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GameChange Solar

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Structural flexibility in utility-scale solar to safeguard module supply risk

16 December 2025

8:00 am – 9:00 am | PST, Los Angeles
11:00 pm – 12:00 pm | EST, New York City
5:00 pm – 6:00 pm | CET, Berlin, Madrid, Paris

Ryan Kennedy
Senior editor
pv magazine USA

Kent Scott
Director of Civil and Structural Engineering
DEPCOM Power

Scott Van Pelt
Chief Engineer
GameChange Solar

Welcome!

pv magazine webinars

Do you have any questions? ❓ 🙋

Send them in via the Q&A tab. 👉 We aim to answer as many as we can today!

You can also let us know of any tech problems there.

We are recording this webinar today. 📹

We‘ll let you know by email where to find it and the slide deck, so you can re-watch it at your convenience. 👀 💡

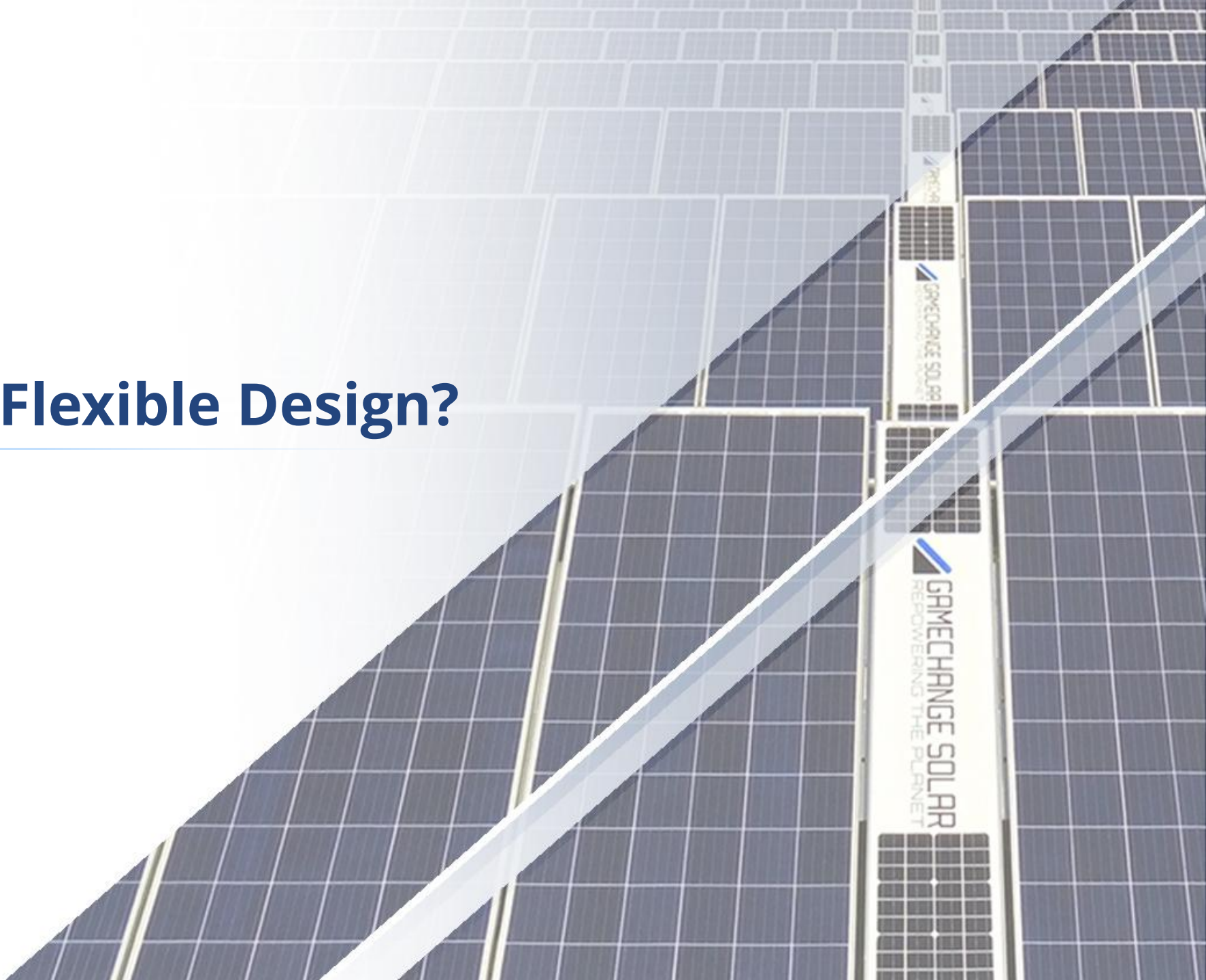
GAMECHANGE SOLAR
REPOWERING THE PLANET

Structural Design to Improve Module Flexibility

December 16, 2025

Scott Van Pelt – Chief Engineer

What is Module Flexible Design?



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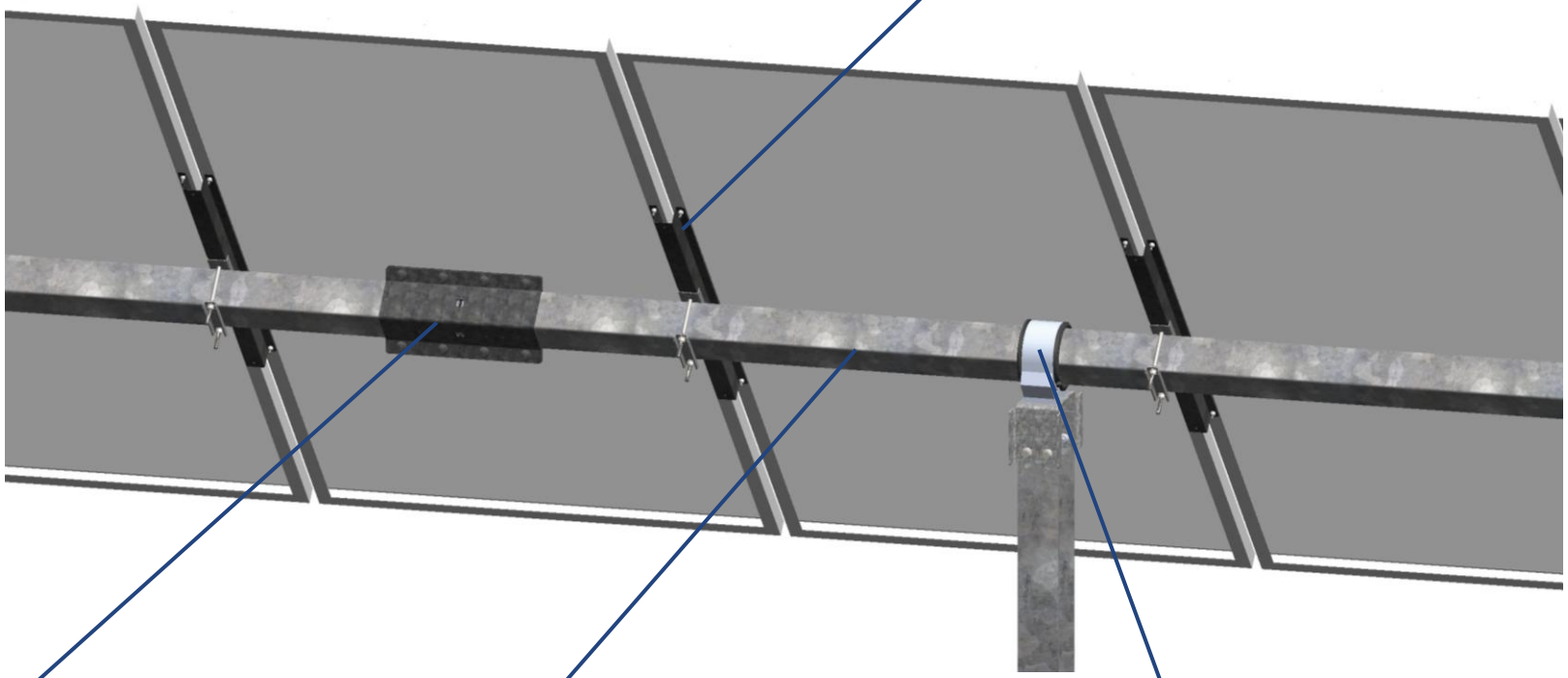
Module Flexibility | Introduction

