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HYPERLOOP-AN INNOVATIVE TRANSPORT: A REVIEW

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ABSTRACT *: The concept of hyperloop was initiated back in 1799 as an atmospheric railway by George Midhurst and got reintroduced by the publication of the white paper of Elon Musk in 2013. By reducing the air resistance and rolling resistance, a hyperloop could travel efficiently with speeds over 1000 kilometres per hour. The enclosed environment of the system ensures reduced external influences.[8]*

Since its announcement by Elon Musk in 2013, regular reports appear on the proposed novel system for ground transportation "Hyperloop" – a system based on transport containers ("pods") that are shot point-to-point at speeds above 1000 kph through a quasi-evacuated tube. The main goal of this report is to give an overview of hyperloop knowledge. The ultimate goal of this report is to know more about the hyperloop and why it is considered as 5th mode of transportation and is the fastest mode of transportation on the ground to ground basis.[1,2,3]

***Key Words*: - Air resistance, rolling resistance, hyperloop**

1. INTRODUCTION

A press conference in August 2013, the South African-born and world-wide active entrepreneur Elon Musk (founder of PayPal, SpaceX, Tesla, …) proposed, under the designation "Hyperloop" a novel transportation system, and described it in detail in a concept. It is remarkable that Musk does not ask for any license fees on the proposed concept ("open source" concept) – therefore, since 2013 a number of private enterprises have been established for the development and marketing of Hyperloop-based systems.[1,2,3]

As according to idea, world will be having a whole new technology to travel.

2. IDEA BEHIND

The basic idea behind Hyperloop is to practically eliminate the air drag on an earth-bound vehicle by moving this vehicle under reduced air pressure (in a quasi-vacuum at around 100 Pa pressure1) almost friction-free in a tube (see Fig. 1). Thereby higher speed (target: 1200 km/h) and rather short travel times should be achieved. This utilises two component: Tubes and capsules[7].

Figure 1: Operating principle of Hyperloop: a transport container („pod") moves in a tube in near-vacuum (100 Pa)

The top-level system requirement is that the pod shall be able to levitate during operation. This are the results in the primary subsystem requirement:

The subsystem shall be able to lift the pod for all attainable operating velocities.

Secondary system requirements are listed below.[7]

The subsystem shall:

• provide a sufficient air gap to prevent physical contact with the guideway.

• be able to lift the expected loaded pod mass with an additional safety margin.

• be mass producible, it should therefore not consist of rare or extremely expensive materials.

• provide air gap data.

• be fully autonomous.

• be able to perform switches on speeds above 600 km/h.

• provide a guidance function such that the vehicle is stable and controllable at all times.

• be able to function within the limits given by the environmental analysis.

3. IMPORTANCE OF SAFTY

For a hyperloop system to be realized, the safety of the system must be guarantee.

As we know the design of hyperloop is major criteria that will decide and ensure the safety of the passengers,

Since we know in hyperloop passenger will experience sonic velocity that will certainly causes dizziness and headache to the passenger.

One more thing should be taken into account the space factor, since the gap between the capsule and tube is vey small this is done for making levitation and to reduce air drag and friction.

The safety level of a hyperloop needs to be at least at the same level as other high-speed modes of transportation, to be accepted by governments and used by passengers. When designing the system, many lessons can be learned from other modes of transportation. In the past, large accidents have caused transport innovations to be slowed down or even to be withheld from implementation. [7]An example is the accident with the Trans-rapid magnetic levitation train in 2006 in Lathen, Germany. During a trial run, a train collided with a maintenance vehicle, causing 23 casualties.1 Although the accident was caused by a human error, a Maglev train has never been realised in Germany ever since. To avoid a similar situation, it is crucial that the hyperloop technology is tested thoroughly before the first passenger ride takes place and that possibilities of human error are minimised.

4. WHAT'S SPECIAL

	Time **	Capacity ***	trains/ pods	Cost	Comfort
Hyperloop* (1200 km/h)	14,7	1 200	24	?	?
Conventional Train (200 km/h)	20,9	40 000	26	+	++
People Mover/ Rapid Transit (90 km/h)	36,2	35 000	72	+	+
Maglev (500 km/h)	12,3	20 000	14	–	++

Table 1.1(A comparison)[4]

	Vehicles			Infrastructure					Control
	Body + interiors			Tube + vacuum					
Hyperloop	Could be based on aviation	Based on aviation	Could be based on Maglev, LIMs	From pipelines, vacuum + doors	Could be based on Maglev	From sub-marines?	Air lock		to be developed
Hi-Speed Train	existing	n/a	existing	(rail)	(like rail)	n/a	n/a	n/a	existing
Maglev	existing	n/a	existing	(guideway)	existing	n/a	n/a	n/a	existing
Aérotrain	existed	n/a	Fans	(guideway)	(guideway)	n/a	n/a	n/a	

Table 1.2(A comparison)[4]

Fig.2(An expectation)

5. RESULT

Hyperloop on the one hand, is still facing a number of technical and process challenges, on the other had is fastest growing ground to ground transportation, and also there are several system-immanent disadvantages. In principle, every successful innovation needs a positive feedback loop ("success breeds success"). At this time, Hyperloop is still far from such positive feedback: the system design is not yet stable, key concepts (such as braking to standstill) are not yet tested, cost estimates have no solid justification.[7]

And per my view it will not kill the railways system. But for the future point of view this transportation will definitely going to change the way we look at time.

And along with several corrective and safety measures it will be the difference in the developing and developed nation.

6. CONCLUSIONS

Besides being significantly more energy efficient than aviation, a hyperloop is powered by electricity coming from both solar panels and other renewable energy sources. The turn-up-and-go system combined with speeds faster than airplanes will completely change human perception of travel and connect cities throughout the entire continent. In order to successfully realise a hyperloop system, two main focus points can be identified: working towards standardisation and setting up the foundation for implementation

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