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2016 LATIN AMERICA PERFORATING SYMPOSIUM, BUENOS AIRES

SLAP2016
SIMPOSIO LATINOAMERICANO DE PERFORATING

IMPROVING EFFICIENCY AND SAFETY IN MULTISTAGE PERFORATING

SLAP-16-3

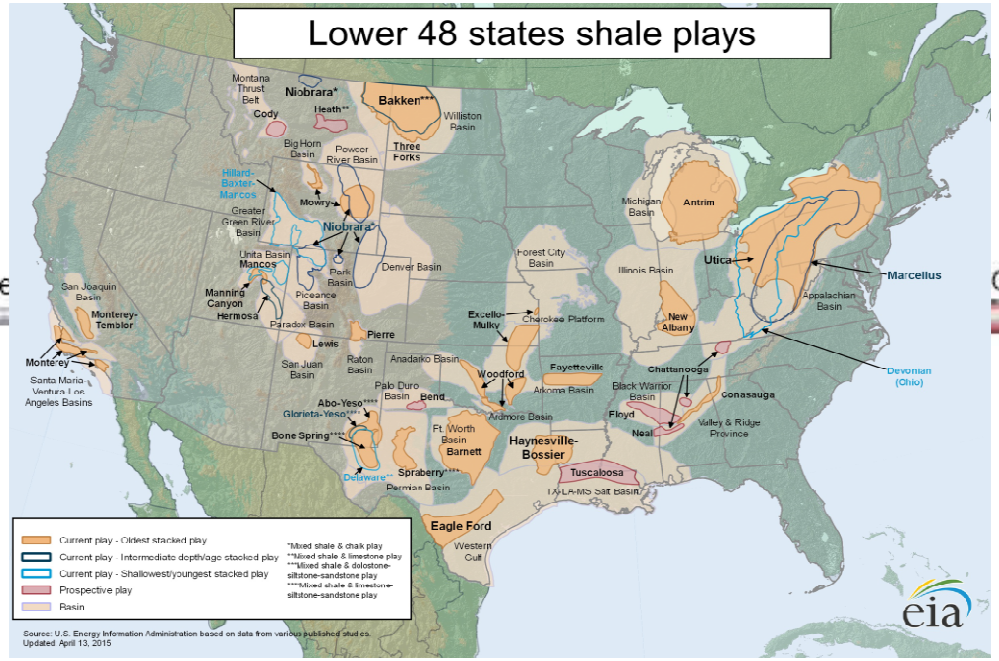
DATE

PRESENTER: Gerardo De Glee, Schlumberger

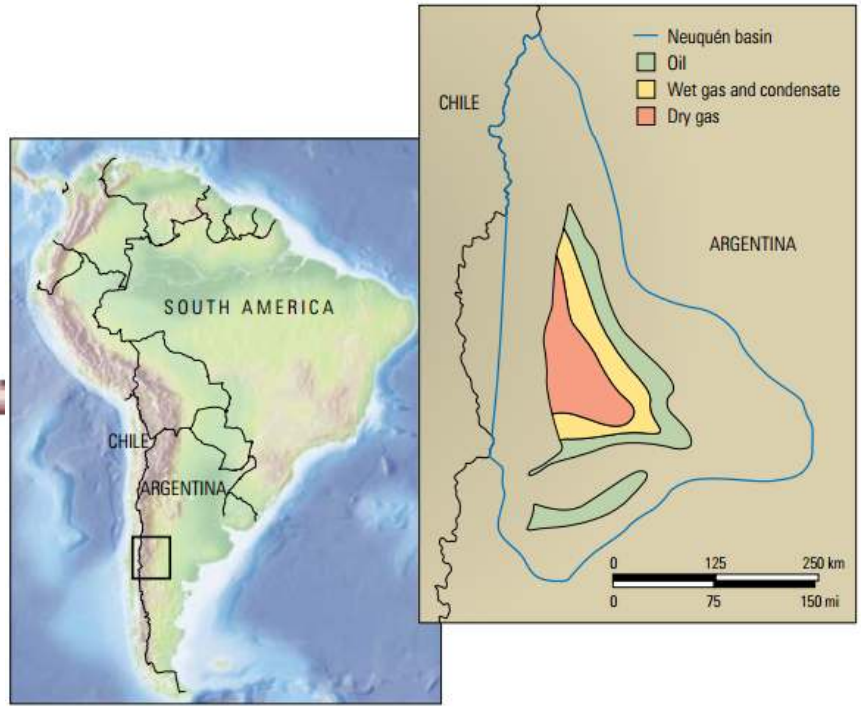
AGENDA

- Multistage Perforating in North America and Argentina
- Horizontal Frac Operations
- Conventional Gun Systems
- New Technology for Multistage Perforating