- Modules may change due to:
  - Availability
  - Pricing
  - Tariff fluctuations
  - Technology Changes
- Module changes occur frequently early in design stages, with minimal scheduling impacts.
- Changing modules after material is manufactured or installed can cause significant delays and cost increases.
- Tracker design dictates most module change impacts.
- Different Modules may also be required during Operational phase of project

Module Flexibility | Genius Tracker™



FlexRails or SpeedClamps
Accommodate differing widths and mounting locations while maintaining overall table length

Squeeze Splice
Friction connection allows for easy field remediation of tube

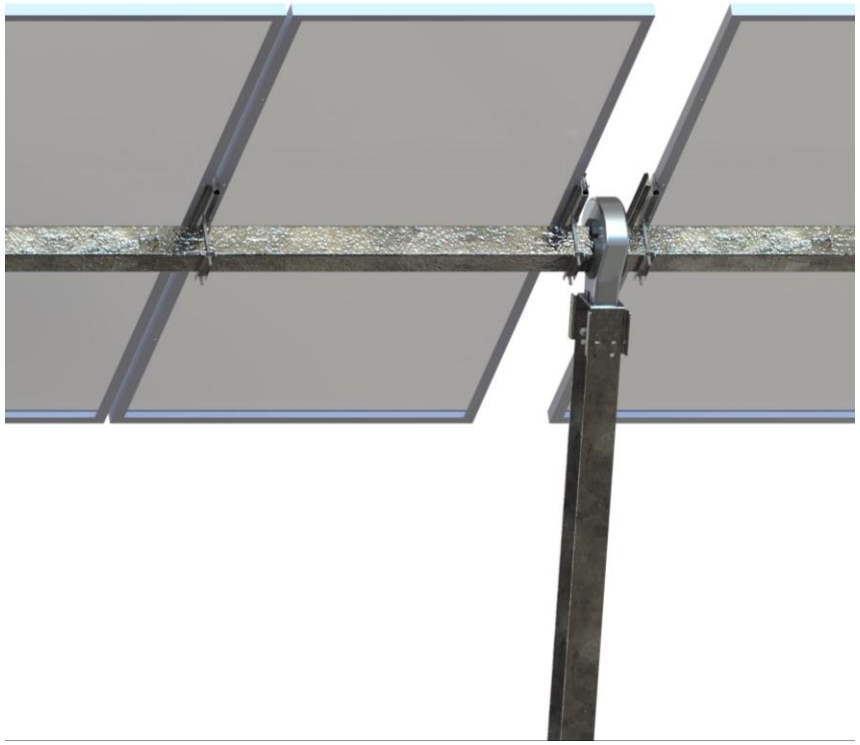
Torque Tube
Lack of alignment holes allows mounting rails to be relocated if needed

Low-Profile Bearings
Piles and bearings underneath modules to minimize potential conflicts

