Hot Box!

Can Solarscreens really make a difference to a hot metal box like Polly??

by Richard Robertson

Essentially a metal box with windows all around, Polly is the perfect testbed to see if simply putting reflective screens in the windows can make a real difference to interior temperatures. Note the rear wheel: The brand new hubcap was lost on the first trip. Grr….

In Project Polly's former life as an **Apollo Rentals'** van she travelled the length and breadth of Australia, but would rarely have stopped in one place for long. Having windows almost all the way around provides plenty of light and good viewing, which I'm sure holiday makers appreciated, but also means she warms up quickly in the sun. Apollo fitted long, heavy curtains that would have gone some way to reducing heat build-up, but with all that glass any curtains were fighting a losing battle. Also, the lack of windscreen or cab window protection simply added to the problem.

Now that Polly is largely a lady of leisure, and even though Mrs iMotorhome ran up a set of curtains with insulated backing, keeping her cool inside when parked for days or weeks on end on our driveway, as well as when travelling, is a priority. So when the good people from **Solarscreen** offered a set of their highly regarded insulation screens for all of Polly's windows it was an offer too good to refuse. The company makes standard sets for the cabs and rear doors of popular vehicles, but we needed a custom set for our side windows.

If you've been following this series you'll know we've had our **Solarscreens** since spring and subjectively they do an excellent job. But with summer in full swing – at least for a few days – it seemed like the perfect time to do some objective research on their real world effectiveness.

To put the test results into perspective it's important to first consider some salient points. Polly is essentially a big metal box that as an ex rental is unlikely to have much insulation. As such she heats up (and cools down) quickly. 'Proper' van conversions sold into the private market should be much better insulated, with most having far less glass area and proper double glazed windows. Coach-built motor homes have even better insulation courtesy of their panelled wall construction. In both these cases the cab becomes the primary source of heat gain/loss via the windscreen and side windows. So in many ways a vehicle like Polly is the worst case scenario – or the best for a test like this.

The Test

Jamie from Solarscreen sent us a high-tech digital thermometer with two, one-metre long leads with sensors at the ends. The unit was placed at the forward end of the kitchen bench, with one lead attached to the side of the cab's passenger seat and the other placed on top of the fridge door; both out of

direct sunlight. While both sensors were only about half way between the floor and ceiling it was impractical to position them higher, which undoubtedly would have led to higher readings.

Two consecutive days were forecast with tops of 33°C and in Polly's usual parking spot she receives full sun along the sides from dawn to dusk. Readings were taken hourly from 6 am 'till 6 pm, with sunrise around 6:07 am and sunset just before 8 pm. The vehicle was entered via the rear door to minimise the chance of inaccurate readings due to sudden external air exposure. Two outdoor thermometers were placed in the shade and their readings compared to that from a nearby Bureau of Meteorology weather station. The results were averaged out to best represent the likely external air temperature.

Day one saw Polly completely screened and in brilliant sunshine from sunrise until just before 3 pm, at which point storm clouds gathered and the temperature began to fall although no rain did.

Day two found Polly 'screenless' since the previous evening. Once again brilliant sunshine started at sunrise, but by 2:15 the clouds again gathered and just before 4 pm the heavens opened as a change moved through and the temperature plummeted.

The Results

Despite the weather not fully cooperating I believe sufficient data was recorded to clearly establish the benefits of our Solarscreens. See the tables and graphs at the end of this story for precise readings and trends.

On day one (screened) the internal temperature rose at a comparable rate to the outside temperature. The average was 3ºC to 4ºC warmer inside, peaking 5.6ºC warmer at 3 pm (which is usually the hottest time of day here during daylight saving), before the clouds rolled

Top to bottom: The thermometer set-up was simple but effective; Getting hot in the cab; the cab sensor on the seat side, to keep it out of the sun.

Insert: Shade air temperature was averaged from the readings of these two thermometers plus a nearby Bureau of Meteorology weather station. **Above:** With the screens removed the interior temperature rose much more rapidly and was nudging 50ºC at 2 pm when storms arrived. Winter heat loss would be just as dramatic.

in. Overall the cab was fractionally warmer than the kitchen and as expected the interior cooled more slowly once the outside temperature started to fall.

On day two the rate of internal temperature rise was significantly faster, peaking at an average 10.1°C at 2 pm just before the storm clouds gathered. That's nearly twice the difference from the previous day and an hour earlier. At that time the cab was also 7ºC hotter than the kitchen, nudging 50ºC. Had the storms not intervened I believe the internal temperature readings would have gone significantly higher. Of course, when the outside temperature plummeted the internal temperature fell more rapidly too.