Multistage Perforating in North America and Argentina



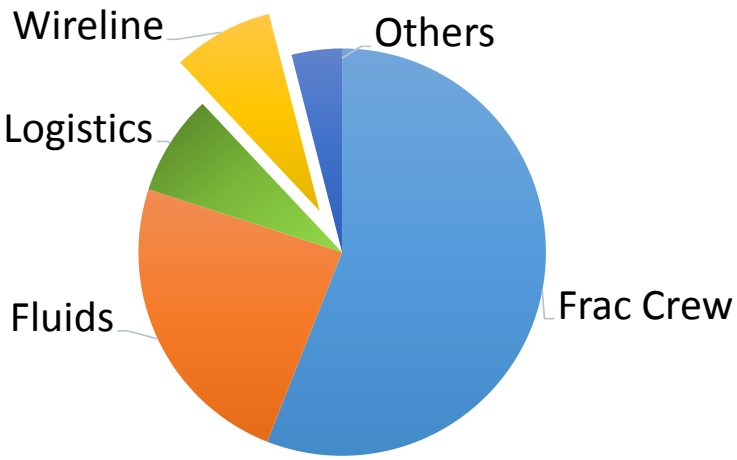
https://www.eia.gov/maps/maps.htm#shaleplay



Vaca Muerta Shale in the Neuquen Basing (blue outline). (Adapted from the US EIA, reference 1)

Horizontal Stage Frac Operation

Cost distribution for a fracturing operation



Common Horizontal Frac Operation

- Great amount of equipment and crews from various service companies
- Cost heavily influenced by Fracturing crew expenses
- Economical returns can only be achieved through maximized **efficiency**

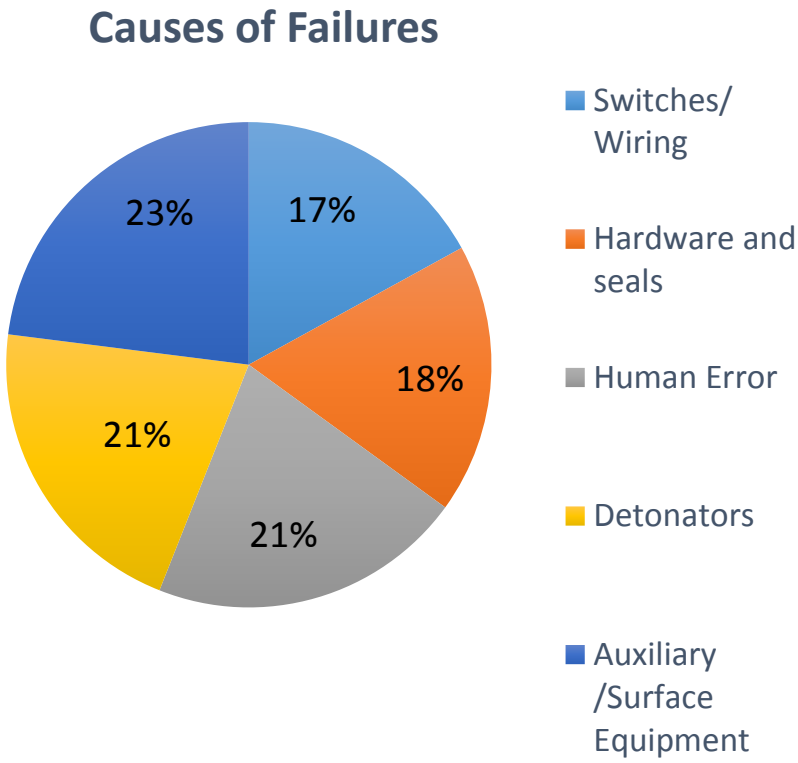
How Efficient is Efficient?

