Elon Musk reveals his 5-step engineering protocol

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How does Elon Musk achieve such game-changing breakthroughs in electric cars and rockets... at the same time? Running Tesla and SpaceX is quite a feat. Doing so while also being an industry leader (in both) is another thing altogether. Musk calls himself an engineer at heart. It begs the question: is there some kind of secret recipe to Elon Musk's engineering prowess?

Above: Elon Musk provides some unique insight into the engineering process in order to "implement rigorously" (Source: Everyday Astronaut)

Elon has discussed a variety of engineering topics in great detail in prior interviews with manufacturing guru Sandy Munro. Recently, however, Elon broke down a fascinating protocol he (and his teams) use to engineer breakthrough cars and rockets. Musk spoke with Everyday Astronaut Tim Dodd at the SpaceX South Texas facility where the massive, awe-inspiring Starship is being assembled.

During the interview, Elon reveals five steps he believes are essential to engineering something wholly new. What's important, however, is that these five steps occur in precisely the order he lays out. Frederick Filloux deftly highlights this protocol in Monday

<u>Note</u> — what follows here is a summary of Musk's 5-step protocol. After that, check out the video from 13:32 - 28.24 to get a longer, albeit fascinating explanation of these steps.

1. Make the requirements less dumb

"Step one: Make the requirements less dumb. The requirements are definitely dumb; it does not matter who gave them to you. It's particularly dangerous when they come from an intelligent person, as you may not question them enough. Everyone's wrong. No matter who you are, everyone is wrong some of the time. All designs are wrong, it's just a matter of how wrong," explains Musk.

2. Try and Delete Part of the Process

"Step two: try very hard to delete the part or process. If parts are not being added back into the design at least 10% of the time, [it means that] not enough parts are being deleted. The bias tends to be very strongly toward 'let's add this part or process step in case we need it'. Additionally, each required part and process must come from a name, not a department, as a department cannot be asked why a requirement exists, but a person can," says Musk.

3. Simplify or Optimize

"Step three: simplify and optimize the design. This is the most common error of a smart engineer — to optimize something that should simply not exist," according to Musk. He, himself, has been a victim of implementing these steps out of order. He refers to a "mental straightjacket" that happens in traditional schools where you always have to answer the question regardless of whether the premise makes any sense at all.
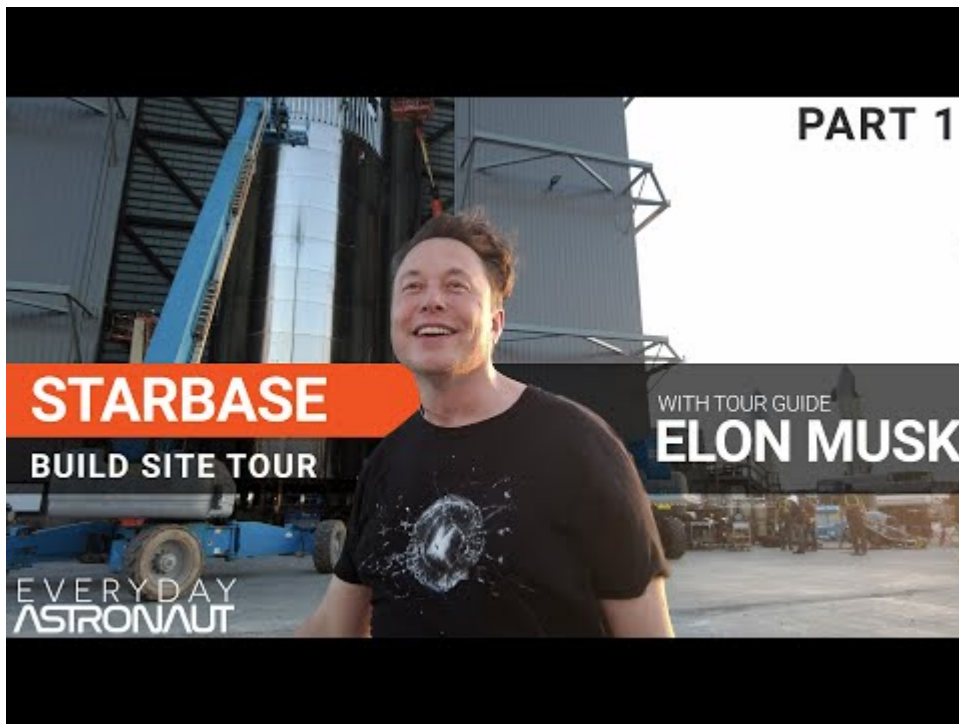
4. Accelerate Cycle Time

"Step four: accelerate cycle time. You're moving too slowly, go faster! But don't go faster until you've worked on the other three things first," explains Musk. Here he uses another example of how these steps should occur in order. During a wrongheaded process you should simply stop, not accelerate. He says, "If you're digging your grave, don't dig it faster."

5. Automate

"The final step is: automate. An important part of this is to remove in-process testing after the problems have been diagnosed; if a product is reaching the end of a production line with a high acceptance rate, there is no need for in-process testing. I have personally made the mistake of going backwards on all five steps multiple times. In making Tesla's Model 3, I literally automated, accelerated, simplified and then deleted," says Musk.

After Musk describes the fifth step, he goes on to provide some great insight into the Tesla Model 3 battery pack production line and how it evolved. Sometimes when these steps can be completely out of whack, Musk says: "It was like being in a Dilbert cartoon." Check out the video below for more.

Video

Watch Video At: https://youtu.be/t705r8lCkRw

Above: Check out the video from 13:32 - 28.24 to get insight into Musk's 5-step protocol for engineering (YouTube: Everyday Astronaut)

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Source: Everyday Astronaut; Monday Note

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