MCP SERVER | NO CODE | CLOUD HOSTED

Beam Span Estimator MCP for AI Agents

Preliminary Concrete Beam Dimensioning and Structural Analysis by Span

The Beam Span Estimator is a structural engineering MCP that lets your AI client quickly estimate minimum concrete beam dimensions and check load safety for any clear span. It also identifies equivalent standard steel profiles to help you compare materials right on the initial architectural sketch, saving time during pre-dimensioning.

A+ Quality Score 100/100

structural-engineering | concrete-beam | steel-profiles | pre-dimensioning | civil-engineering

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vinkius.com/mcp/beam-span-estimator

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.

Beam Span Estimator MCP

3 tools available
Cloud-hosted on Vinkius

Designing new structures starts with rough sketches. This connector helps structural engineers bypass tedious manual calculations when figuring out basic concrete beam sizing. You input a simple clear span measurement; the MCP immediately estimates the minimum required height and width using industry rule-of-thumb methods. Beyond just dimensions, it gives you instant comparisons to standard steel profiles that match or exceed your calculated depth. It also flags potential structural risks by assessing load adequacy against your geometry.

This process means you don't have to switch between multiple calculation sheets or consult static design guides for basic sizing checks. You get immediate feedback on material selection and potential load deficiencies, right within your agent chat interface. Because this capability is hosted on Vinkius, you connect once from any MCP-compatible client and gain access to this entire catalog of specialized engineering tools.

Core Capabilities

01 — Estimate concrete beam sizing

Calculate the minimum required height and width for a concrete beam based only on its clear span.

02 — Compare to standard steel profiles

Find matching or larger standard steel sections that fit the calculated depth of your concrete beam.

03 — Assess structural load risk

Evaluate if a given applied load falls within typical, safe range for the estimated beam geometry.

One Click on Vinkius — From Prompt to Execution

Available at **vinkius.com/mcp/beam-span-estimator** — connect your AI agent in three steps.

01 Provide your AI client with the clear span distance and any known structural constraints.

02 The MCP runs calculations to suggest minimum concrete dimensions and then compares those results against available standard steel profiles for material options.

03 Finally, you assess the calculated geometry by running a load adequacy check to determine if the proposed beam can safely handle the expected forces.

The bottom line is that instead of performing three separate calculations across different software, your agent handles the entire preliminary structural assessment in one flow.

Built For

Civil and structural engineers need this MCP. If you spend time on initial design sketches—the phase where dimensions are rough and quick iterations happen constantly—you know how slow manual calculations get. This tool gets you accurate, preliminary sizing estimates fast.

Structural Engineer

Uses this MCP to quickly generate preliminary beam sizes based on spans during the early concept design phase.

Architect

Provides the initial clear span dimensions, letting their agent run structural pre-checks before handing off drawings for final engineering.

Civil Engineer

Verifies material suitability by comparing calculated concrete depths against standard steel profiles in a single chat interaction.

What Changes When You Connect

01 Instantly determine preliminary dimensions: Use `calculate_beam_dimensions` to find minimum beam heights and widths in seconds, rather than hours of manual calculation.

02 Streamline material choice: The MCP uses `compare_steel_profiles` to show you standard steel alternatives that match your calculated beam depth right away. No cross-referencing needed.

03 Catch structural problems early: Before finalizing plans, run a check with `validate_load_adequacy` to flag potential risks from excessive loads or deflection.

04 Consolidate design steps: You combine dimensioning, material comparison, and load checking into one conversation flow, eliminating context switching between different tools.

05 Faster iteration cycles: When you're sketching multiple options for a building, this MCP lets you test dozens of spans and materials rapidly.

Real-World Applications

Checking preliminary beam sizes for a new roof span

A structural engineer inputs the clear span for a long-span roof. The agent uses `calculate_beam_dimensions` to get initial estimates, then runs `compare_steel_profiles` to see if W410 or W460 steel sections are suitable alternatives.

Verifying load capacity during design revision

An architect updates the anticipated floor load on an existing beam. The agent first estimates the dimensions and then uses `validate_load_adequacy` to tell them immediately if the current geometry is insufficient for the new load.

Material selection comparison

The team needs to decide between concrete and steel support beams. The agent calculates the required concrete depth, then uses `compare_steel_profiles` to pull up matching W-series profiles, allowing for a direct material comparison.

Quick sizing check in the field

A site foreman needs an estimate for a temporary walkway span. The agent runs the minimum dimension calculation instantly using `calculate_beam_dimensions`, providing actionable numbers on the spot.

Patterns to Avoid

Mixing up beam and column dimensions

✗ AVOID

A user tries to run a load check by inputting a column's vertical dimension instead of the beam's horizontal span. This gives nonsensical results.

✓ INSTEAD

Always start with `calculate_beam_dimensions` using the clear span measurement, then use `validate_load_adequacy` with the correct anticipated load (kN/m). Never mix these inputs.

Ignoring profile standardization

✗ AVOID

The user calculates a required depth of 415mm and assumes any steel beam will work, leading to material ordering issues.

