

M C P S E R V E R

N O C O D E

C L O U D H O S T E D

Bit Selection Optimization MCP

Pick the right bit for any formation and cut drilling costs.

Bit Selection Optimization MCP gives your AI agent the technical data it needs to make drilling decisions. It analyzes formation strength and abrasiveness to recommend specific IADC categories, predicts how fast you'll drill, and runs cost-per-foot math to ensure you're choosing the most efficient bit for the job.

drilling

oil-and-gas

geology

bit-selection

cost-analysis



The connectivity layer between AI and the world's software.

Vinkius sits between AI and every application. All communication passes through Vinkius Cloud via the Model Context Protocol (MCP) — with governance, observability, and security at every layer.

Your AI Connections Run Through Vinkius Cloud

The world's largest
managed MCP catalog

Vinkius is the connectivity layer where AI connects to the software your business already runs. We handle the hosting, the security, the credentials, the uptime — you get agents that actually do things.

We operate the world's largest managed MCP catalog. Major SaaS platforms, CRMs, databases, and cloud providers — running, monitored, production-ready. This MCP server is hosted and maintained by the Vinkius Cloud for AI Agents.

The agent doesn't manage credentials, doesn't manage uptime, doesn't manage security. Vinkius does.

— Architecture principle

Four Pillars of the Vinkius Runtime

01 — Security by design

Credentials stay encrypted at rest via AES-256. The AI agent never touches raw keys — they're injected into a sandboxed V8 isolate at runtime. Actions are logged, and connections have an emergency kill switch.

03 — Deterministic observability

Eight immutable metrics per endpoint: request volume, p95 latency, error rate, active connections, cost attribution. A live payload feed logs every tool call with mutation detection.

02 — Built on MCP Fusion

This MCP server was built with **MCP Fusion**, the open-source framework (Apache 2.0) that powers the entire Vinkius catalog. Schema-as-firewall strips undeclared fields, compiled PII redaction runs at zero overhead, and cryptographic lockfiles produce git-diffable audit trails.

04 — Autonomous operations

Servers are deployed, monitored, and patched autonomously. New capabilities and security patches ship weekly. Zero-downtime deployments ensure continuous availability across all managed MCP servers.

AES-256

Encryption at rest

Ed25519

PKI vault signatures

24h TTL

Ephemeral session keys

V8 Isolate

Sandboxed execution

One Token. Instant Access.

Every MCP server on Vinkius is accessed through a **Connection Token**. Tokens are generated in the cloud dashboard and produce a unique MCP endpoint URL. Paste this URL into any MCP-compatible client — no SDK required.

A single token can serve **multiple AI clients simultaneously**, or you can issue separate tokens per client for granular access control. Each token tracks its own request count, last activity timestamp, and can be individually enabled or revoked.

MCP ENDPOINT`https://edge.vinkius.com/{token}/mcp`

Claude



Cursor



VS Code



Windsurf



Grok



Gemini

Security Is the Architecture

Security in Vinkius is not a feature — it's the foundation of the runtime. The gateway enforces multiple independent protection layers between AI agents and third-party APIs.

01 — Ed25519 PKI Vault

Every workspace has an Ed25519 Master Key. Session keys are generated ephemerally (24h TTL) and signed by the Master Key. Credentials never leave the vault boundary.

02 — V8 Isolate Sandboxing

Tool code runs inside isolated-vm V8 isolates with 64 MB memory caps and per-request timeouts. No filesystem access, no network access except through the SSRF-guarded fetch bridge.

03 — SSRF Guard

All outbound HTTP requests are DNS-resolved and validated before execution. Private IP ranges (10.x, 172.16-31.x, 192.168.x, AWS metadata 169.254.x) are blocked at the network layer.

05 — Cryptographic Audit Trail

Every request is signed into a SHA-256 hash chain with Ed25519 signatures. Events form a tamper-proof, SIEM-exportable forensic record.

04 — DLP & PII Redaction

A ResponseGuard pipeline intercepts every tool response. Configurable redaction patterns strip sensitive fields (emails, SSNs, card numbers) before data reaches the AI agent.

06 — Honeypot Trap System

Phantom credentials are injected into isolated environments. If a honeypot is used outside Vinkius infrastructure, the server is quarantined instantly.

Emergency Kill Switch

EU AI Act Art. 14(1)
Compliant

The kill switch is an **emergency halt** mechanism — not a simple toggle. When triggered, it executes three actions atomically:

01 — Server deactivated

The MCP server is immediately taken offline across the entire cluster.

02 — All tokens revoked

Every connection token is invalidated. Total lockout — reconnection blocked until new tokens are issued.

03 — WebSocket connections killed

Active connections terminated via Redis pubsub broadcast. Propagates to every runtime node in the cluster.

Full Visibility. Zero Guesswork.

The Vinkius cloud dashboard includes a full MCP Governance suite — real-time analytics and security controls for production AI operations.

Control Plane

KPI dashboard with request volume, latency, success rate, token consumption, and AI-generated operational briefings.

FinOps

Cost tracking per tool, payload compression savings, budget optimization signals, and consumption trends.

Firewall & DLP

PII redaction activity, sensitive data protection counters, and security event timeline.

Agent Activity

Which AI clients are connecting, how often, and what they're doing — real-time session tracking.

Tool Health

Slowest and most error-prone tools, with actionable root-cause insights and performance baselines.

Incident Log

Error trends, failure rates, status-code breakdowns, and forensic audit trail access.

Get started at cloud.vinkius.com — connect your AI agent in under 60 seconds.

