

## **ELON MUSK - RICK STANTON TIMELINE (THAILAND)**

*(For consistency, all times quoted here are in local Thai time, 14 hours ahead of California. The emails were transcribed from document 60 [here](#) and may contain minor typos.)*

### **ON JULY 7, 2018 AT 1:53 AM ELON MUSK TWEETS:**

Inflatable tubes & pods being made out of Kevlar for better abrasion resistance. A SpaceX engineer happens to be in Thailand & is headed there now. Could one of the divers DM me? Need approx contour of most difficult sections for tube fab.

### **ON JULY 7, 2018 AT 2:54 AM ELON MUSK WROTE TO RICK STANTON:**

Are you one of the divers who understands the cave geometry?  
Trying to help out, but need to know the details of the most problematic areas.

### **ON JULY 7, 2018 AT 4:09 AM ELON MUSK TWEETS:**

Building double-layer Kevlar pressure pods with Teflon coating to slip by rocks & front/rear rope tow hitch & lead pockets for neutral buoyancy. ~60 cm oval. Testing this aft in a pool with a subject who has never done SCUBA. Do the divers think something like this might work?

[**Editorial note:** The pods described above are separate from the rigid metal mini-sub.]

### **ON JULY 7, 2018 AT APPROX. 10:00 AM**

Elon Musk has a phone call with Rick Stanton and John Volanthen.

### **ON JULY 7, 2018 AT 12:29 PM RICK STANTON WROTE TO ELON MUSK:**

Thanks for the chat just now, we're not going to be available for any communication for a short while. Will review any ideas or concepts you come up with and get back to you later.

### **ON JULY 7, 2018 AT 3:06 PM ELON MUSK TWEETS:**

Some good feedback from cave experts in Thailand. Iterating with them on an escape pod design that might be safe enough to try. Also building an inflatable tube with airlocks. Less likely to work, given tricky contours, but great if it does.

### **ON JULY 7, 2018 AT 4:13 PM ELON MUSK WROTE TO RICK STANTON:**

Would it be possible to send me a video segments or several pictures of the most difficult sections?

This would be extremely helpful.

### **ON JULY 7, 2018 AT 4:56 PM RICK STANTON WROTE TO ELON MUSK:**

We don't have this, it won't mean anything without scale.

If you make a capsule which tightly encloses a 15 year old boy, and no bigger. It will fit through.

### **ON JULY 7, 2018 AT 5:46 PM ELON MUSK WROTE TO RICK STANTON:**

Ok Building both a pressure resistant aluminium tube and a dry rubber cocoon. Baseline requirement is that whether the person is passed out or having a panic attack, they will still be fine. Also, no stray hoses that can get caught on anything or pulled out Basically a straightjacket with an air feed. Is this roughly the right direction?

**ON JULY 7, 2018 AT 5:54 PM RICK STANTON WROTE TO ELON MUSK:**

I'm not sure about the rubber cocoon at it would transmit pressure onto the child.  
Rigid is better, plus O2 as a breathing gas rather than air.

**ON JULY 7, 2018 AT 6:00 PM ELON MUSK WROTE TO RICK STANTON:**

Ok

**ON JULY 7, 2018 AT 8:58 PM RICK STANTON WROTE TO ELON MUSK**

It only needs to go to a water depth of 5m, plus some safety margin.

**ON JULY 8, 2018 AT 1:02 AM ELON MUSK TWEETS:**

Got more great feedback from Thailand. Primary path is basically a tiny, kid-size submarine using the liquid oxygen transfer tube of Falcon rocket as hull. Light enough to be carried by 2 divers, small enough to get through narrow gaps. Extremely robust.

**ON JULY 8, 2018 AT 1:35 AM ELON MUSK TWEETS:**

Continue to be amazed by the bravery, resilience & tenacity of kids & diving team in Thailand. Human character at its best.

**ON JULY 8, 2018 AT 2:13 AM ELON MUSK WROTE TO RICK STANTON:**

Will have more info for you soon. It is 35 cm in diameter and 160cm long. We can make more that are longer or shorter.

Dual air ports on front and rear (so possible to attach up to four tanks at once). Front ports are recessed into metal, so not subject to front damage. All ports have secondary caps in case a leak develops.

With the front caps on, this is strong enough to be used as a battering ram if need be. Nose is 2.5cm thick solid, high toughness 22 19 alloy aluminum.

