Preliminary Report of TDP Spacing Calculator

**Purpose:**

Minimizing the time it takes to get a job done, while increasing quality, consistency of work, and eliminating unnecessary human error is a noble goal to strive for within any business. To further Solar FlexRack’s pursuit of such goal, this project was conducted to reduce the quote time necessary for TDP racking and also to help eliminate unnecessary human error while allowing more data to be collected per quote.

1. **Overall Results**

The excel spreadsheet developed during this project’s duration is successful in finding a working post spacing the majority of the time that avoids interference with the given verticals as well as a combination of tube lengths that also avoid interference.

The Current benefits of the spreadsheet are listed below:

1. Automatically Recommends a post and tube combination that will avoid interference
2. Shows multiple solutions, allowing for more options when it comes to quoting
3. Manually enter desired spacing for posts or tubes and check for interference instantly
4. Eliminates a great deal of time spent in AutoCAD
5. Eliminates human error that can mess with the quoting process

The Potential Future benefits of the spreadsheet are listed below:

* 1. With some time and more work, the need to manually use AutoCAD could be eliminated completely. For example, the spreadsheet can give a working tube and post layout and the user can go straight to Risa and model it. If the model works then it is possible to send the excel data straight to Solidworks and autodraw what would have been produced within AutoCAD. This would potentially save multiple hours per quote
  2. The ability to validate studies on using standardized lengths for certain project aspects
  3. The ability to more easily record data generated on what else would have worked for certain quotes
  4. TDL support is partially functional at the moment, but with little work it is possible to fully implement

1. **Conclusions**

Overall, this exploration and resulting spreadsheet has great potential to save Solar FlexRack’s engineers time on TDP quotes. Additionally, it allows for increased consistency between projects and has multiple future benefits. The largest benefit that this spreadsheet offers is the ability to collect data and potentially standardize the usage of a small selection of tube lengths for the majority of tracker projects. This concept is discussed more within the Tube Experiment Preliminary findings.

1. **Recommendations**

In the future, it is recommended that this spreadsheet is updated as the SFR workbook is. With constant updates, the quoting process can become more streamlined and the engineers can focus on the more important aspects of Solar Flex Rack’s operations.

Specifically, within the potential coming updates, it is recommended that the list of pre-programmed data be refined and optimized in order to reduce calculation time and further organize the project as a whole. Most importantly, it is recommended that research into autodrawing tracker racks be prioritized as the next goal. It is very feasible that - with little work –it is possible to take the existing data within the spreadsheet, organize it, and export it to Solidworks in order to automatically produce the drawings for all tracker projects.This would not only eliminate time that Solar FlexRack’s engineers spend on drawings, but also eliminate human error. Additionally, this system would allow all time in AutoCAD to be eliminated from the quoting process. Less importantly, landscape support is nearly complete, but it is necessary to create a different equation for how the spreadsheet calculates the end of the tube length. OR double the amount of calculations by increasing the max number of verticals used.

**Assumptions and Constraints**

**Assumptions:**

All racks are assumed to be symmetrical.

**Constraints:**

The suggested post and tube spacing is based off of pre-programmed data, and the quality of generated results are highly dependent on the optimization of this data. The results are also highly dependent on the tolerances and various other inputs that are easily changed.

The output post and tube spacing utilizes a prioritization system. A constant post spacing is recommended over a non-constant one. When constant is not possible, priority is given to whichever has less of a difference between the multiple post spacings. This system is however not flawless and may be improvable.