Module Flexibility | Bearing Design

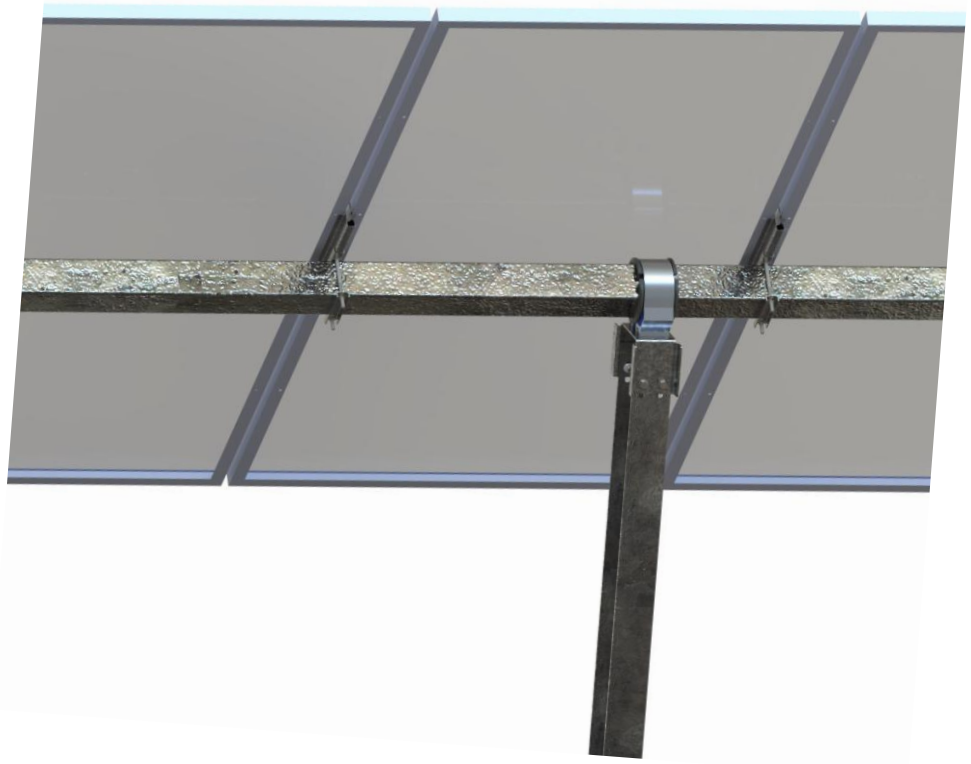
High Profile Bearings

- Installed between modules
- Interference likely with module change



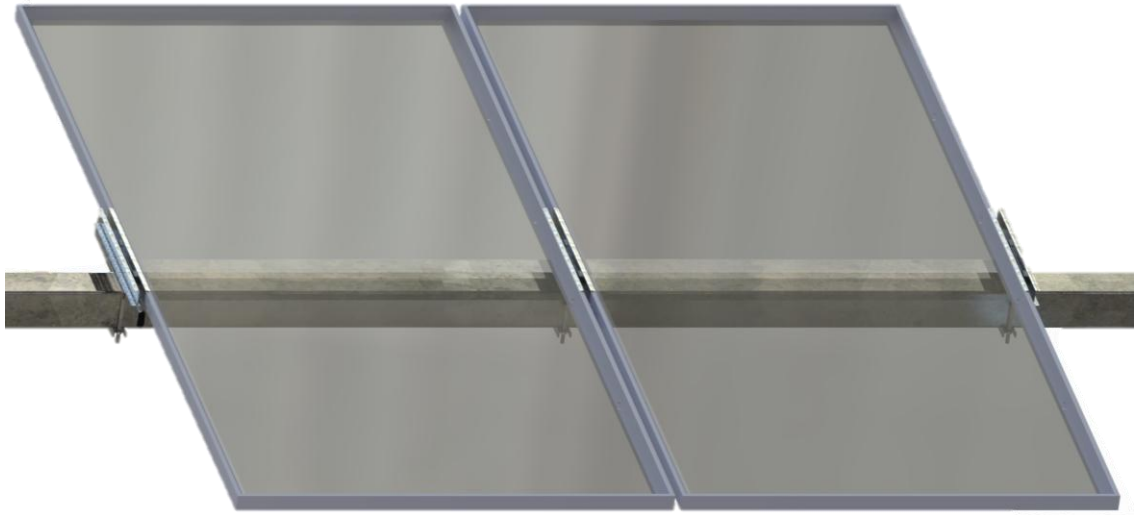
Low Profile Bearings

- Installed beneath modules
- Low likelihood of interference



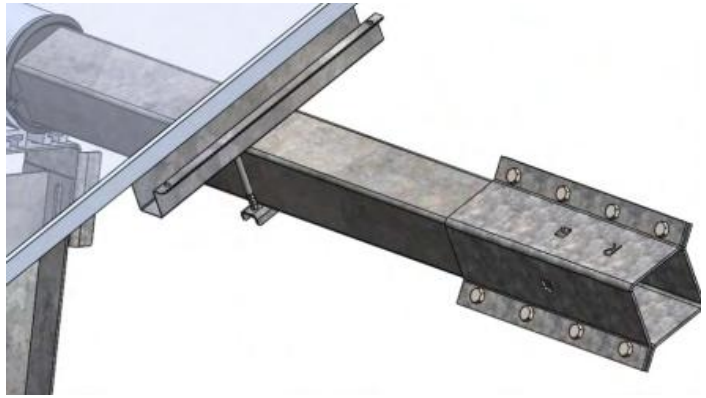
Module Flexibility | Torque Tube Design

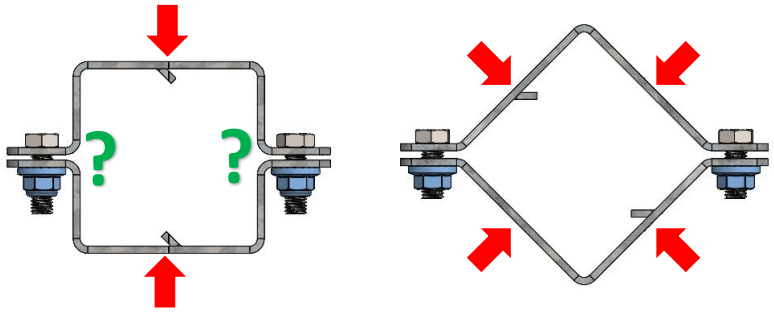
- Module changes may result in new rail location, even with identical width and length.
- Torque Tubes with alignment holes lock in rail location, leading to extensive field remediation.
- Continuous tubes allow rails and modules to shift as they need.
- Ends without swages or bolt holes allow for modification if required



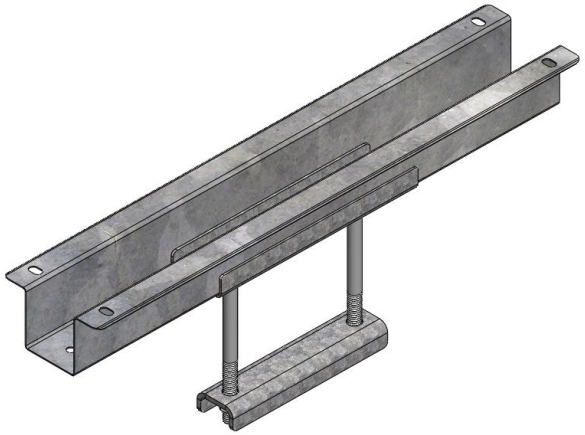
Module Flexibility | Squeeze Splices

- Connection between Torque Tube sections made using squeeze splices
- "Witches Hat" style splice reduces likelihood of issues due to manufacturing tolerances
- Connection without swages or bolt holes allow for modification of tubes if required



