PROOF THAT THE THERMAL AND GRAVITATIONAL ENERGY AVAILABLE WERE INSUFFICIENT TO MELT STEEL IN THE TWIN TOWERS AND 7 WORLD TRADE CENTER ON 9/11/01

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In this communication I shall show that only explosives could have produced the large amounts of molten steel found at the site of the World Trade Center (WTC) in the days following 9/11. There is universal agreement by scientists in and out of government that the temperatures reached in the fires were much lower than the melting point of steel. (1-3) Steel could have only have melted (assuming no explosives were used) if it gained additional energy in falling. I shall show that this gravitational energy is insufficient to cause melting.

Steven E. Jones has made a strong case that some molten steel (or iron-rich metal) was observed pouring from high up in the South Tower (4). In that case gravity was not a factor. However, much more molten steel was probably found in the rubble than was observed pouring out of the buildings, and the purpose of this report is to show that gravity could not have played a significant role in its formation.

Although there are some technical points involved in my arguments, I will describe, in an elementary way, all the scientific concepts involved. This report will also provide references showing that molten steel was indeed found.

Unit of Energy

I will use the joule, the unit of energy in the metric system. One joule per second is a watt. We're all familiar with watts since light bulbs are rated in them. For example, a 100 watt light bulb uses up energy at a rate of 100 joules per second. Another common unit is the calorie. One calorie is 4.186 joules. This is not the calorie used in rating foods, which are rated in kilocalories or Calories (calories with a capital C). A human uses up about 2000 Calories a day which is approximately equivalent to the rate of energy usage of a 100 watt light bulb.

Heat of Fusion

Suppose you start off with a solid at room temperature and you add energy to it by putting it in an oven. The temperature will increase until you reach the melting point. Then as the solid melts the temperature will stay constant until the all solid has changed to the liquid. Then the temperature will begin to increase again. An example of this occurs when you take an ice cubes out of the refrigerator and put them in a glass. The ice cubes heat up and then start to change to liquid water. This occurs at 32 degrees Fahrenheit or 0 degrees Centigrade. Then, after the ice has melted, the water heats up to room temperature. The melting point of steel is at about 1535 degrees C. The energy required to change steel from solid to liquid is called the heat of fusion and it's about 272,000 joules per kilogram. (5)

Heat Transfer

Energy flows from hot to cold. It never flows the other way. Thus it is impossible for a steel bar, initially with the same temperature throughout, to, by itself, transfer energy so that one end is hotter than the other. Thus in spite of the large fires in the WTC, no steel could melt unless the temperature rose above the melting point. And according to tests conducted by NIST, no WTC steel samples saw temperatures of 600 C, which is well below the melting point of steel. (6)

Specific Heat

This is the amount of energy required to raise a unit mass of a substance, one degree. For example at room temperature the specific heat of iron is 0.45 joules per gram per degree Centigrade. (7) The temperature has to be specified since the specific heat varies with temperature. The specific heat of iron is about the same as the specific heat of steel. It increases with temperature, reaching a value of about 0.72 Joules per gram at 1400 degrees C. (8)

Energy Acquired by a Falling Body

A falling body is accelerated by the force of gravity. This is, according to one of Newton's Laws, equal to the mass times the acceleration of gravity, which in the metric system is 9.8 meters per second per second. Actually when a body falls, it is

also acted on by the force of friction. In the spirit of giving the official theory every possible chance, we shall neglect friction. The energy acquired by a falling body is equal to the product of the force multiplied by the distance through which the force is applied. Thus the energy acquired by a body of mass m falling a distance h is m*g*h, (meaning m times g times h). The energy acquired by a 1 kilogram object falling from the top of one of the twin towers is thus 1* 9.8*411 = 4028 joules. (The height of the twin towers was about 1350 feet or 411 meters.)

