Updated analysis of E-cat test October 6
by David Roberson, Oct 28, 2011.

I have been reviewing the data obtained during the September and October tests and can now confirm that there is proof that the E-cat generates a large amount of excess energy. Proof has been before us for a long time but it is not easy to discern.

Below is a graph of the temperature readings versus seconds at the E-cat output thermocouple referred to as T2 during the October test.

My analysis is as follows:

Mr. Rossi performed a carefully controlled E-cat heating procedure. The pattern of setting the input power to “5”, then “6”, all the way to “9” is intended to slowly allow the internal components to reach ideal operation temperature. The reactor reaches equilibrium somewhere around 13000 seconds into the test. Once this has been achieved, a series of on and off power pulses (“9”) is applied to the core. This series of power applications occur at a frequency that is high enough to be well filtered by the low pass nature of the internal E-cat heat flow mechanism. This is evident by the smooth curve of T2 versus time that shows up from 13000 seconds through about 15500 seconds. It is important to note that the T2 curve is slowly falling throughout this time duration. The average T2 reading is 120.5 C and has a slight negative slope. I realized that the implication was that the E-cat output power would slowly begin to fall along with this curve since that temperature drives the check valve, etc.

What can we make of this curve of T2 versus time? It turns out that a lot of information is revealed. I did an analysis of the input power pulse waveform starting at 11400 seconds until 14881 seconds to get the average filtered component of the drive signal and obtained a net power input of 1252 watts. Then I realized that all of this power must be causing the E-cat core module to reach some operational temperature. It then responds to the elevated temperature and the LENR effect within starts to generate extra energy. Next, the energy associated with the input power (1252 joules/second* time) adds to the newly released energy of the core. The two of these energy sources end up as heat which proceeds to add energy to the water contained within the E-cat.

The water will now either increase or decrease in temperature, depending upon the heat that is lost from the system. We know of at least three loss paths. The main output leading to the heat exchanger, leakage water or vapor from the case, and heat leaving the case due to radiation or other means. All that we need to prove is that the sum of these loss factors is greater than 1252 watts in order to prove beyond doubt that LENR is functioning within the Rossi device.

There is one subtle point to explain. There is a very slight negative slope in T2 versus time during this region. I performed a quick calculation and found that the power lost within the water tank as a result of this slope is ((122-120.7) C x 4.188 joules/(C-grams) x 30000 grams)/1860 seconds = 87 joules/seconds or 87 watts. This calculation reveals that a very small increase in the drive power will allow the temperature of the water bath and hence output power to remain constant. This is a very important point to make. The E-cat will continue to put out the same power for as long as this input power (1252 watts) is applied. This may not be the ideal self-sustain mode that we all love, but it is significant.

Of course I was not content to leave out the additional knowledge revealed by this region of the T2 temperature reading versus time. There is more wonderful evidence to glean. Notice the positive slope in T2 reading that begins at 16000 seconds. This slope is quite linear from 16000 seconds until the level "9" input power pulse ends at the start of the self-sustaining mode. An application of the identical formula as during the negative slope above shows the following: (3 C x 4.188 joules/C-grams x 30000 grams)/2700 seconds = 139.6 watts. This calculation suggests that Rossi can increase the output power rather easily by driving the core with an application of full power "9" for a brief time. It is not clear at this time what the limits of safe and predictable operation are.

We are fortunate to have additional information revealed by the same graph. The region following the peak in output power can help us determine how the unit responds to no drive conditions as when it is used for self-sustaining operation. Notice the slope after the peak at approximately 18000 seconds. This negative slope is caused by the end of input drive power resulting in reduced LENR activity. The slope has a value that is clearly greater than the slowly falling region mentioned in my first calculation above. Application of the exact same technique as in the previous samples yields (2.7 C x 4.188 joules/(C-g) x 30000 grams)/1000 seconds = 339.2 watts. This calculation suggests that the water is cooling relatively quickly and I suspect that this rate is indicative of the cooling rate that would dominate if there were no LENR reaction present. Compare this slope to that which begins at around 30000 seconds after the hydrogen is eliminated and the water rate increased.

Further evidence of the LENR activity is revealed by the smoothly falling curve of T2 within the region of 22000 seconds. About the only sensible explanation for this very long period of power output observed toward the end of the experiment is that the heat must be LENR related. It can be determined that the power generated by the LENR action within the E-cat is less than that resulting from the steady application of power observed in the first case I analyzed. It is assumed that this reduced power output is associated with the decision of Mr. Rossi to only populate one active core within the E-cat for this test. Three times the LENR generated power is expected when all three are installed. I am still attempting to find an explanation for the rise in T2 that begins at approximately 25000 seconds.