Conclusion

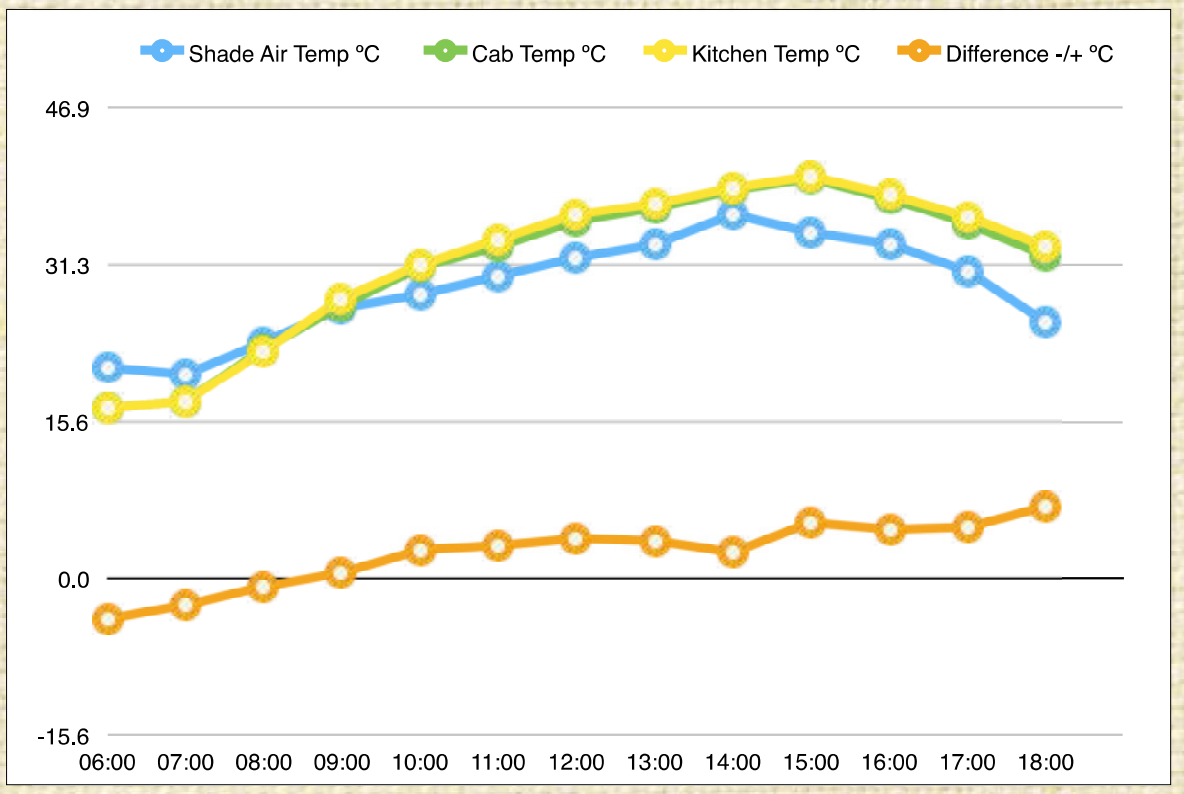
In the real world you're unlikely to park your vehicle in the sun in the middle of summer and sit in it all day long with all the windows and roof hatches closed. What these test results show, however, is that even in a worst-case scenario the addition of Solarscreens to a vehicle like Polly made a significant difference. Comfort levels aside, the reduced temperature is important for the efficiency of the fridge as well as the life of the house batteries, other electronic items and stored food.

In a real world situation – say in a caravan park with the aircon on in the middle of summer – they would dramatically reduce airconditioner workload, while in winter they would keep heat in and lessen the effort of your heating system. In between, when just parked up and needing to keep the interior more comfortable, a few screens in strategic positions, coupled with open windows and hatches would make a world of difference.

