WHITE PAPER · FADAL VMC 4020-906-1 × AEROSPACE

Fadal VMC 4020 for Aerospace

CNC vertical mill for precision milling, drilling, and contouring on prototypes through medium production runs. 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.

20" W × 48" L × 24" H workpiece envelope
ENVELOPE

±0.0005" routine on critical features
TOLERANCE

1994
SINCE

ISO 9001:2015
QMS

Same-week / rig-down direct
RESPONSE

Pistol Whiskers · 20" W × 48" L × 24" H workpiece envelope · CNC vertical machining center

PUBLISHED
January 15, 2026

LAST UPDATED
2026-01-15

FORMAT
Web + PDF

READ TIME
~6 min

Executive summary

Machine: Fadal VMC 4020-906-1 (shop nickname: *Pistol Whiskers*). CNC vertical machining center at B&R Productions, running from our New Waverly, Texas shop under an ISO 9001:2015 quality system.

Application: CNC vertical mill for precision milling, drilling, and contouring on prototypes through medium production runs for Aerospace customers — Aerospace primes, tier-1 and tier-2 suppliers, MRO shops, propulsion component manufacturers, structural assembly integrators, actuator OEMs.

Envelope: 20" W × 48" L × 24" H workpiece envelope. **Tolerance:** ±0.0005" routine on critical features. **Traceability:** Material by heat and lot on every job.

The machine, in context

The Fadal 4020 is the workhorse of American medium-envelope CNC milling — rigid, well-understood, and forgiving with the harder alloys. Pistol Whiskers is our go-to for prototype work, repair parts, and small-to-medium production runs where the part fits inside the envelope. It handles complex pocketing, milled features, and multi-face setups without flinching on the alloys that would chatter marginal equipment.

Full specifications

Model	Fadal VMC 4020-906-1 ("Pistol Whiskers")
Type	3-axis CNC vertical machining center
Workpiece envelope	20" W × 48" L × 24" H (B&R working spec)
Axis travels	40" X × 20" Y × 20–28" Z (Fadal 4020 platform)
Table size	48" × 20"
Spindle taper	CAT 40
Spindle speed	75 – 7,500 RPM standard; 10,000 RPM on HT-series builds
Spindle drive	15 HP with 220 ft-lb torque (HT class)
Rapid traverse	900 IPM (per axis)
Automatic tool changer	21-tool ATC
Control	Fadal CNC-88 / Format 2 (some HT and later builds run Fanuc 0i-MC)

Machine weight	~12,500 lb
Tolerance capability	±0.0005" routine on critical features
Materials	Aluminum, stainless, tool steel, 4140/4340, Inconel, Hastelloy, 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 Pistol Whiskers

- Structural brackets and airframe fittings
- Actuator housings and end caps
- Engine mount hardware within 20" envelope
- Sensor housings and control-system enclosures
- Machined tooling and fixtures for aerospace assembly

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 Fadal VMC 4020 platform and Aerospace work. Also indexed as FAQ schema for AI answer engines.

What's the workpiece envelope on the Fadal VMC 4020?

20" W × 48" L × 24" H is B&R's stated working envelope. The Fadal 4020 platform itself has 40" X, 20" Y, 20–28" Z travels — plenty of headroom for the parts we quote on this machine.

What tolerances can the Fadal hold on Inconel or 17-4 PH?

±0.0005" routine on critical features. The 15 HP spindle and 220 ft-lb torque handle roughing without chatter; sharp carbide with the right feed keeps aged-condition alloys behaving.

How many tools can be loaded at once?

21-tool automatic tool changer. Enough for most single-setup jobs — plan the tool list with us in the RFQ and we'll confirm the setup fits.

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.