IPS 2024

IPS 24-1.2

Next Generation of TCP Oriented Perforating Gun: Flexible, Efficient, Accurate

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Oriented TCP Perforating

Applications

Productivity Enhancement

- Improve Hydraulic fracture treatments
  - Intersect natural fractures
  - Improve reservoir drainage
- Perforate away from drilling formation damage
  - Avoid early water or gas production

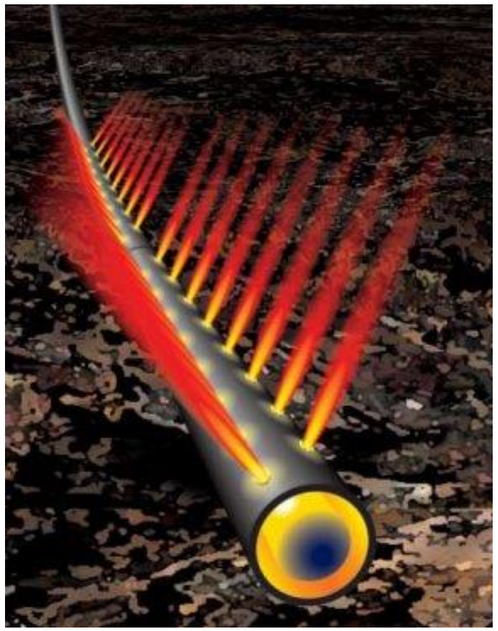
Sand Prevention

Perforate into maximum stress direction of wellbore
Usually vertical in horizontal wells

Completion Design

Avoid perforating completion hardware
Perforate relief well
Reduced chance of differential sticking

Leaving Guns downhole across perforating interval

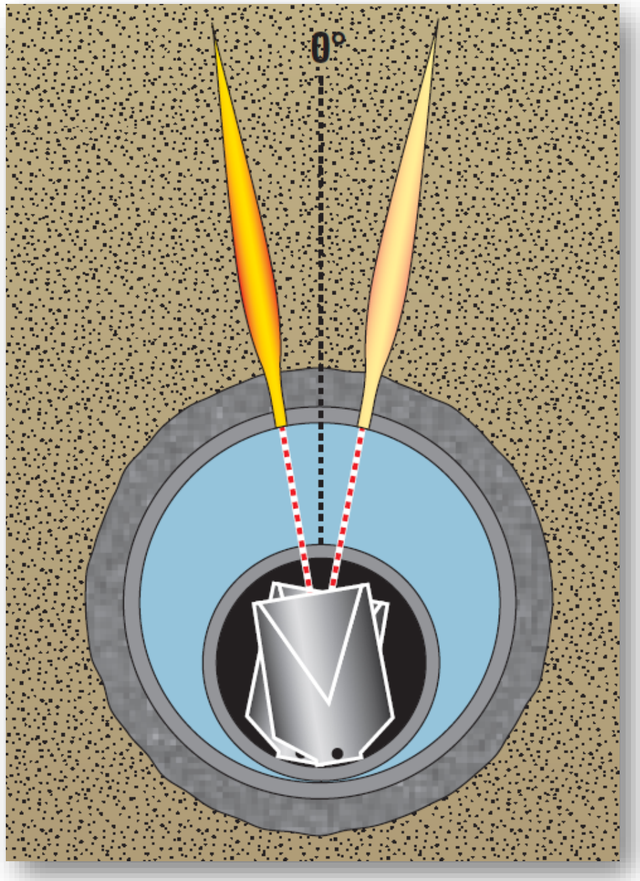


Oriented Perforating Systems

Passive Orientation – Concentric Orienting Loading Tube

Loading Tube rotates internally on bearings

Orienting weights added to the Loading Tube



Features:

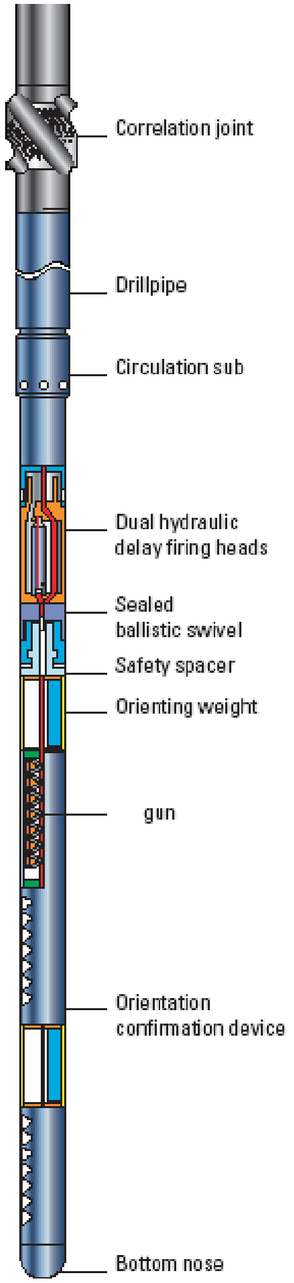
- Each Gun orients independently
  - Ease of job planning

