TECHNICAL ASSISTANCE REQUEST

Winning further Solar Prize competitions will permit us to use funds and vouchers to improve product design and validate product quality and reliability through a systematic and extensive Test Plan. While we have been fortunate to have over a dozen pilot projects in place and operating successfully to date, we must have independent testing (reviewed by Independent Engineers) to commercialize sales on a broader platform. A bank of product and component mechanical tests imposed at a variety of environmental conditions will boost consumer confidence for the underserved Commercial and Industrial solar markets.

The Failure Mode and Effects Analysis Summary (a portion) shown below reveals Failure Modes posing the highest risks that must be mitigated with independent testing.

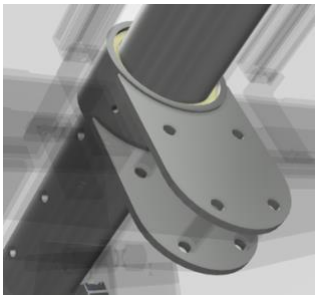
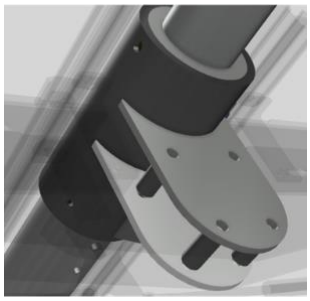
FMEA

Process/Product Name: Top-Of-Pole Single-Axis Tracker Rotation
Responsible: Pursuit Solar - Solar Prize Team
Prepared By: Eddie Bugg & Fin Doyle
FMEA Date (Orig.): 3-Jun (Rev.): 1

