Maglev: Racing to Oblivion?
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Two years ago the world's only magnetically levitated train in commercial service shut down. It had carried riders for a 90-second trip between the airport in Birmingham, England, and a conventional rail line 600 meters (almost 2,000 feet) distant. But after 11 years in operation, the high-tech train, which was once hailed as a step into the future, was replaced by humble shuttle buses. The buses lack glamour, but when they break down, replacement parts for them can be readily found—a virtue pointedly lacking in their one-of-a-kind predecessor. The end of the line for the Birmingham maglev may prove a bleak harbinger for the few lingering efforts to bring to maturity a form of transportation that was long envisaged as tomorrow's high-speed, energy-efficient alternative to trains and to short-distance air travel.

Maglev use high-strength magnets to levitate and propel a vehicle that speeds no more than a few centimeters above a nonmetallic guideway. Transportation visionaries have dreamed of levitated locomotion since the early part of this century, but enthusiasm has risen and waned.

Despite 30 years of development, no maglev has entered service for carrying passengers long distances, and only a few short-hop projects, such as the Birmingham connection, have reached completion. Germany and Japan, which have led the world in maglev enterprises since the U.S. dropped out in the 1970s, have sunk billions of dollars into research and development. But their efforts have yet to progress beyond test tracks that serve as futuristic showpieces. It seems increasingly unlikely that the technology will ever compete in any significant way with airplanes, cars or more conventional trains for trips of up to 800 kilometers.

Why is there so little to show for so many years of work? Any radically new technology comes with inherent cost, safety and mechanical risks, which lead governments and the private sector to choose the most conservative options. As engineers have attempted to perfect maglevs, high-speed forms of conventional rail technology have become an increasingly attractive alternative. Thirty years ago many transportation designers considered about 250 kilometers per hour to be the maximum travel speed for a wheeled train rolling down a steel track. But France's Train a Grande Vitesse (TGV) now reaches 300 kph in routine service—and higher speeds, up to 350 or even 400 kph, and under study [see "How High-Speed Trains Make Tracks," by Jean-Claude Raoul, page 100]. The TGV, in fact, holds the world speed record for a train, having achieved 513 kph in a 1990 demonstration run.

The literal absence of any track record for maglev means that today any nation seeking a timesaving rapid link between cities may well choose to purchase the TGV or another high-speed train—and they are doing so in Europe and the Far East. In fact, new high-speed lines connecting major European cities have been established recently.

Maglev might more easily obtain high speeds for routine operation. The lack of friction between the vehicle and the guideway prevents the wear and tear experienced by a wheeled vehicle and the track beneath it. But over a typical 600-kilometer run, a maglev that attains 450 to 500 kph might save only 30 to 60 minutes compared with a high-speed train traveling from 300 to 350 kph. (A faster maglev would consume too much power because of the rapidly increasing aerodynamic drag.)

The dwindling advantage in speed may hamper deployment of an untried new technology that can be justified only on the few medium-length routes that can support high enough passenger traffic. "Is it really worth it? I think not," says Tony R. Eastham, an expert on high-speed trains and a professor.
in the departments of civil and electrical engineering at the Hong Kong University of Science and Technology. "My gut feeling is that maglev will not be implemented in Germany or Japan--although it might take another couple of years for people to reach this conclusion."

If maglev has any chance left at all, it will probably come in Germany during the next decade. The country is putting together a $5.9-billion public-private financing package for a maglev, known as the Transrapid, to connect the 292-kilometer stretch between Hamburg and Berlin, set to begin in 2005. It wants the technology as a symbol that the reunited nation remains an innovator--and to quell questions about why it has not built a commercial maglev inside its own border while trying to sell these flying trains abroad. Yes this past spring German federal officials noted that the undertaking's costs have risen by 10 percent above earlier estimates and that ridership and revenue projections had dropped substantially. The Transrapid, moreover, still faces opposition from one of Germany's state governments and from environmentalists who object to the cost of the project and who dispute the contention that the train has low energy requirements at elevated speeds.

A train that flies just off the ground may continue to hold a certain allure for technophiles. Recent proposals seems to highlight not an expedient push for higher speed but rather a preoccupation with technology for its own sake. Commissioners in Allegheny County, Pennsylvania, have approved bond guarantees for a train that would use super-conducting magnets to take passengers from a Pittsburgh parking garage to nearby shops. "Building this one-half-mile system is like opening an air route to Latrobe [a nearby city] using a Boeing 737," wrote one irate citizen to the Pittsburgh Post-Gazette. Like a World's Fair monorail, the main prospect for maglev's future, if any, may be as a high-tech tourist ride.