

1C Solar Cell Design and Module Manufacturing Platform

Our task is to engineer the future of solar electricity.

Team leaders: Student A and Student E

due 4-27-10: i) one paragraph each on selected solar cell design and consistency of manufacturing platform with constraints; ii) two F-o-M plots supporting analysis and conclusions.

This section requires system integration concepts. Your solar cell design should be based on optimized parameters determined with the PC1D simulator. This exercise is similar to your effort in class, but this time you rationally select parameters and optimize details with the simulator. Your criteria for a successful manufacturing platform should be consistent with the original constraints. You should gain an appreciation of the full engineering process at this stage, because this final design is based on your history of earlier decisions. It is not uncommon for design changes to be made, even at this late stage. Good engineering practice minimizes the number of design iterations.

The major issues for cell design are contained in the PC1D simulator. Extra credit will be given for finding legitimate issues that are not included in the simulator.

Some issues for the manufacturing platform are:

- Ability to scale to desired production volumes
- Availability of an appropriately educated engineering and labor force
- Continued compatibility with electrical power generation/distribution infrastructure
- Cost-of-Ownership: $(\text{capital cost} + \text{operation cost}) / (\text{throughput} \times \text{utilization} \times \text{yield})$
- Complete technology and materials supply chains
- Adaptability to automation

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