Now, if we were to assume that the power output is around 3125 (4.2 C x 4.188 joules/C-gram x 178 grams/seconds) watts (note 1) during the initial powered region above and multiply this figure by 3 you get 9375 watts. The average input was only 1252 watts at that assumed time. We calculate a COP of 7.5 which is reasonable. This number needs to be adjusted to include the wasted input power for controls, etc. but those additions would not cause the final COP value to be significantly below 6.

I wish to mention one last observation that is gleaned from the data and graph. A delay of 1526 seconds exits between application of a power pulse and its effect appearing as water temperature rise. It is not clear why there is such a significant delay within the device reaction, but the data supports this contention.

(1) This value is calculated by using the values measured at 15:42 within Mats Lewan report.

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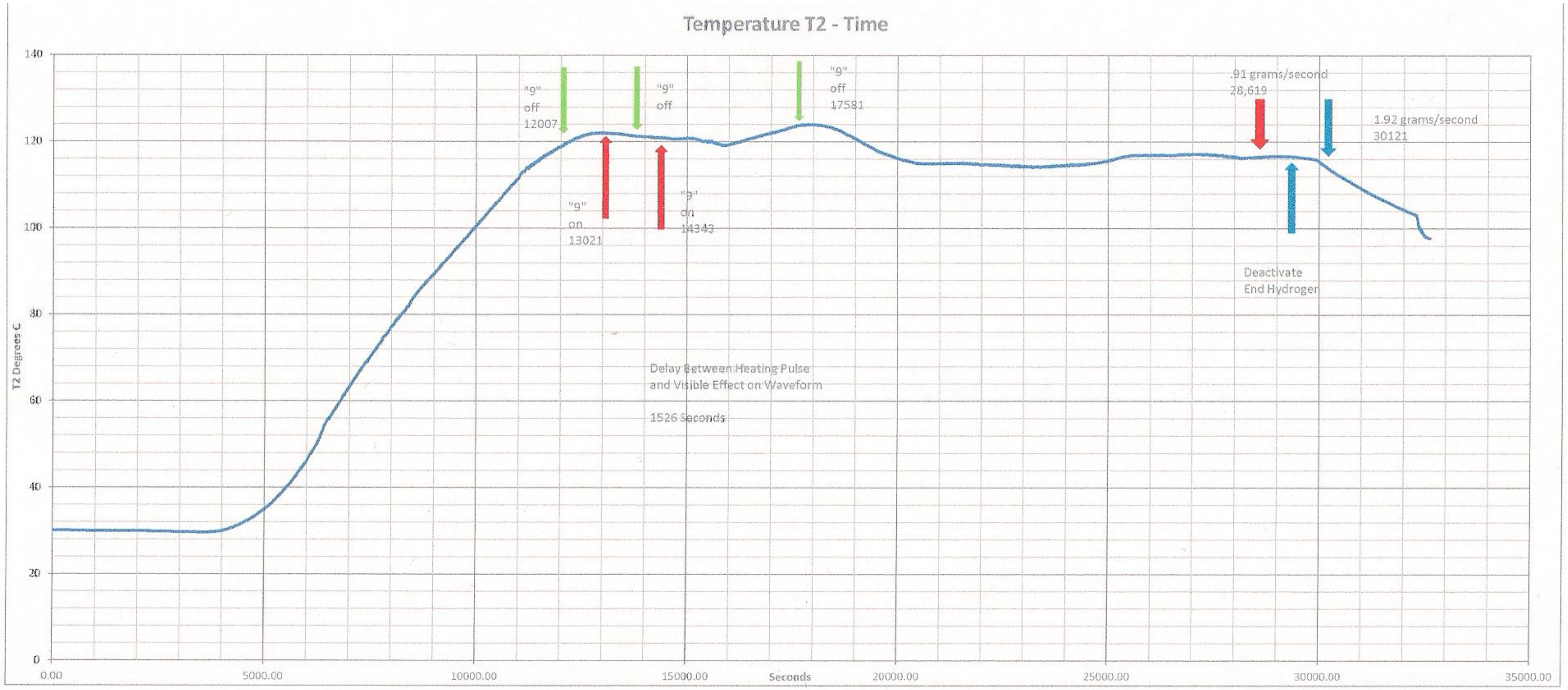
(Graph of T2 versus seconds can be found below).


Temperature T2 - Time
T2 Degrees C
Seconds
140
120
100
80
60
40
20
0
0.00
5000.00
10000.00
15000.00
20000.00
25000.00
30000.00
35000.00
"9" off 12007
"9" off
"9" off 17581
"9" on 13021
"9" on 14343
.91 grams/second 28,619
1.92 grams/second 30121
Deactivate End Hydrogen
Delay Between Heating Pulse and Visible Effect on Waveform
1526 Seconds