Question 2

Choose a use case for a material, for example one of the parts of the standing rigging of a sailboat, where a new material enabled higher performance, and briefly explain how that material enabled higher performance compared to materials that were used earlier.

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Complete

Example case: Laminated Lithium-Ion Batteries for Electric Vehicles (EVs)

Even though laminated batteries are still using lithium-ion based material, their new design has led to many novel applications. Normally, lithium-ion batteries usually have the cylindrical and prismatic designs. These designs are already carefully tested for the past decades and have been circulated in widespread applications for electronic devices. However, there exist many shortcomings in each design, such as packaging efficiency, suboptimal cooling rate and energy density [1]. Laminated batteries, on the other hand, have their cells stacked or folded into a flat, pouch-like shape. This design has gained significant attention, especially in the automotive industry for EV cars.

Performance Enhancement with Laminated Batteries compared to old designs [2]:

Packaging Efficiency: The flat, rectangular shape of laminated batteries allows for more efficient packaging, maximizing the use of available space within an EV. Meanwhile, prismatic batteries are usually big and not packaging efficient.

Improved Cooling: The design of laminated batteries allows for more uniform and efficient cooling. Cylindrical cells might not cool as evenly as laminate design

Lightweight: The absence of metal casings, as seen in cylindrical cells, means laminated batteries can be lighter, which is crucial for EVs to minimize their weights.

Real-world Application: Nissan's electric Leaf vehicle uses a laminated lithium-ion battery pack [3]. The laminate battery design was chosen by Nissan for the above reasons, which helps enhance their vehicle's overall range and performance.

- Sources:
- [1] https://blog.epectec.com/pros-and-cons-of-lithium-prismatic-cells-vs-cylindrical-cells
- [2] https://batteryuniversity.com/article/bu-301a-types-of-battery-cells [3] https://www.marklines.com/en/report_all/rep1786_201811

Comment:

Question 3

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In digital image correlation, a deformation field is iteratively applied to an image of a deformed object and numerically optimized, in order to minimize the change in pixel intensities relative to an image of the underformed object.

Your answer is correct.

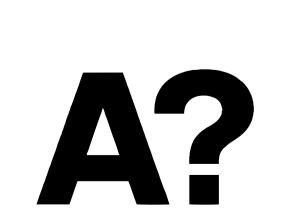
The correct answer is: In digital image correlation, a [deformation field] is iteratively applied to an image of a deformed object and numerically optimized, in order to minimize the [change in pixel intensities] relative to an image of the underformed object.

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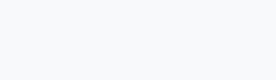
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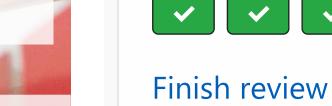
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Binh Nguyen (Log out)







Correct

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