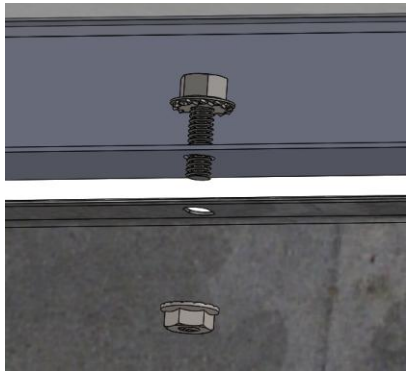


Module Mounting | Crystalline



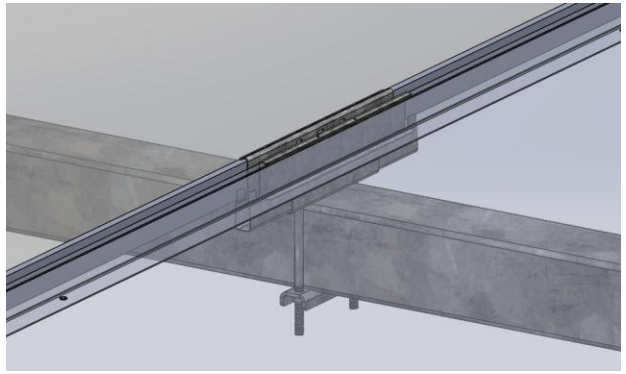
Preassembled Purlin

- Module mounting holes
- Higher wind pressures

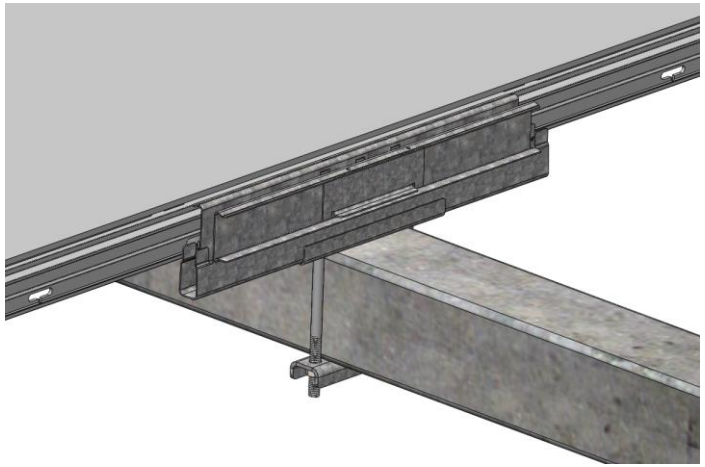


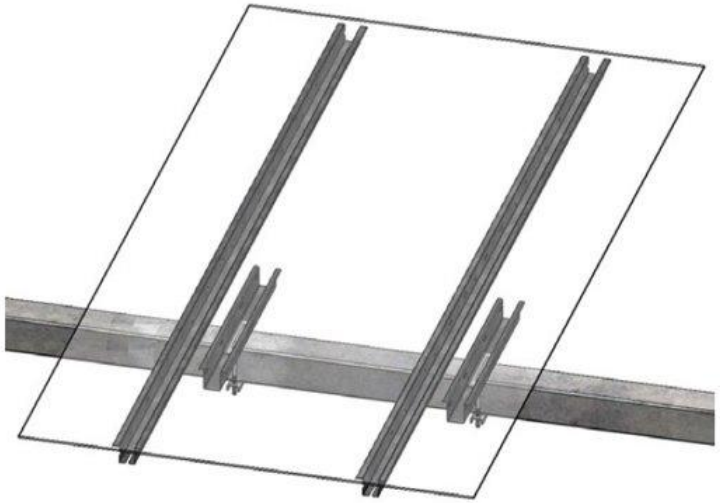
Preassembled SpeedClamp

- Clamps onto module frame
- Faster installation



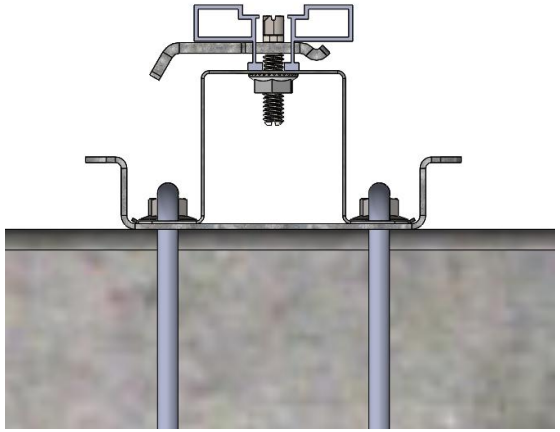
Module Mounting | Thin Film





First Solar Series 6

- SpeedClamp compatible
- Shared Clip for high load

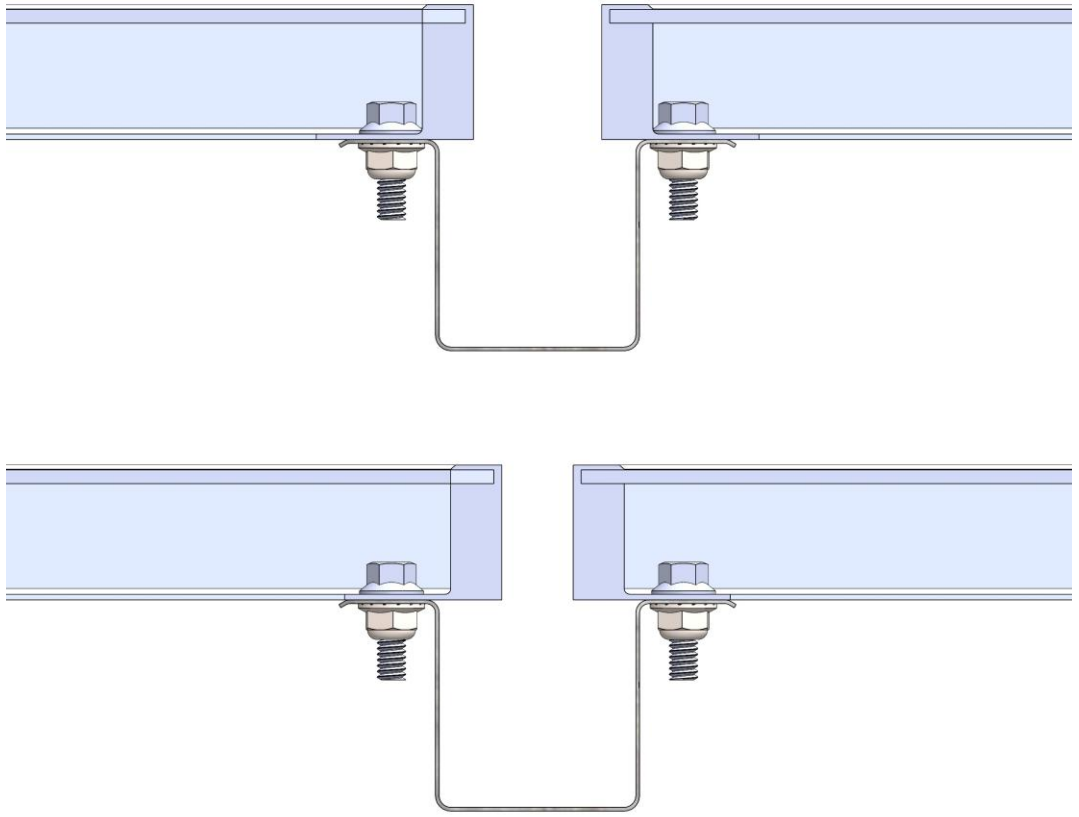


First Solar Series 7

- Nested Purlins
- ARaymond PowAR Wedge

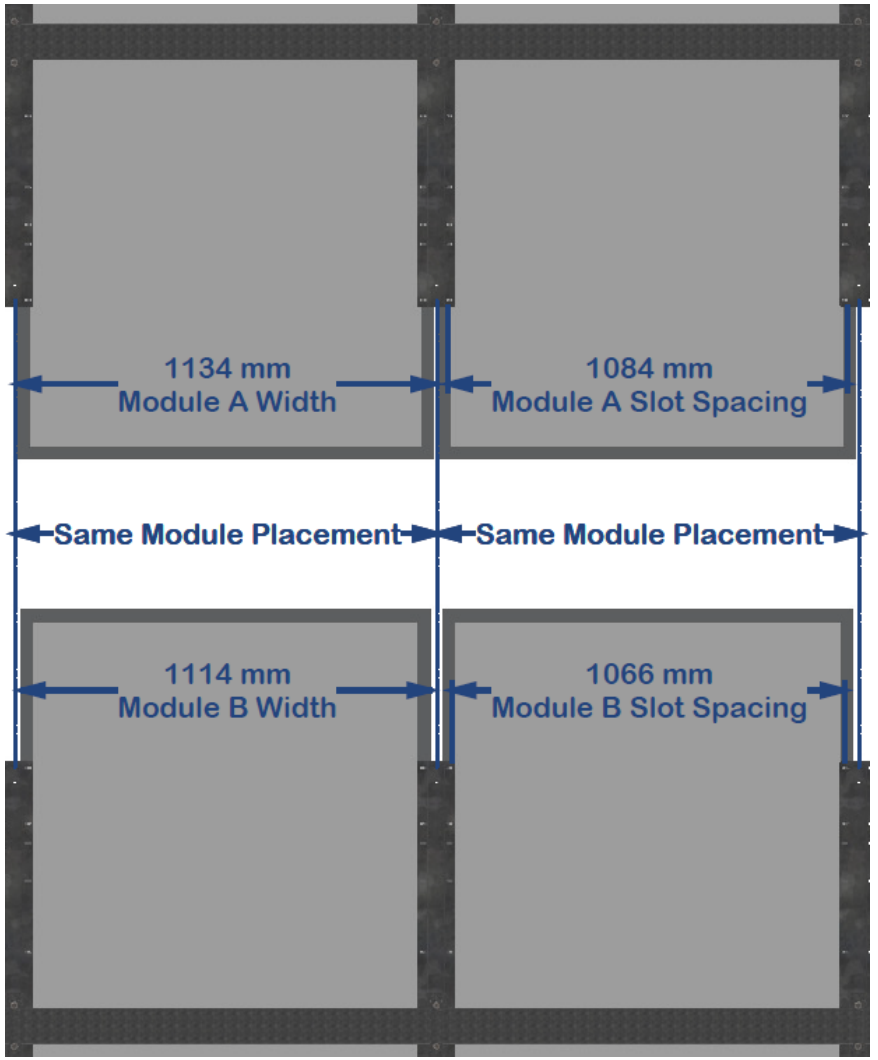
Module Flexibility | Module to Module Spacing

