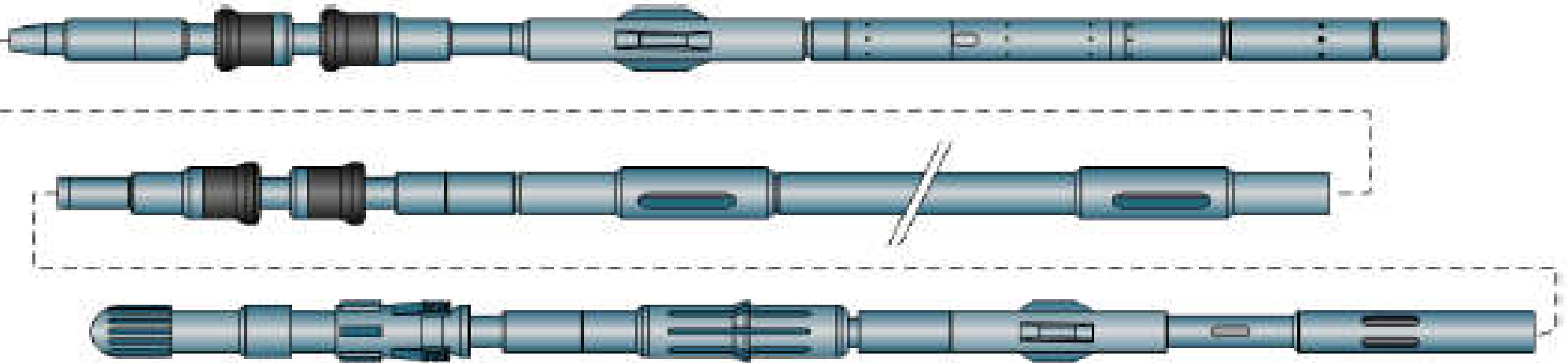
# Surface tests and Jobs performed cont'd

- Job number xxxxxxx
- Job details :



## Selective Multi-Stage FRAC

- BHA used to stimulate new and existing completions by fracturing the formation through BPS (Burst plug system)
- The BHA consists of cup packers, mechanical anchor, Frac port, Pressure and Temperature sensors (other sensors and measurement can be added and configured)
- It can be used with drill pipes as well as coil tubing





## Selective Multi-Stage FRAC cont'd



- Burst plug sleeves are the newest and universal among all similar BPS technologies in the market.
- Inside the sleeve there is a module that is activated with pressure differential which can be configured as per the requirements
- Features/ Advantages :
  - ✓ No moving elements, sleeve RIH/POOH smoothly
  - ✓ The opening pressure can be configured
  - ✓ Large volume of flow through the sleeve
  - ✓ Ability to open with differential as well as with absolute pressure
  - ✓ Can be used for re-fracs and with acidic fracturing
  - ✓ Options to manufacture closable sleeves
  - ✓ Reliable and easy configuration
  - ✓ Diskless embedded system

## Selective Multi-Stage FRAC cont'd

- Features:

- ✓ Dual packers replaced cup packers
- ✓ Ability to manipulate the casing after Frac operation (High ISIP)
- ✓ Insensitivity to a poor planned well as a repeating the frac operation

- Advantages:

- ✓ High temperature (90 degC and higher)
- ✓ Deep wells (3000 MD and more)
- ✓ High RIH speed
- ✓ High number of stages in 1 Run
- ✓ Large volume of FRAC



## Ball activated full-bore (full-passage) sleeves with counter



- Full-bore (full passage) sleeves with counter is a new technology that provides unlimited number of stages with the ability to perform cluster application up to 10 sleeves in 1 stage.
- The activation ball 93.9 mm allows to have a large ID, needless to have other ball sizes allows to client not to limit the size of liner.
- Unique structure of the sleeve allows to count the balls that passes through and provides sequential processing of fracturing the stages.



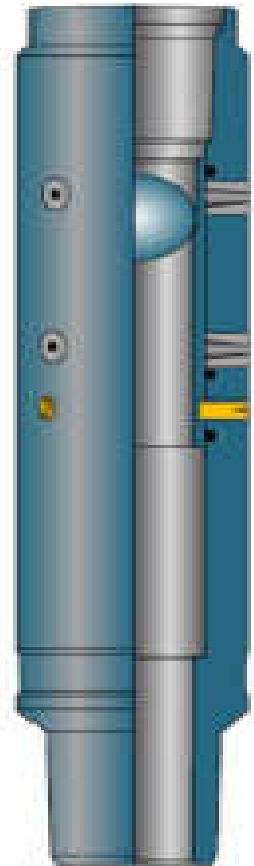
# Ball activated full-bore (full-passage) sleeves with counter cont'd

- Main Advantages:
  - ✓ Single size of the ball regardless of number of stages
  - ✓ Large passing diameter
  - ✓ Up to 500 sleeves in a well
  - ✓ Optimal utilization with dissolved balls
  - ✓ No need to perform normalization after FRAC operation
  - ✓ No risk of mistaking the ball sizes



# Perfo-Frac: Abrasive jet perforation and Fracking

- Perfo-Frac system provides combination of abrasive jet perforation and multi-stage fracturing. It is a replacement of a traditional perforation with cable
- Technology features:
  - ✓ Multi-stage tool for intensification of flow of the well.
  - ✓ Abrasive perforation of smooth pipe.
  - ✓ Frac operation through the holes made by perforation.
  - ✓ Up to 11 stages of perforation and fracturing in 1 Run.
  - ✓ Creating of additional perforated holes between already existing. stages that were done with Plug and Perf or Frac sleeves.
  - ✓ Re-frac: creating new perforated holes near already existing.






# Perfo-Frac: Abrasive jet perforation and Fracking cont'd

EASTERN  
DRILLING

- Advantages of the technology:
  - ✓ Perforation and Fracturing in 1 Run.
  - ✓ No Explosives.
  - ✓ Simple execution.
  - ✓ No depth limitation.
  - ✓ Easily adjustable to any kind of rig pumps.
  - ✓ The effect of the technology has been proved with industrial tests.
  - ✓ The increase of production level.
  - ✓ Significant decrease of the utilization time of rig.
  - ✓ Abrasive perforation, Multi-stage fracturing using frac fluid and proppant.





**Thank You!**  
Q&A Session.