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## Hyperloop—A New Transportation System

Five years ago I learned of a new transportation concept that was the brain child of Elon Musk. In so many ways his proposed transportation system screamed “write me up as a column,” but I didn’t until now because even though so many of his ideas have come to fruition, this one sounded so futuristic I expected it couldn’t be built this century.

Boy was I wrong! His hyperloop proposed transportation system has moved from concept to a number of prototype systems in just a few years. Hyperloop One, co-founded by a past SpaceX engineer, is now completing construction of a test track in Nevada that can fit a full-size pod (passenger or freight vehicle) (Photo 1).

In July 2013, Elon Musk tweeted “Will publish Hyperloop alpha design by Aug 12. Critical feedback for improvements would be much appreciated.” In just a few words, Musk described how he made an idea for an impossible new transportation system possible in such a short

The Hyperloop Alpha document mentioned in his tweet is available online at [www.spacex.com/sites/](http://www.spacex.com/sites/)



Hyperloop One

**Photo 1—This Hyperloop One test track will soon be used to test a full-size pod.**

spacex/files/hyperloop\_alpha.pdf. It describes how Elon Musk thought engineers could build a pod that could travel at airplane speeds on the ground through a welded-together system of giant sealed tubes. He proposed that to move through this

envisioned this system would work, read his Hyperloop Alpha pdf. What I want to describe here is where this technology is today and how close it is to becoming a reality.

After setting his idea free for everyone to develop, Elon Musk’s

SpaceX company started providing assistance to everyone interested in developing this technology, including sponsoring competitions. SpaceX also built a one mile long, to scale, test tack with 6’ diameter tubing to test the pods that would eventually work their way from regional wins to the pod development finals. This past January three teams that survived all the earlier competitions

**Photo 2— MIT students with the pod they built and tested on the SpaceX track.**



MIT News

period of time. He first created the type of document needed to create a patent and then left it open source so anyone could help turn his dream into reality.

closed tube system, the front of the pod would have a super strong fan suction system that could suck the air that is directly ahead of its nose out of the tubes; thereby creating a

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and also passed all the final tests that SpaceX engineers put their pods through got to race their pods on the SpaceX hyperloop test track in Hawthorne CA.

The MIT team and their vehicle are shown in Photo 2. An MIT YouTube video, [www.youtube.com/watch?v=IAJBhVykeEHU](http://www.youtube.com/watch?v=IAJBhVykeEHU), shows how it works. Elon Musk in his Alpha report indicates the need for the pod to create the vacuum because hundreds of miles of tubing would develop leaks if one tried to keep an entire system at near vacuum conditions. For concept development, the vacuum system could be built into the test track. Here the goal is to determine how fast, how much turbulence, and how other forces that affect other transportation systems would be changed if the transportation system ran in a low-air environment provided by the hyperloop test track.

When it comes to testing a full-size system, Hyperloop One seems to be ahead of the competition. If they stay on schedule, they will be ready for their first test run of a full-

size hyperloop pod by the time you read this column. Physically, the tubes in their DevLoop test track (Photo 1) will allow the test pod about a 3/4 mile run to see if their design is viable. Their pod has been designed to run through tubes that have an inside circumference of a little less than 11' (Photo 3). This Hyperloop One YouTube video, [www.youtube.com/watch?v=HHLNI-m-Xa4](http://www.youtube.com/watch?v=HHLNI-m-Xa4), dramatically shows you Hyperloop One building the hardware and tube system in Nevada that will prove their proof of concept.

**Taking it a Step Further**

1. All current transportation vehicles experience certain forces as they move through the air. What forces do they experience and which of these forces would a hyperloop vacuum system eliminate?

2. Group project—build a working model that shows the basic hyperloop concept. ©



Hyperloop One

**Photo 3 —The Hyperloop One test track has 11' diameter cylinders. You can see how big it is compared to team members standing inside and around it.**

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