Paper Title

First Authora, Second Authorb,1 Third Authorb

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Second Affiliation, Address, City and Postcode, Country

Abstract

The abstract should be concise and to-the-point, no more than 250 words. It should briefly summarize the key aspects of the paper, including the engineering problem at hand, the methods used, the main results, and the conclusions. The abstract should be clear and easy to understand, avoiding technical jargon, complex terminology, and abbreviations. Please provide context for the work, including a brief overview and the significance of the research. If possible, emphasize what makes the project unique or innovative. (Formatting used: Style A-Text.)

Keywords

List your keywords here, separated by commas. (Style: A-Text.)

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# Introduction (Style: Heading 1)

First, we advise you to briefly describe the background and significance of the project and highlight the underlying core engineering problem. Highlight the potential impact of solving the proposed problem.

Introduce a discussion on how other companies or researchers usually address this type of problem (conduct a literature review), with reference to publicly available information. Formulate a stance of the current approach in relation to what others are doing.

Briefly describe the methodology or approach used during the project, providing enough detail to give the reader a sense of how the work was conducted. Give a brief overview of the main findings or results of the study. Harmonise these sentences with the conclusion and abstract sections.

Provide a summary of the paper's structure, explaining how the different sections relate to each other and what the reader can expect to find in each section. (Style: A-Text.)

# Materials and Methods

In the Materials and Methods section, you should provide a comprehensive description of the procedures, techniques, materials, and tools used in your study. The goal is to allow other researchers to understand and reproduce your work.

Begin by providing a general outline of the methodology employed in the study, highlighting the primary methods, techniques, or approaches. Describe the materials used in your study, such as specific software, hardware, simulation tools, or physical materials. Include relevant details, such as software versions, material properties, and sources or manufacturers. Detail the specific setup for your simulations or analyses, including the choice of model type boundary conditions, loading conditions, and any simplifications or assumptions made. Explain the rationale behind these choices. Focus on the aspects that have significant impact of your results.

Describe the geometry of the model, including any features, dimensions, and complexity. Discuss the meshing strategy, including element types, mesh size, and refinement areas. Explain any mesh convergence or sensitivity studies conducted to ensure the accuracy and stability of the results. If applicable, describe the material models used in the analysis, such as linear or nonlinear, elastic or plastic, isotropic or anisotropic, and any relevant parameters or constants. Provide the source of these models or parameters, whether from literature, experiments, or other sources. Explain the solver used for the analysis and the solution procedure, including any iterative or time-stepping methods, convergence criteria, and tolerances. Briefly describe the steps taken to ensure the accuracy and credibility of the results, such as comparison to experimental data, benchmarks, or analytical solutions. A more in-depth discussion of validation and verification can be provided in a separate section of the paper. Explain any post-processing or data analysis techniques used to interpret the results, such as contour plots, stress or strain calculations, or statistical analysis.

If you are using a previously published method with modifications, clearly describe the changes and the rationale behind them. Be sure to reference any existing methods, tools, or software used, and highlight any novel or modified techniques employed in your study.

Remember that the Materials and Methods section should be clear and detailed enough for an independent researcher to reproduce your work.

# Results and Discussion

The Results and Discussion section is an essential part of a research paper, as it presents your findings and interprets their significance in the context of the study.

Begin by clearly presenting the results obtained from your analysis or simulations. Use tables, figures, charts, or graphs to effectively convey your findings. Ensure that these visual elements are appropriately labeled, numbered, and referenced in the text. Provide clear captions and explanations to help readers understand the information being presented. Interpret and analyse the results in light of the research objectives and questions. Discuss any patterns, trends, or relationships observed in the data. Explain the implications of these findings for the problem or topic being studied. Compare your results with previous research, if applicable. Highlight any similarities or differences, and discuss possible reasons for these observations. This comparison helps to validate your findings and place them in the context of existing knowledge. Revisit the validation and verification efforts mentioned in the Materials and Methods section. Discuss how these efforts support the credibility and reliability of your results. Address any limitations or uncertainties in your findings and their potential impact on the study's conclusions. Discuss the limitations of your study, including any assumptions made in the methodology, constraints in the analysis or simulation setup, or uncertainties in the input data. Explain how these limitations may affect the interpretation and generalizability of your results.

