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BENTLEY INSTITUTE, CITY TOWER 2, OFFICE 1206, SHEIKH ZAYED ROAD

Harj Dhaliwal

Managing Director of
Virgin Hyperloop One's Middle East
and India Field Operations

About the Speaker

Martin Tillman (CIHT Dubai) introduced Harj Dhaliwal as the speaker for CIHT Dubai's inaugural evening lecture.

Harj is Managing Director of Virgin Hyperloop One's Middle East and India Operations. With over 35 years of civil engineering experience, he has held senior management roles in global client and consulting organisations, including 22 years in the development, delivery, and management of heavy rail, light rail, and metro projects across Europe and the Middle East. Previously, he was the Programme Director for the delivery and operation of the UAE's first national railway, Etihad Rail.

Harj is a Chartered Civil Engineer, member of the Institution of Civil Engineers, Member of the UK Engineering Council, and holds a bachelor's degree in Civil Engineering from Nottingham Trent University, UK. Harj is based in Hyperloop One's Dubai office.

Presentation

Harj began with an overview of his presentation about Hyperloop, focusing on the technology, the company, the research and innovation taking place at Virgin Hyperloop One's testing facility in Las Vegas, and what is going on in the ME region.

Hyperloop is a new mode of transport intended to move people and freight quickly, on-demand, direct from origin to destination. In a low-pressure tube, pods accelerate via electric propulsion and travel above a track using magnetic levitation with ultra-low aerodynamic drag. This allows very high speeds (1080 km/h, 300m/s). Low air pressure reduces friction resistance and the magnetic levitation means that there are effectively no moving parts. The vehicle pods 'fly' through the sealed tubes.

Virgin Hyperloop One, backed by Virgin Group & DP World, is one of the companies taking this technology forward to realisation, raising US$ 370 million in capital from investors. However, Virgin Hyperloop One is the first company in the world to test a full-scale Hyperloop system, integrating components such as vacuum, propulsion, levitation, control systems, tube, and structures.

Hyperloop has recruited engineers and technologists with aerospace and high speed rail experience. It is progressing studies in the USA, India and the GCC, projecting that a Hyperloop system could reduce the journey times between Dubai and Abu Dhabi to 12 minutes, and between Abu Dhabi and Riyadh to 48 minutes, transforming the regional economy.

Harj presented a slide which indicated that the current traditional commuting time and distance for a city like London (10-12 km in 30 minutes) could be transformed to 500km in the same time. This will revolutionise economic connectivity and enable larger regions to act as economic 'powerhouses'.

As well as providing very high speeds, the use of emerging connected and autonomous vehicle (CAV) technology means that Hyperloop can operate an on demand service from multiple origins to multiple destinations. There will be no timetables and passengers can turn up, board a pod, specify their destination and set off to join a 'platoon' of other vehicles. Each pod will only run when there is demand and each pod will be able to accommodate approximately 25-30 people.

An on demand service using low pressure magnetic levitation makes Hyperloop very efficient in terms of energy use and cuts low occupancy operations associated with traditional public transport systems. Hyperloop is therefore more sustainable than many modes of transport.

The presentation highlighted the route between Mumbai and Pune in India which is the most advanced in moving towards a commercial proposition and delivery. India's population is growing fast and there is a need for new infrastructure to support economic development and address congestion and improve the quality of environment. The journey between Mumbai to Pune currently takes 4 hours and Hyperloop would reduce this to 30 minutes. Harj also presented two maps showing potential Hyperloop networks in India and across the GCC, each with multiple origin and destination points.

Hyperloop is a system designed for cargo traffic as well as passengers, for the transporting of high value, time sensitive goods. This would use the same pod technology which would be fitted out to accommodate paletised freight, much like the containers that are currently shipped as air freight.

Questions

• **Martin Tillman (CIHT and Aecom): Mumbai to Pune is a great opportunity. What is the capacity of Hyperloop on this corridor?**	The ultimate capacity is 16,000 passengers per direction per hour with platooning convoys of pods.
• **Lake (technical consultant): What are the evacuation plans for Hyperloop?**	Hyperloop tubes are built in sections to allow rapid escape. Re-pressurisation can also take place very quickly to allow passenger evacuation.
• **Lake (technical consultant): Can the Hyperloop tubes be placed in the sea as well as on land?**	Yes, they can go anywhere!
• **Anna (Software Development): How will ticket prices for Hyperloop compare with other modes?**	The public's willingness to pay needs to be understood. This would vary between markets and reflect differing values of time. As an example initial consideration would price a one-way journey between Pune and Mumbai at around US$24.
• **Sorin Honc (Aecom): What is the CAPEX and OPEX for Hyperloop and what is the rate of return?**	The IRR (Internal Rate of Return) needs to be in the high teens percentage which is always a challenge for transport infrastructure projects. However, the CAPEX for Hyperloop is not considered expensive when compared with traditional rail, high speed rail or highway investment. The OPEX is less due to the fact that there are no moving parts on the vehicles meaning lower wear and tear.
• **Sorin Honc (Aecom): Will the Mumbai to Pune line be PPP or government funded?**	Virgin Hyperloop One is investing in this project as a commitment, although figures not given.