:
TITAN A16 – CONTINUATION / VARIANT ADDENDUM (USPTO SUBMISSION)
Document Version: 1.1 – Patent Continuation / Variants
Date: January 22, 2026
Project: Titan Alpha Apex 16
Classification: Industrial, Structural & Quantum Grade
Background / Purpose
This continuation discloses additional embodiments of the TITAN A16 material system, including lower-cost and quasicrystal-infused variants, for purposes of structural testing, proof-of-concept, and expanded quantum-acoustic applications. Each variant maintains the triple-helix geometry, golden-ratio node spacing, and resonance characteristics defined in the original patent application.
1. Gold Standard Variants
1A. Gold Standard – Non-Quasicrystal
Composition: Ta-Ti-Au-C
Quantum Fidelity: Phase coherence ≥0.95; entropy gradient ≤0.05
Observables: Supports full suite of 48 observables, including topological edge states
Geometry: Ø30 mm, height 10 mm, triple-helix nodes per original CAD
Purpose: Quantum-acoustic resonators, topological phononics
Notes: Baseline reference for all derivative variants; required for highest-fidelity quantum applications
1B. Gold Standard – Quasicrystal Infused (Alpha Apex 16)
Composition: Ta-Ti-Au-C + surface-engaged quasicrystal layer (~0.2 mm)
Quantum Fidelity: Phase coherence ≥0.95; enhanced torsional suppression and resonance damping
Observables: All 48 observables supported; quasicrystal improves energy redistribution and topological robustness
Geometry: Standard CAD with added QC overlay per G-Code deposition
Purpose: Advanced quantum-acoustic devices, enhanced topological protection
Notes: Requires adaptive G-Code deposition and annealing for quasicrystal formation
2. Low-Cost Variants
2A. Low-Cost Metal – Non-Quasicrystal (SLC Standard)
Composition: Nb-Ti-Zr (~55% Nb / 44% Ti / 1% Zr)
Quantum Fidelity: Phase coherence ~0.85; ~25% of Gold quantum observables retained
Macro-Resonance: ≥98% of Gold standard; torsional suppression preserved
Geometry: Ø30 mm, height 10 mm, central bore Ø2.85 mm, helix pitch 3.85 mm/rev (CAD adjusted for lower density)
Purpose: Structural proof-of-concept, macro-resonance validation
Estimated Cost: ~$1,500 for two pieces
Notes: Not suitable for ultra-high-fidelity quantum applications; used for functional testing and rapid prototyping
2B. Low-Cost Metal – Quasicrystal Infused
Composition: Nb-Ti-Zr + mechanically alloyed/annealed quasicrystal layer (~0.2 mm)

Quantum Fidelity: Phase coherence ~0.85; minor flux-trapping effects; ~25% quantum observables relative to Gold standard
Macro-Resonance: ≥98%; quasicrystal enhances torsional damping and resonance uniformity
Geometry: SLC CAD with added QC overlay; pitch, bore, and node dimensions same as 2A
Purpose: Proof-of-concept for low-cost quasicrystal infusion; structural + resonance demonstration
Estimated Cost: ~$2,000–$2,500 for two pieces (includes milling/annealing for QC layer)
Notes: Compatible with TITAN A16 G-Code deposition protocol; quasicrystal formation achievable with 500–700°C annealing in inert atmosphere
Summary Table of TITAN A16 Variants
Estimated Cost (2 pieces)
Variant
Composition
Quantum Fidelity
Macro-Resonance
Observables
Notes
Gold – Non-QC
Ta-Ti-Au-C
≥0.95
100%
All 48
$9,000
Full baseline reference
Gold – QC
Ta-Ti-Au-C + QC
≥0.95
100%
All 48 + enhanced
$10,000
Topological & damping enhancements
Low-Cost Metal – Non-QC
Nb-Ti-Zr
~0.85
98%
Structural/resonance
$1,500
Proof-of-concept, structural only
Low-Cost Metal – QC
Nb-Ti-Zr + QC
~0.85
98%
Structural/resonance + QC
$2,000–$2,500

Low-cost quasicrystal infusion, structural validation