WindSTAR
Wind-Energy Science, Technology, and Research Industry/University Cooperative Research Center

Automation for Blade Manufacturing

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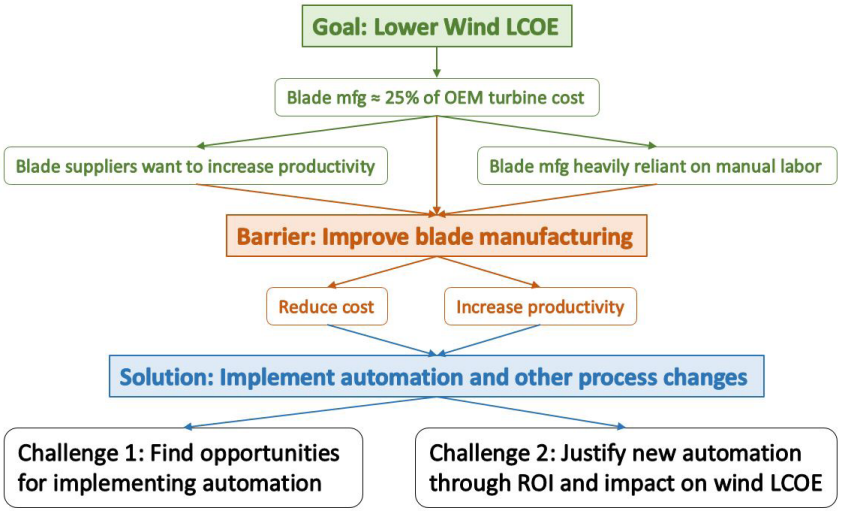
Wind blade suppliers could realize a reduction in overall manufacturing cost and cycle time through the implementation of cost-effective automation. Currently, up to a third of the total OEM wind blade manufacturing cost comes from labor. The use of automation is limited to (1) cranes that move pieces on the factory floor, (2) pump systems for resin infusion, and (3) machines for cutting fabric and core material and painting and machining finished blades. Attempts to further implement automation for wind blade manufacture have historically been unsuccessful, primarily due to prohibitive capital costs. Other composite manufacturing sectors, i.e. aerospace and automotive, have successfully utilized high levels of automation and benefited from this implementation. Before additional automation can be inserted into the composite wind blade manufacturing process, any proposed system will need to "buy" its way onto the blade with a good ROI. Thus, there is a need for a detailed investigation of the wind blade manufacturing process and potential automation technologies.

During the year, an extensive review of existing and past work in automation for composites manufacturing relevant to wind blades was performed to serve as the foundation for a larger investigation into the wind blade manufacturing process. Because the scope of a comprehensive project dedicated to identifying new opportunities to insert automation into the wind blade manufacturing process is larger than a typical WindSTAR project, the current study was pursued with the intent of laying the groundwork for an IACMI proposal. The IACMI project is focused on creating a simulation of a generic wind blade manufacturing facility and the development of a techno-economic model. These complimentary tools will provide insight into how automation can lead to manufacturing process improvements. The IACMI project proposal is in the late stages of submission and approval and several partnerships with members of industry have been made—including two members of WindSTAR.



Solution Approach to Challenge 1:
Surveys of members of blade and automation supply industries will be conducted to mine for information regarding opportunities for new automation. Site visits to blade manufacturing facilities will aid the development of the generalized blade manufacturing simulation and the identification of opportunities for process changes.

Solution Approach to Challenge 2:
The generalized blade manufacturing simulation and techno-economic model will be used in tandem to provide insight into potential benefits of proposed automation technologies and other process changes. Recommendations for further investigation of proposed technologies will be made based on indications of good ROI. The manufacturing simulation will have built-in flexibility to be easily applicable to various blade manufacturing processes.