

UNISIG deep-hole drilling for Aerospace

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

UNISIG

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

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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 Aerospace customers — Aerospace primes, tier-1 and tier-2 suppliers, MRO shops, propulsion component manufacturers, structural assembly integrators, actuator OEMs.

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 Aerospace

Typical buyer: Aerospace primes, tier-1 and tier-2 suppliers, MRO shops, propulsion component manufacturers, structural assembly integrators, actuator OEMs.

What's hard about aerospace work: Certification-driven documentation, exotic superalloys, tight tolerances on structural and engine components, ITAR handling for controlled prints, and customer-specific QMS integration.

Typical Aerospace parts we produce on Deep Hole

- Actuator cylinder bores
- Landing gear component through-holes
- Long structural fittings with internal features
- Engine mount and pylon components
- Fluid handling tubes and manifolds

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 Aerospace

Standard range: Titanium Grade 5 (Ti-6Al-4V) and Grade 23 (Ti-6Al-4V ELI) · Inconel 718 · Inconel 625 · Waspaloy · A286 · 17-4 PH · 15-5 PH · 13-8 Mo PH · Aluminum 7075/6061 · Custom aerospace alloys on request.

Titanium Grade 5 is the workhorse and it's temperature-sensitive: aggressive chip load with flood coolant keeps the heat in the chip, not the workpiece. Light cuts overheat titanium and cook tools; that's why titanium demands a different intuition than steel. Inconel 718 in aerospace-aged condition is harder and less forgiving than the annealed billet stock — most aerospace 718 work assumes aged. 17-4 PH and 15-5 PH are common for structural and actuator components; both are precipitation-hardening stainless with condition-specific machining plans.

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, aerospace 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 Aerospace

± 0.0005 " routine on critical features. Tighter with proper fixture and setup — some aerospace features run ± 0.0002 " or GD&T-driven cylindricity and position tolerances. CMM verification standard on first articles; process-driven measurement on runs. Surface finish measured, not estimated.

Documentation and quality workflow

Customer-specific quality plans integrated on demand. First-article layout and CMM verification standard. Material traceability by heat and lot. ITAR-controlled prints handled under NDA with customer-specific document control — prints stay in-shop. Certificates of conformance issued with delivery.

Response time and emergency work

AOG (aircraft-on-ground) work prioritized when material is available. Emergency response supported for existing aerospace customers with blanket arrangements or established relationships. Call direct at (936) 291-7827.

How we compare

Compared to a captive aerospace shop: we're faster for one-offs and small runs, more flexible on setup, and we don't require a long approval process. Compared to a lowest-bidder commodity shop: we understand the alloys, we've handled ITAR before, and we treat first-article inspection as a discipline rather than a formality.

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 Aerospace 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.

Do you serve aerospace primes and tier-1/2 suppliers?

Yes. Aerospace primes, tier-1 and tier-2 suppliers, MRO shops, propulsion component manufacturers, and structural assembly integrators. Customer-specific quality plans and AS9100-lineage QMS expectations supported.

Can you handle ITAR-controlled aerospace/defense work?

Yes. ITAR-controlled prints handled under NDA with customer-specific document control. Prints stay in-shop.

What tolerances do you hold on aerospace parts?

±0.0005" routine on critical features. First-article layout and CMM verification standard. Surface-finish targets measured to spec.

What aerospace alloys do you run?

Titanium Grade 5 (Ti-6Al-4V), Grade 23 ELI, Inconel 718 and 625, Waspaloy, A286, 17-4 PH, 15-5 PH, aluminum 7075/6061. Custom aerospace alloys on request.

Can you respond to AOG (aircraft-on-ground) work?

Yes, when material is available. Emergency response supported for existing aerospace customers. Newer customers should call to discuss what's realistic for their specific alloy and part.

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Ready to talk about your Aerospace 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.

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