

New Select-Fire System

Improved Reliability
and Safety in Select
Fire Operations.

Jim Gilliat/Khaled Gasmi

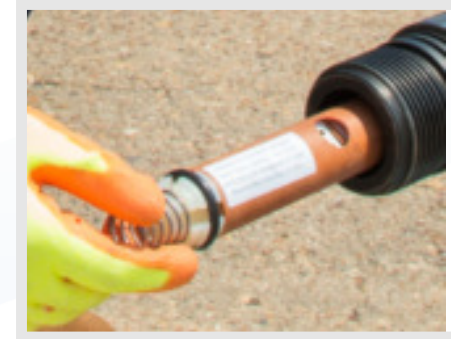


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Select-Fire System

- A step change in select fire operations
 - Uses a unique electrical/ballistic transfer system
 - Eliminates the weakness inherent in current technologies that use ported subs and require on site wiring
- Offers all the redundancy and monitoring capability of the current leading intelligent switch technology
- Avoids the need for downhole controller subs



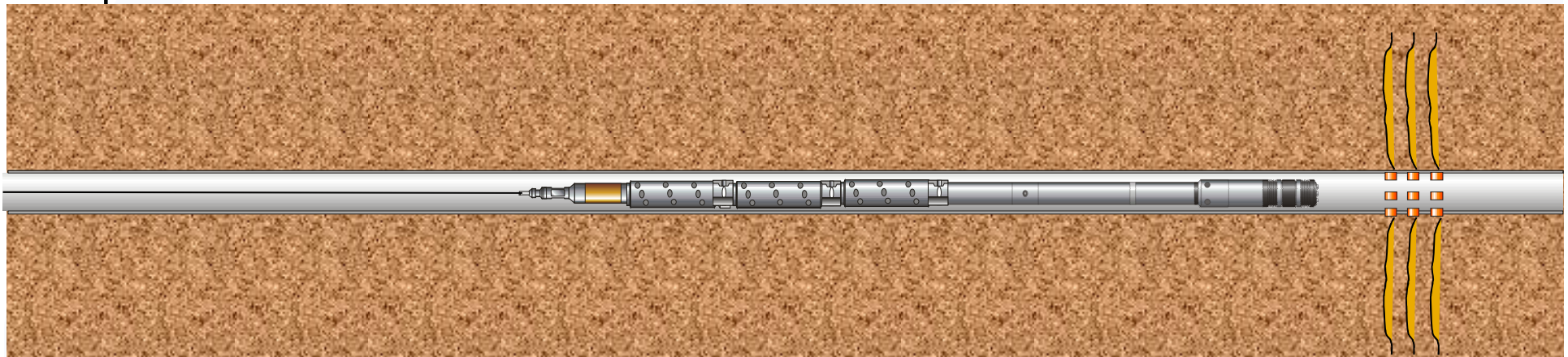
Applications



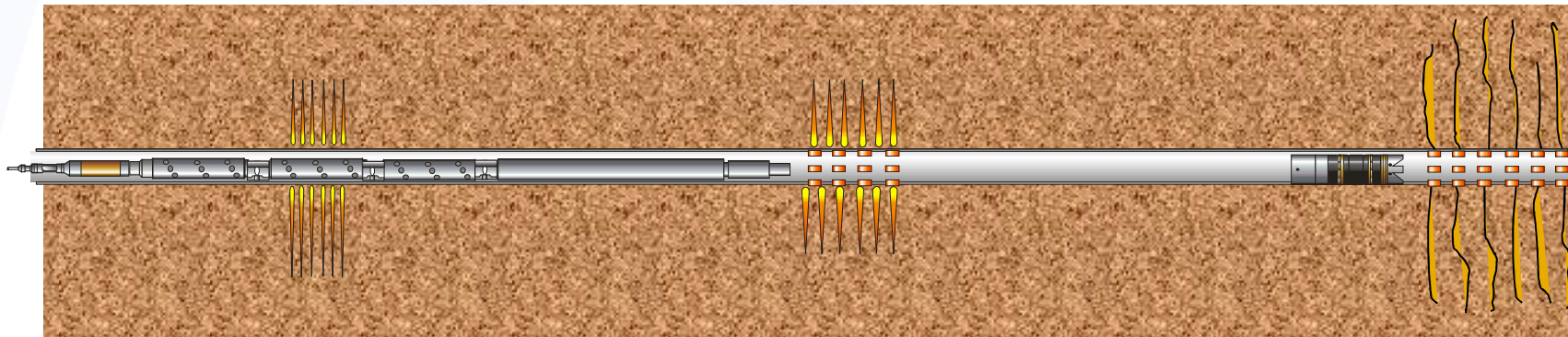
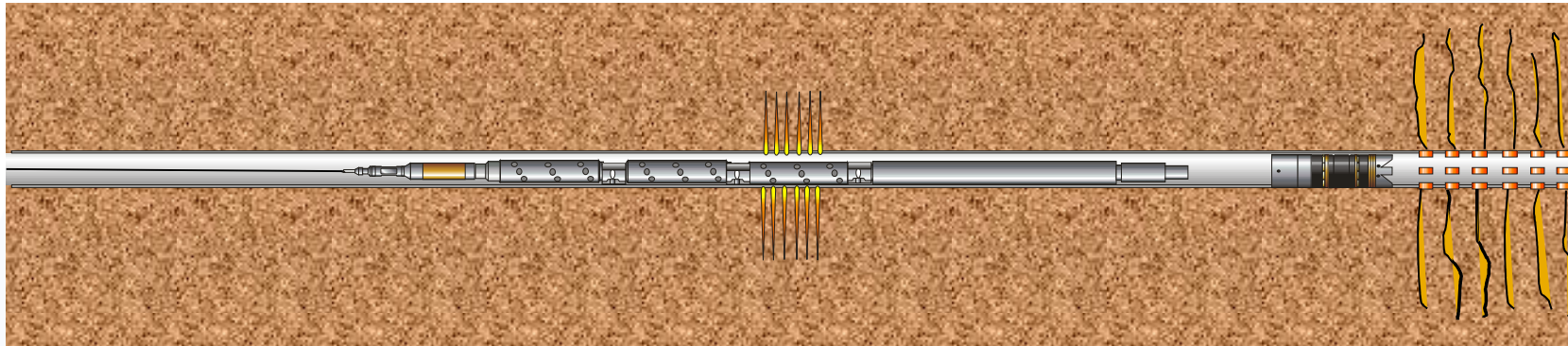
- Multistage perforating
- Selective perforating
- Plug and perforating operations
- Single run plug and perforate operations
- Pump down perforating
- Smart Coil Applications

