

Hell on no wheels

The crash of a demonstration train in Germany casts a shadow on magnetic levitation technology. **Ned Stafford** reports.

When an advanced prototype train crashed into a maintenance wagon in Germany late last month, 23 passengers were killed. But the accident may have also dealt a mortal blow to the long-touted idea of fast passenger trains that float on magnets, transport specialists say.

Although human error was cited as the probable cause of the accident, the crash has raised safety issues that will now make it much more difficult to gain final approval for a proposed airport shuttle in Munich — a contract vital to the future of Germany's magnetic levitation or 'maglev' train.

Transrapid International, a Berlin-based joint venture between Siemens and ThyssenKrupp, and the Central Japan Railway of Nagoya (JR Central) run the world's two principal projects aimed at developing maglev trains, which glide along almost without friction at speeds of 500 kilometres per hour or more. That compares with a top test speed of 515 km per hour for the world's fastest conventional train, France's TGV — although the TGV travels at only 320 km per hour on service routes.

Between the two of them, Transrapid and JR Central have yielded just one commercial maglev sale so far: Transrapid's contract to build a 30-kilometre airport shuttle in Shanghai, China, which was completed in 2002 at a cost of US\$1.2 billion. Executives from Siemens and ThyssenKrupp say that additional foreign sales will be next to impossible unless a showcase maglev line is built in Germany.

Immediately after the 22 September accident, near Lathen in northern Germany, Munich mayor Christian Ude spoke out against a proposed €1.6-billion (US\$2 billion), 37-km maglev shuttle between the city's train station and its airport, saying he preferred a conventional high-speed train costing just €500 million. He alleged that safety concerns about Transrapid's Munich concept had already been voiced in planning meetings — particularly concerning a proposed 3-km tunnel. Solving the



Broken dreams: the reputation of 'maglev' trains has been damaged by a fatal accident in Germany.

safety problems, he said, could drive costs up to €2.5 billion or more.

Supporters of the project refute Ude's safety claims, and transport specialists around the world are split on whether the crash suggests that the Transrapid is unsafe.

JR Central barely skipped a beat after the accident, announcing just three days later that it would invest ¥355 billion (US\$3.1 billion) more in the technology over the next ten years. It plans to build a larger demonstrator of its

existing design, and to develop a train using superconducting magnets that operate at a higher temperature than before, to reduce the need for magnet cooling. Last November, the company tested its first train using its latest magnets, and achieved a top speed of 553 km per hour.

JR Central spokesman Taro Yoshikawa says an accident like the one in Germany was unlikely with Japan's maglev train because of differences in design. The Japanese train runs

inside a U-shaped double track, whereas the German one sits on a monorail. But Yoshikawa declined to comment on whether the Japanese system is safer overall than Transrapid's.

"There was human error, but one should not have relied on human control. There are definitely safety problems," says Helmut Holzapfel, a civil engineer specializing in transportation at the University of Kassel. One of the major safety issues is the relatively light weight of maglev trains. "Any obstacle on a maglev track presents a problem," he says. "The heavier the obstacle, the bigger the problem — it's just simple physics."

One potential safety measure would be automatic shutdown whenever an object touches the track. But this could be triggered by non-dangerous objects such as birds. Other potential measures include radar devices installed in the train or video cameras mounted along the tracks or in the train.

Transrapid's train has had an uneven ride since research began on it more than 30 years ago. Germany has backed the project heavily in the hope of export sales — but selling it at home has been difficult enough. A proposed 300-km link between Berlin and Hamburg was abandoned in 2000 after eight years of consideration, as was a Dortmund-Düsseldorf link three years later. Transrapid finally succeeded with China — but only after transferring some of its technology to the Chinese and receiving a large but undisclosed support package from the German federal government.

Financial details of the Chinese deal are hard to come by. But ThyssenKrupp's last annual report gives Transrapid sales for 2004 as just €21 million, out of a group total of €5.7 billion. Transrapid accounted for 200 employees out of 27,500.

And just days before the fatal Transrapid accident, ThyssenKrupp chief executive Olaf Berlien indicated that Transrapid would pursue its technology in partnership with the Chinese if the state and federal governments fail to fully approve the Munich contract within 18 months.

John Harding, a physicist and former chief maglev scientist for the US Department of Transportation's Federal Railroad Administration, believes that airport shuttles are not the best application of maglev technology in any case, as short maglev lines don't save much time compared with normal trains. The Munich plan is "very hard to justify," he says.

But he is quick to add that the Lathen crash has not changed his view that maglev technology can be safe. "It was not a technology issue," he says. "They just screwed up."

Additional reporting by Ichiko Fuyono in Tokyo.

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