Maglev 2024 and the art, convincing the world of something better

Travelers between Hamburg and Berlin (Germany) are currently having to put up with longer journey times once again, as the so-called “wear stock” along the railroad line needs to be replenished (this is the Deutsche Bahn AG's original phrase for such renovation work). For the third time since the planned Hamburg-Schwerin-Berlin Transrapid line was abandoned in February 2000, the replacement route will once again be closed for several months due to renovation work after 2009 and 2021.

Creativity in the lack of understanding of magnetic levitation technology on the part of artificial intelligence - before and after the presentations
(Source: The International Maglev Board / ChatGPT respectively GFM-eV / Neuroflash)

Professional visitors to the 26th International Conference on Magnetically Levitated Systems and Linear Drives (Maglev 2024) [1] at Malmoe agree that maglev lines have a much longer service life than conventional railroad lines due to their contact-free movement capability.

The latest developments in Japan, China, South Korea and Brazil were presented at the conference. Following a temporary suspension of development activities due to the COVID-19 pandemic, the latter country returned with a new test vehicle [2] for superconducting magnetic levitation (SML) for urban transportation solutions.

In contrast, the contributions from the German side were more historical reviews, such as those by Dr. Friedrich Loeser on 50 years of Transrapid - product and company Thyssen - and by Kenji Eiler from the International Maglev Board (IMB) [3] in a holistic form on the worldwide development of maglev technology. Last but not least, the Gesellschaft zur Förderung der Magnetschwebetechnologie (GFM-eV) presented „some binocular views onto old and new maglev systems“ [4] to promote the SupraTrans from Dresden/Karlsruhe and the Transportsystem Bögl (TSB) from Sengenthal.

Other non-profit organizations, such as the Dutch foundation “Freedom of Mobility” (FroM) [5] , also demonstrated their commitment to the use of magnetic levitation technology in Europe.

In addition, the question was to what extent maglev trains powered by green electricity can be helpful in the transformation of a country to CO_2 neutrality. Prof. Dr. Henrik Ny from the Department of Strategic Sustainable Development (Systainability Transformation of Energy and Transport Research Team) [6] part of Faculty of Engineering at Blekinge Institute of Technology, Karlskrona (Schweden), which was also responsible for organizing [7] the conference, made positive statements on this.

Taboo topics were also addressed, as the IMB had published a study (in German [8]) in 2020 on particulate matter emissions in track-guided high-speed rail traffic, which should not have any direct health effects for passengers, but would have a direct impact on rail staff, who would be permanently exposed to these emissions during an eight-hour working day. So far, rail operators have not discussed separate occupational health and safety measures for those affected.

But it was also about the question of where the introduction of magnetic levitation technology could be most economically viable. These would be corridors with a high population density, which is why Ms. M.Sc. Judith Oginga Martins from Blekinge University of Technology then posed the question: “*Why not in Africa?*”. She ended her presentation with the words: “*Maglev is the future!*”.

Prof. Rune Wigblad from the University of Skövde saw a similar socio-economic effect in the event of the construction of two maglev connections from Malmö and Copenhagen to Gothenburg as the Öresund Bridge had when Copenhagen and Malmö grew together. This was reflected in the fact that the neighboring city could be reached within 40 minutes. And the travel time between Gothenburg and Malmö/Copenhagen could also be reduced to 40 minutes. The three cities could thus grow together into one city. However, the Swedish state railroad Trafikvärket would still have to be convinced to commit to a new rail technology. This does not appear to be the case at present - in contrast to Japan, where the Japanese Railways Company (JR) sees the Chuo Shinkansen magnetic high-speed train as a natural progression from the conventional Shinkansen high-speed trains in order to provide a competitive product against domestic air traffic.

Prof. Dr. Roderick Smith from Imperial College London pointed out how important it is to deal not only with technology, but also with social sciences in order to win the hearts of citizens for technically sensible transport projects. Acceptance should come from below and not be imposed from above. He illustrated this with a negative example in which politics had failed miserably:

The “High Speed 2” project using conventional wheel-rail technology, which (according to information of GFM-eV) was supposed to be a more cost-effective replacement for the „UK Ultraspeed“ [9] transport solution based on Transrapid technology following its abandonment in 2007, is facing a disaster [10] that can also be described as a derailment.

Prof. Dr. Johnnes Klühspies from the IMB gave an impression of how difficult it can be to convey an understanding of magnetic levitation technology from the specialist world to the public. He had made several unsuccessful attempts to use an AI chatbot to generate images of the Transrapid, the Chou Shinkansen and a Hyperloop system.

The prompt "*Please provide a picture of a Transrapid Maglev in a station full of people, glass hall, evening light.*" was followed, for example, by futile correction instructions such as "W*ithout tracks, please*". The strange depictions (see above, among others) left him with the impression that artificial intelligence had not yet been able to understand magnetic levitation technology. In other words, it was not yet present in the language models. The audience wondered whether this was perhaps intentional? In any case, he posed the question to the audience:

"*If AI is simply not able to do this, how are politicians supposed to be able to understand magnetic levitation technologies?*".

This was the prelude to the question of how we can communicate the benefits of magnetic levitation technology to the public from the "filter bubble" of the experts, which became one of the common threads of the conference.

Magnetic levitation technologies have the potential to revolutionize the transportation sector through increased speeds, energy efficiency and reduced environmental impact. Here are some ways to convince the world of the benefits of magnetic levitation technology:

1. **Emphasize environmental friendliness**: Maglev trains use less energy compared to conventional trains, which leads to a reduction in CO_2 emissions. A campaign could emphasize the positive impact on climate protection and sustainability.
2. **Speed and efficiency**: With speeds of over 500 km/h, Maglev trains offer a faster and more efficient travel option, which can be particularly advantageous on long-distance routes.
3. **Comfort and safety**: Thanks to minimal friction and advanced technology, Maglev trains offer a smoother and more comfortable ride than conventional trains.
4. **Technological progress**: The implementation of magnetic levitation technologies promotes innovation and the growth of high-tech industries in the countries that invest in them.
5. **Economic benefits**: The expansion of the Maglev network can create jobs and boost the economy, particularly in the fields of engineering, construction and technology development.
6. **Public support and education**: To reduce skepticism and reservations, information campaigns could promote awareness and support for Maglev projects.

By combining and communicating these aspects, it is possible to stimulate discussion about the benefits of magnetic levitation technology and motivate society to be open to innovative transportation solutions in 2024 and beyond.

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Links (valid on 21.09.2024):

[1] https://mkon.nu/maglev_2024/
[2] https://revistapesquisa.fapesp.br/projeto-brasileiro-de-trem-de-levitacao-magnetica-inicia-nova-fase-de-testes/
[3] https://www.maglevboard.net/
[4] http://gfm-magnetbahn.org/en/news/2024/0918/index.html
[5] https://www.stichtingfrom.nl/
[6] https://a.bth.se/sustaintrans/#team
[7] https://a.bth.se/sustaintrans/2022/10/29/maglev-2024/
[8] https://www.researchgate.net/publication/340849390_Feinstaubemissionen_im_spurgefuhrten_Hochgeschwindigkeitsverkehr_Rad-Schiene-Hochgeschwindigkeitsbahnsysteme_im_Vergleich_mit_Magnetschnellbahntechnologien
[9] https://www.expressandstar.com/news/transport/2020/02/12/boris-johnson-uk-government-looking-at-maglev-trains/
[10] https://yorkshirebylines.co.uk/politics/the-shambles-of-hs2-is-down-to-a-miserable-failure-of-government/
[11] http://gfm-magnetbahn.org/en/news/2024/0921/index.html