Multi-Gun Wireline Plug & Perforate

- Number of guns is limited only by lubricator length, normally from 3 to 10 guns may be selectively fired in one run.
- RF Safe systems, Guardian, EBW systems are all compatible.
- Assembly is pumped to perforating depth using the frac pumps
- A composite plug can be run with the assembly to isolate a lower perforated interval.



Multi-Gun Wireline Plug & Perforate



How is it Different?

- Preprogrammed unique address for each switch
 - Saved on first contact with switch
 - Eliminates mechanical/pressure firing issues
- Unique electrical/ballistics connection eliminates ported subs or wellsite wiring
- Requires no wiring or setup on site
- Skips a gun if one fails
- Employs two-way communications with the surface for control and safety

Features and Benefits

- Requires no wiring or setup on site
 - Eliminates human error during rigup
- Uses two-way communications with the surface
 - Perforate while wireline is moving
- Skips a gun if one happens to fail
 - Optimizes frac fleet use with onboard redundant guns
- Tests gun string at safe depths
 - Early detection of potential failures and quick remediation
- Operates on negative voltage only
 - Uses cable head release tools for pumpdown operations in longer horizontal sections

Specifications

- Up to 40 selections
- No internal power source
- No window ports
- Operates with approved detonators or Guardian Fired Guns, including EBW's
- Meets HSE and RP67 requirements
- FHA for #10 and #20 setting tools

CONVENTIONAL EB SWITCH PREPARATION

1.



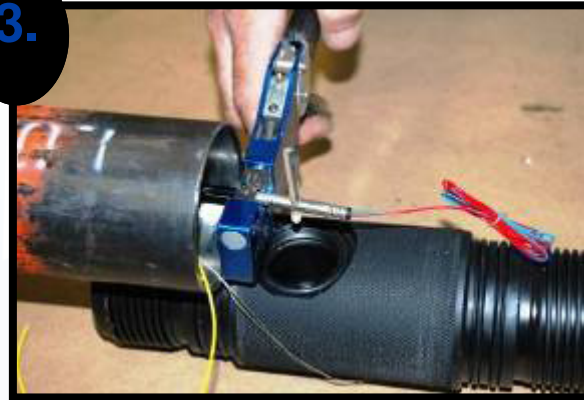
Conventional Switch Sub

2.



Measure and cut Det. Cord

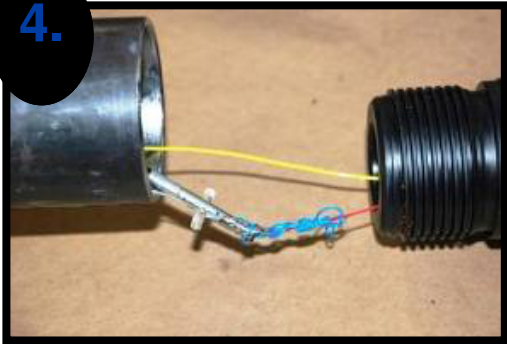
3.



