TGV's 357Mph Demo Proves HSM's Superiority: HMR Can't Avoid The Speed / Maintenance Penalty

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TGV's Speed Record Proves There Is A Costly Speed / Maintenance Penalty For Fast High Maintenance Rail And The Need For Heightened HMR Safety Standards As Speeds Increase

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Tuesday, April 3, 2007, was a big day for TGV and the French. Congratulations are in order for what has never been done before with a steel-wheel-on-steel-rail train – achieving a phenomenal top speed of 357.2 mph.

Notably, the test run of the new Alstom V150 took place on a new very straight and very flat rail line between Paris and Strasbourg that is scheduled to open this June. To be sure, the test run was a wonderful way for TGV to demonstrate and advertise its technical prowess with high-speed electric-powered trains. It should be noted that the French are very aggressively promoting their TGV technology all over the world and this new speed record demonstrates the power of French technology.

TGV's event was heavily and effectively publicized all around the world with news media bursting with excitement and broadcasting stirring video images of the achievement for all to be amazed. The images even made the evening news on major American television networks, a land of woefully inadequate passenger rail service and rail technology.

The big question is: so what does the TGV test really mean?

From the perspective of those familiar with maglev technology, the TGV speed record was the equivalent of putting a propeller plane into a power dive to demonstrate that it could fly as fast as a jet. The inference being, of course, that the performance of the old technology was equal to that of the new - as long as the wings were not ripped off or the train did not derail, both of which are distinct possibilities at these performance limits. The point is that no steel-wheel train will ever run at 357 mph in commercial service. Besides intolerable passenger ride comfort and exterior noise levels, such speeds would require such a vast expenditure for energy and maintenance as to put such a line quickly out of business.

The reality is that at comparable speeds, maglevs such as the German Transrapid or Japanese MLX-01 travel safer and smoother at these speeds with less effort, consume less energy, and do so with no increased *speed/maintenance penalty*. By this I mean that whether traveling at 30 mph or 300 mph, a maglev's maintenance cost remains about the same. This is not the case for a fast train system because the increased friction resulting from higher speeds creates higher heat and increases the rate of wear on the steel mating surfaces. Overcoming the forces of friction not only consumes vast amounts of energy at the high speeds demonstrated by the Alstom V150, but the friction quickly eats up tracks, wheels, brakes, bearings, axles, motors, the overhead catenaries and pantographs. This fact of physics limits rail system top speeds to about 220 mph. Indeed, overcoming air resistance at speeds over 100 mph is what consumes much of a vehicle's propulsion energy, whether rail or maglev.

In stark contrast to the souped-up TGV speed record, the world's first high-speed maglev in Shanghai is a system that routinely achieves a speed of 267 mph on its high speed runs. This particular maglev technology is designed to reach a top *cruising speed* of 310 mph, but the first leg of its new line is only 19 miles long and therefore too short for higher speeds (it did reach 311 mph on Nov. 12, 2003 during a test). Given the positive buzz and hype surrounding TGV's high-speed run, it is clear that maglev technology's position as the "better mouse trap" is not enough to guarantee commercial success in today's competitive global economy – effective marketing is just as important, as the TGV test clearly demonstrates.

According to *Railway Gazette International*, the specially modified TGV hit its top speed of 357 mph after traveling for 13 minutes and covering 45 miles. It took another 48 miles to come to a stop. This is in stark contrast with the Shanghai maglev, which in November 2003 had a standard-issue five-car train set hit a top speed of 311 mph after traveling about four minutes over a distance of 11 miles on its unmodified guideway. (It took another 7.5 miles to stop.) Only the power levels and speed controls had to be adjusted to attain such outstanding one-time performance. More to the point, in normal commercial service, the Shanghai maglev hits 267 mph in 3 minutes and after only 9.3 miles — 75% of the TGV world-record speed in 20% of the distance — in perfect comfort, and within seconds of its stated departure and arrival times. This is an everyday phenomenon.

If the goal is to move passengers rapidly, efficiently, comfortably and safely on the ground, the TGV test amply demonstrated the case for adopting maglev technology. For the V150 to attain its speed record, it required a great deal of expensive track preparation and pushed the technology to its operational limit. On the other hand, for everyday transportation where comfort is (or should be) king, the likely top cruising speed for this TGV will remain in the 190 to 220 mph range. On the other hand, for a maglev to maintain speeds of 310 mph, there is none of the *shake, rattle and roll* that the TGV's passengers felt at that same speed. Not inconsequentially, there is also no wear and tear on a maglev's tracks (called guideways) or equipment because the two never touch during travel.

Alstom Transport's President Philippe Mellier commented in a Reuters' article on March 28th that, "*the running costs of a maglev train were much higher than for a TGV train*." Mr. Mellier is most likely aware that not all maglevs are the same. Transrapid's maglev operations and maintenance costs are a third to half that of running a TGV or any other high speed rail technology at high speeds, precisely because of the friction-related reasons previously mentioned. He was probably referring to the Central Japan Railroad's MLX01 maglev, since he was asked about their world-record speed of 581km/h (361mph). Considering that the capital costs for a German maglev system are about the same as for a high-speed rail system, but with half the O&M costs, it should be apparent that underwriting a maglev transportation system makes better financial sense to a profit-minded operating entity. These O&M costs will become increasingly important as global energy prices climb.

With higher speeds, lower operating costs, and lower environmental impact, maglevs literally leave high-speed rail in the dust. And, with on-time, to the second, performance of over 99% (as is the case in Shanghai and with the so-called low-speed maglev system in Nagoya, Japan), little will be lost as a result of canceled trips, equipment failure or weather related delays; all situations that now plague the American air and rail transportation system. These are the very reasons the Chinese have embraced a maglev system, adopted it as their own, and are developing new maglev projects.

However, when it comes to the high stakes game of high-speed ground transportation, the French certainly possess something that their German and Japanese counterparts seem to lack – world-class marketing and public relations skills.

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