



Optimizing well stimulation performance with GasGun[®] propellant technology improves operating cash flow by enhancing production or injection rates and lowering stimulation costs. Engineers who specify open hole and cased hole stimulation programs with GasGun technology can affordably enhance well performance by increasing productivity or injectivity index. The GasGun propellant creates high-pressure gases downhole that propagate fractures through each perforation tunnel into the targeted pay zone.

Unlike acidizing or hydraulic fracturing, all perforation tunnels are stimulated because gas is generated rapidly, preventing leak-off into preferential perforations. By tailoring the gas pressure-time profile, multiple radial fractures can be created up to 50 ft into the formation. Radial fractures can have a more significant impact on flow rates than planar fractures created by hydraulic fracturing. Patented, progressively burning GasGun propellant technology improves well stimulation by

- Fracturing past near-wellbore damage
- Replacing small- to medium-sized frac jobs
- Replacing acid or improving effectiveness of acidizing
- Minimizing vertical migration out of zone.

A Wide Variety of Well Applications

More than 15,000 GasGun stimulations have been conducted worldwide with and without acidizing or fracturing. The GasGun creates fractures that extend deep into the formation to improve productivity or injectivity. Stimulation applications include:

- Overcoming deep cement invasion and other causes of near-wellbore damage
- Pre-acid or pre-frac treatment to improve breakdown and placement of fluids
- Close gas-oil, gas-water or oil-water contacts
- Vertical and horizontal injection wells with scale damage
- Remote operations where deploying frac spreads is not practical.

Progressively burning GasGun propellant generates high-pressure gas, which creates fractures that extend deep into the formation to improve productivity or injectivity. Engineers who analyze GasGun's 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 that standardize on GasGun have allowed some operators to eliminate costly stimulation jobs.

GasGun Enhanced Stimulation Technology

GasGun propellant enhanced stimulation technology is designed and proven to lower total cost of operations and improve the profitability of open and cased hole producing and injection wells.

Field Proven

In many applications, GasGun propellant stimulation technology has been proven to deliver distinct advantages over other stimulation methods. Enhanced Energetics offers analysis of well performance improvement



when the GasGun is used to enhance or replace acid and frac jobs. Performance can also be compared with propellant technology offered by other oilfield service providers to demonstrate the increased effectiveness and power of GasGun technology.

Software Simulation

Operators and wireline service companies can benefit from Enhanced Energetics' proprietary modeling software that analyzes wellbore configuration, rock properties (Poisson's ratio, Young's modulus, fracture toughness, tensile strength, etc.), state of stress (pore pressure, overburden stress, horizontal stresses, etc.) and concentration stress around the wellbore. Post-frac test data can be used to develop proprietary stimulation models that create a competitive advantage for enhancing well performance with our patented propellant technology.

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

*Exceeding maximum temperature ratings can result in unintentional detonation.