- Mounting Hole Location in module frame can have an impact
- "Transverse" mounting location is distance between bolt holes parallel to short side of module
- Even if overall dimensions of module are same, if transverse dimension changes spacing can change
- Results in change in module-to-module gap which can add up over length of table



Module Flexibility | FlexRails™

- Allow for up to +/-10mm change in module dimensions
- Design, manufacture, and deliver trackers before final module selection
- Enable safe harbor of tracker materials
- Installed on over 1GW of projects



Module Flexibility | Case Study

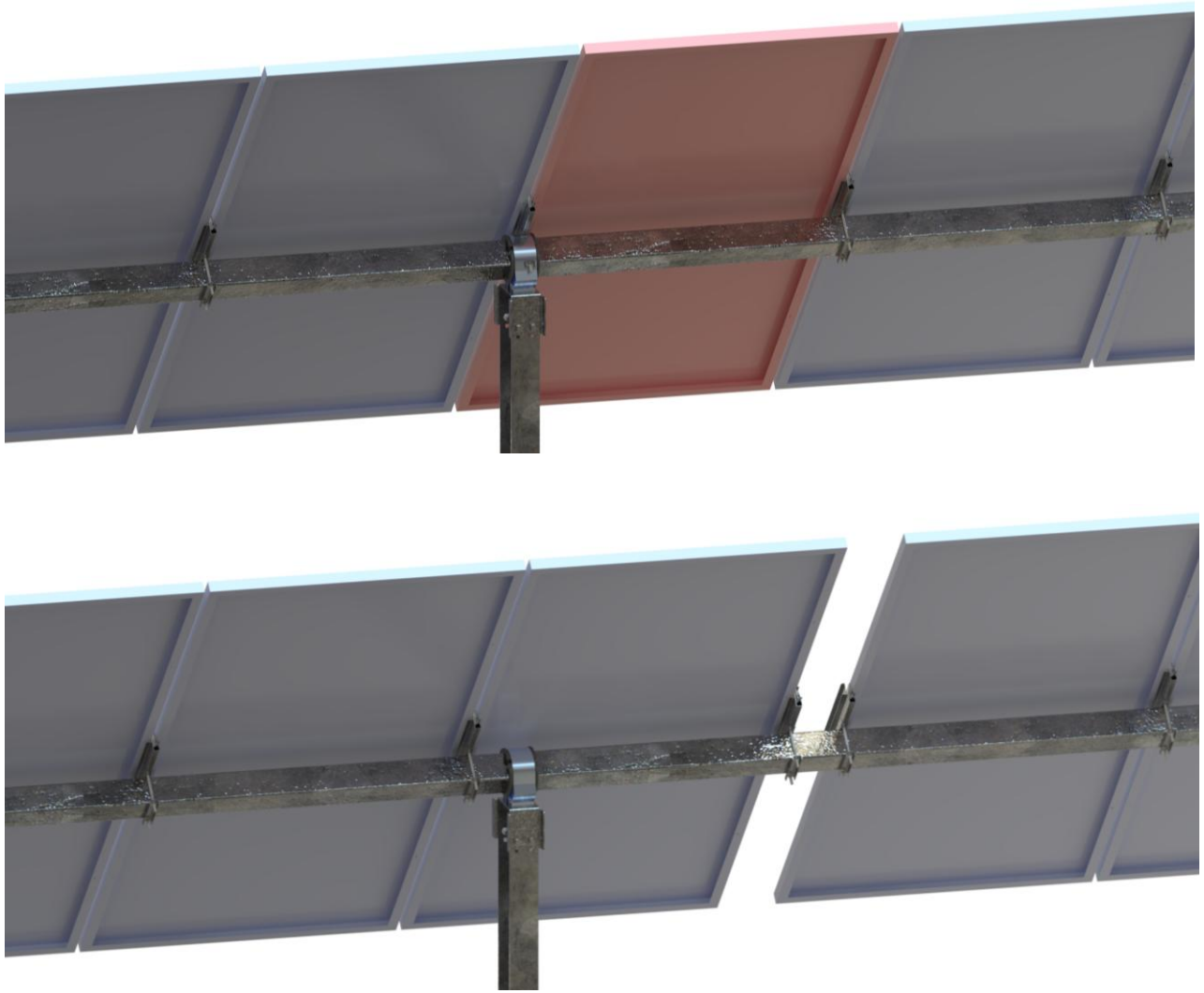
Designing for Multiple Modules

- 264MW Project in Texas
- FlexRails absorb variation in module dimensions
- Identical table design for all four modules

Module Manufacturer	Adani	BYD	Jinko	Trina
Maximum Length (mm)	2266	2278	2264	2384
Module Width (mm)	1133	1134	1134	1134
Module Slot Spacing Length (mm)	400/990/1400	400/1100/1400	400/1100/1400	400/790/1400
Mounting Slot Spacing Width (mm)	1092	1085	1084	1091

Module Flexibility | Site Remediation

- Interference is still possible for major changes where piles have been installed.
- Engineering gaps are used to eliminate interference at nominal cost.
- Tube extension are available if needed.