Energy Needed to Melt Steel

Now let's first calculate the energy needed to raise the temperature of one kilogram of steel from an initial temperature to the melting point temperature. The NIST (1) report on page 30 states that the temperature of insulated steel in a fire never gets above 350 degrees C, while uninsulated steel can reach a temperature of 800 degrees C. According to the official theory much insulation (which is used in all steel frame buildings) was knocked off the steel beams by the impact of the planes. Of course, 7 WTC was never hit by a plane and molten steel was found in its wreckage. The actual temperature of the steel was probable never higher than 250 degrees C (3), but let's be conservative and use the 800 degree number. The average specific heat between 800 degrees C and the melting point (1536 degrees C) is about .65 joules per gram per degree C or 650 joules per kilogram per degree C. (Note the energy is proportional to the mass, so a kilogram needs a thousand times more energy to raise its temperature a degree as a gram.) Thus the energy needed to raise the temperature of a kilogram of steel from 800 degrees to the melting point is

(1536 – 800)*650 = 478,400 joules.

The energy needed to melt one kilogram of steel is 272,000 joules as described above. Thus the total energy needed to melt one kilogram (or per kilogram) is

272,000 + 478,400 or 750,400 joules.

Let's be generous and assume that all the energy of motion of the falling steel is converted to heat in the steel. Then the gravitational energy available as shown above is at most 4028 joules. This is a lot less than the 750,400 joules needed to melt the steel. In fact the gravitational energy is too small by a factor of 750,400 divided by 4028, or 186. The factor is probably much larger because, for example, all the molten steel probably did not fall from the top floor and in the case of WTC 7, the

building height is about half that of the towers. A more realistic number would be over a thousand.

How the Steel Was Melted

Steven E. Jones, obtained several samples of once melted steel (or iron-rich material) from the WTC (4,9). He had it analyzed and it contained mostly iron but also Sulfur and other metals indicating that it was produced by the reaction of thermate and steel. Thermate is a variation of thermite, which can be an incendiary or explosive depending on the fineness of the powders comprising the mixtures. Ultra-fine powders (less than about 100 micron particle size) are needed for the explosive form. Thermite analogs can be used in building demolitions. (10) When thermite is ignited a chemical reaction takes place that produces molten iron and lots of heat. Sulfur is added to enhance the melting of steel by the molten iron product. Sulfur was also found, independently, in steel from WTC 7 by J.R. Barnett. (11)

D.P. Grimmer showed that a few inches of thermite applied to the outside of any column in the twin towers would contain enough energy to melt through the column; enough could be used to bring the buildings down. (12)

Evidence That Molten Steel Was Found in the WTC Debris

In James Glanz's New York Times 11/29/2001 Article "A Nation Challenged: The Sight; Engineers Have A Culprit in the Strange Collapse of 7 World Trade Center: Diesel Fuel." The next to last paragraph reads "A combination of an uncontrolled fire and the structural damage might have been able to bring the building down, some engineers said. But that would not explain steel members in the debris pile that appear to have been **partly evaporated in extraordinarily high temperatures,** Dr. Barnett said."

In the website
http://911research.wtc7.net/wtc/evidence/moltensteel.html
several references to reports of molten steel are cited. Here are a few examples:
A report by Waste Age describes New York Sanitation Department workers moving "everything from molten steel beams to human remains."

A report on the Government Computer News website quotes Greg Fuchek, vice president of sales for LinksPoint Inc. stating: In the first weeks, sometimes when a worker would pull a steel beam from the wreckage, the end of the beam would be dripping molten steel.

A Messenger-Inquirer report recounts the experiences of Bronx firefighter "Toolie" O'Tolle, who stated that "some of the beams lifted from deep within the catacombs of Ground Zero by cranes were dripping from molten steel." See also: http://www.pnacitizen.org/john_gross_nist_pnac.php

Conclusions

Since there was molten steel in the wreckage of the World Trade Center, and since the temperatures of the fires were insufficient to melt steel, and since the gravitational energy was shown to be very much smaller than the energy needed to melt steel, the Twin Towers and 7 WTC could only have been brought down by explosives or cutter charges.

References

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(11) An Initial Microstructural Analysis of A36 Steel from WTC Building 7, J.R. Barnett et al, HOM, 53, (12)(2001)
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