Bit Selection Optimization MCP

4 tools available

Cloud-hosted on Vinkius

You can stop guessing which bit will handle a specific formation. This MCP gives your AI client the ability to act as a technical drilling consultant. By feeding it geological data like compressive strength and abrasiveness, you can get immediate recommendations for the best bit type. It handles the heavy lifting of comparing different configurations so you can see which one actually makes sense for your budget and your ROP targets. Instead of manually running numbers, you can ask your agent to predict wear or calculate the financial impact of a specific drilling run. It turns raw geological inputs into actionable drilling plans.

Core Capabilities

01 — Bit Recommendation

Your agent identifies the correct IADC category based on formation type and strength.

02 — Performance Prediction

The AI estimates drilling speed and how much the bit will wear down.

03 — Financial Modeling

Your agent calculates the Cost-per-Foot for any given drilling run.

04 — Configuration Comparison

The AI compares two different bit setups to find the most cost-effective choice.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/bit-selection-optimization — connect your AI agent in three steps.

- 01 Connect your preferred AI client to the Vinkius hosted MCP.
- 02 Provide geological data like formation strength or abrasiveness to your agent.
- 03 Ask the agent to select a bit or calculate costs using the built-in tools.
- 04 Receive specific IADC codes, cost metrics, or performance predictions.

Connect your AI client to Vinkius and start running drilling calculations immediately.

Built For

This MCP is built for drilling engineers and operations teams who need to make fast, data-driven decisions at the rig site or in the office.

Drilling Engineer

Hands off geological data to the AI to get bit recommendations and cost estimates.

Operations Manager

Uses the AI to compare different bit options to control drilling costs.

Geologist

Provides formation properties to help the AI select the right tool for the rock type.

What Changes When You Connect

- 01 Reduces manual math by automating Cost-per-Foot calculations.
- 02 Speeds up decision making by providing instant IADC category matches.

- 03

Lowers drilling costs by identifying the most efficient bit configurations.
- 04

Provides predictable drilling outcomes through wear and speed estimates.

Real-World Applications

Formation Matching

Match a bit to a specific rock type by providing its compressive strength and abrasiveness.

Bit Selection Comparison

Compare a PDC bit against a Roller Cone bit for a specific formation to find the winner.

Budget Planning

Run cost-per-foot math to see how different bit choices impact the total drilling budget.

Drilling Speed Prediction

Estimate how fast you will drill and how long the bit will last before it needs replacement.

4 Tools Available

#	TOOL	DESCRIPTION
01	select_optimal_bit	This tool recommends the best bit type and IADC category based on your specific geological and drilling objectives.
02	calculate_cost_analysis	Use this to find the financial efficiency of a drilling run by calculating the Cost-per-Foot metric.
03	compare_bit_options	This tool performs a side-by-side comparison of two different bit configurations to see which performs better.
04	estimate_performance_metrics	This tool predicts expected drilling speed and bit wear characteristics for a chosen bit.

See It in Action

Real prompts you can use once this MCP is connected to your AI agent through Vinkius Cloud.

- U** Recommend a bit for a soft shale formation with a compressive strength of 40 MPa and low abrasiveness for maximum ROP.



The recommended bit is a PDC bit with IADC code M123, which is optimized for high ROP in soft formations.

- U** What is the cost-per-foot if the bit costs \$50,000, the rig rate is \$20,000/hr, the ROP is 50 ft/hr, and the bit life is 20 hours?



The total drilling cost is \$450,000 and the cost-per-foot is \$450.

- U** Compare a PDC bit (IADC M222) and a Roller Cone bit (IADC 537) for a hard granite formation.



The Roller Cone bit (IADC 537) is the winner due to its lower Cost-per-Foot in hard granite formations.

Frequently Asked Questions

01 What AI clients can I use with this MCP?

You can use this MCP with any compatible client, including Claude, Cursor, Windsurf, and VS Code.

02 Do I need to host the MCP myself?

No, Vinkius hosts and manages the MCP for you. You just connect your client and it is ready to use.

03 Can this MCP help with cost-per-foot calculations?

Yes, the `calculate_cost_analysis` tool specifically determines financial efficiency using the Cost-per-Foot metric.

04 How does it recommend a bit?

The `select_optimal_bit` tool uses your inputs regarding formation type, strength, and abrasiveness to suggest the best IADC category.

05 Can I compare two different bits?

Yes, the `compare_bit_options` tool allows you to perform a side-by-side comparison of two bit configurations.

Go Live in 60 Seconds

Get your connection token from cloud.vinkius.com, then paste the endpoint URL into any MCP-compatible client.

YOUR MCP ENDPOINT

`https://edge.vinkius.com/[TOKEN]/mcp`

CLIENT	WHERE TO CONFIGURE
 Claude AI	Profile → Customize → Connectors → "+" → Add custom connector → Paste endpoint
 Cursor	Settings → Features → MCP Servers → "+ Add New MCP Server" → Type: SSE → Paste endpoint
 VS Code	Ctrl/Cmd+Shift+P → "MCP: Add Server" → add <code>"bit-selection-optimization": { "url": "..." }</code>
 Windsurf	MCP Settings → <code>mcp_settings.json</code> → Add endpoint URL
 ChatGPT	Settings → Tools & plugins → Add MCP server → Paste endpoint
 Gemini	Extensions → Add MCP Server → Paste endpoint URL

ASK AN AI ABOUT THIS

Let your preferred AI explain this MCP server

-  **Ask ChatGPT** 
-  **Ask Claude** 
-  **Ask Perplexity** 
-  **Ask Gemini** 
-  **Ask Grok** 

READY TO CONNECT

Bit Selection Optimization is live on Vinkius Cloud.

Get your connection token, paste it into your AI agent, and
start building. No SDK. No deployment. Just results.

Start at cloud.vinkius.com →

vinkius.com · support@vinkius.com

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Platform	Vinkius Cloud for AI Agents
Endpoint	<code>https://edge.vinkius.com/{token}/mcp</code>

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