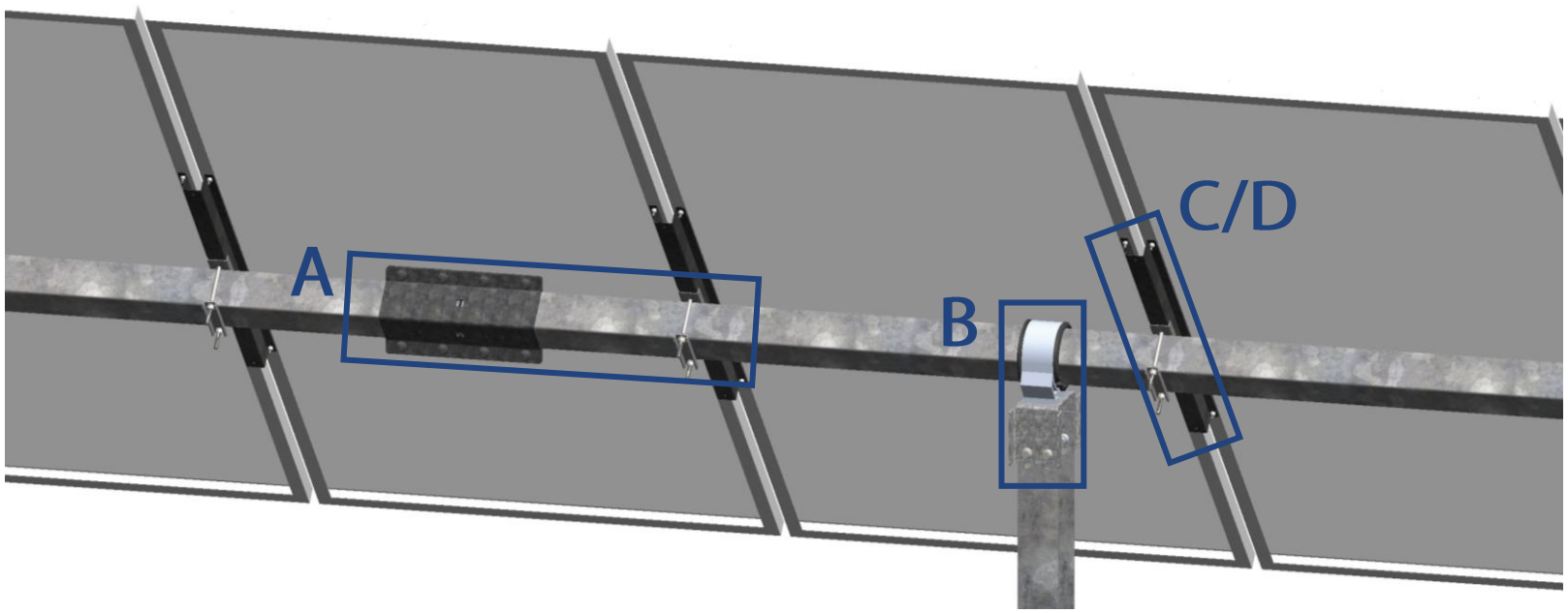
Conclusions

A. Unpunched torque tubes with friction connection splices allow module rails to shift if module dimensions change.

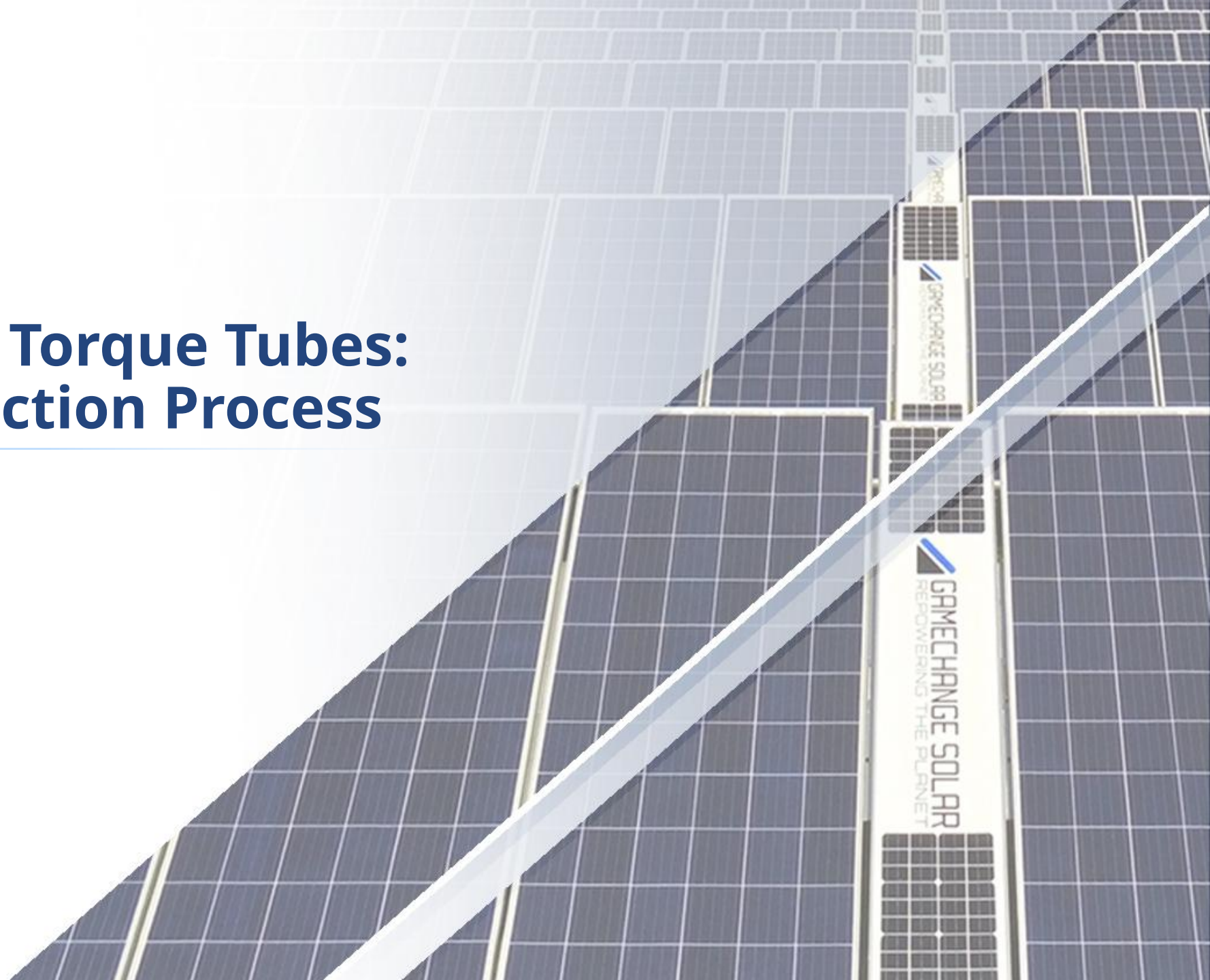
B. Low profile bearings reduce geometric conflicts due to shifting module positions.

C. SpeedClamps bypass module mounting holes, maintaining consistent spacing and design across multiple modules.

D. FlexRails absorb differences between modules, allowing for completion of tracker design before finalization of module selection.



Module Flexible Torque Tubes: Start of Construction Process



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What are the Safe Harbor Requirements

Treasury Notice 2025-42:

.02 Physical Work Test. Construction of an applicable wind or solar facility begins when physical work of a significant nature begins. Work performed by the taxpayer and work performed for the taxpayer by other persons under a binding written contract that is entered into prior to the manufacture, construction, or production of the applicable wind or solar facility for use by the taxpayer in the taxpayer's trade or business (or for the taxpayer's production of income) is taken into account in determining whether construction has begun. See section 5.01 of this notice. Whether physical work of a significant nature has begun with respect to an applicable wind or solar facility before July 5, 2026, will depend on the relevant facts and circumstances.