Oriented Perforating Systems

Passive Orientation – Rotating Gunstring

Gunstring rotates with swivel above the Gunstring

Combination of weighted spacers and special weighted Charges required



Features:

- Provides good accuracy over whole interval
- Orientation Confirmation Device (OCD) provides data for whole interval
- Job planning required for number of weighted spacers

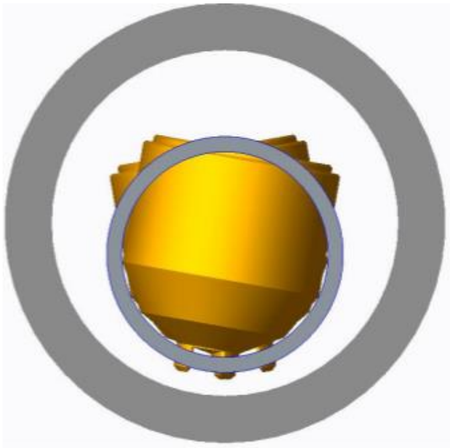
Oriented Perforating Systems

Passive Orientation – Eccentric Orienting Loading Tube

Orienting Loading Tube using standard materials and commercial components

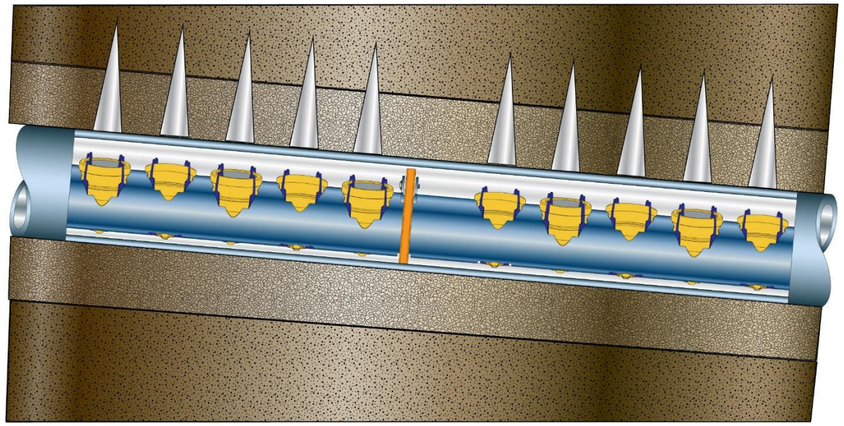
No orienting weights or Charges required to provide orientation

Standard TCP Tandem Adapters for modularity and compatibility



Features:

- Each Gun orients independently – OCD on each Gun
- Ease of job planning
- Uses standard Charge families, low debris options
- Simple eccentric design provides high orientation accuracy
- Lower Gun weight allows longer intervals



Oriented Perforating Systems

New Self-Oriented Gun Qualification

Bent wellbore test

- Up to 10 deg/100 ft dogleg

Dogleg testing

Temperature testing

Incline/dogleg testing

Drop testing

API Section 1, 6 testing

System Specifications and Accessories

Specifications

	3.38/3.50* Orienting Gun	4.50**/4.72 Orienting Gun
Fluid Limitations	Liquid or Gas*	Liquid**
Maximum diameter including burrs, shot in liquid (in)	3.706*	4.792**
Maximum diameter including burrs, shot in air (in)	3.705*	N/A**
Shots per foot/Phasing	5 spf, +/-10	4 spf, +/-10
Orientation Accuracy	0, +/-10 degrees	0, +/-10 degrees
Max Dogleg	10 deg/100ft	10 deg/100 ft
Min Inclination	30	30
Pressure Rating	15,000 psi*	10,000 psi**
Temerature Rating	400F	400F

