Analysis of E-cat test October 6 by Bob Higgins, Oct 19, 2011.

In this analysis, reported items such as water leakage, heat loss through the insulation, difference in source water temperature and the water temperature of Tin, and the final energy stored in the E-cat when the experiment was terminated were incorporated.

There has been substantial Vortex-l traffic about how the experiment could have easily been improved, but the real point now is to understand the data available and determine what information that can be derived from it with confidence.

Note that the spreadsheet represents a median estimate of what transpired. Best and worst case analysis should follow so as to condition what can be understood with confidence from the data. The result, of course, presumes the data was reported honesty (this is not in question).

The possibility of contamination of the heat exchanger Tout by the hot water/steam of the exchanger primary input was considered. However, because the secondary water flowed up and through the secondary outlet of the brass manifold at high rate, and because the contaminating primary heat would have to pass this water to reach the thermocouple, it was estimated that heat from the primary inlet would quickly be diverted into the secondary outlet water rather than causing direct temperature rise error at Tout. Thus, this contamination heat was regarded as a possible minor second order error. Additional analysis will be needed to confirm this estimation.

With the new larger E-cat, by virtue of its greater mass, it becomes harder to rule out physical and chemical energy storage mechanisms on the basis of black box tests. The larger E-cat needs a longer test producing more excess energy to conclude that what was demonstrated could not have been a charade. The smaller E-cat was easier to analyze on that basis because the reactor volume/mass was so small. In the October 6 test, Ing. Rossi was very gracious in allowing his device to be dismantled at the end of the experiment – the hallmark of an honest man. Still, after viewing photos of the interior cooling water cavity, only about 10-20% of the mass can be identified and about 80-90kg of unknown materials remain in the reactor core that could be, to a skeptical eye, fuel for chemical reaction or physical storage (liquid metal). The net nominal excess heat output of 25 kWH is not sufficient to rule out such alternate energy storage mechanisms. However, if the natural "dishonesty radar" is set aside, and the reactor comprises what Ing. Rossi claims, then the result is astounding.

It is amazing that the skeptical buzz is switching from "Is there excess energy?" to "Is there commercially viable COP?" Just evidence of reproducible excess energy is a physics shattering realization.

This nominal case analysis suggests a COP of only 3.8 was demonstrated, but the trend in self-sustaining mode was a COP>40. In the present E-cat design, it is likely that periodic electrical re-stabilizations of the self-sustaining mode would have been needed that were not seen in this short test. The actual long term COP with this

design may be less than 40 -maybe in the 20-30 range when extrapolating the self-sustaining mode into a long term operation. So, optimists will believe that a COP of >40 is achievable with future revision and the skeptics will insist that only a COP of 3.8 was demonstrated. It is a rational extrapolation that a future product could become available having a stable and safe self-sustaining mode that produces a COP > 20. Note that by the same measure, existing nuclear fission reactors have a finite COP. It all comes back to whether money is spent in the product to produce some electricity from the heat output which could be used in the control. This is an economic decision. Stirling engine technology is presently expensive enough that for simple heat applications, a grid supplied control system may be a better choice.

In summary, while the Oct. 6 test of Andrea Rossi's E-cat was far from perfect, it represented a significant addition to the publicly released information about his invention. Skeptics will insist the test was too short and lacked sufficient rigor to provide incontrovertible evidence of a nuclear reaction – they are correct. However, despite the test's flaws (and considering the integrity of those involved), the data suggests that substantial excess energy (as heat) was produced. Nominal case analysis of the 9.5 hour test indicates 34kWh of cumulative heat produced while consuming 9kWh of cumulative input electrical energy. Most output heat was produced in the final 4 hours of self-sustaining reaction, during which the input was ~125W and heat output rate was above 5kW. At test termination, the data suggests that the self-sustaining mode of reaction could have been continued. Critical error analysis of the experiment will continue; but the expectation is that errors will be unable to account for the large excess heat output.

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Robert J. (Bob) Higgins received his B.S. in Electrical Engineering from Mississippi State University in 1976. After completing his degree, he joined Motorola's Applied Research Laboratory in 1976 as an Electronic Research Engineer. While at Motorola, he completed the Masters in Engineering degree in 1980 from Florida Atlantic University. In 2000, Motorola awarded Bob the title of "Dan Noble Fellow" for "Leadership in Communications Technology". Bob has 28 issued U.S. and international patents in technologies ranging from component designs to systems. Today Bob is a Distinguished Member of the Technical Staff in Motorola Solutions' Chief Technology Office at its Plantation, Florida (USA) campus.