WHITE PAPER · UNISIG DEEP-HOLE DRILLING MACHINE × OIL & GAS

UNISIG deep-hole drilling for Oil & Gas

Precision gundrilling and BTA drilling for long, straight, tight-tolerance holes in oilfield and aerospace parts. This paper covers what the machine does, the oil & gas parts we produce with it, the alloys we run, the tolerances and finishes oil & gas buyers expect, and the documentation package.

Long-bore capability — high L/D ratios ENVELOPE	**1994** SINCE	**ISO 9001:2015** QMS
Same-week / rig-down direct RESPONSE		

Deep Hole · Long-bore capability — high L/D ratios · gundrilling / BTA deep-hole drilling machine

PUBLISHED
January 15, 2026

LAST UPDATED
2026-01-15

FORMAT
Web + PDF

READ TIME
~6 min

Executive summary

Machine: UNISIG Deep-Hole Drilling Machine (shop nickname: *Deep Hole*). gundrilling / BTA deep-hole drilling machine at B&R Productions, running from our New Waverly, Texas shop under an ISO 9001:2015 quality system.

Application: Precision gundrilling and BTA drilling for long, straight, tight-tolerance holes in oilfield and aerospace parts for Oil & Gas customers — Frac fleet operators, wellhead crews, wireline and coil-tubing service companies, downhole tool manufacturers, completion tool OEMs, subsea equipment vendors, produced-water handling equipment suppliers.

Envelope: Long-bore capability — high L/D ratios. **Tolerance:** ±0.0005" routine on critical features. **Traceability:** Material by heat and lot on every job.

The machine, in context

Deep, straight, concentric holes are one of the hardest features to produce on any CNC platform without a purpose-built machine. Most job shops don't have one. Downhole tool bodies, valve stems with long bores, hydraulic cylinders, and any part that needs a straight bore longer than a few diameters routinely gets outsourced — or worse, made poorly on an inadequate setup. UNISIG deep-hole drilling is a genuine capability moat.

Full specifications

Machine type	UNISIG deep-hole drilling center — gundrill + BTA capable
Manufacturer	UNISIG (Menomonee Falls, WI) — US-built purpose machines
Platform depth capability	From a few inches to over 65 ft (20 m) per drilled hole
Platform diameter range	Under 1 mm gundrill through ~1 m BTA-class bores
Common configurations	USC-M series combines gundrilling + BTA + up to 120 tools in one guarded machine
Reference model USC-3M	71" drill depth per side; angled holes at +30° / -15°; 63" × 78" rotating table; workpieces to 66,150 lb
Straightness control	Sub-thousandth-per-foot drift on typical setups
Concentricity	Held tighter than conventional CNC-lathe drilling can offer
Coolant strategy	High-pressure through-tool
Materials	Inconel, Super Duplex, 17-4 PH, 4140/4340, Monel, titanium

Values marked "platform" reflect the machine manufacturer's published spec range for this platform family; B&R's working spec is what we quote on this specific unit.

Who this serves in Oil & Gas

Typical buyer: Frac fleet operators, wellhead crews, wireline and coil-tubing service companies, downhole tool manufacturers, completion tool OEMs, subsea equipment vendors, produced-water handling equipment suppliers.

What's hard about oil & gas work: Chloride stress-corrosion cracking, sour service (H2S), high-cycle pressure loading, exotic superalloys, and rig-down clocks that turn every hour into money. Documentation trails required for API-adjacent work.

Typical Oil & Gas parts we produce on Deep Hole

- Downhole tool bodies with long central bores
- Frac pump plungers requiring deep coolant/lube passages
- Valve stems with long stem bores
- Hydraulic cylinders for pressure-control equipment
- Coiled-tubing tool bodies with internal passages

Above list is representative; if your part isn't shown, call and ask — most oilfield / aerospace / defense / industrial turned or milled work fits somewhere in the shop.

Alloys we run for Oil & Gas

Standard range: Inconel 718 (aged and annealed) · Inconel 625 · Super Duplex 2507 (UNS S32750) · Duplex 2205 · 17-4 PH (all conditions H900 to H1150) · Monel K-500 · Nitronic 50/60 · F22 · F91 · 4130/4140.

Alloy behavior is different in oilfield service. Inconel 718 in the aged condition (H900, roughly 40-45 HRC) is a different machining problem than annealed 718 — feeds, speeds, and tool geometry all shift. Super Duplex 2507 machined without cutting-temperature control develops brittle intermetallics that destroy the chloride-resistance the alloy was chosen for; a shop that shrugs when you ask about phase balance is a shop that will quietly ruin your part. 17-4 PH in Condition A machines like a well-behaved stainless; in H900 it's a different animal. Every one of these alloys we run weekly, not experimentally.

> **What "we run these weekly" means:** we stock or reliably source the common alloys in the industry's typical spec range. Sharp tooling, proven feeds and speeds, and process control specific

> to each alloy family. Your part is not the one we're experimenting on.

How we machine it — our 5-step process

This is the process B&R runs on every job, oil & gas or otherwise. The specifics of feeds, speeds, and tooling shift by alloy and machine; the discipline is universal.

1. **Material verification.** Every job starts with material traceability. Heat and lot numbers documented against the mill test report. For customer-supplied material, we verify against the CofC before touching the stock.

