

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

Ethylene Cracker Design Engine MCP

Model steam cracking processes and furnace parameters with precision.

Ethylene Cracker Design Engine MCP provides specialized modeling for steam cracking processes. You can determine physical furnace parameters, forecast chemical yields, evaluate maintenance needs, and test how different feedstocks like naphtha, ethane, or LPG affect your design constraints.

A+ Quality Score 100/100

ethylene

steam-cracking

furnace-design

petrochemical

process-modeling



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.

Ethylene Cracker Design Engine MCP

4 tools available

Cloud-hosted on Vinkius

This MCP gives your AI client the ability to run complex petrochemical simulations. Instead of manually calculating furnace configurations, you can use your agent to determine physical and operational design based on specific capacity targets. You can model how different feedstocks, such as naphtha or LPG, will behave within your current setup. It handles the math for predicting product slates and estimating how much coke will accumulate over time. This allows you to test design adaptability and evaluate maintenance requirements without running manual iterations. You can check if a furnace can handle alternative feedstocks without hitting design limits, making it a practical tool for process engineering and plant optimization.

Core Capabilities

01 — Furnace Design

Your agent calculates physical and operational parameters for specific capacities.

02 — Yield Forecasting

The AI predicts the chemical composition of the output based on furnace settings.

03 — Maintenance Planning

The tool estimates coke accumulation and its impact on furnace lifespan.

04 — Feedstock Testing

You can check if a furnace design remains valid when switching between ethane, naphtha, or LPG.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/ethylene-cracker-design-engine — connect your AI agent in three steps.

- 01 Connect your preferred MCP-compatible client to Vinkius.
- 02 Provide your design targets or feedstock data to your AI agent.
- 03 The agent calls the specific design or prediction tool.
- 04 The MCP returns the calculated parameters or forecasts.
- 05 Your agent presents the technical results for your review.

You connect your AI client to the Vinkius hosted MCP to start running simulations.

Built For

This MCP is built for professionals working in petrochemical engineering and process design.

Process Engineers

They use the tool to model furnace parameters and feedstock flexibility.

Plant Managers

They rely on coking impact estimates to plan maintenance schedules.

Chemical Engineers

They use yield predictions to optimize product slates.

What Changes When You Connect

- 01 Automates the calculation of furnace physical and operational parameters.
- 02 Provides chemical yield forecasts for various feedstock types.

03 Predicts coke accumulation to assist in maintenance scheduling.

04 Tests feedstock adaptability against existing design constraints.

Real-World Applications

New Plant Design

Calculate the necessary furnace parameters for a specific annual capacity.

Maintenance Optimization

Estimate coke buildup to determine when a furnace needs cleaning.

Feedstock Switching

Verify if a furnace can switch from ethane to naphtha without violating constraints.

Product Optimization

Adjust furnace configurations to change the resulting chemical product slate.

4 Tools Available

#	TOOL	DESCRIPTION
01	assess_feedstock_flexibility	This tool checks if a designed furnace can handle an alternative feedstock without hitting design constraints.
02	calculate_furnace_parameters	Use this to determine the physical and operational design of the furnace based on your target capacity and feedstock.
03	estimate_coking_impact	This tool evaluates the operational lifespan and maintenance requirements of the furnace.
04	predict_product_slate	This tool forecasts the chemical composition of the output for a specific furnace configuration.

See It in Action

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

U Design a furnace for 500,000 metric tons of ethane per year.



The furnace design for 500,000 metric tons of ethane includes a coil outlet temperature of 820°C and a residence time of 0.25 seconds.

U What will the product yield be for naphtha at 850°C and 0.3 seconds residence time?



At 850°C and 0.3 seconds, the predicted yields are 32% ethylene, 15% propylene, 5% butadiene, and 12% aromatics.

U How much coke will accumulate after 60 days of operating with naphtha at 840°C?



After 60 days of operation, the estimated coke thickness is 1.2mm with a predicted pressure drop increase of 0.05 bar.

Frequently Asked Questions

01 What feedstocks can this MCP model?

The MCP handles various feedstocks including naphtha, ethane, and LPG.

02 How do I use this with Claude or Cursor?

You connect your client to Vinkius, which hosts the MCP. Once connected, your AI client can call the design and prediction tools directly.

03 Can I use this to plan maintenance?

Yes, you can use the `estimate_coking_impact` tool to evaluate the operational lifespan and maintenance needs of a furnace.

04 Does this MCP require me to host anything?

No, Vinkius hosts and manages the MCP for you. You just connect your client and start working.

05 Can I check if my current furnace can handle different feedstocks?

Yes, the `assess_feedstock_flexibility` tool is specifically designed to check if a furnace can handle alternative feedstocks without violating design constraints.

06 What feedstocks can I model?

The engine supports modeling for naphtha, ethane, and LPG feedstocks.

07 How do I check if my furnace can handle a different feedstock?

You can use the `'assess_feedstock_flexibility'` tool to evaluate if a current design is compatible with an alternative feedstock type.

08 Can I predict the chemical output of my furnace?

Yes, the `'predict_product_slate'` tool forecasts the chemical composition including ethylene, propylene, and other yields based on temperature and residence time.

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>"ethylene-cracker-design-engine": { "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

Ethylene Cracker Design Engine 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

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Server ID	01a094ea-4bfe-7149-af39-fb6408afc9f7
Platform	Vinkius Cloud for AI Agents
Endpoint	<code>https://edge.vinkius.com/{token}/mcp</code>

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