ABRAJ
ENERGY SERVICES

Multi-Stage Pinpoint Fracturing

Precision Stimulation Delivered As A Single Integrated Scope



Place. Isolate. Measure. Repeat.

Pinpoint fracturing is an integration problem, not a pumping problem. ABRAJ closes the loop — hydraulic fracturing, coiled tubing and well testing under one operational command.

TECHNICAL CASE STUDY

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EXECUTIVE SUMMARY

Multi-stage pinpoint fracturing is a precision stimulation method that treats reservoir intervals sequentially and selectively, rather than stimulating several intervals together or relying on conventional plug-and-perforation completions. It is most valuable in tight sandstones and carbonates, and in thin laminated or otherwise heterogeneous reservoirs — formation types common across Middle East well delivery, where variable in-situ stress distribution leads to uneven stimulation and bypassed pay. The technique itself is well established. What separates a successful pinpoint programme from an expensive one is not the pumping — it is the coordination.

Every stage requires the coiled tubing unit, the fracturing spread and the measurement package to operate as one system: at the same depth, on the same clock, under the same command. Where those functions are split across multiple contractors, the interfaces become the risk. Waiting time between stages, disputed depth control, and divided accountability compound across a multi-stage programme and surface as non-productive time (NPT).

ABRAJ Energy Services delivers this sequence as a single integrated scope — hydraulic fracturing, coiled tubing and well testing under one operational command. The result is a repeatable stage-level workflow in which treatment placement is controlled, stage turnaround is predictable, and interval contribution is measured rather than assumed.



Credibility Spine

- **Documented field programme.** ABRAJ's multi-stage pinpoint fracturing execution is documented in two SPE technical publications — SPE-232509 and SPE-232358 — covering the operational innovations, execution controls and efficiency gains achieved relative to conventional plug-and-perforation.
- **MENA-first integrated fracturing.** ABRAJ was the first Omani company in the MENA region to provide fully integrated fracturing services, extending local execution capability for complex stimulation programmes.
- **Two active fracturing fleets.** Two dedicated hydraulic fracturing fleets operating for Petroleum Development Oman (PDO) in the Sultanate of Oman.
- **Closed-loop delivery.** Fracturing, coiled tubing and well testing delivered under a single integrated scope — one contract, one crew structure, one point of technical accountability.

THE PRECISION PROBLEM

Complex reservoirs defeat averaged completions.

Heterogeneous formations exhibit vertical and lateral variability in permeability, stress and fluid content across the pay section. A completion designed around the average of that section is, by definition, wrong for most of it. The strongest intervals take the treatment; the weakest take very little; and pay that would have produced is left behind because the treatment followed the path of least resistance rather than the reservoir plan.

Conventional plug-and-perforation partially addresses this by creating stages, but at a cost. Each stage requires repeated wireline plug setting, perforating runs, and coiled tubing plug milling on completion. The cycle is mechanically sound but slow, and the time penalty scales directly with stage count — precisely the wells where more stages would deliver the most value.

What pinpoint execution changes

- **Design authority moves to the interval.** Each stage is designed and pumped against its own reservoir characteristics and risk profile, not against a wellbore average.
- **Stage count stops being a cost ceiling.** Removing the plug-set / perforate / mill cycle removes the main reason stage counts are constrained.
- **Contribution becomes verifiable.** Stage-by-stage execution creates a stage-by-stage record, which can be measured against design intent rather than inferred at the end of the job.

The commercial argument

Pinpoint fracturing is not simply a better way to fracture a well. It is a way to stop paying for stimulation that does not reach the reservoir it was designed for.



HOW MULTI-STAGE PINPOINT FRACTURING WORKS

Multi-stage pinpoint fracturing enables targeted fracture initiation and treatment at specific wellbore intervals. The method combines coiled tubing for precise tool positioning, abrasive hydraulic jet perforating to establish communication with the formation, mechanical stage isolation, and real-time monitoring to optimise treatment response.