2. **First-article layout.** Stock is measured and laid out before any cutting starts. Concentricity, roundness, and squareness of the starting material established; if the stock is out of tolerance we call the customer before wasting time on a bad blank.

3. **Roughing with process control for the alloy.** Feeds, speeds, and coolant strategy set for the specific alloy family — sharp coated carbide (or PCD for high-volume Ti Grade 5), positive rake, high-pressure through-tool coolant on 2507 and Inconel to control cutting temperature. Interrupted cuts get extra attention because they cycle heat into the workpiece.

4. **Finish pass to spec.** Finish pass with a fresh insert, controlled DOC, and measured surface-finish targets. Critical features (bore concentricity, seat grooves, sealing surfaces) are held tighter than most job-shop lathes can offer.

5. **CMM verification + documentation.** Every critical dimension CMM-verified. First-article report generated. Certificate of conformance issued with delivery. Customer-specific ITPs and PPAP-style packages produced on demand.

Tolerance and finish expectations in Oil & Gas

±0.0005" routine on critical sealing and mating surfaces. Bore concentricity and roundness held tighter than most job-shop lathes can offer. Surface-finish targets measured with a profilometer, not estimated. For seat grooves and packing bores, finish is often the difference between a sealing part and a leak-path.

Documentation and quality workflow

Material traceability by heat and lot on every job — non-negotiable for API-adjacent work. First-article layout and CMM verification standard. Customer-specific ITPs (Inspection and Test Plans) supported. PPAP-style packages produced on demand. Certificate of conformance issued with delivery.

Response time and emergency work

Rig-down and fleet-down work prioritized over routine production. Same-day and next-day realistic when material is on the shelf. Call (936) 291-7827 direct — say "rig-down" and the phone gets to the shop floor. For emergency work off-hours, leave a voicemail; we route emergencies.

How we compare

Compared to buying finished components from an OEM: we're faster for one-offs and low-volume runs, and we hold traceability the OEM often won't share when you're outside their warranty window. Compared to a commodity job shop: we run the alloys weekly and won't ruin your metallurgy on cutting-temperature mistakes.

Working with B&R Productions

New customer or existing, the process starts the same way: call (936) 291-7827 or send a print through the quote form. Prints are accepted as PDF, STEP, IGES, DWG, or DXF; if you only have a sample part, we reverse-engineer routinely. NDAs on request. ITAR-controlled prints handled under document control with prints staying in-shop.

Quotes typically come back within 24 hours for standard work, same-day for repeat customers on stocked materials, and near-immediately by phone for emergency and rig-down situations. Lead times are quoted honestly — we don't promise Wednesday and deliver next month.

Frequently asked questions

8 questions covering the UNISIG deep-hole drilling platform and Oil & Gas work. Also indexed as FAQ schema for AI answer engines.

What's the max depth the UNISIG can drill?

The UNISIG platform can drill from a few inches to over 65 ft (20 m) per hole. Diameter range from under 1 mm gundrill through ~1 m BTA-class. Send us your part dimensions and we confirm feasibility.

Why can't a CNC lathe drill deep holes the same way?

Straightness and concentricity fall apart at high L/D ratios on a conventional lathe — chip evacuation, drill drift, and tool support don't scale. A purpose-built deep-hole machine keeps sub-thousandth-per-foot drift on long bores; a lathe can't.

Can the UNISIG drill angled holes?

Yes on capable USC-M configurations — reference USC-3M supports +30° / -15° angled holes with a 63" × 78" rotating table holding workpieces up to 66,150 lb.

What kind of oil & gas customers does B&R Productions work with?

Frac fleet operators, wellhead crews, wireline and coil-tubing service companies, downhole tool manufacturers, completion tool OEMs, and subsea equipment vendors. We work with new customers regularly — first-time orders don't get worse service.

Do you handle rig-down and emergency work?

Yes. Same-day and next-day are realistic when the material is on the shelf (Inconel 718, 625, Super Duplex 2507, 17-4 PH, 4140/4340). Call (936) 291-7827 direct and say "rig-down" — the phone gets to the shop floor, not a form.

Do you machine to API 6A / API 6D tolerances?

Yes. API-adjacent tolerances routine. Material traceability by heat and lot standard on every job. Customer-specific ITPs and PPAP-style packages supported.

How do you keep Super Duplex 2507 from losing its chloride resistance during machining?

Controlled cutting temperature — moderate SFM, aggressive feed with sharp coated carbide, high-pressure through-tool coolant. The failure mode nobody wants (sigma-phase intermetallics forming from overheating) shows up months later in service. We run 2507 weekly — this is a process we've internalized, not a spec we're learning on your part.

Can you reverse-engineer discontinued OEM oilfield parts?

Yes — routine work. Send a worn sample and any print or spec you have. We produce the replacement with material traceability the OEM often won't share when you're outside their warranty window.

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Ready to talk about your Oil & Gas work?

Send us a print or a sample photo and specs. Emergencies: call direct and say "rig-down."

Published by B&R Productions — a precision CNC machining shop in New Waverly, Texas, in business since 1994. ISO 9001:2015 certified. Serving oil & gas, aerospace, defense, and industrial customers across Texas and the Gulf Coast.

Written by the B&R Productions team. Machine specs verified against manufacturer data. Alloy and process notes reflect shop practice as of 2026-01-15.