Opportunities for WL improvement

- Time saved running in hole
- Time saved with faster rig-ups
- Time saved preventing misruns

Conventional Guns Reliability in Multistage Perforating

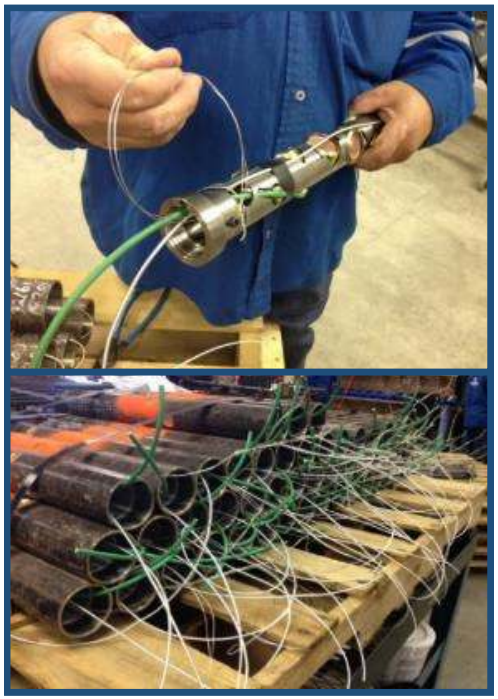
- Conventional Gun Systems have potential for service quality issues
- Wiring needs and assembly, are critical points in the process



Conventional Gun Shop Operations

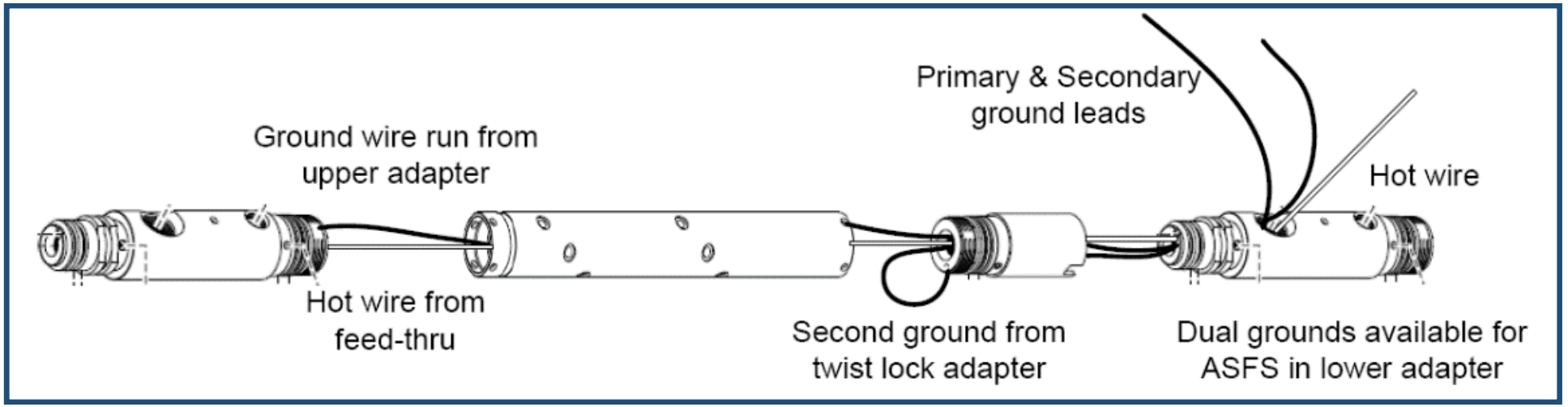
Intermediate Adapters

Loading Process



Gun Strings

Conventional Gun Shop Operations



Conventional Wellsite Operations

- Perforating strings range from 3 to 10 guns per string
- Radio Silence zone required
- Gun string electrical connections
- Detonators armed at the well site

A Revolutionary Selective Gun System

A new benchmark for Perforating:

- ✓ Safest initiator system in the industry
- ✓ Improved Reliability
- ✓ Improved Operational Efficiency
  - Gun Shop
  - Well site

