



PETER FRISCHMUTH—ARND

# The Need for Speed

With the race for high-speed train transportation heating up, magnets are looking very attractive

By CHARLES P. WALLACE LATHEN

**T**HE IDEA OF USING MAGNETIC LEVITATION to run a high-speed railroad has been around since 1934, when a German scientist named Hermann Kemper received a patent on the technology. Such trains would be extremely fast and float quietly over the tracks supported by magnetic attraction instead of steel wheels. Although a brilliant idea, the problem has been that it is simply too expensive to implement over a long distance. Now a project in China and advanced proposals for two more trains in Germany have moved maglev from science fiction to commercial reality.

The Chinese project should be up and running by January 2004. The plan calls for a 30-km route linking Shanghai's business district with Pudong Airport for an estimated cost of \$1.2 billion. Reaching speeds of up to 430 km/h, the train will ferry passengers from downtown to the airport in eight minutes. "We have a breakthrough in China," says Manfred Wackers, managing director of Transrapid International, a German joint venture that is producing the trains. "I think this will be a showcase to the world for our technology." The idea is to have the trains ready for an experimental tryout in January 2003 before Chinese Premier Zhu Rongji, a key supporter of the project, retires from office. The trains and operating system will be imported from Germany, while the Chinese are building

the track, known as a guideway, and stations.

In Germany, the federal government has allocated \$2.1 billion for two projects that have completed feasibility studies and are now in the legal planning stage. Some \$1.6 billion in government funds has been earmarked to build a 78-km-long route stretching from Dortmund to Düsseldorf in time for the 2006 World Cup. A separate package of \$500 million has been set aside to build a maglev train that will cover the 37 km from Munich Airport to the city center in just 13 minutes. But the federal money will supply only about half the construction costs, and it's not clear where the rest will come from. Earlier this year the Munich city council rejected the airport project because it was so expensive, saying it prefers a conventional express subway train. The vote isn't binding, but it illustrates the strength of opposition to Transrapid's initial price tag.

The original plan was to build a demonstration route between Berlin and Hamburg, a distance of 292 km, which the Transrapid would take less than an hour to cover. But the costs of construction rose to \$6 billion, and environmentalists opposed the plan on grounds that existing rail infrastructure was sufficient. After the government of

**FASTER FUTURE** Maglev could prove to be the quicker, cheaper alternative to rail travel

Chancellor Gerhard Schröder came to power in 1998, the plan was shelved as too extravagant. The Transrapid company, a joint venture between Siemens and Thyssen-Krupp, lost \$80 million on the cancellation.

Still, the technology behind the Transrapid train is cutting edge. The train is wrapped around the aluminum guideway and thus can't derail. Magnets powered by batteries in the train lift the cars 10 mm, while magnets on the sides of the train maintain horizontal stability. The propulsion system is built into the underside of the guideway instead of inside the train. It creates a traveling wave in the guideway, and the vehicle is pulled along like a surfboard on a wave. Because of the complexities involved, the train is operated by computers from a central control point so that no personnel are required on board.

A test track for the Transrapid maglev train has been operating in the town of Lathen, near the border with Holland, since 1984. The prototype looks like an ordinary high-speed German passenger train with six seats across. At the start of the journey, the train levitates off the guideway with a small bump and then begins to accelerate quickly. The track is 31 km long with loops at either end. In a recent test drive, the train hit 411 km/h over a relatively short distance; the French high-speed trains, made by Alstom, have a maximum speed of about 300 km/h. The maglev ride is relatively smooth, but changes in speed can

cause vibrations inside. Transrapid officials maintain, however, that the maglev train requires much less service than high-speed conventional trains because there is no wear-and-tear on either the vehicle or the tracks.

The company now hopes to get demonstration projects up and running in a number of locations to serve as working advertisements for the technology. There's a proposal to build a Trans-

rapid line from Amsterdam to the Hague in Holland. U.S. officials have begun a feasibility study on two projects: a line linking Baltimore, its airport and downtown Washington, D.C., and a 78-km maglev route in Pittsburgh. From there, the planners back in Germany hope the small projects will blossom into something larger—as Hermann Kemper would have wanted. ■



**OFF TRACK** German Greens oppose the high-tech railway