Bring Ground Wire
and Through Wire out of
the gun, crimp detonator

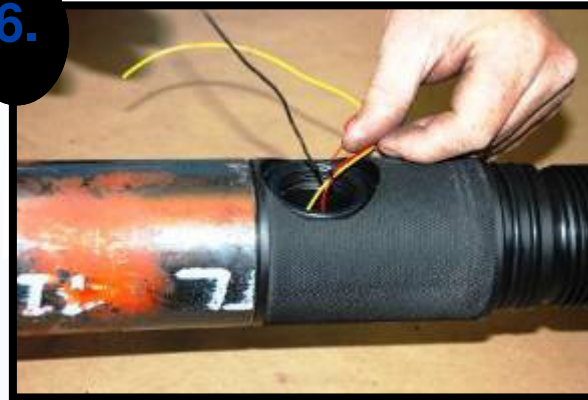
CONVENTIONAL EB SWITCH PREPARATION

4.



Make electrical connections

6.



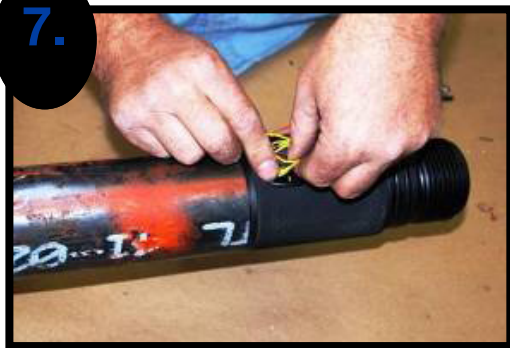
Sort wires, crimp as required

5.



Install EB Style Switch

CONVENTIONAL EB SWITCH PREPARATION



Coil wires, pack into switch sub



Inspect wiring, remove shunt



Arming complete

New Select Fire System

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Pull shunt, slide into sub, connect guns, system is ready.

SUREPERF™ TECHNICAL OVERVIEW

Switch Sub

Houses the pressure bulkhead, switch cartridge and connects guns, no ports

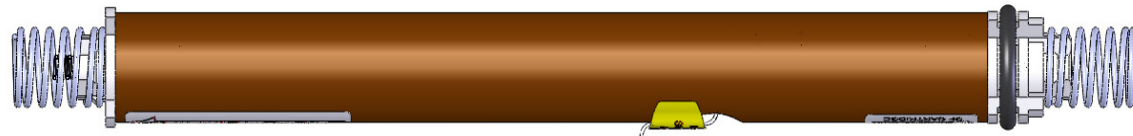


Pressure Bulkhead and Pressure Terminal

Provides through connection and prevents upper gun from flooding when lower gun is fired