Pinpoint compared with conventional execution

Conventional plug-and-perforation	Multi-stage pinpoint fracturing
Zones treated together, or individually with repeated plug-set, perforate and mill cycles	Individual zone treatment with greater flexibility in zone differentiation and targeted design
Longer time to complete; time penalty scales with stage count	Faster time to complete relative to plug-and-perf; no milling cycle
Stage count constrained by cycle time and cost	High stage-count potential
Uneven stimulation across the pay section is common	More uniform reservoir contact across treated intervals
Bypassed pay possible where treatment follows path of least resistance	Improved and verifiable contribution across treated zones

The workflow

Phase 1 — Pre-treatment planning

1. **Reservoir characterisation:** analysis of petrophysical properties, stress profiles and formation behaviour.
2. **Zone selection:** identification of productive intervals from log data, core analysis and production history.
3. **Treatment design:** stage-specific stimulation design to achieve the target fracture geometry, including fluid system selection.
4. **Mobilisation:** deployment of the coiled tubing unit, fracturing spread and well testing package as a single coordinated spread.

Phase 2 — Execution

1. **Coiled tubing deployment:** positioning of the bottomhole assembly at target depth.
2. **Hydrajet perforating:** abrasive jetting cuts through casing, cement and rock to create focused entry points for fracture initiation at the selected interval.
3. **Mechanical isolation:** a CT-conveyed resettable isolation tool with packer isolates the target stage from previously treated or non-target intervals.
4. **Pinpoint fracture initiation:** the fracture is initiated at the selected jetting point, enabling controlled treatment placement into the intended interval.
5. **Proppant placement with CT-assisted control:** the main treatment is pumped through the annulus while clean or treated fluid may be pumped through the CT to support pressure control, reduce near-wellbore bridging risk and improve response where screenout tendency is present.
6. **Sequential treatment:** the packer is unset, the BHA is moved to the next target interval, and the sequence repeats.

Phase 3 — Post-treatment

1. **Flowback and clean-up:** controlled fluid recovery to minimise formation damage.
2. **Production logging:** verification of contribution from each treated zone.
3. **Performance analysis:** comparison of actual response against design parameters, feeding the design of subsequent stages and wells.



THE INTEGRATED EXECUTION LOOP

Place. Isolate. Measure. Repeat.

Pinpoint fracturing is a closed loop, and each element of it is a full service line in its own right. Run separately, they introduce an interface — and a handover risk — at every stage change. Run together, they compound into execution speed.

Coiled tubing — precision at depth

The CT unit positions the bottomhole assembly, performs abrasive jet perforating, and conveys the resettable isolation packer. During proppant placement it carries clean or treated fluid to support pressure control and reduce near-wellbore bridging risk. In pinpoint execution, coiled tubing is not a support service. It is the delivery mechanism, and depth control accuracy on the CT determines whether the treatment enters the interval it was designed for.

Hydraulic fracturing — treatment matched to the interval

Dedicated fracturing fleets pump a stage-specific design: fluid system, proppant schedule and rate matched to the characteristics of that interval rather than averaged across the wellbore. Fleet availability and readiness are what make high stage-count programmes executable on schedule rather than theoretically possible.

Well testing — the evidence layer

Controlled flowback and surface measurement close the loop. This is where a pinpoint programme proves its premise: that each treated zone contributes, and that actual response matches design intent. Without measurement, zone contribution is an assertion. With it, it is a result.

Measured flowback data also feeds forward. Stage-level response informs the design of subsequent stages on the same well and subsequent wells in the same formation — converting a single job into a learning programme, and a learning programme into predictable delivery at field scale.

