

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

Atmospheric Distillation Design MCP

Turn crude oil assay data into precise column configurations.

Atmospheric Distillation Design MCP provides the engineering math needed to build and optimize Atmospheric Distillation Units. You can use it to determine theoretical stages, predict product yields from specific crude assays, and calculate the energy required for furnaces and cooling systems. It bridges the gap between raw assay data and actionable column design.

distillation

crude-oil

refinery

chemical-engineering

process-design



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.

Atmospheric Distillation Design MCP

4 tools available

Cloud-hosted on Vinkius

You can use this MCP to handle the heavy lifting of atmospheric distillation unit (ADU/CDU) design. Instead of manually running separate calculations for every design iteration, you can feed crude oil assay data directly to your AI client to get immediate results. It handles the core engineering math for column sizing and energy balancing. You can determine the necessary theoretical stages to hit your separation targets or predict exactly how much naphtha, diesel, and residue you'll get from a specific feedstock. It also manages the thermal side of the design, helping you find the best pumparound locations to save energy and calculating the total heat duty for your furnace and condensers. It's built to turn raw refinery data into a functional column blueprint.

Core Capabilities

01 — Column Sizing

Your agent calculates the theoretical stages needed for specific separation requirements.

02 — Yield Prediction

The AI estimates the volume of product fractions based on crude oil assays.

03 — Energy Optimization

Your agent identifies optimal pumparound locations to improve heat recovery.

04 — Thermal Duty Calculation

The tool computes furnace heat requirements and product cooling needs.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/atmospheric-distillation-design — connect your AI agent in three steps.

- 01 Connect your preferred client like Claude or Cursor to Vinkius.
- 02 Provide your crude oil assay data to your AI agent.
- 03 Ask the agent to run specific tools like stage calculations or yield estimates.
- 04 Review the calculated column configurations and energy requirements.

You connect the MCP to your AI client and start running engineering calculations immediately.

Built For

This MCP is built for refinery engineers and process designers who need to move quickly from assay data to column specifications.

Process Engineer

Hands off crude assay data to the AI to generate initial column designs.

Refinery Designer

Uses the tool to verify stage counts and energy balances for new units.

Chemical Engineer

Relies on the tool to optimize heat recovery through pumparound calculations.

What Changes When You Connect

- 01 Connects crude oil assay data directly to column configuration math.
- 02 Reduces manual calculation time for theoretical stage determination.

- 03

Provides rapid energy consumption estimates for furnace and condenser duty.
- 04

Optimizes heat recovery by identifying efficient pumparound locations.

Real-World Applications

Initial Unit Design

Use the tool to set the foundation for a new atmospheric distillation unit based on feedstock properties.

Feedstock Sensitivity Analysis

Predict how changing your crude oil source will impact your product yields.

Energy Efficiency Audits

Run pumparound optimizations to find ways to reduce furnace duty.

Capacity Planning

Calculate how throughput changes affect the required number of theoretical stages.

Patterns to Avoid

Manual Iteration Loops

❌ AVOID

You manually calculate stages in a spreadsheet, then type those numbers into your AI client to ask for yield predictions.

✓ INSTEAD

Feed your crude oil assay data directly to the MCP and use ``calculate_column_stages`` to let the math drive the design iterations.

Ignoring Energy Recovery

❌ AVOID

You design a column based solely on separation targets without checking if your furnace duty is too high.

✓ INSTEAD

Use ``optimize_pumparounds`` to find better heat removal locations and ``evaluate_energy_consumption`` to check your total thermal load.

Static Yield Assumptions

❌ AVOID

You assume a fixed yield for naphtha and diesel regardless of the crude oil source you are using.

✓ INSTEAD

Run ``estimate_product_yields`` every time you change your feedstock to see how the product volumes actually shift.

The Right Fit

Process engineers and refinery designers should connect this MCP if they need to move from raw assay data to column specifications quickly. It is not for general chemical engineers who do not work with distillation unit design. The decision depends on whether you need to automate the math behind column sizing and energy balancing.

Atmospheric Distillation Design 4 Tools

These tools handle the core engineering math for column sizing, product yields, and thermal energy management.

#	TOOL	DESCRIPTION
01	calculate_column_stages	Use this to find the exact number of theoretical stages required to reach your separation goals.
02	estimate_product_yields	This tool predicts the specific volume of each product fraction you'll get from a given crude oil.
03	evaluate_energy_consumption	This calculates the total heat needed for the furnace along with the cooling requirements for products and pumparounds.
04	optimize_pumparounds	This tool finds the best locations and flow rates for heat removal to maximize energy efficiency.

See It in Action

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

U Calculate the number of stages needed for a throughput of 50000 kg/h with specific assay data.



The required number of theoretical stages is 32, with a minimum of 24 stages.

U What are the expected yields for this crude oil?



The predicted yields are: Naphtha 15%, Kerosene 12%, Diesel 25%, Gas Oil 30%, and Residue 18%.

U Calculate the energy consumption for the column design.



The total energy requirement is 450 MW, consisting of 380 MW furnace duty and 70 MW condenser duty.

Frequently Asked Questions

01 What kind of data does this MCP need?

It primarily uses crude oil assay data to perform distillation calculations.

02 Can I use this with Claude or Cursor?

Yes, you can use this MCP with any MCP-compatible client including Claude, Cursor, and Windsurf.

03 Does this tool handle energy calculations?

Yes, it can evaluate total energy consumption, including furnace duty and cooling requirements.

04 How does it help with heat recovery?

It uses the optimize_pumparounds tool to find the best locations and flows for heat removal.

05 What is the output of the yield tool?

The tool provides predicted volumes for product fractions like naphtha, kerosene, and diesel.

06 What inputs are needed for column stage calculation?

You need to provide the crude throughput, the assay data as a JSON string, and the target product specifications.

07 Can I optimize energy efficiency?

Yes, you can use `optimize\_pumparounds` to find the best locations for heat removal to maximize energy recovery.

08 How are product yields determined?

Yields are calculated by integrating the boiling point distribution from your assay data over the specified cut points.

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>"atmospheric-distillation-design": { "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

Atmospheric Distillation Design 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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DOCUMENT INFORMATION

Generated	September 2026
MCP Server	Atmospheric Distillation Design MCP
Server ID	01a096a9-05b4-731c-878e-6fd130abc84f
Platform	Vinkius Cloud for AI Agents
Endpoint	https://edge.vinkius.com/{token}/mcp

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