(1) Off-site physical work of a significant nature. Generally, off-site physical work of a significant nature may include the manufacture of components, mounting equipment, support structures such as racks and rails, inverters, and transformers and other power conditioning equipment.

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What are the Safe Harbor Requirements – Continuous Work

Treasury Notice 2025-42:

.04 Continuity safe harbor: deemed satisfaction of continuity requirement.

Except as provided in this section 4.04, if a taxpayer places an applicable wind or solar facility in service by the end of a calendar year that is no more than four calendar years after the calendar year during which construction of the applicable wind or solar facility began (Continuity Safe Harbor Deadline), the applicable wind or solar facility will be considered to satisfy the Continuity Requirement (Continuity Safe Harbor). The excusable disruption rules in section 4.02 of this notice do not apply for purposes of applying the Continuity Safe Harbor. If an applicable wind or solar facility is not placed in service before the end of the fourth calendar year after the calendar year during which construction of the applicable wind or solar facility began, whether the applicable wind or solar facility satisfies the Continuity Requirement under the Physical Work Test will be determined by the relevant facts and circumstances.

Start of Construction Process

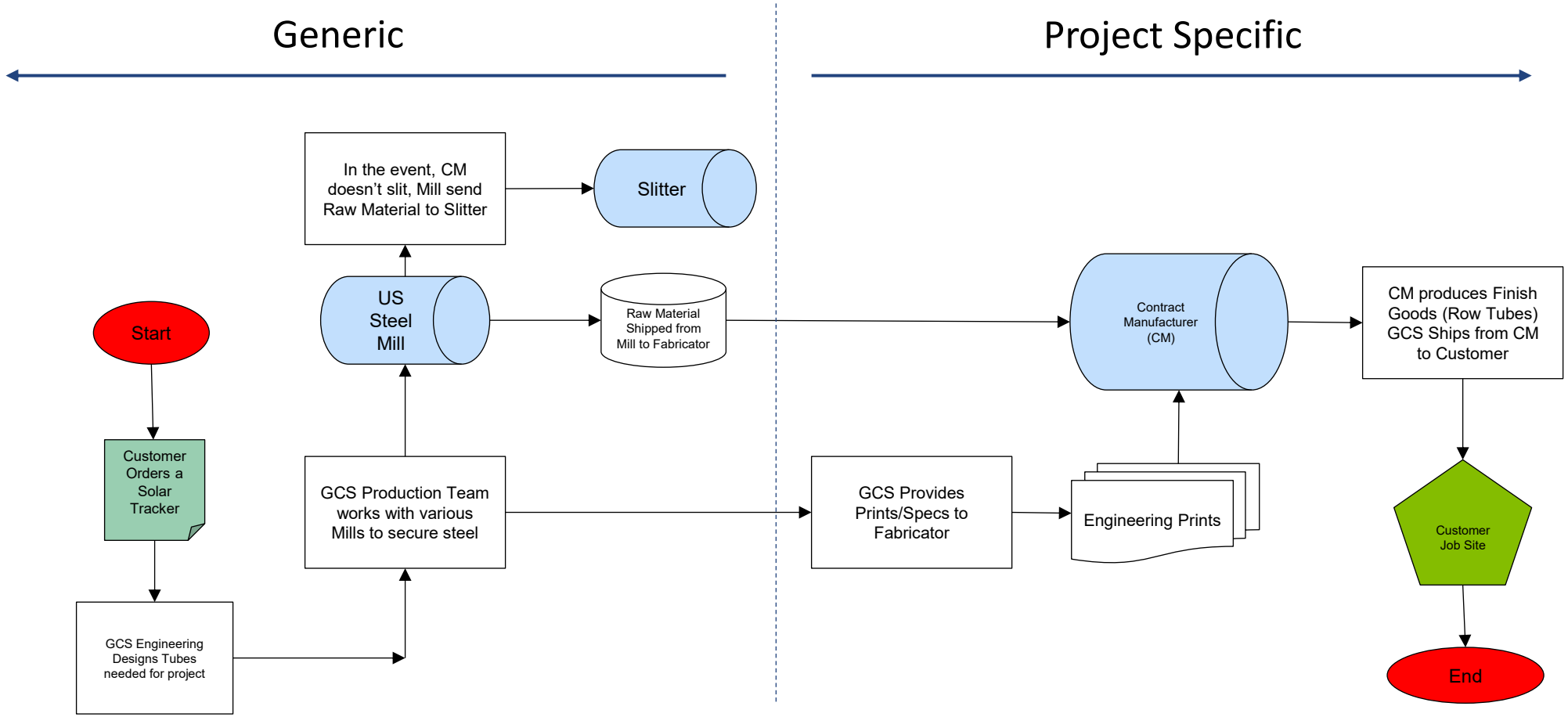
GCS can create Torque Tube Specifications with the following specifications.

- Location of the site: Wind Speed, Snow Load, ROM => Grade, Thickness, Diameter
- Design Life => Coating
- Modules to be used (can be more than one, but need a limited number:1 to 4 modules)
- Sting Sizing so GCS can engineer row lengths => Tube Segment Lengths

With the above information, GCS can engineer torque tubes for this specific job.

- Job Specific Part Numbers
- Job Specific Specifications
- Tubes would be manufactured with a unique project-specific part number
- Tubes would be individually marked with Mfg. Date and Unique Part Number

Torque Tube – Manufacturing Process Flow



Torque Tube – Start of Construction Process

- Production begins based on project specific PO.

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230 East Ave Suite 100
Norwalk CT 06855
United States
212-388-5180

Purchase Order

Date	P.O. No.
[redacted]	[redacted]

Vendor	Ship To
[redacted]	[redacted]

S.O. Number	Terms	Available To Ship Date
	[redacted]	[redacted]