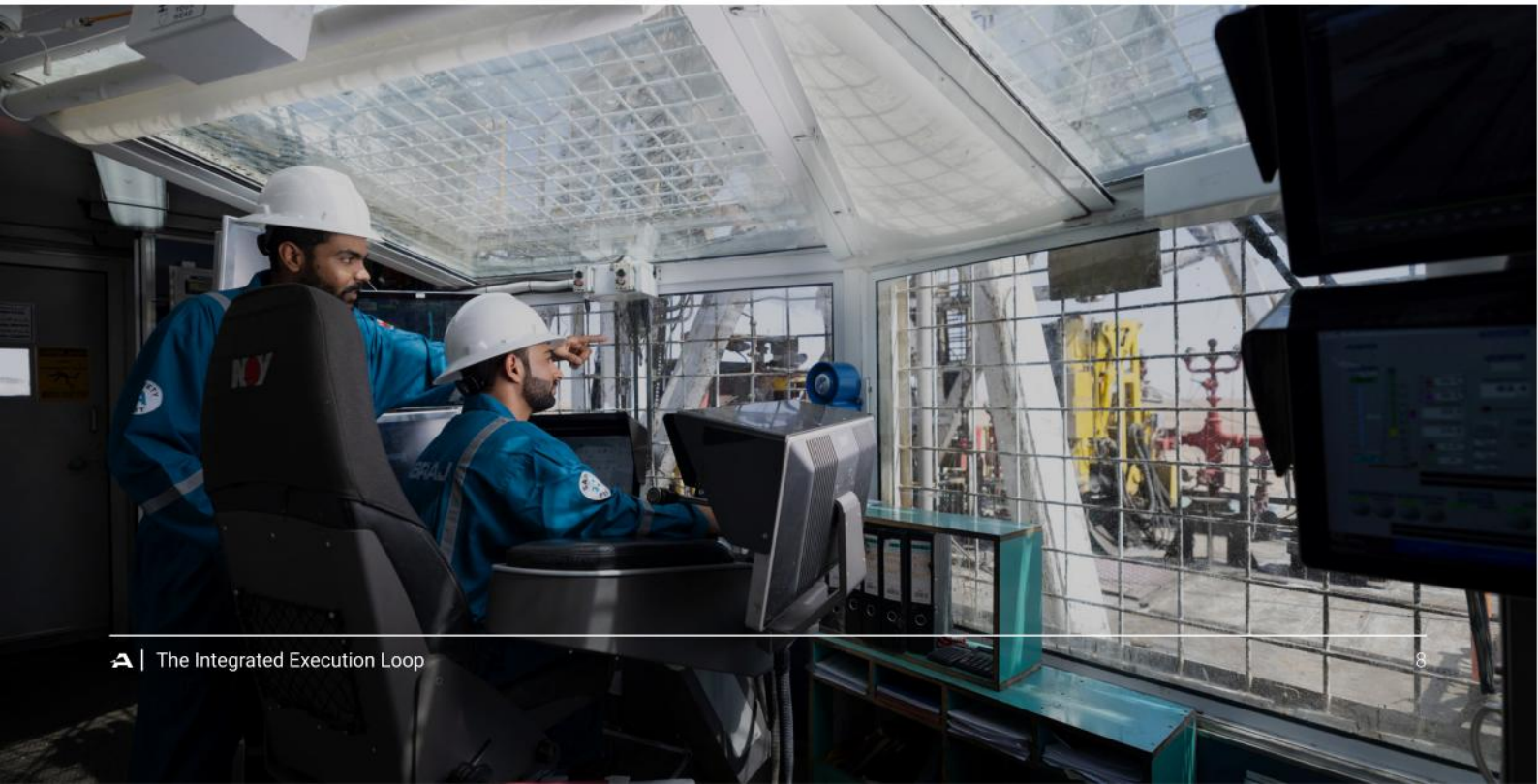


Why single-scope matters

- **One command structure.** The same operational authority across placement, isolation and measurement — no negotiation between contractors mid-stage.
- **No interface delay.** Stage completion flows directly into the next positioning run, removing the waiting time that accumulates across high stage-count wells.
- **Undivided accountability.** When a stage behaves unexpectedly, there is a single point of technical responsibility for diagnosis and response.
- **One data set.** Treatment data and flowback data sit in the same record, held by the same party, available for the same analysis.
- **Fewer contracts for the operator.** A single integrated scope in place of three separately managed service agreements.

Delivery capability

Capability	Scope
Hydraulic fracturing	Two dedicated fracturing fleets operating for PDO in Oman
Coiled tubing services	Full-service CT units for positioning, hydrajet perforating and isolation-tool conveyance
Well testing	Surface well testing packages
Delivery model	Fracturing, coiled tubing and well testing under a single integrated scope
Regional reach	Pre-qualified to operate in 6 countries; strategic partnerships with national and international operators



INDUSTRY BENCHMARKS

Third-party reference data only.

The figures below are drawn from publicly reported global applications of pinpoint fracturing. They are provided for technical context and do not represent ABRAJ Energy Services well results.