Explain the practical implications of your findings, particularly for the specific industry or application domain. Discuss how your results can be used to inform decision-making, optimise designs, or improve performance. Identify areas for future research or investigation, based on your findings, limitations, or unanswered questions. Suggest potential avenues for further exploration, such as refining the methodology, addressing identified uncertainties, or applying your results to new problems or domains.

Remember that the Results and Discussion section should not only present your findings but also interpret their meaning and significance in the context of your study. By discussing the results in detail, comparing them to previous research or benchmarks, addressing limitations, and exploring practical implications and future work, you provide readers with a comprehensive understanding of your study's contributions to the field.

## Inclusion of figures and tables (Style: Heading 2)

Please do not leave any sections empty, every section title should be followed by some text. If you have nothing to write to a section, since you plan to structure your thoughts into multiple subsections, there is always the possibility to include a brief overview like; “this section contains our guidelines related to figures and tables”. The other possibility is that there is no need for the first subsection title, this is often the case with introductory subsections.

### Figures (Style: Heading 3)

Figure 1.a. and b. display the proposed way to add titles to figures. Make sure every illustration includes a caption. Supply captions independently, not affixed to the image. A caption should contain a short title (not on the figure itself) and a depiction of the illustration. Minimize text within the illustrations themselves, but clarify all symbols and abbreviations employed.

In case your digital artwork has been created in a Microsoft Office tool (Word, PowerPoint, Excel), kindly provide it in the original document format. However, if a different software was used to finalize your electronic artwork, it should be saved or converted into one of the suggested formats listed below. Pay attention to the necessary resolution specifications for different types of images:

* EPS (or PDF): For vector drawings, ensure all fonts are embedded,
* TIFF (or JPEG): For colour or grayscale photos (halftones), maintain a minimum of 300 dpi,
* TIFF (or JPEG): For bitmapped line drawings (pure black & white pixels), maintain a minimum of 1000 dpi,
* TIFF (or JPEG): For combinations of bitmapped line/half-tone (color or grayscale), maintain a minimum of 500 dpi.

Please do not provide files optimized for screen use (like GIF, BMP, PICT, WPG), as they usually possess limited colours and pixel quantity, or submit files with low resolution, or ones that are overly large compared to the content.

Please use the “Cross-reference” feature to reference to your figures (Figure 1.). An easy was to create more figure titles like this, is to copy this one below your next figure, and just “Update Fields” in the document. This will make the figure numbering update, and your in-text cross-references will follow. Cross-references are to be placed manually in-text, to reference each figure before their occurrence. You are encouraged to group multiple figures, in this case please do not forget to clearly designate them with a), b), etc.

 

b.

a.

Figure 1.a. Generated painting about engineering, in the style of Salvador Dali, b. Another generated painting about engineering, in the style of Salvador Dali (These images were created with [6]).

### Tables

Table 1. provides an example. Submit tables as modifiable text, not as images. Tables can be located either next to the relevant text in the article, or on separate page(s) at the end. Number tables in the order of their appearance in the text and place any table notes below the table body. Limit the use of tables and confirm that they do not duplicate results reported elsewhere in the article. Please refrain shading within table cells.

Please use the “Cross-reference” feature to reference to “Table 1”. An easy was to create more table titles like this, is to copy this one above your next table, and just “Update Fields” in the document. This will make the table numbering update, and your in-text cross-references will follow. Cross-references are to be placed manually in-text, to reference each table before their occurrence.

Table 1. Mid-term NAFEMS projects (source of data [7]).

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| --- | --- | --- | --- | --- |
| Project Name | Engineering Discipline | Project Lead | Estimated Cost ($) | Completion Date |
| Hyperloop Extension | Civil Engineering | Jason Martell | 2,500,000,000 | December 2025 |
| Quantum Processor Design | Computer Engineering | Rachel A. Tao | 1,000,000,000 | April 2024 |
| Eco-friendly Skyscraper | Architectural Engineering | Martin Gomez | 800,000,000 | October 2026 |
| Advanced Robotic Prosthetics | Biomedical Engineering | Sofia Kovalenko | 200,000,000 | July 2024 |

### Units and abbreviations

Adherence to the International System of Units (SI) is mandatory for the nomenclature, symbols, and abbreviations. Physical quantities symbols used within the text should be italicized (such as v, T, n, etc.). Conversely, unit symbols comprised of letters should be in regular text (for instance, ms-1, K, min, mm, etc.). Additional information can be found at: https://physics.nist.gov/cuu/pdf/sp811.pdf.