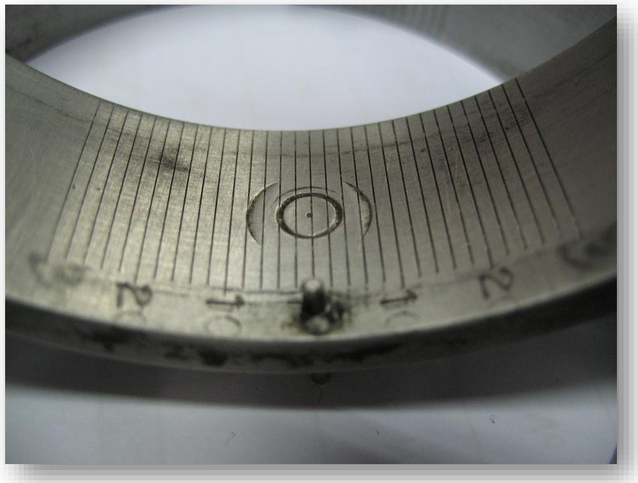
Optional Accessories

Orientation Confirmation Device

- Up to 1° accuracy
- Measures each Gun

Remote Handling Adapters

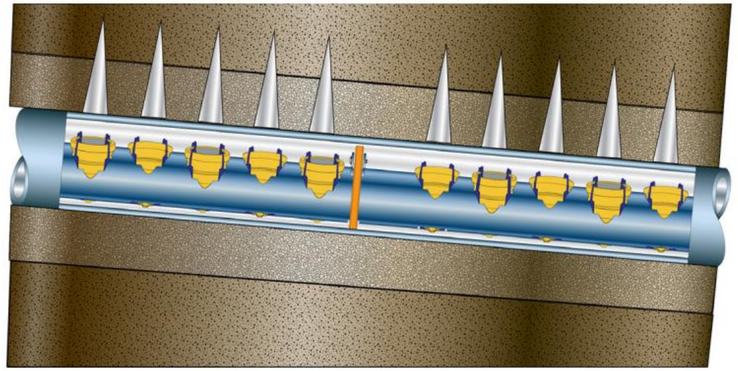
3.50 Chrome Orienting Gun System

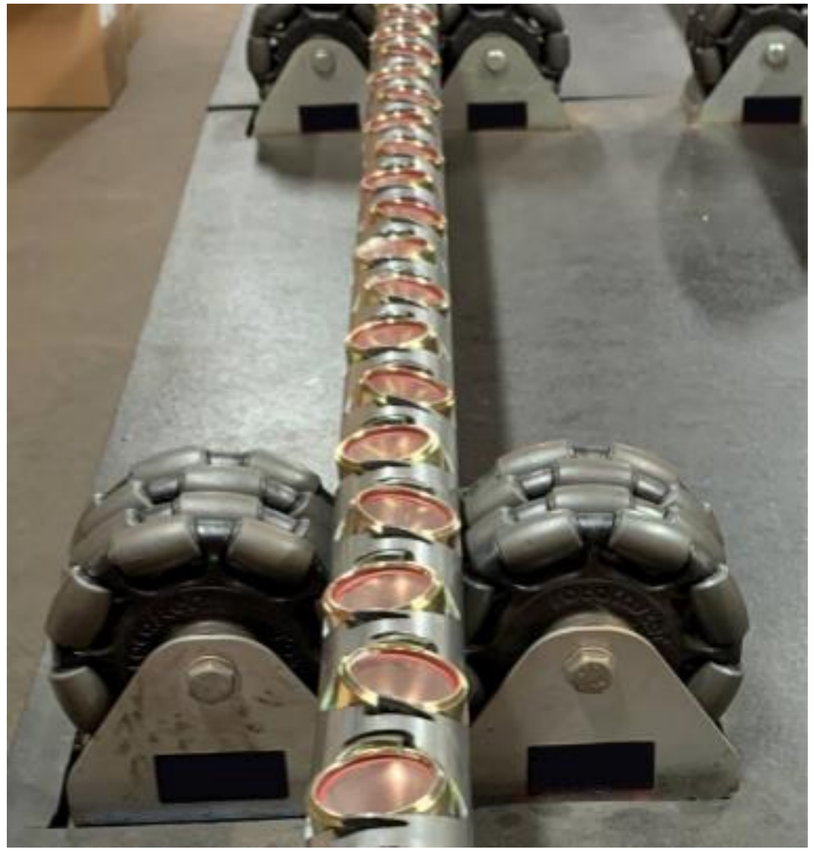


System Operations

Current Status for New TCP Orienting System

- SPE-202391-MS - Development of a New Oriented Perforating System for a Challenging Subsurface Environment
  - Successfully deployed in multiple regions
    - No SQ incidents reported
    - Other sizes in development





QUESTIONS?

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