Hot Sun Industries Ltd.
1382 Wynbrook Pl
Burnaby BC V5A3Y6
604 298 7095
www.h2otsun.com

June 2, 2012 and July 13, 2012

Heliocol vs Powerstrip Performance Comparison

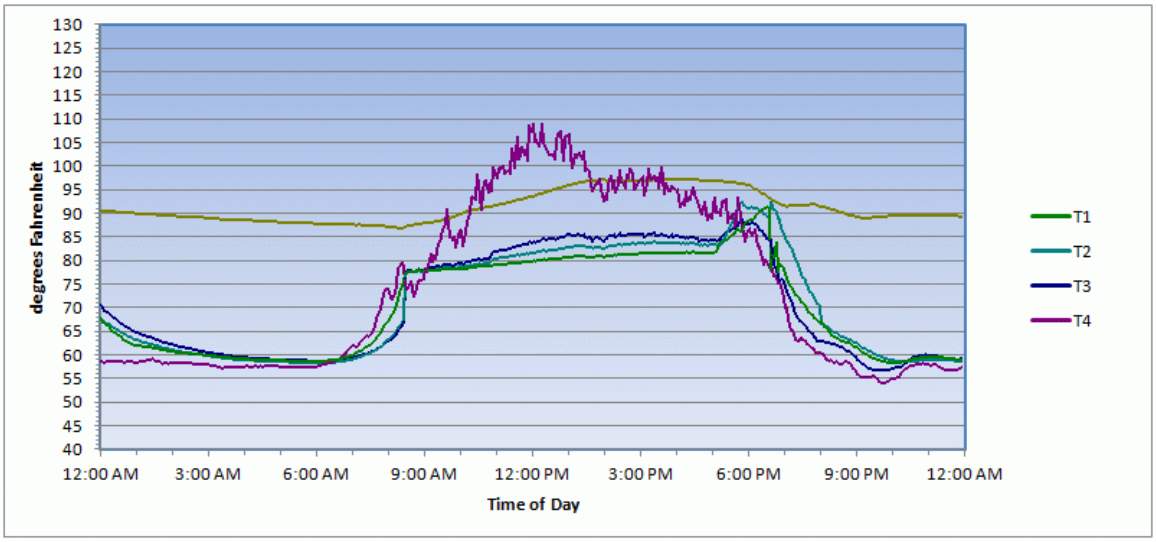
Hypothesis: Different unglazed solar panels behave differently in different situations. All products of this type expose a high wetted surface area of black absorber to the sun and allow sufficient flow that the big black thing in the sun's temperature is minimized. Different collector designs will react differently to wind. Sun puts the heat in and wind takes the heat out. Powerstrip got a lousy performance curve from FSEC testing in 2011 and Heliocol's numbers are much better.

After several months of sensor calibration issues we got 3 sensors in the same flow reading the same temperature over the range of temperatures we want to test. We set up a 4x12 Heliocol plumbed in series after an identical surface area (headers included) of Powerstrip solar panel. Data was collected with a SWIM PC version 4 final production version. This is Hot Sun's in house precision data logger with many other features.

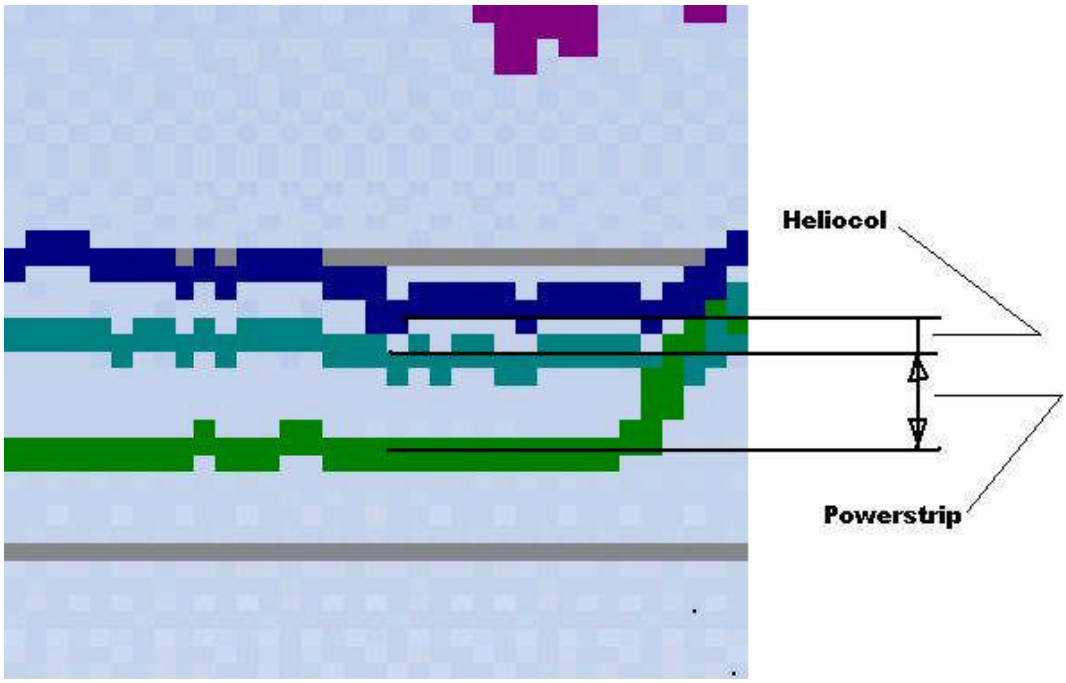
TEST RIG:

OBSERVATIONS

On one of the first days of data collection we see the following:



The purple line is the roof sensor. This is the solar radiation sensor but it really tells us the overall energy input. Wind reduces this temperature. Sun increases it. On this day, June 2, 2010 at around 1:30 pm you can see that the purple line dropped. This is because the wind picked up. T1 is before solar. T2 is after Powerstrip and T3 is after Heliocol. All 3 are plumbed in series so the difference between the temperatures is proportional to the energy delivered. Note that before 1:30 the Heliocol slightly outperformed the Powerstrip but as soon as the wind picked up the Powerstrip greatly outperformed the Heliocol. If we look closely at around 4:30 pm by zooming in we see the Powerstrip outperforms the Heliocol by a factor of 3 in this particular condition.



Over the course of this entire day we've tallied all the data and determined Heliocol's average deltaT was very close to Powerstrip's. Field testing done by testing agencies purposely tries to eliminate the wind effect by minimizing it but wind can't be turned off in the real world.

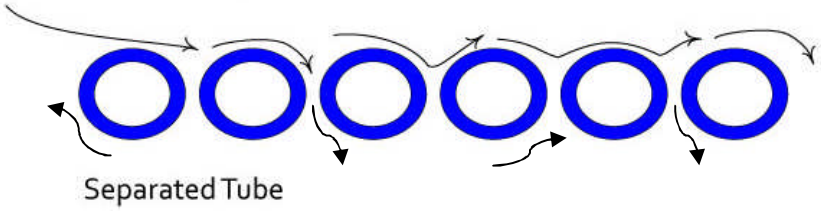
CONCLUSION:

Heliocol is not a better performing collector than Powerstrip and in windy conditions Powerstrip's performance difference is dramatic. Heliocol is better in low wind and Powerstrip is better in higher wind. FSEC and SRCC purposely minimize the wind effect and in doing so skew the performance numbers in favor of collectors that perform better in low wind. As we've always said, collectors should be compared on an area to area basic not on published test results

Above a typical Heliocol system showing how the rigid panel sits up off the roof allowing wind to steal heat from the back side.

Above a typical Powerstrip installation showing how the roof is used as insulation on the back side of the collector. We would expect this tile roof situation to be an amplification of the effect we have proven on a regular shingle roof.

In addition Heliocol is an individual or separated tube design. This means air can move around the entire perimeter of the tube. Powerstrip is a fin tube so the air cannot move around the back side.



This in addition to the fact the Heliocol sits up off the roof accounts for the superior high wind performance of Powerstrip.

Heliocol's better low wind performance can be explained by the fact the tubes are much thinner perhaps. In addition the separation allows diffuse solar radiation to heat the back side of the collector. In a real life situation with cold and wind to deal with we want the collector to be naturally wind protected.

All the data is published at http://www.powerstripsolar.com/Control4/michael

If you look at June 1, 2012 you'll see the readings with the sensors in the calibration position. June 2, 2012 is the data analyzed above

On June 8, 2012 Mike ADamcik elevated the Heliocol panel 1.5" off the roof to simulate the effect of the Heliocol panel on a tile roof where more air could get underneath. Notice the dramatic decrease in performance even in ideal sunny conditions. On June 28 the Heliocol was raised 3" off the shingle roof surface. Powerstrip outperforms in every weather condition when the Heliocol panel is separated from the roof as it would be on a typical wavy s-tile installation.

Conclusion:

Powerstrip is a much better real world condition collector. Collectors like Heliocol that fare better in standardized performance testing only do better when fitted tight to a test rig surface or when mounted to a planar surface like a shingle roof and only in ideal low wind conditions. In less ideal conditions of wind and lower air temperatures and less solar radiation Powerstrip does better and on roof surfaces that are not insulating like tile roofs where there can be a large gap between the collector and the roof, Powerstrip greatly outperforms. Powerstrip's flexibility means it lays tighter against the roof surface and uses the roof surface itself as wind protection regardless of roof type.

This evidence is clear and indisputable and available online. You can look at the data today in real time. The broader issue here is the fact that our web based monitoring

capability trumps FSEC and SRCC's very expensive standardized collector testing and brings all performance results from all standardized testing into question. Since our first bad experience with expensive standardized testing in 1980 with test certificate 85092 on our original Powermat solar collector we have tried to argue our bad ratings to no avail. With this evidence hopefully test agencies will do what is right and start incorporating Hot Sun's precision web based monitoring systems into their own test procedures for more transparency and accuracy. This technology will allow them to improve their test methodology and reduce their costs.

Other collectors have been designed to perform best in standardized tests. Powerstrips have been designed to perform better in real life. Standardized tests can not be taken as an indication of real life performance according to those test agencies but Hot Sun's testing can be taken as an indication of real life performance because it is real life performance.

Hot Sun's web based technology has application like this in all clean tech and sustainability quantification challenges and quantifying energy savings is the key to moving toward a sustainable energy future.

Ken Wright BASc (mechanical engineering UBC 1984), lead investigator.
President, Hot Sun Industries Inc
Poway CA
858 683 0800

President, Hot Sun Industries Ltd.,
Burnaby BC
778 300 1803

Gordon Wright PEng
Web based control and Monitoring Division Chief Engineer
Hot Sun Industries Ltd.