

ENGINEERING AND AI WEBINAR SERIES

TE KAHA, REVISITING THE PROJECT WITH AN AI LENS – Q&A

Question	Answer
<p>Do I need to learn any coding language to incorporate my structural design analysis?</p> <p>Do you conduct any seminars on how to properly incorporate design software to ai?</p>	<p>You don't need to be a software developer to start using AI meaningfully in structural engineering, but some familiarity with scripting (particularly Python) is a real advantage.</p> <p>AI can actually lower the barrier to learning code by helping engineers write, refactor, and understand scripts much faster than traditional learning routes. Many engineers are now using AI as a co-pilot to build small, targeted tools rather than large software systems.</p> <p>In terms of training, Mott MacDonald runs internal capability-building sessions, and organisations like Engineering New Zealand and the AI Forum NZ are increasingly hosting practical, discipline-specific seminars. We expect this area to grow rapidly over the next 1–2 years.</p> <p>Many teams are seeing value from AI even without writing code themselves, by using AI-enabled tools embedded directly into existing design software.</p>
<p>What did you mean by deterministic models?</p>	<p>By deterministic workflows, we mean engineering workflows where the same inputs always produce the same outputs, even if AI was used to generate parts of the code or logic.</p> <p>In practice, this means:</p> <ul style="list-style-type: none"> • AI can write or refactor code, but the code itself behaves predictably. • AI outputs are placed behind validation and constraint checks. • Engineers define acceptable ranges, limits, and behaviours – effectively creating guardrails around AI use. <p>This is critical for safety-critical disciplines like structural engineering.</p>

<p>What platform did you create your Ai agent's in? Did you make them with their own UI?</p>	<p>Most AI-assisted engineering tools are built using standard development environments such as VS Code or Visual Studio, often combined with Python-based workflows and Grasshopper.</p> <p>At Mott MacDonald, we typically:</p> <ul style="list-style-type: none"> • Use foundation models accessed through approved enterprise platforms. • Avoid training proprietary models unless there is a strong, validated business case. • Focus on workflow integration, not standalone AI “black boxes”. <p>The emphasis is on safety, traceability, and maintainability, rather than novelty.</p> <p>These agents are tightly scoped and task-specific, not autonomous decision-makers</p>
<p>Have you ever trained an AI on custom datasets?</p>	<p>Yes – but selectively. Training or fine-tuning AI on custom datasets can be powerful, especially for:</p> <ul style="list-style-type: none"> • Internal standards and guidance, • Repetitive QA tasks, • Historical project data analysis. <p>However, it also introduces data governance, security, and bias considerations, so it’s not always the right approach. In many cases, combining retrieval-based AI (AI that searches trusted datasets) with deterministic workflows provides most of the value with lower risk</p>
<p>Hi Nick F, super engaging presentation, thanks so much! What AI resource (newsletter, podcast, book, blog) would you recommend for structural engineers to stay up to date with AI?</p> <p>And what is your top AI use case as a structural engineer, one that you use AI for every day or week?</p>	<p>I personally like to use LinkedIn to stay up to date with industry and technology news, but there are many great resources online including Python for Structural Engineers, https://hamel.dev/, bimirco.com, langchain on YouTube, AI Engineer, and more.</p> <p>Top AI use case for me falls under personal AI - using AI to summarize meeting transcripts and generate action items</p>
<p>Great to see the real-world application of computational design on live projects - especially in NZ. Truly fantastic work. Did you run any multi-objective optimisation/generative design studies on aspects of the project at all? How did you avoid the trap of thousands of generated options (ala the "thousand bowls of porridge problem")?</p>	<p>On Te Kaha, we used computational exploration rather than unconstrained generative design. The key was tight constraints driven by buildability, performance, programme, and cost. A common pitfall is generating thousands of options with no clear way to decide. We avoided this by:- Keeping the number of variables deliberately limited,- Applying engineering judgement early, and- Using qualitative reviews alongside quantitative metrics. AI can help here in future by ranking and clustering options, rather than simply generating more of them</p>

<p>Thank you for the great presentation. Do you validate the AI-generated designs separately, or is it built into the workflow?</p> <p>Are the optimisation constraints effective when working with AI?</p>	<p>Validation should always be built into the workflow, not treated as a separate step.</p> <p>In practice:</p> <ul style="list-style-type: none"> • AI-assisted outputs are checked against engineering constraints, • Results are reviewed by qualified engineers, • Independent verification remains essential for safety-critical decisions. <p>AI does not remove the need for validation – it changes where and how validation happens</p>
<p>What lessons from Te Kaha highlight the limitations of traditional parametric workflows, and how does AI help overcome those constraints?</p>	<p>As discussed in the presentation, traditional parametric workflows are powerful but sometimes struggle with:</p> <ul style="list-style-type: none"> • Scale of data (e.g. thousands of model outputs), • Change tracking across many iterations, • Script complexity (“spaghetti code”) <p>AI can help by:</p> <ul style="list-style-type: none"> • Summarising changes between model versions, • Highlighting where performance moved materially, • Refactoring and simplifying scripts, • Acting as an interface between engineers and large datasets.
<p>Could you track the changes with a change register for each change and the logic which would have given you the contextual changes.</p>	<p>Yes – and in practice on Te Kaha this is exactly what we did do. But we did this more in a manual sense by recording changes and implications by detailed inspection by the design team.</p> <p>This is also an area where AI is particularly strong, in augmenting the process which is subsequently reviewed and accepted by the designers.</p> <p>AI can automatically:</p> <ul style="list-style-type: none"> • Track design changes, • Attach contextual metadata (why the change happened), • Link changes to performance impacts. <p>This supports better transparency for teams, reviewers, and clients.</p>