Abbreviations should be spelled out completely when they first appear in the text, followed by the abbreviation in brackets, like finite element analysis (FEA). The interpretation of symbols and units associated with these symbols should be clarified each time they're used or referred to in a nomenclature section located at the end of the manuscript, preceding the References.

### Equations

Please formulate complete sentences around the introduction of formulae. The Crossland equivalent stress ($σ\_{Cr}$) is calculated as

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| --- | --- |
|  $σ\_{Cr}=\sqrt{J\_{2,a}}+α\_{Cr}σ\_{h,max}$ , | (1) |

where $J\_{2,a}$ is the amplitude of the second invariant of the deviatoric stress tensor over a load cycle (MPa), $α\_{Cr}$ is a material parameter and $σ\_{h,max}$ is the maximum of the hydrostatic stress over a load cycle.

# Verification and Validation

The Verification and Validation (V&V) section demonstrates that your methodology, models, and results are accurate, consistent, and suitable for their intended purpose.

Describe the steps taken to verify your models, simulation setup, and numerical methods. (Verification focuses on ensuring that the computational implementation of the model is accurate, and the mathematical equations are solved correctly.) Explain, how you assessed the mesh sensitivity of your models and determined the appropriate mesh resolution. Describe any convergence criteria, tolerances, or other solver settings used to ensure the stability and convergence of your numerical solutions. If possible, compare your results to known analytical or simplified solutions to demonstrate the correctness of your implementation.

Explain the steps taken to validate your models and results by comparing them to experimental data, real-world observations, or other reliable sources of information. (Validation focuses on ensuring that the model accurately represents the physical phenomena being studied.) Describe any relevant experimental data used for validation and how it was obtained, including any uncertainties, limitations, or assumptions associated with the data. Present a detailed comparison of your simulation or analysis results with the experimental data or real-world observations. Use visual aids, such as plots or graphs, to clearly illustrate the similarities and differences. If applicable, provide quantitative measures of agreement between your results and the validation data, such as error metrics, correlation coefficients, or other relevant statistics. If there are any discrepancies between your results and the validation data, discuss possible reasons for these differences, such as model simplifications, assumptions, or uncertainties in the input data.

If applicable, discuss the methods used to quantify the uncertainties associated with your models, input data, or results. Explain how these uncertainties may impact the interpretation and generalizability of your findings. Discuss the key factors that affect your findings and their implications for the study's conclusions.

# Conclusions

The Conclusions section of a research paper is vital for summarizing your findings, highlighting their significance, and outlining the implications of your study.

Begin by briefly summarizing the key findings of your study, revisiting the research objectives and questions. Highlight the most important results and discuss how they contribute to the understanding of the problem or topic being studied. Explain the significance of your findings in the context of the broader field or application domain. Highlight the potential impact of your research on industry practices, decision-making, or future developments.

Discuss any potential limitations or constraints that should be considered when applying your findings in practice. Identify areas for future research or investigation, based on your findings, limitations, or unanswered questions.

# Acknowledgement

In the Acknowledgements section of a research paper, you have the opportunity to show appreciation to those who contributed to your work, supported your research, or provided resources enabling your study. Be sure to mention specific grant numbers or funding programs, if applicable. Express gratitude to those who contributed to your research, such as collaborators, or colleagues who provided valuable feedback, guidance, or assistance throughout the project. Recognize research institutions or facilities that hosted your work or granted access to crucial resources, such as laboratories, equipment, or computing resources.

# Nomenclature

The use of a nomenclature is non-mandatory, the possibility is also provided to explain every notation and symbol right after their occurrence in text. Please either include a nomenclature here, just before the reference section, or explain every notation and symbol one-by-one.

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| --- | --- |
| g | Gravitational acceleration (m/s2) |
| m | Mass (kg) |
| χ | Stress gradient (1/mm) |

# References

In the References section of a research paper, you should provide a comprehensive list of sources cited throughout your work, allowing readers to locate the original sources and verify the information you presented. For the NAFEMS Proceedings, the chosen citation style is IEEE.

Ensure all references mentioned in the text appear in the reference list and vice versa. For any references included in the abstract, provide complete details. We discourage the listing of unpublished findings and personal communications in the reference list. Citing a reference as 'in press' signifies its acceptance for publication. Make sure to include DOI-s in each applicable instance and use the https://doi.org/10.xxxxx/xxxxxxxx format. List references numerically in the order they are cited in the text.

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