✓ INSTEAD

After running dimensions, always use `compare_steel_profiles`. This tool filters results down to actual, standardized profiles (like W460×52) you can order.

Skipping load validation

✗ AVOID

The user gets preliminary dimensions and assumes the beam is strong enough for a heavy equipment load, leading to potential structural failure.

✓ INSTEAD

Never assume safety. After getting initial dimensions, you must run `validate_load_adequacy` with the exact anticipated load (kN/m) before proceeding.

The Right Fit

Use this MCP if your primary need is preliminary structural sizing based on span length and material comparison. If you are in the early stages of concept design, it's perfect because it gives quick estimates for dimensions (`calculate_beam_dimensions`) and checks load safety (`validate_load_adequacy`). Don't use it if you already have final, detailed architectural drawings that require complex Finite Element Analysis (FEA); this MCP is for pre-dimensioning. Also, don't rely on the steel comparison alone; always verify dimensions first using `calculate_beam_dimensions` before running `compare_steel_profiles` . This tool gives estimates, not certified structural stamps.

Beam Span Estimator MCP: Solving Initial Concrete Design Challenges

Before this MCP, sizing a concrete beam required juggling multiple reference guides. You'd manually look up rules like L/10 or L/12 based on the clear span, estimate rough dimensions (height and width), then spend time cross-referencing those dimensions against standardized material profiles to see what steel alternatives were available.

Now you just input the span into your agent. It automatically runs the basic dimension calculation for you, providing both minimum and maximum estimates instantly. You get accurate sizing parameters without ever opening a PDF guide.

Beam Span Estimator MCP: Verifying Structural Load Requirements

Without this tool, checking if the beam could handle an unexpected load meant guessing or running complex manual calculations to predict deflection and risk. You'd often have to recalculate dimensions just because a load changed by 10 kN/m.

With the MCP, you get immediate risk feedback. You run `validate_load_adequacy` right after sizing, telling you if that specific combination of load and geometry is safe or if you need bigger materials. It's instant due diligence.

Beam Span Estimator: 3 Structural Engineering Tools for Concrete Design

Use these tools to calculate required dimensions, compare materials, and validate structural loads instantly within your chat agent.

#	TOOL	DESCRIPTION
01	`calculate_beam_dimensions`	Gives you the estimated minimum height and width for a concrete beam based on a given clear span length.
02	`compare_steel_profiles`	Identifies specific, standardized steel sections that match or exceed the depth suggested by your calculated concrete beam.
03	`validate_load_adequacy`	Runs an assessment to determine if a specified load is within a typical safe range for the resulting beam dimensions.

See It in Action

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

U I have a clear span of 7 meters for the main corridor beam. What should its minimum concrete dimensions be?

Beam Dimensions Estimate

For a 7-meter clear span, here are your preliminary recommendations based on common rules:

- **Minimum Height (L/12):** Approx. 0.58m
- **Maximum Height (L/10):** Approx. 0.70m
- **Suggested Width:** 0.35m

Use these numbers to start your design sketch.

U Find some steel profiles that match a beam depth of about 600mm.

Matching Steel Profiles Found

We found several standard W-series profiles that meet or exceed the 600mm depth requirement:

- **W520×90:** Depth: 520mm (Close fit)
- **W610×85:** Depth: 610mm (Good match)
- **W700×100:** Depth: 700mm (Exceeds requirement)

U Is a live load of 80 kN/m safe for the beam dimensions I calculated?

Load Adequacy Report

- **Input Load:** 80 kN/m
- **Calculated Geometry:** H=0.65m, W=0.35m
- **Risk Level:** High

⚠️ **Warning:** The load of 80 kN/m is too high for the current beam geometry. This suggests a significant risk of excessive deflection. Consider increasing the height or width.

Frequently Asked Questions

01 **How does the Beam Span Estimator help me with initial structural sizing?**

The MCP gives you fast, reliable estimates for beam dimensions using simple span inputs. It skips complex manual calculations and provides minimum/maximum height and width ranges needed for your rough design sketches.

02 **Can I use the Beam Span Estimator to compare concrete beams with steel supports?**

Yes, it's built for that. After calculating preliminary dimensions, you can run a comparison tool that finds standard steel profiles (like W-series) that match or exceed your suggested beam depth.

03 **What if my load estimate changes? Can the Beam Span Estimator check that?**

Absolutely. You use the load validation tool to test any anticipated force against your current geometry. It gives you a clear risk level—low, medium, or high—telling you exactly where structural concerns lie.

04 **Is this MCP for advanced final engineering plans?**

No. This is strictly a pre-dimensioning tool for concept design and initial sketches. It's designed to give reliable estimates, not certified calculations needed for final blueprints.

05 **Does Beam Span Estimator help with temporary structures too?**

Yes, because it relies on the clear span measurement, you can quickly check sizing requirements whether the beam is part of a permanent building or a temporary walkway.

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 `"beam-span-estimator": { "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

Beam Span Estimator 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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