AI Simulation Automation with Ansys & MCP

Overview

PDL Digital has been exploring the next generation of engineering simulation workflows using AI-assisted automation, Ansys scripting, PyMechanical and MCP (Model Context Protocol) technologies. The objective was to investigate how engineers can interact with simulation software using natural language instructions, reducing manual effort while improving consistency, productivity and accessibility across complex analysis workflows.

The project demonstrated how AI can act as an engineering assistant, helping users review simulation models, identify appropriate analysis approaches and automatically execute routine simulation tasks from model setup through to post-processing.

The Challenge

Engineering simulation workflows can be resource-intensive and often involve repetitive tasks such as model preparation, analysis setup, solving and result extraction. While these activities are essential, they can consume significant engineering time and introduce variability between users.

As AI technology continues to evolve, PDL recognised an opportunity to investigate how natural language interfaces and emerging MCP tooling could be combined with Ansys automation capabilities to create a more efficient and intuitive simulation environment. The challenge was to understand how AI could support engineers while maintaining robust engineering workflows and technical oversight.

Our Solution

PDL Digital developed a proof-of-concept workflow that combines AI-assisted interaction with Ansys automation technologies.

The solution enabled engineers to:

- Describe simulation requirements using natural language.
- Automatically launch and interact with Ansys environments.
- Review and interrogate existing simulation models.
- Recommend appropriate analysis methodologies.
- Generate analysis setups automatically.
- Execute simulation runs.
- Post-process and extract results.
- Support more advanced simulation workflows through AI-assisted decision-making.

By leveraging Ansys scripting, PyMechanical and MCP-driven automation, the workflow demonstrated how complex engineering tasks can be initiated through simple written instructions while maintaining traceability and engineering control.

Outcome

The project demonstrated the potential for AI-assisted engineering workflows to significantly reduce the time spent on repetitive simulation activities while improving consistency and accessibility.

By enabling engineers to focus on interpreting results and solving engineering problems rather than software operation, the approach has the potential to accelerate analysis delivery, improve productivity and lower the barriers to adopting advanced simulation technologies. The work also provides a foundation for future AI-enabled engineering workflows that can scale across multiple analysis disciplines and software platforms.

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Perform a static structural analysis of a cantilever beam.
Upload the geometry file beam.step.

- Material: Structural Steel (default)
- Mesh: default mesh with element size 5 mm
- Fixed support on the YZ face at X = -100 mm
- Pressure load of 1,000,000 pascals on the top face (XY face at Z = +5 mm)
- Results: Total Deformation and equivalent stress
- Take a screenshot of the equivalent stress result
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Fig 1: AI Input

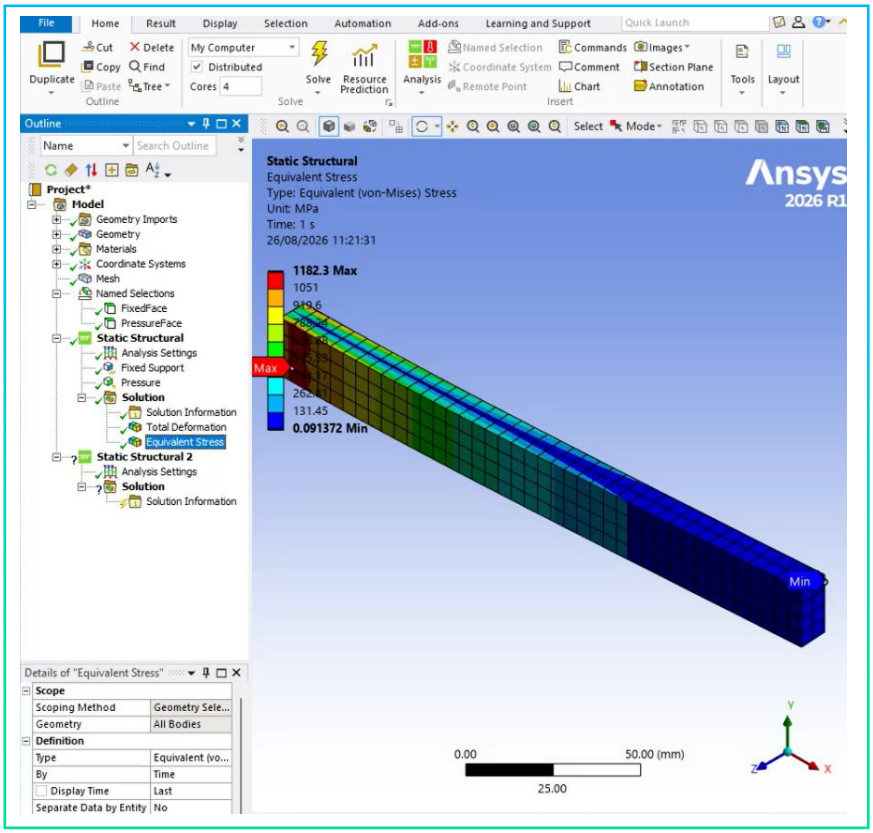

Fig 2: AI Output