

# Optimize Recompletions



▲ Kraken

▲ GasGun

Optimizing well recompletion performance with GasGun® and Kraken® technology improves operating cash flow by enhancing production or injection performance and lowering stimulation costs. GasGun and Kraken propellant tools create high-pressure gases downhole that propagate fractures out of perforation tunnels into the targeted pay zone.

Unlike acidizing or hydraulic fracturing, all perforation tunnels are stimulated due to the speed of pressurization, preventing leak-off into preferential perforations. Independent research has proven that Enhanced Energetics' progressively burning propellant tools can create fractures up to 50 ft into the formation.

Engineers who specify workover programs with these propellant technologies can affordably enhance well performance by

- Replacing or improving small- to medium-sized frac jobs
- Replacing acid or improving effectiveness of acidizing
- Minimizing vertical migration out of zone
- Reducing frac and acid breakdown pressures.

## Formations with Existing Perforations — GasGun

Recompleting wells with existing perforations by deploying GasGun technology for each underperforming zone can achieve higher production or injection rates. More than 5,000 wells have been completed with GasGun tools worldwide. The GasGun method creates fractures that extend deep into the formation to improve productivity or injectivity. Carbonates, sandstones and naturally fractured reservoirs can be stimulated effectively and very affordably with this proven technology.

## Formations without Perforations — Kraken

Wells not performing up to expectations can be enhanced with Kraken propellant-boosted perforating. Kraken can be used with or without acidizing or fracturing treatments. The minimal investment to enhance well productivity by integrating propellant boosters can drive significant well improvements. By penetrating beyond conventional perforations and near-wellbore skin damage, productivity is increased. For injection wells, Kraken technology delivers measurably lower injection cost per barrel by reducing surface pressure and improving the injection rate. Hundreds of thousands of dollars can be gained by applying Kraken technology in recompletions by perforating and stimulating in one trip.

*Progressively burning GasGun and Kraken technology generates high-pressure gas, creating fractures that improve well connectivity. Engineers who analyze stimulation effectiveness by initial production or injection increase (IP/II), operating time and safety will observe that the return on incremental investment in enhanced well performance routinely exceeds their expectations. Workover programs leveraging propellant technology have allowed some operators to eliminate other costly stimulation methods.*

## Enhanced Stimulation and Perforating Technology

Enhanced Energetics offers proven propellant-enhanced stimulation and perforating technology designed to lower total cost of operations and improve profitability of vertical and horizontal producing and injection wells.



GasGun propellant technology is designed to be deployed in 2.875-in. and larger tubing and casing. Conveyed by wireline or tubing, the GasGun tool incorporates reusable high-strength steel carriers.

|                             |                    |                    |                    |
|-----------------------------|--------------------|--------------------|--------------------|
| <b>GasGun diameter</b>      | 2 in. [51 mm]      | 3.375 in. [86 mm]  | 4 in. [101 mm]     |
| <b>GasGun charge length</b> | 1-20 ft [1-6 m]    | 1-10 ft [1-3 m]    | 1-10 ft [1-3 m]    |
| <b>Number of ports</b>      | 4-32               | 16-80              | 24-120             |
| <b>Maximum temperature</b>  | 280°F [138°C]      | 280°F [138°C]      | 280°F [138°C]      |
| <b>Maximum pressure</b>     | 8,000 psi [55 MPa] | 8,000 psi [55 MPa] | 8,000 psi [55 MPa] |

\*Exceeding maximum temperature ratings can result in unintentional detonation.



Kraken-enhanced perforating is significantly more effective than standard perforating at improving completion and recompletion performance in conventional, unconventional and saltwater disposal wells. Standard gun systems and shaped charges can easily be enhanced with Kraken technology to perforate and stimulate in one trip.

|                                  |                                       |
|----------------------------------|---------------------------------------|
| <b>Kraken gun size options</b>   | 2.75, 3.125, 4.0 in. [70, 79, 102 mm] |
| <b>Typical gun swell</b>         | 0.22 in. [5.6 mm]                     |
| <b>Maximum shot density</b>      | 6 spf [19 spm]                        |
| <b>Maximum pressure</b>          | 20,000 psi [138 MPa]                  |
| <b>1-hr temperature rating*</b>  | 280°F [138°C]                         |
| <b>10-hr temperature rating*</b> | 260°F [127°C]                         |

\*Exceeding maximum temperature ratings can result in unintentional detonation.