Application area	Reported production impact	Reference benefit
Tight gas reservoirs (Australia)	**+30%** vs. AFE expectations	Improved completion efficiency
Middle East carbonate	**+130%** (870 to 2,000 bbl/d)	Horizontal well optimization
Thin oil reservoirs (China)	**+100%** (rates doubled)	Bottom water management
Global cumulative deployment	**6,000+ wells**, 18 countries	Global deployment footprint

Why the technique produces gains

Reported production gains from pinpoint fracturing in global applications are typically driven by a combination of execution and reservoir-contact advantages:

- **Maximised reservoir contact:** each zone receives dedicated stimulation, reducing the bypassed pay associated with commingled treatments.
- **Controlled fracture geometry:** fluid, proppant and rate tuned per interval to drive fracture dimensions toward the design target.
- **Clean perforations:** hydrajet perforating can create wide, clean tunnels without the crushed-zone damage associated with explosive charges.
- **Uniform proppant distribution:** precise stage-level placement supports more consistent conductivity across treated intervals.

ABRAJ'S DOCUMENTED PROGRAMME

ABRAJ's multi-stage pinpoint execution is documented in two SPE technical publications — SPE-232509 and SPE-232358.

Publication	Contribution
SPE-232509	Implementation of multi-stage pinpoint hydraulic fracturing in the region, including technical innovations, operational efficiencies and lessons learned from a pioneering application.
SPE-232358	Complementary work on precision stimulation execution and reduced-time delivery compared with the conventional plug-and-perforation method.

Together these papers set out:

- **Operational innovations** developed to deliver precision stimulation reliably in complex reservoir environments.
- **Execution controls** ensuring consistent stage placement, treatment quality and treatment-to-treatment repeatability.
- **Efficiency gains** including reduced completion time relative to conventional plug-and-perforation execution.
- **Lessons learned** from a pioneering application of the technique in the region.

This is the substance behind the capability claim: not a marketing position, but technical work submitted to and accepted by the industry's technical community, and available for independent review.

Wider technical engagement

- **SPE International Hydraulic Fracturing Conference 2025** — official sponsor and technical presenter, covering heavy oil development and precision stimulation operations.
- **Proprietary ABRAJ fluid systems** — customised fracturing fluid designs presented through industry conferences and technical sessions.

CONCLUSION

Multi-stage pinpoint fracturing is a critical enabling technology for the economic development of tight gas and complex carbonate reservoirs, particularly where heterogeneous intervals benefit from stage-by-stage stimulation and stronger control of interval contribution.

But the technique alone is not the differentiator. The differentiator is whether one party can place the treatment, isolate the stage, measure the response, and carry that learning into the next stage — without a contractual seam in the middle of the sequence.

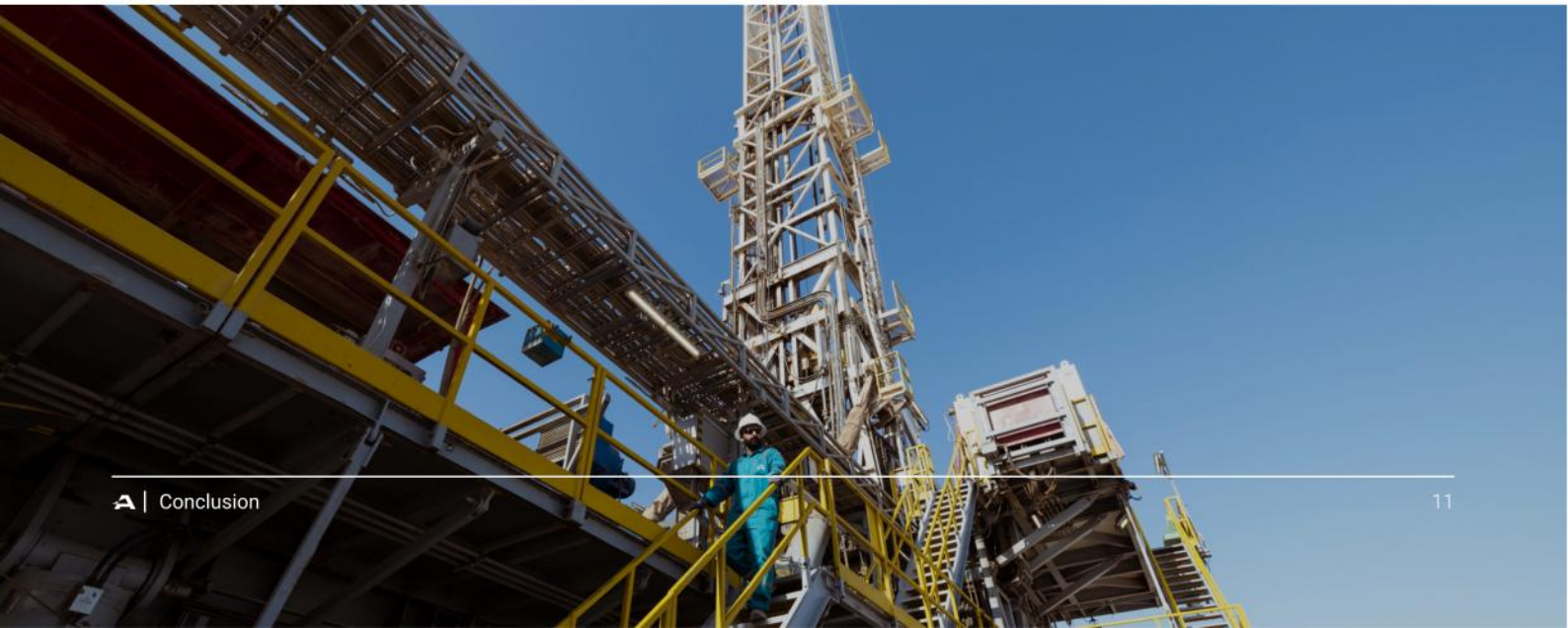
That is the capability ABRAJ Energy Services has built:

- **An integrated execution model.** Hydraulic fracturing, coiled tubing and well testing delivered under a single scope, with one command structure and one point of technical accountability.
- **Active field capacity.** Two dedicated fracturing fleets operating for PDO in Oman.
- **Documented technical evidence.** SPE-232509 and SPE-232358, setting out the operational innovations, execution controls and efficiency gains from the programme.
- **Regional execution capability.** Among the first in MENA to provide fully integrated fracturing services, pre-qualified to operate in six countries.

As operators in the region advance tight gas and complex carbonate developments, demand for precision stimulation will increase — and with it, the premium on execution that is measured rather than assumed. ABRAJ is positioned to support that requirement through integrated delivery, disciplined planning and repeatable operating controls.

Place. Isolate. Measure. Repeat.

One scope. One crew structure. One point of accountability for the outcome of the well.



SOURCES

1. ABRAJ documented programme

Sayapov, E., Al Jahdhami, A., Saleh, M., Fatkhutdinov, D., Maiz, P. E., Elsayed, S. S., Rosario, I., & Nakhwa, A. D. (2025). A step-change in multistage proppant fracturing operational efficiency: 97% faster execution and optimized placement using coiled-tubing in a low-pressure horizontal oil well in Oman (Paper SPE-232509-MS). In SPE Conference at Oman Petroleum & Energy Show, Muscat, Oman. Society of Petroleum Engineers. https://doi.org/10.2118/232509-MS

Maiz Palacios, O. E., Fatkhutdinov, D. N., Alshueili, B., Sayapov, E. I., Al Jahdhami, A., Saleh, M., Nakhwa, A. D., & Burstall, R. (2025). First field deployment of coiled-tubing pinpoint fracturing with zonal isolation tool in Oman: Operational optimization in a horizontal well with multi cluster fracturing stages (Paper SPE-232358-MS). In SPE Conference at Oman Petroleum & Energy Show, Muscat, Oman. Society of Petroleum Engineers. https://doi.org/10.2118/232358-MS

2. Wider technical engagement

Society of Petroleum Engineers. (2025). SPE International Hydraulic Fracturing Technology Conference, Muscat, Oman.

3. Field and campaign data

ABRAJ Energy Services. (n.d.). Integrated Fracturing Services operational records — two dedicated hydraulic fracturing fleets in Oman [Unpublished raw data]. ABRAJ Energy Services SAOG, Muscat, Oman.

4. Industry benchmarks (third-party reference)

Gilbert, J. V., Greenstreet, C. W., & Bainbrigge, P. R. (2005). Applications of pinpoint fracturing in the Cooper Basin, Australia (Paper SPE-97004-MS). Society of Petroleum Engineers. https://doi.org/10.2118/97004-MS

Stanojcic, M., Jaripatke, O. A., & Sharma, A. (2010). Pinpoint fracturing technologies: A review of successful evolution of multistage fracturing in the last decade (Paper SPE-130580-MS). Society of Petroleum Engineers. https://doi.org/10.2118/130580-MS

