

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

Fluid Catalytic Cracking Design Suite

Model heavy hydrocarbon conversion and reactor heat balances.

Fluid Catalytic Cracking (FCC) Design Suite gives your AI client the engineering logic needed to design and optimize FCC units. It handles the heavy lifting of calculating product yields, managing catalyst circulation, and predicting the thermal environment of the regenerator. You can use it to assess catalyst health and maintain precise heat balances during heavy oil conversion.

fcc

refinery

hydrocarbons

catalysis

chemical-engineering



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.

Fluid Catalytic Cracking (FCC) Design Suite MCP

4 tools available

Cloud-hosted on Vinkius

You can now run complex FCC unit design calculations directly through your AI client. This MCP provides the specific engineering tools required to model how heavy hydrocarbons convert into high-value products like gasoline and olefins. Instead of manually calculating mass flows or thermal profiles, you tell your agent what your feed properties and conversion targets are, and it handles the math.

When you're designing a unit, you can use this MCP to determine how much catalyst needs to circulate to keep the heat balance stable. It also lets you look ahead at the regenerator's thermal and chemical environment to avoid operational issues. If you're worried about feed contaminants or temperature spikes, the suite can assess deactivation risks to help you understand how quickly your catalyst might lose effectiveness. It turns your AI into a specialized refinery engineering assistant that understands the relationship between feed density, CCR, and final product distribution.

Core Capabilities

01 — Yield Prediction

Your agent calculates volume distributions for gasoline, olefins, and other products.

02 — Heat Balance Management

The AI determines the necessary catalyst mass flow to keep the reactor stable.

03 — Regenerator Modeling

Your client predicts the thermal and chemical state of the regenerator environment.

04 — Catalyst Health Assessment

The MCP evaluates how feed contaminants and temperature affect catalyst life.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/fluid-catalytic-cracking-fcc-design-suite — connect your AI agent in three steps.

- 01 Connect your MCP-compatible client like Claude or Cursor to Vinkius.
- 02 Provide your feed properties and target conversion to your AI agent.
- 03 The agent calls the specific FCC design tool needed for the calculation.
- 04 The MCP returns the calculated yields, flow rates, or thermal conditions.
- 05 Your agent presents the technical results for your review.

Connect your AI client to Vinkius to access these engineering tools instantly.

Built For

This MCP is built for refinery engineers and chemical process specialists who need to run rapid design iterations.

Process Engineer

Uses the MCP to run quick yield and circulation calculations during unit design.

Refinery Manager

Uses the tool to assess the impact of feed changes on product output.

Catalyst Specialist

Uses the deactivation tools to monitor catalyst health and life cycles.

What Changes When You Connect

- 01 Calculates product distributions based on feed density and CCR.
- 02 Maintains heat balance by determining precise catalyst circulation rates.

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- 03** Predicts regenerator thermal environments to prevent operational upsets.
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- 04** Assesses catalyst deactivation risks from feed contaminants.
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Real-World Applications

Unit Design Iteration

Run multiple scenarios to find the optimal catalyst circulation for a new FCC unit design.

Feedstock Change Analysis

Check how switching to a different VGO feed affects your gasoline and olefin yields.

Operational Safety

Predict regenerator temperatures to ensure they stay within safe operating limits.

Catalyst Lifecycle Planning

Evaluate how temperature and contaminants will impact how fast you need to replace catalyst.

4 Tools Available

#	TOOL	DESCRIPTION
01	analyze_deactivation_risk	This tool assesses how quickly your catalyst will lose its effectiveness based on operating conditions.
02	calculate_product_yields	This tool determines the expected volume distribution of products based on your specific feed and catalyst inputs.
03	determine_catalyst_circulation	Use this to calculate the required mass flow of catalyst needed to maintain both the reaction and heat balance.
04	evaluate_regenerator_conditions	This tool predicts the thermal and chemical environment inside the regenerator.

See It in Action

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

- U** Calculate the product yields for a VGO feed with density 0.85, CCR of 0.5, and distillation endpoint of 550, targeting 70% conversion with a catalyst activity of 0.9.



The predicted yields are: Gasoline 52.5%, LCO 18.2%, HCO 10.3%, Coke 8.5%, and Gas 10.5%.

- U** What is the required catalyst circulation rate for a feed flow of 50,000 kg/h with a coke yield of 0.08 and a heat requirement of 1,200,000 kJ/h?



The required catalyst mass flow rate is 15,000 kg/h, resulting in a circulation ratio of 0.3.

- U** Predict the regenerator conditions for a catalyst flow of 15,000 kg/h, a coke yield of 0.08, and an oxygen availability of 2.0.



The predicted regenerator temperature is 695°C, with a flue gas composition of 3% CO and 2% O₂.

Frequently Asked Questions

01 What kind of feedstocks can this MCP model?

The tools are designed to model heavy hydrocarbons, such as VGO, for conversion in FCC units.

02 Can I use this with Claude or Cursor?

Yes, this MCP works with any MCP-compatible client including Claude, Cursor, and Windsurf.

03 Does this MCP handle heat balance calculations?

Yes, the `determine_catalyst_circulation` tool calculates the mass flow required to maintain the heat balance.

04 How does the MCP help with catalyst management?

It uses the `analyze_deactivation_risk` tool to assess how quickly catalyst effectiveness drops based on temperature and contaminants.

05 Do I need to host the MCP myself?

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

06 How do I calculate the expected gasoline yield?

You can use the `calculate_product_yields` tool. Provide the feed properties (density, CCR, and distillation endpoint), the desired conversion target, and the catalyst activity level.

07 Can this tool help with heat balance calculations?

Yes. Use `determine_catalyst_circulation` to calculate the necessary mass flow of catalyst required to satisfy the endothermic heat requirement of the cracking reaction.

08 How is catalyst deactivation assessed?

The `analyze_deactivation_risk` tool assesses risk by evaluating the feed type (VGO or Residue), metal content, and the predicted regenerator temperature.

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>"fluid-catalytic-cracking-fcc-design-suite": { "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

Fluid Catalytic Cracking (FCC) Design Suite 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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Platform	Vinkius Cloud for AI Agents
Endpoint	https://edge.vinkius.com/{token}/mcp

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