China unveils new high-speed maglev technology

On 17 September China's CRRC Zhuzhou Locomotive unveiled the key components of its magnetic-levitation (maglev) train with a design speed of 600 km/h. An operational prototype will be ready in months and following testing next year, the company hopes to start serial production in 2021. In addition, a 200-km section made of vacuum tubes is planned to test speeds of up to 1,000 km/h. China's rapid rate of technological advancement in high-speed rail transportation won't stop there. In 2017 China Aerospace Science and Industry Corporation (CASIC) revealed plans to research a "flying" train network that it said could eventually have a top speed of 4,000 km/h.



Unveiling of the maglev train body prototype in Qingdao, Shandong Province, May 2019.

Inspiring Chinese engineers, the 600 km/h train's power system, including a long-stator linear motor and two transformers, were unveiled in the city of Zhuzhou in Hunan province. This follows the unveiling of the train body prototype that rolled off the production line in the eastern city of Qingdao, Shandong Province in May. CRRC Zhuzhou Electric developed the long-stator linear traction motor which is dubbed as the "heart" of the train.

China's first commercially operating maglev service began in Shanghai in December 2002. With a top speed of 431 km/h, it was built by a joint venture with German companies, Siemens and ThyssenKrupp. Now China is developing its own technology. "We have been pursuing independent research of maglev technology and manufacturing maglev trains with our own intellectual property rights", said Zhou Qinghe, president of CRRC Zhuzhou Locomotive.

The need for more and faster high-speed trains in China is obvious given the enthusiastic demand from the population. More than 100 million trips were made via the Chinese high-speed railway network during the past weeklong National Day holiday. China Railway Corporation added more than 1,000 trains on Sunday and Monday to cope with the surge. China's high-speed railway network now totals 29,000 km, up from 22,000 km in early 2018. More than 10 billion trips were made on the network by the end of first quarter of 2019, China Central Television reported. The busiest line, the Beijing-Shanghai route has now topped 1 billion trips since it opened eight years ago. The average seat occupancy rate on this line has increased from less than 67 per cent to over 78 per cent now.

Considering waiting times at airports, China's highspeed trains in many instances provide superior travel times than do aeroplanes. The high-speed railway network currently uses conventional wheel-on-rail technology and maximum speeds are up to 350 km/h. Maglev technology will ensure future travel times will be faster than air travel for all major routes. But maglev provides several other advantages.

He Yunfeng, an official from CRRC Zhuzhou Locomotive, said that different from traditional electrical motors, the long-stator linear motor used in its maglev has a strong climbing ability, low noise, low energy consumption, and quick start and stop times. Maglev trains provide much lower noise given there is no physical contact between the train and track. Much of the noise from conventional trains comes from the contact of steel wheels rolling on steel rails. The minimum turning radius for maglev trains is much smaller than for conventional trains, allowing them to better bypass buildings in route planning and avoid relocation.

Maglev is also superior in metropolitan areas, travelling at speeds below 100 km/h with regular stops. Some Chinese cities such as Qingyuan in Guangdong Province have started maglev line projects, and more cities such as Chengdu in Sichuan Province and Jinan in Shandong Province are adding maglev lines into their transportation planning to connect cities and boost regional integration. Low noise levels, the smaller turning radius, along with smoother and faster acceleration, are big selling points for maglev use in cities.

Once the vacuum tubes are rolled out and speeds exceed 1,000 km/h, aeroplanes will find it hard to compete. It may be sooner than we think! As reported in the *Asia Times* on 2 October, according to the *Changjiang Daily*, the official communications office for Wuhan (capital city of Hubei province), a set of experimental tracks will be laid out early next year in the province that will pave the way for the world's fastest floating trains. "Hubei will start work on a 200 km section made of vacuum tubes to

conduct experiments to verify the cutting-edge, high-temperature superconducting maglev theory and ultimately push the speed limit to 1,000km/h.”

Australia and the world would do well to embrace this exciting technology that will be as revolutionary as the shift from horse and cart to the steam locomotive. In August 2011 the Citizens Electoral Council called for Australia to embrace vacuum maglev technology, noting that the extensive flat terrain of the Nullarbor Plain provides a distance to build up to ultra-high speeds. So far, the federal and state governments have done nothing. It’s time to get moving!

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