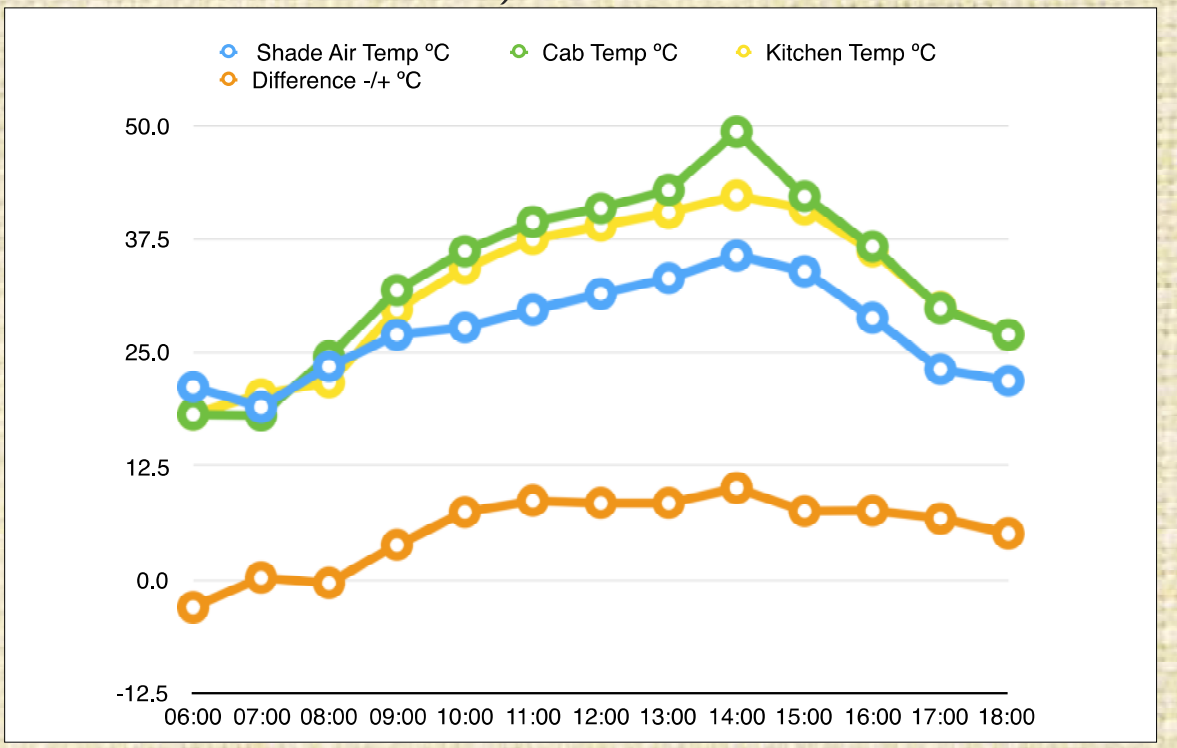
While solarscreens aren't the cheapest reflective window screen option, I've had a look at some competitors and so far seen nothing that compares in terms of material density – ours are seven layers thick – or quality. At the end of the day any reflective window screens are better than nothing, but for quality and efficiency I believe Solarscreens are hard to beat.

Project Polly Temperature Charts

Day 1 - with Solarscreens



Day 2 - without Solarscreens



Project Polly Temperature Charts

Day 1 - with Solarscreens

Time	Shade Air Temp °C	Cab Temp °C	Kitchen Temp °C	Average Temp °C	Difference -/+ °C
06:00	21.0	16.9	16.9	16.9	(4.1)
07:00	20.2	17.6	17.5	17.6	(2.7)
08:00	23.5	22.7	22.5	22.6	(0.9)
09:00	26.9	27.2	27.8	27.5	0.6
10:00	28.2	30.9	31.3	31.1	2.9
11:00	30.1	33.1	33.7	33.4	3.3
12:00	31.9	35.6	36.1	35.9	4.0
13:00	33.3	36.8	37.3	37.1	3.8
14:00	36.2	38.7	38.9	38.8	2.6
15:00	34.4	39.8	40.1	40.0	5.6
16:00	33.2	37.7	38.3	38.0	4.8
17:00	30.5	35.2	35.9	35.6	5.1
18:00	25.5	32.2	33.1	32.7	7.2

Day 2 - without Solarscreens

Time	Shade Air Temp °C	Cab Temp °C	Kitchen Temp °C	Average Temp °C	Difference -/+ °C
06:00	21.2	18.2	18.2	18.2	(3.0)
07:00	19.0	18.1	20.4	19.3	0.3
08:00	23.5	24.6	21.7	23.2	(0.4)
09:00	27.0	31.9	29.8	30.9	3.9
10:00	27.8	36.2	34.3	35.3	7.5
11:00	29.8	39.4	37.5	38.5	8.7
12:00	31.5	40.9	39.0	40.0	8.5
13:00	33.2	42.9	40.4	41.7	8.5
14:00	35.7	49.3	42.3	45.8	10.1
15:00	34.0	42.2	40.8	41.5	7.6
16:00	28.9	36.7	36.2	36.5	7.6
17:00	23.2	29.9	30.0	30.0	6.8
18:00	21.9	27.0	27.0	27.0	5.1