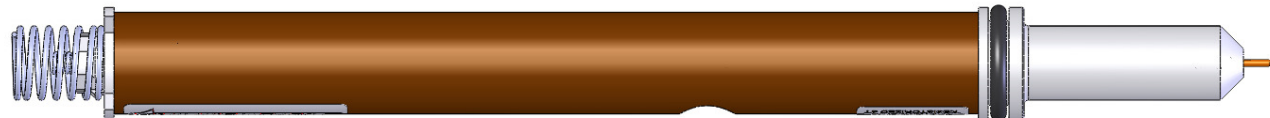
Cartridge Assembly

Gun Contains Switch, Detonator and through connectors



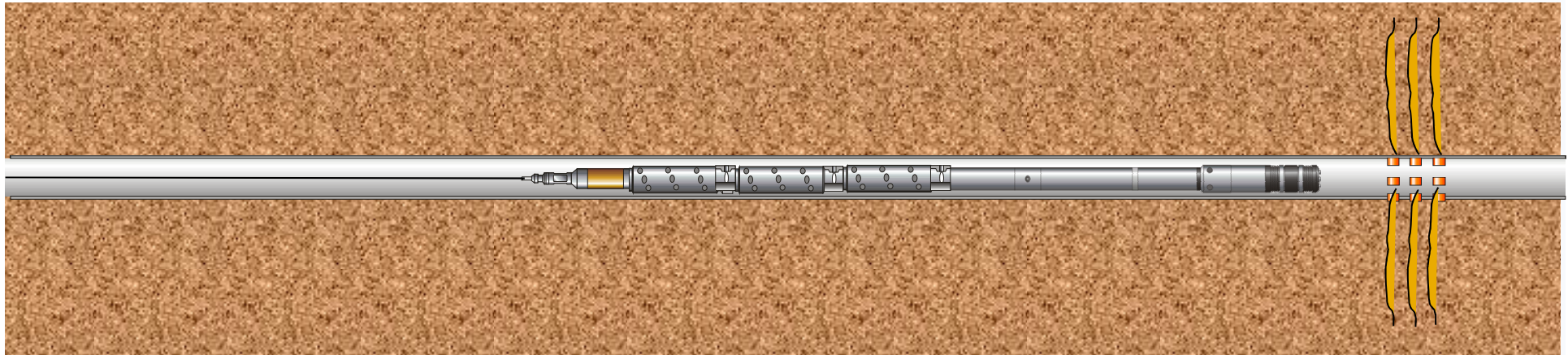
Cartridge Assembly

Setting Tool Contains switch, and connection to igniter



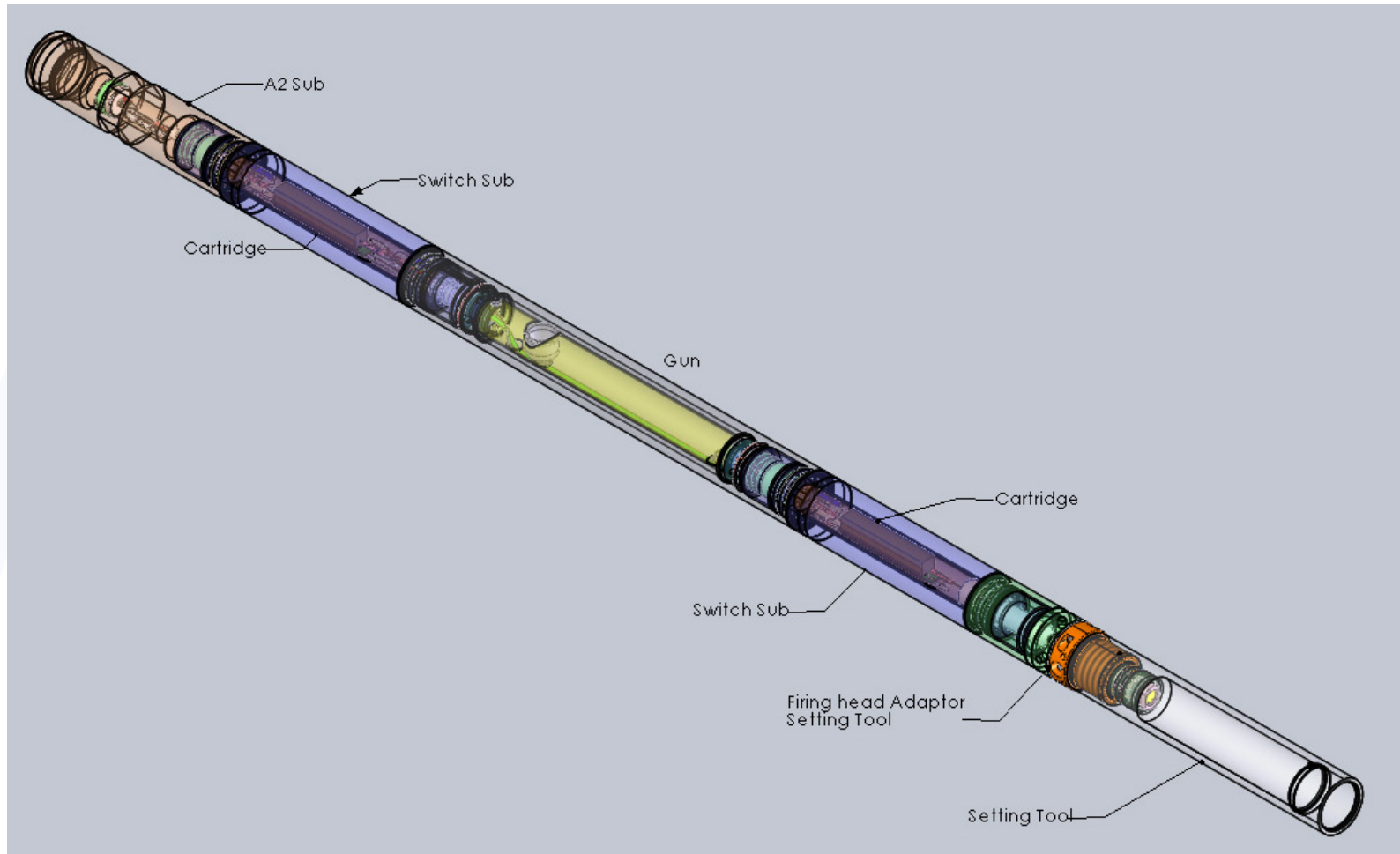
Case History

- South Texas Plug and Perf Application.
 - 12 runs into lateral
 - 4 guns and a composite bridge plug per run (average)



- Average preparation time, 20 minutes
- 64 total selections, 1 switch failure resulting in less than 1 hour of NPT

Technical Overview Gun String



Conclusion

- Offers a step change in technology and reliability
- Easy to assemble in the field
- Eliminates the majority of issues inherent in select-fire systems