Safety- Ballistic Interrupt

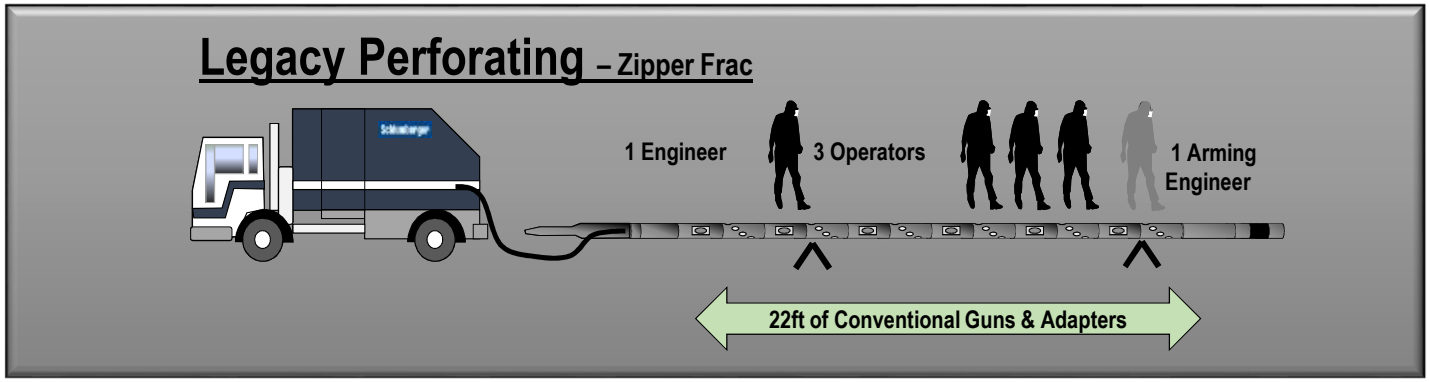
Reliability & Efficiency - Gun Shop

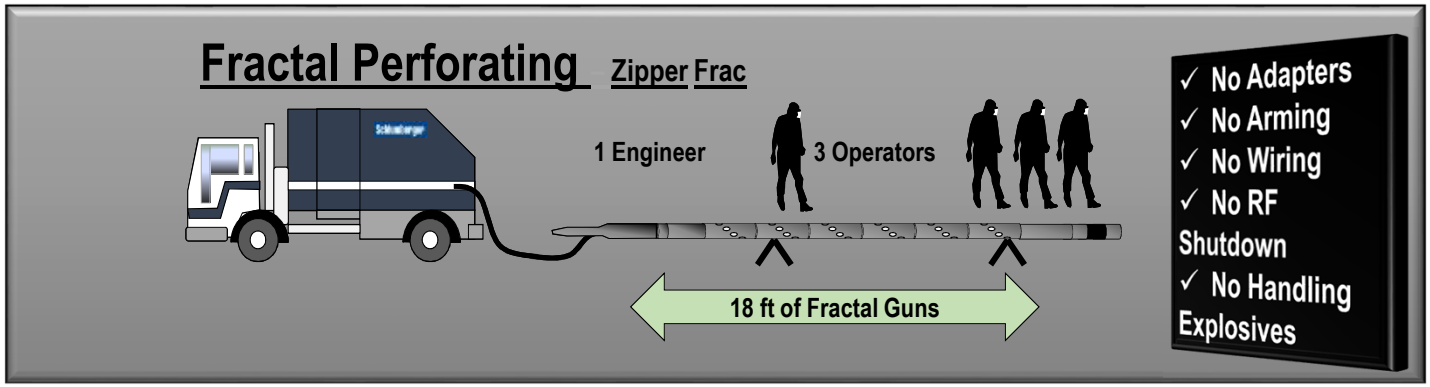
Intermediate Adapters

Loading process

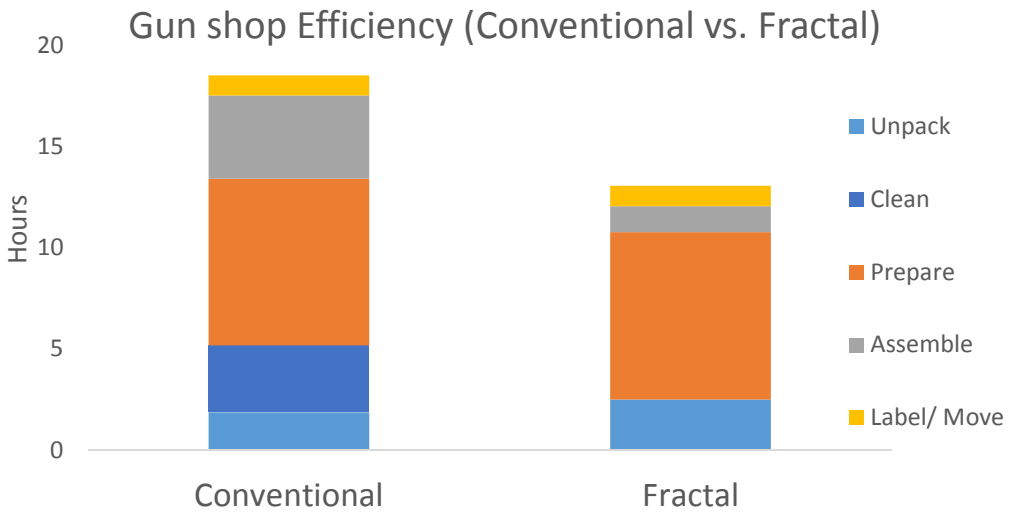
Gun Strings

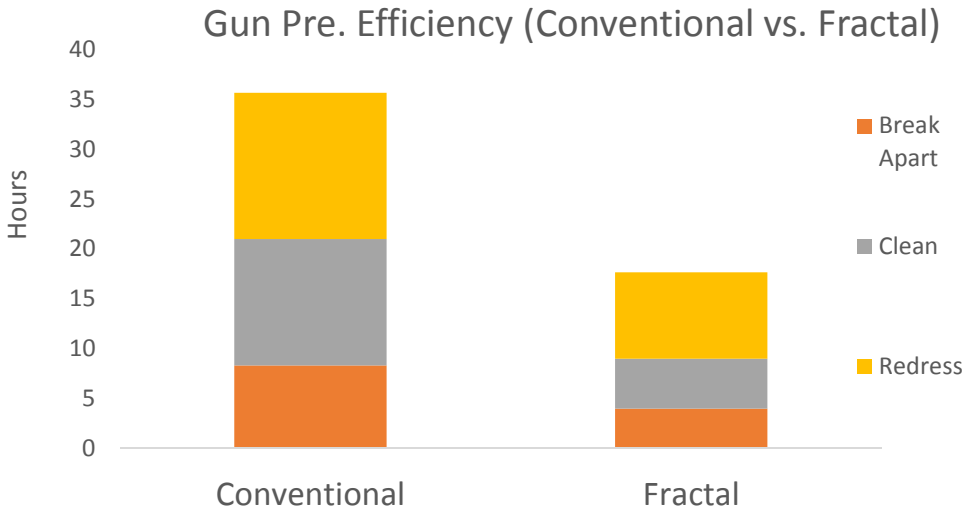
Reliability & Efficiency - Well site





North America Land Fractal Deployment





Specifications

	Specifications
Gun Diameter in, (mm)	**2-7/8 , 3-1/8, 3-1/2** (73.0, 79.4, 88.9)
Gun Length ft, (m)	1, 2, 3, 5 (0.3, 0.6, 0.9, 1.5)
Shot Phasing/ Density	60°/6 shots per foot (60°/20 shots per meter)
Reliability	99.9 % or higher
Max Temperature / Pressure	340°F (171°C) – 18K Psi or 20Kpsi
Arming Options	Ballistic Interrupt Detonator / Radio Safe Detonator
Gun Housing type	Slick, Scalloped
Guns Selectivity	Up to 40 addresses

Multistage Stimulation Perforating Solution

Safety

- Ballistic interrupter
- Addressable Switch Technology

Reliability

- Modular approach – easier to load
- Pre-assembled from factory
- Fully disposable (no need for cleaning, quick TAT)

Efficiency

- No well site arming
- Tested and verified
- Optimized rig up

North America Land Fractal Deployment

- 9 locations in North America
- Proven reliability 99.9%
- > 18,000 guns shot
- ~ 3600 stages
- Reduces gun failures by up to 77%

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QUESTIONS?
THANK YOU!