

## Peer-Review

Shi, Michael. 2025. "Blade Assembly Design and Optimization for the 2025 Science Olympiad Division C Wind Power Event." *Journal of High School Science* 9 (2): 85–102.

The technical note, "Blade Assembly Design and Optimization for the 2025 Science Olympiad Division C Wind Power Event," is well-documented and can be considered for publication after addressing the following points:

1. The author should provide context for the Reynolds number in relation to wind turbine performance, explaining its impact on aerodynamics and efficiency.
2. Figure 9 should be clearly labeled for clarity.
3. For the data presented in Figures 11 and 12, the author should clarify how different Tip Speed Ratios (TSRs) were achieved. Was the blade design specifically tailored to meet a particular TSR? If so, what modeling approach was used to achieve the desired TSR?
4. When altering the number of blades, did this impact the rotation speed of the turbine? If so, was the change significant, and how was this accounted for in the analysis?
5. The statement, "For both high-speed and low-speed wind conditions, an increase in the number of blades resulted in a lower peak voltage," requires further explanation. The author should provide a reasoning or hypothesis for this observation.
6. The decision to offset the turbine by 10 cm should be justified. Was this distance chosen based on prior analysis or experimentation? Were other distances considered? If not, why? If so, what were the comparative results?
7. The number of references should be expanded to ensure a robust academic foundation and to support key claims throughout the paper.

Addressing these points will strengthen the technical rigor and clarity of the paper.

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The technical note, "Blade Assembly Design and Optimization for the 2025 Science Olympiad Division C Wind Power Event," is well-documented and can be considered for publication after addressing the following points:

Thanks a lot for the encouragement. Below is my response:

1. The author should provide context for the Reynolds number in relation to wind turbine performance, explaining its impact on aerodynamics and efficiency.  
Author's response: The context for the Reynolds number was added to the section "Blade Airfoil Profile and its Aerodynamic Characteristics" under the Methods chapter.
2. Figure 9 should be clearly labeled for clarity.  
Author's response: Labels were added in Figure 9.
3. For the data presented in Figures 11 and 12, the author should clarify how different Tip Speed Ratios (TSRs) were achieved. Was the blade design specifically tailored to meet a particular TSR? If so, what modeling approach was used to achieve the desired TSR?  
Author's response:
  - a. The context to clarify this issue was added to the section "RPM (revolutions per minute) and TSR (tip speed ratio)" under the Methods chapter.
  - b. More explanation was also added after Figure 12.
4. When altering the number of blades, did this impact the rotation speed of the turbine? If so, was the change significant, and how was this accounted for in the analysis?  
Author's response:

- a. A new section of “Number of Blades” was added under the Methods chapter. Numerous citations (9-12) were added to discuss the impact.
  - b. RPMs for devices with different number of blades were added in Figures 13 & 14.
  - c. More comments were also added before Figure 13.
5. The statement, “For both high-speed and low-speed wind conditions, an increase in the number of blades resulted in a lower peak voltage,” requires further explanation. The author should provide a reasoning or hypothesis for this observation.  
Author’s response: Refer to number 4.
6. The decision to offset the turbine by 10 cm should be justified. Was this distance chosen based on prior analysis or experimentation? Were other distances considered? If not, why? If so, what were the comparative results?  
Author’s response: Figure 17 and a related discussion were added.
7. The number of references should be expanded to ensure a robust academic foundation and to support key claims throughout the paper. Addressing these points will strengthen the technical rigor and clarity of the paper.  
Author’s response: The number of references was expanded to 15. Thank you for the advice.

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Thank you for addressing all of the comments satisfactorily. Your time addressing the comments is appreciated. There is a small mistake / formatting issue in the Reynold’s formula  $cl/cd$ . It appears as  $cl=cd$ . Please correct it and submit if the paper is accepted for publication.

I recommend this paper for publication.  
Thank you and congratulations.

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Dear Dr. Apte,

There are two modifications for the current draft (rev2).

1. According to the comment from reviewer 1: “There is a small mistake / formatting issue in the Reynold’s formula  $cl/cd$ . It appears as  $cl=cd$ .”  
Author’s response: error was corrected on page 5.

2. A paragraph was added in the Acknowledgments chapter to acknowledge the copyright permission from Science Olympiad.

A separate file was also uploaded. The file shows the copyright permission via the email communication between the author and the Science Olympiad administration (Ms. Jenny Kopach, CEO of Science Olympiad). Ms. Jenny Kopach is aware that this document will be in public domain, and she just prefers only having the office address and phone number (not her email address). I think this should be fine.

If there are any questions, please let me know. Thanks for everyone’s time on my manuscript.

Michael Shi  
April 17, 2025

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Thank you for addressing all the comments. Accept.

Although not required, it may be interesting to discuss variable twist. Can you 3D print fan blades with a 'spacer' that 'expands' as the wind speed increases so that maximum voltage is achieved at both low and high speeds?

Again, although not required, what would you expect the scaled up (to commercial size) voltage? Is this consistent with current voltages ?

Please also address the highlighted portions of the text in the attached file.