<p>From a Building Services perspective, especially when we're coordinating life safety systems with architectural and structural elements, how confident should we be in using AI assisted tools for critical design decisions, and how do we make sure compliance and public safety remain fully protected as this technology progresses?</p>	<p>Live answered: Maintain a human-in-the-loop.</p> <p>Follow-up: AI should be used to support, not replace, life-safety design decisions. Confidence comes from:- Deterministic workflows,- Explicit compliance checks,- Clear accountability,- Human sign-off.AI can assist with coordination, clash detection, and documentation review — but compliance responsibility remains firmly with the engineer.</p>
<p>What is the AI advanced technology you could embed into your model for improvements over the next 20-30years for the operation of the Build like Wi-Fi technology, laser displays, future proof the seismic response, add enhanced urban design every 5 years, etc.</p>	<p>Hard to forecast that far ahead when times are changing so fast! But generally, the better organized your model data is, the better your AI insights will become. The future will be about data, how we store it, organize it, and present it. So, getting your model data (and process for model setup and information management) in order would be a good start.</p>
<p>If AI pricing increases, as anticipated, is there a break-even point that the use of AI will become less effective project wise due to client budget constraints?</p>	<p>AI pricing is actually going down - but the total cost may rise as you mentioned if we all start using more and more AI. I don't think cost of AI will be an issue, in the same way that cost to run FEA models is not an issue. But it's possible that we may add AI costs to our budget estimates in the same way that we may add software licence cost to some budget estimates!</p>
<p>How do you maintain confidentiality when using AI?</p>	<p>We use secure "AZURE OpenAI" deployments (non-public, data is not used for training). So, as an enterprise we pay for the confidentiality. But this is a big concern and when using third party AI products it is important to read the T&Cs carefully</p>
<p>Hi Nick. For small-medium projects, how close are we to AI taking architectural plans, detecting structure and materials from them, and then auto-building the analysis model? Of course, this would need engineer review but can boost efficiency.</p>	<p>Live answered: Not there yet!</p> <p>Follow-up:</p> <p>But we are getting closer. AI can already assist with:</p> <ul style="list-style-type: none"> • Interpreting drawings, • Detecting structural systems, • Proposing initial analysis models. <p>However, this still requires engineer review and correction. The opportunity is in speeding up the first 60–70%, not eliminating engineering judgement</p>
<p>It's interesting how you manage to get the Grasshopper AI to do refactoring or even optimise. What are the underlying LLM models you are using (foundation</p>	<p>Underlying LLMs are OpenAI foundation models, running in a loop combined with specific "tools" which allow the system to search for grasshopper components, and even place those components onto the canvas.</p>

<p>or proprietary, trained in-house)? Thanks</p>	
<p>As AI becomes more embedded in our CAD, BIM, and computational design platforms, do you see it reaching a level where we can confidently rely on it for compliance driven and safety critical modelling?</p> <p>And do you think this shift might eventually lead to a new discipline focused specifically on governing and validating AI in engineering practice?</p>	<p>I would not personally rely on AI for any compliance decisions or safety related modelling. There should always be a human involved. AI will continue to improve, but it should always be humans in the driver's seat. As far as humans to validate AI outputs - this is not how I see things playing out. AI is the copilot for the human, not the other way around.</p>
<p>Nick Franklin, you mentioned sustainability at the start. How do you balance the use of AI with the sustainability component given the huge computational energy required?</p>	<p>We in Mott MacDonald balance the benefits of AI with our sustainability commitments by embedding a Responsible AI policy that addresses environmental impact, running our AI solutions on energy-efficient cloud infrastructure like Microsoft Azure, and ensuring that AI's computational energy use is included in our organisation's net zero by 2040 target. You can read more about our approach in our Responsible AI Policy on our website.</p> <p>Also - we use AI in a proportionate way, when developing our solutions we ensure that we use the smallest models meeting our needs. We monitor our carbon footprint related to AI use to track our impact. We also use AI in solutions which are driving more sustainable outcomes (we have a few examples there: https://www.mottmac.com/en/insights/topics/shaping-ai/)</p>
<p>I think a large part that hasn't been really discussed, is the peer review and construction phases. How could we have streamlined communications between the design engineer, peer reviewer and the design engineer and the builder</p>	<p>First and foremost, effective collaboration between the designer, peer reviewer, and builder must be grounded in mutual trust and professional respect – no technology replaces that.</p> <p>That said, there is a real opportunity for AI to support and strengthen these relationships, particularly in how information is communicated and interrogated across parties who may not be equally familiar with all aspects of the design.</p> <p>AI can assist by:</p> <ul style="list-style-type: none"> • Helping designers respond to peer review comments with clearer structure, stronger cross-referencing, and direct links to the relevant analyses, drawings, and specifications. • Supporting builders by quickly directing them to the most relevant details, clauses, or design assumptions without relying on long email chains or document searches. • Summarising complex technical issues in a way that improves shared understanding across disciplines. <p>Importantly, AI should be seen as a co-pilot, not an arbiter – an aid that improves clarity, traceability, and confidence in decision-making. Used well, it can actually</p>

	<p>reinforce trust and transparency between designers, reviewers, and contractors, rather than undermine it.</p>
<p>To help answer Gerhard's question regarding balancing use of AI with sustainability component given the computational energy required, we in Mott MacDonald balance the benefits of AI with our sustainability commitments by embedding a Responsible AI policy that addresses environmental impact, running our AI solutions on energy-efficient cloud infrastructure like Microsoft Azure, and ensuring that AI's computational energy use is included in our organisation's net zero by 2040 target. You can read more about our approach in our Responsible AI Policy on our website.</p>	<p>Answered above</p>