MCP SERVER | NO CODE | CLOUD HOSTED

Blending Optimization Mining MCP

Solve complex metallurgical blending problems with linear programming.

Blending Optimization Mining MCP gives your AI client the mathematical heavy lifting needed for metallurgical blending. It uses linear programming to find the most efficient ore combinations, ensuring you hit specific grade constraints while maximizing value from your available stockpiles.

A+ Quality Score 100/100

ore | blending | linear-programming | metallurgy | mining-optimization

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vinkius.com/en/ai-agent-connect/blending-optimization-mining

SCAN TO VIEW

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.

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.

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.

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	Ed25519	24h TTL	V8 Isolate
Encryption at rest	PKI vault signatures	Ephemeral session keys	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.

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.

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.

06 — Honeytoken Trap System

Phantom credentials are injected into isolated environments. If a honeytoken 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.

Agent Activity

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

FinOps

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

Tool Health

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

Firewall & DLP

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

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.

Blending Optimization Mining MCP

4 tools available
Cloud-hosted on Vinkius

You can now give your AI agent the ability to handle complex metallurgical math. This MCP provides the specific tools needed to manage ore blending through linear programming. Instead of manual calculations, your agent can look at your current stockpiles using get_source_availability to see exactly what you have on hand. From there, it can run calculate_optimal_blend to find the most efficient recipe that meets your mass and quality requirements. If you aren't sure if a target is even possible, the agent uses validate_blend_feasibility to check the math before you commit to a plan. You can also use predict_blend_quality to see the expected chemical makeup of a specific mix before it ever hits the processing plant. It turns your AI client into a specialized tool for mining optimization and grade control.

Core Capabilities

01 — Stockpile Inspection

Your agent checks current inventory and quality profiles.

02 — Feasibility Testing

The AI verifies if a target grade is mathematically possible.

03 — Optimal Recipe Generation

Linear programming finds the most efficient ore mix.

04 — Composition Forecasting

The agent predicts the chemical makeup of a proposed blend.

One Click on Vinkius — From Prompt to Execution

Available at **vinkius.com/en/ai-agent-connect/blending-optimization-mining** — connect your AI agent in three steps.

01 Connect your MCP-compatible client to Vinkius.

02 Ask your agent to check current stockpile availability.

03 Request a feasibility check for your target grade.

04 Run the optimization tool to get the final recipe.

Connect your client to Vinkius and start running optimization math immediately.

Built For

This MCP is built for professionals managing ore stockpiles and metallurgical processing.

Metallurgists

They hand off complex blending calculations to the agent to verify grade targets.

Mine Planners

They use the agent to optimize ore source combinations for efficiency.

Process Engineers

They use the agent to predict the chemical output of specific ore mixes.

What Changes When You Connect

01 Replaces manual linear programming with direct AI tool calls.

02 Reduces errors in grade forecasting through mathematical validation.

03	Optimizes ore usage by finding the most efficient source combinations.
04	Provides instant feasibility checks for target grade constraints.

Real-World Applications

Grade Constraint Management

Ensure every blend meets strict chemical requirements for downstream processing.

Stockpile Optimization

Find the best way to use available ore to hit specific mass and quality targets.

Pre-blend Verification

Check if a planned mix will actually hit the desired iron or phosphorus levels.

Inventory Analysis

Get a clear view of available ore quality and quantity across all stockpiles.

4 Tools Available

#	TOOL	DESCRIPTION
01	`get_source_availability`	This tool pulls current stock levels and quality profiles for every available ore stockpile.
02	`predict_blend_quality`	Use this to calculate the expected chemical composition of a blend based on specific ore masses.
03	`validate_blend_feasibility`	This tool checks if a target blend can actually meet your required grade constraints.
04	`calculate_optimal_blend`	This tool solves linear programming problems to find the best ore combination for your needs.

See It in Action

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

U Find the best blend for 5000 tons of ore with at least 62% Iron and max 0.05% Phosphorus using available sources.

The optimal recipe for 5000 tons is: Source_A (3200 tons) and Source_B (1800 tons), resulting in 62.5% Iron and 0.04% Phosphorus.

U Is it possible to blend 1000 tons of ore with 65% Iron using the current stockpiles?

No, the current stockpiles cannot reach a 65% Iron concentration for a 1000 ton mass; the maximum achievable is 63.8%.

U What will the quality be if I mix 2000 tons of Source_A and 3000 tons of Source_C?

The predicted blend will have a total mass of 5000 tons with an Iron grade of 61.2% and Silica content of 4.5%.

Frequently Asked Questions

01 **What kind of math does this MCP use?**

It uses linear programming to solve for the most efficient combinations of ore sources.

02 **Can I use this with Claude or Cursor?**

Yes, you can connect this MCP to any compatible client like Claude, Cursor, or Windsurf.

03 **How does it handle ore quality?**

It uses quality profiles from your stockpiles to predict the chemical composition of any proposed blend.

04 **Will it tell me if my target is impossible?**

Yes, the feasibility tool specifically checks if a target can be met with your current ore sources.

05 **Do I need to host the math engine myself?**

No, Vinkius hosts the MCP and manages everything so it is ready to use immediately.

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 `"blending-optimization-mining": { "url": "…" }`
Windsurf	MCP Settings → `mcp_settings.json` → 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

Blending Optimization Mining 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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Server ID	`01a07e79-6adb-72e1-b151-c8b02fc40d6e`
Platform	Vinkius Cloud for AI Agents
Endpoint	`https://edge.vinkius.com/{token}/mcp`

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