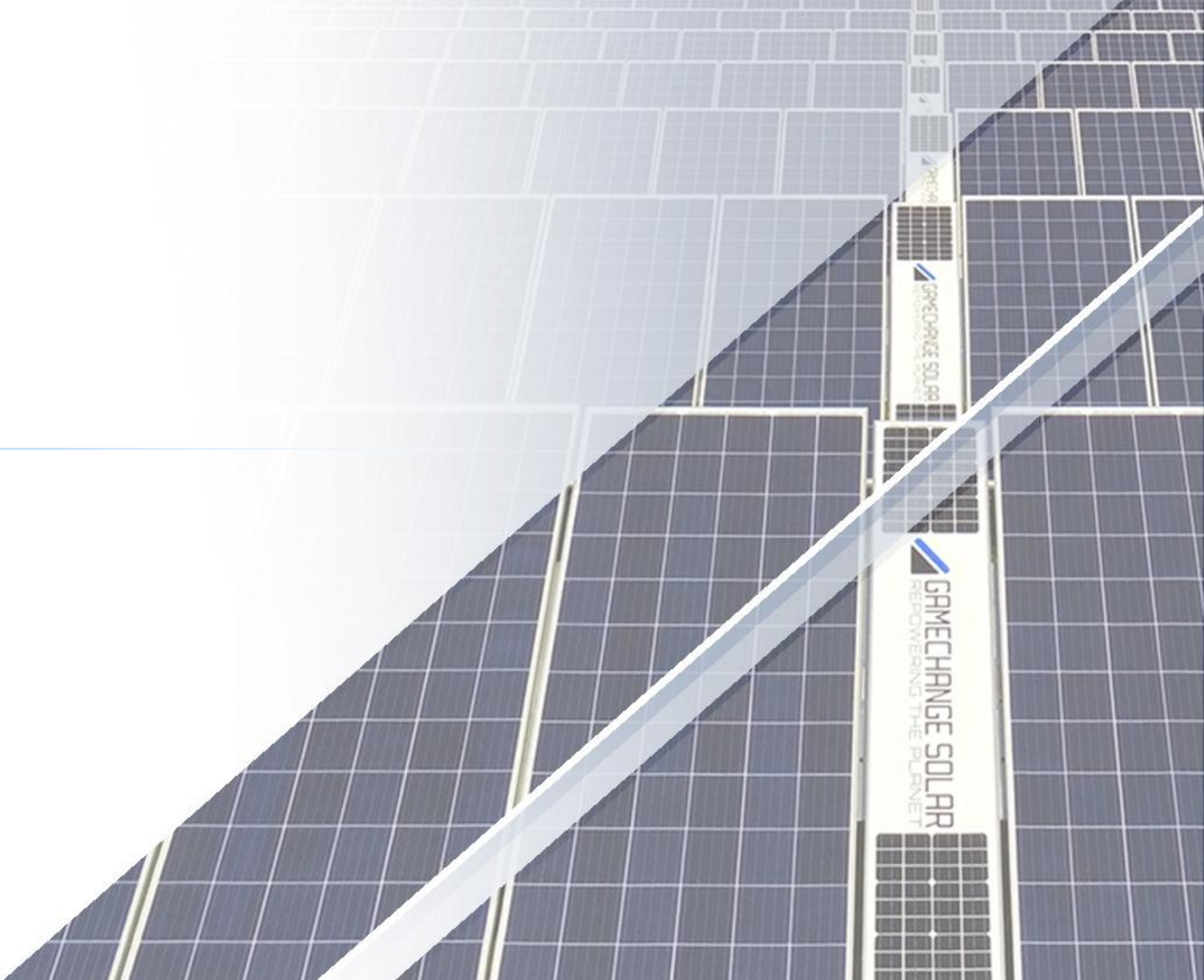
Item	Qty	Project	Rate	U/M	Purchase Contract	Amount
GC365-.120-WH-2552 Row Tube, GC365 (Min 0.12), 456.875, Grade 80, G180, (White - WH)	1,520		[redacted]	Each		[redacted]

- Tubes manufactured with Unique Project Specific Part Number and Mfg Date/Time

Conclusions

- Guidance from Treasury explicitly call out racking as an option for off-site physical work of a significant nature
- GCS can create Torque Tubes specific to a given project.
- Torque Tubes can be provided to align with project schedule and support continuous progress goals
- Given the module flexible nature of the Genius Tracker, the tubes can likely still be used for that given project even if modules change.

THANK YOU



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DEPCOM POWER™

Practical Application

CA100

Design Parameters

AC Capacity	100 MWac
Site Area	520 Acres
Arrays	27
Inverter	Sungrow
Racking	GameChange Genius 1P
Module Count	188,433

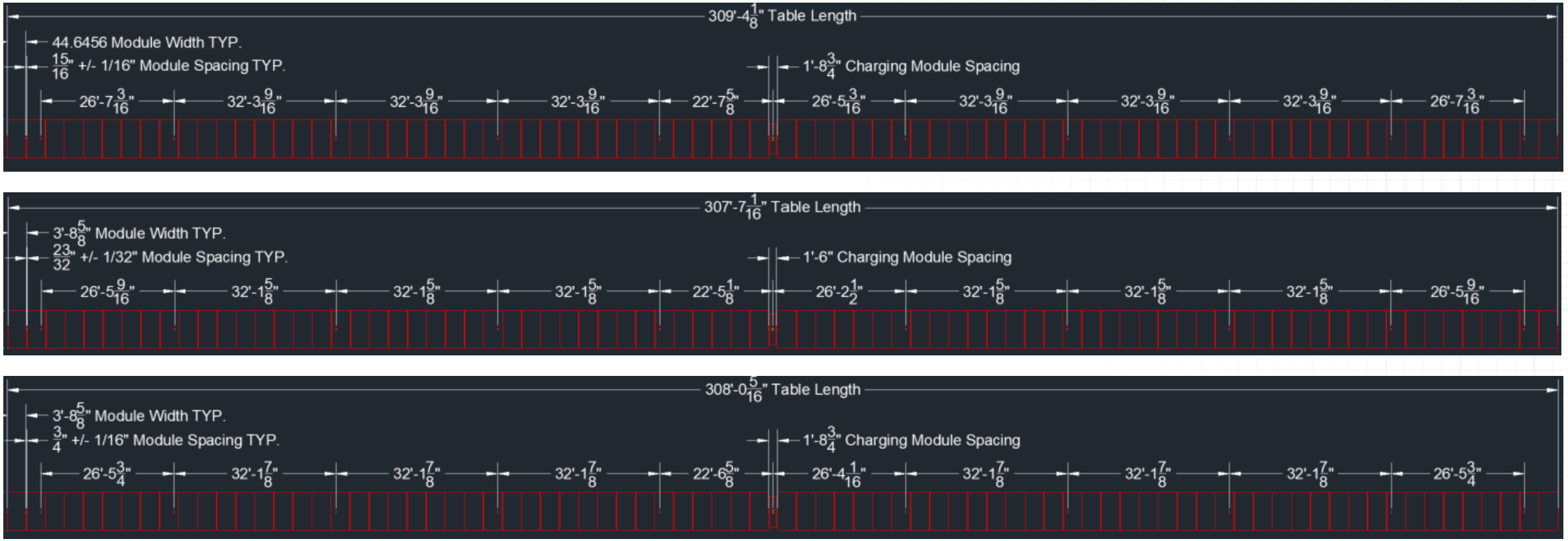
Module Changes

Brief Timeline

- Due to tariff risks, Owner was contemplating up to four module suppliers with three seriously considered.
- Modules supply strategy changed four times between March 2025 and present day
- Flexibility in GameChange design allowed DEPCOM to consider both purlin and SpeedClamp mounting systems with only ~1.5 ft (~0.46 m) variance in 3-string trackers
- This allowed DEPCOM to keep all options available and viable to the Owner

Module Changes

Optionality - Purlins



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Module Changes

Optionality - SpeedClamps

Questions?

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by Ryan Kennedy

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9:00 am – 10:00 pm EDT, New York City

Thursday, 18 December 2025
10:00 am – 11:00 am EST, New York City
4:00 pm – 5:00 pm CET, Berlin

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Next-gen BESS design: Energy density, and the logistics headache

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Ryan Kennedy
Senior editor
pv magazine USA

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