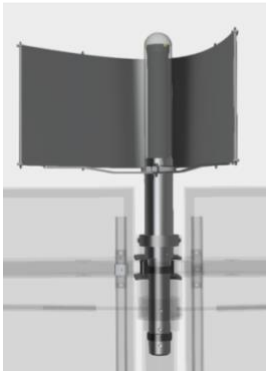
Process Step/Input	Potential Failure Mode	Potential Failure Effects	SEVERITY (1 - 10)	Potential Causes	OCCURRENCE (1 - 10)	Current Controls	DETECTION (1 - 10)	RPN	Action Recommended	Resp.	Actions Taken	SEVERITY (1 - 10)	OCCURRENCE (1 - 10)	DETECTION (1 - 10)	RPN
What is the process step, change or feature under investigation?	In what ways could the step, change or feature go wrong?	What is the impact on the customer if this failure is not prevented or corrected?		What causes the step, change or feature to go wrong? (how could it occur?)		What controls exist that either prevent or detect the failure?			What are the recommended actions for reducing the occurrence of the cause or improving detection?	Who is responsible for making sure the actions are completed?	What actions were completed (and when) with respect to the RPN?				
Tracker begins to turn West.	No direct sunlight.	Less energy gain. Visual frustration.	4	Presence of clouds, snow, or structure causing shading for 2 hours after sunrise.	8	Visual Inspection	1	32	1. Sell only in high solar day locations. 2. Proper Tracker siting. 3. Clear snow?	Eddie	1. Publish Performance Guidelines 2. Publish Application Guide. 3. Publish O&M Manual.				0
	Presence of ice on StrongBack restricts Collars from rising.	Less energy gain. Visual frustration.	8	Pressure build up on HelioDrive causing failure.	4	1. Visual Inspection. 2. Sun warming, if tracking.	5	160	1. Testing 2. Sell only in warm locations. 3. Ice shields? 4. Grease? 5. Open Bearing clearances?	Fin/Eddie	1. Environmental Testing 2. Publish Application Guide. 3. Publish O&M Manual.				0
	Presence of dust, dirt, sand, or mud on StrongBack restricts Collars from rising.	Less energy gain. Visual frustration.	8	Added friction restricting movement. Wear and tear on Bearings.	4	1. Grease 2. Self-cleaning (wiping) 3. Visual Inspection.	5	160	1. Testing.	Fin/Eddie	1. Environmental Testing 2. Publish Application Guide. 3. Publish O&M Manual.				0
	Proper alignment between StrongBack and Collars binds Collars from rising.	Less energy gain. Visual frustration.	8	1. Incorrect Assembly/Installation. 2. Poor fastener torqueing.	4	1. Clear Installation Manual. 2. PM - Fastener torques.	5	160	1. Testing.	Fin/Eddie	1. Conditional Testing 2. Publish Installation Manual. 3. Publish O&M Manual.				0
	HelioDrive has insufficient capacity to lift/turn Tracker.	Less energy gain. Visual frustration.	8	Tracker design is beyond torque capacity with safety factors.	3	1. Proper project-specific design for HelioDrive load/capacity checks.	10	240	1. Testing 2. Publish clear capacity guidelines for HelioDrive.	Fin	1. Perform Capacity Testing 2. Publish Design Guidelines				0
	HelioDrive Receiver Failure	Less energy gain. Visual frustration.	8	Seal failure	3	Visual Inspection - Wax leaking down StrongBack.	5	120	1. Testing.	Fin	1. Perform Conditional Pressure Testing 2. Perform Conditional ALT.				0
	HelioDrive Receiver Failure	Less energy gain. Visual frustration.	8	Brazing failure	3	Visual Inspection - Wax leaking inside Glass.	5	120	1. Testing.	Fin	1. Perform Conditional Pressure Testing 2. Perform Conditional ALT.				0
	HelioDrive Receiver Failure	Less energy gain. Visual frustration.	8	O-Ring Port failure	3	Visual Inspection - Wax leaking inside Glass.	5	120	1. Testing.	Fin	1. Perform Conditional Pressure Testing 2. Perform Conditional ALT.				0
	HelioDrive Receiver Failure	Less energy gain. Visual frustration.	8	Glass breakage - Argon gas leakage	3	Visual Inspection - Cracked or shattered glass.	5	120	1. Testing.	Fin	1. Perform Conditional Pressure Testing 2. Perform Conditional ALT.				0
	HelioDrive Receiver Failure	Less energy gain. Visual frustration.	8	Glass O-Ring failure - Argon gas leakage	3	Visual Inspection - Fogged glass.	5	120	1. Testing.	Fin	1. Perform Conditional Pressure Testing 2. Perform Conditional ALT.				0
	HelioDrive Receiver Failure	Less energy gain. Visual frustration.	8	Glass Retention Screw/O-Ring failure - Argon gas leakage	3	Visual Inspection - Fogged glass.	5	120	1. Testing.	Fin	1. Perform Conditional Pressure Testing 2. Perform Conditional ALT.				0
	HelioDrive Lower Assembly Failure	Less energy gain. Visual frustration.	8	Concentric Bearing(s) wear.	3		10	240	1. Testing.	Fin	1. Perform Conditional Capacity Testing 2. Perform Conditional ALT.				0

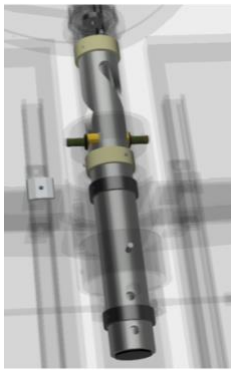
Beginning with the Tracker Structure itself, critical component interfaces must be mechanically cycle tested for potential wear and fatigue during accelerated lifetime, simulating 20-30 years of use.

- StrongBack, Collars/Bearings – Follow Collar and Drive Collar with Bearings
    - Cycle Testing with and without imposed temperature gradient, ice, dust, dirt, and sand.

- HelioDrive Full Assembly, Receiver, and Lower Assembly
    - Load Capacity Testing
    - Cycle Testing with and without temperature gradient for mechanics, pressure capacity, and O-Ring seal failure.





- Damper Assembly
    - Load Capacity Testing
    - Cycle Testing with and without temperature gradient for mechanical wear.