It is made from very high strength rocketgrade aluminum.

Cylinder section is what the Falcon rocket uses high pressure liquid oxygen transfer.

Weights 35kg.

Will send pics in a few hours. Anything else that could be helpful? I am talking to the Prime Minister later today. Is there anything you would like me to convey?

**ON JULY 8, 2018 AT 7:51 AM RICK STANTON WROTE TO ELON MUSK:**

With respect all I see is a tube, albeit made of fancy materials. We're ferrying in food in such a thing. The devil is in the detail. Breathing systems, off board gas venting systems, ballast trimming arrangements etc adding additional gas via Quick Release SCUBA compatible fittings. Why not have a long high pressure cylinder between the legs? Or a stepped tube with wider body and thinner leg section.

**ON JULY 8, 2018 AT 7:53 AM ELON MUSK WROTE TO RICK STANTON:**

With respect, I am trying to be helpful. Please do not be rude.

**ON JULY 8, 2018 AT 8:07 AM RICK STANTON WROTE TO ELON MUSK:**

Apologies, as the tone of that didn't come across well. We are all still very much on board with the concept of a tube for safe evacuation. Though there does need to be a much more thorough investigation of all the matters mentioned in my previous mail. I'm not going to be available for the rest of the day.

**ON JULY 8, 2018 AT 8:20 AM ELON MUSK WROTE TO RICK STANTON:**

Understandable. Right now, I have one of the world's best engineering teams who normally design spaceships and spacesuits working on this thing 24 hours a day. We are trying to get it right in a very short period of time. If it isn't needed or won't help, that would be great to know. Otherwise, it would be very helpful to have as much design direction as possible.

**ON JULY 8, 2018 AT 8:30 AM RICK STANTON WROTE TO ELON MUSK:**

It is absolutely worth continuing with the development of this system in as timely a manner as feasible. If the rain holds out it may well be used.

**ON JULY 8, 2018 AT 8:48 AM ELON MUSK WROTE TO RICK STANTON:**

Sounds good, will continue.

Parts are being assembled and will undergo testing in water in a few hours. Will send pics and video. However, don't want to put it on a plane if you think there are important changes needed. Operating principle is same as spacecraft design - no loss of life even with two failures.

**ON JULY 8, 2018 AT 2:07 PM ELON MUSK TWEETS:**

Given Chiang Rai airport hours, soonest we could've departed US was an hour ago, but cave now closed for diver rescue. Will continue testing in LA in case needed later or for somewhere else in future.

**ON JULY 8, 2018 AT AFTERNOON (FIRST RESCUE DAY)**

Rick Stanton realizes they have no fitting mask for the youngest boy Titan.

**ON JULY 8, 2018 AT 8:00 PM**

The SpaceX team begins with the testing of the escape pod in the Pali Charter high school in LA.

**ON JULY 9, 2018 AT 12:13 AM RICK STANTON WROTE TO ELON MUSK:**

We're worried about the smallest lad please keep working on the capsule details

**ON JULY 9, 2018 AT 4:40 AM ELON MUSK TWEETS:**

Thanks @palicharterhigh for letting us use your pool

**ON JULY 9, 2018 AT 4:49 AM ELON MUSK TWEETS:**

Mini-sub arriving in about 17 hours. Hopefully useful. If not, perhaps it will be in a future situation.

**ON JULY 9, 2018 AT 6:10 AM BRANDIE WEIKLE TWEETS:**

Well done. Looks useful for some sort of emergency but will it make it through the tightest turns of the Thai cave? That one particularly narrow spot seems like it would be unsuitable to anything that wasn't as flexible as a human body. If it will, then awesome.

**ON JULY 9, 2018 AT 6:12 AM ELON MUSK TWEETS:**

According to divers who have made the journey, this is capable of maneuvering through all passages

**ON JULY 9, 2018 AT 7:14 AM ANNA ELIZABETH TWEETS:**

Is there enough space to safely turn it at the bottom to go up?

**ON JULY 9, 2018 AT 7:39 AM ELON MUSK TWEETS:**

According to divers who have made the passage, yes. However, we also made an exact replica that is inflatable, so that the entire path can be tested without risk of blockage.

**ON JULY 9, 2018 AT 8:14 AM ELON MUSK TWEETS:**

A second one that is 30cm shorter is almost complete