Behind the Scenes of Lego

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Introduction

It all started with one brick, but not the one you’re thinking of.

We are talking about the famed Lego brick. This single brick has been the foundation of S.T.E.M. related fun for ninety years now!

The Lego Legacy

Lego has been a beloved toy brand for kids (and we can’t lie, for adults too) since the 1930s. They now have theme parks, stores globally, and a state of the art facility in Denmark! But who designs the sets that we adore? Who designs them around structural integrity and maneuverability? It’s the Lego designers!

An overview of the Lego headquarters. This environment is centered around imagination and doesn't incorporate rigid details.

Why a Lego designer?

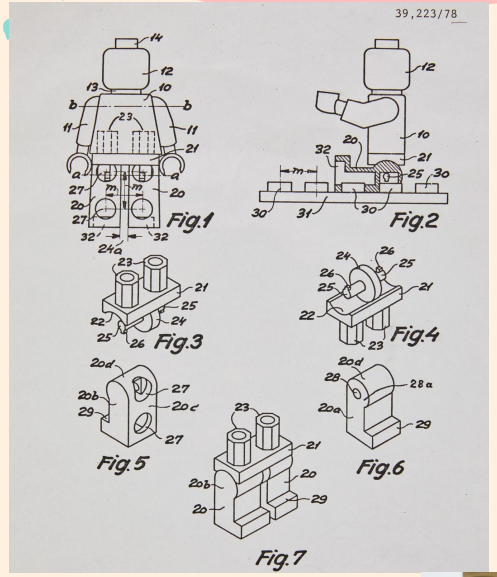
Why a Lego Designer?

The image above shows five lego designers planning out and coming up with ideas for their next lego set, Lego Dots.

We chose Lego designers since it’s a job that most people don’t think about when it comes to S.T.E.M related careers. Furthermore, as a team we would like to learn more about the people who make the Lego sets that we love.

What does a Lego Designer do?

A designer for Lego does a lot more than just build a Lego set! For example, they develop 3D models of the sets, creating a S.T.E.M learning experience through the creation of unique themes for sets that may last years. A designer also has to understand any constraints whilst building, and still make the set interactive and fun.



The image at left shows the intricate details for a simple yet complex component: the minifigure.

At right, the Hogwarts Castle is shown, which exhibits multiple aspects of STEM.

S.T.E.M In Lego

Science: Sometimes lego designers work with different parts, including the rails and decorations. Science is incorporated through eco-friendly bricks, benefiting people and the planet .

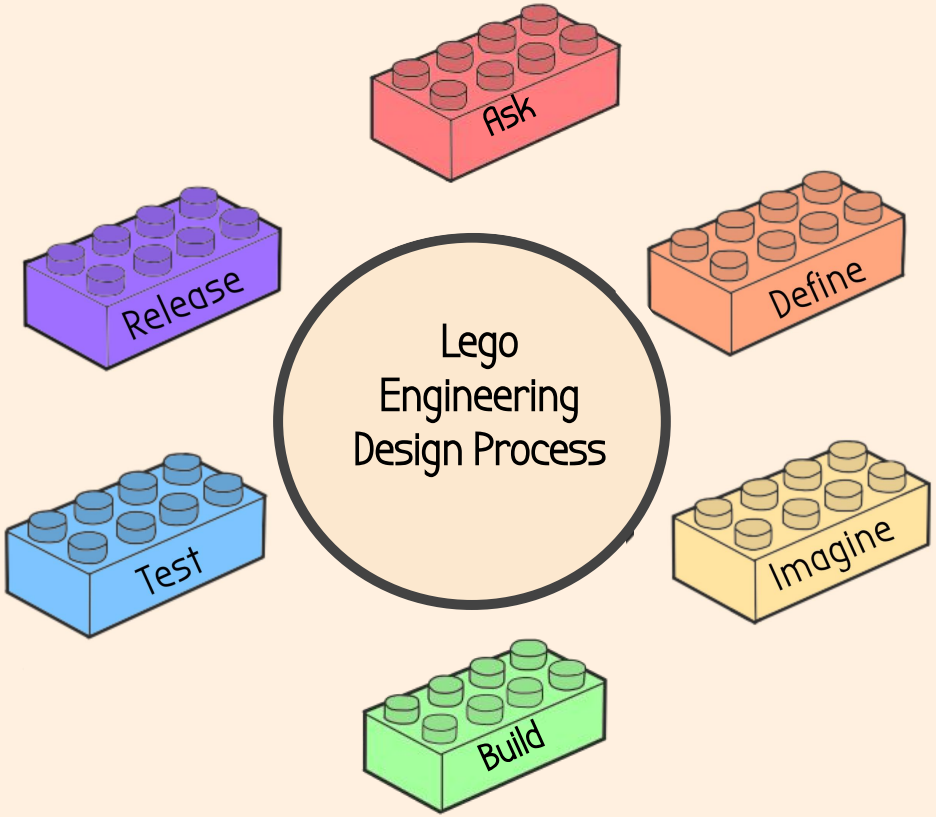
Technology: Designers use different pieces of technology, CAD softwares, and parts to achieve different results and add magic to the piece. They designed a new piece just for this set, and implemented a complex gear system with a special tool for the joints.

Engineering: While designing complex sets such as the roller coaster, designers use aspects of structural engineering to ensure the structural integrity of the set. Another example is the AT-AT which balances stability and scale with modern beauty, like any other building would.

Mathematics: Mathematics is used in different aspects, which includes calculating the weight of the project and speed of the track. In the AT-AT, the designers had to calculate the scale and box size, along with the component count.

Lego Engineering Design Process

The Lego Design Process



The Lego design process and VEX share many similarities. Both start with defining a problem. Then, the designer or member must brainstorm and research for a solution or idea. Afterwards, a prototype or build is constructed, and then advanced to the testing phase. During this phase, the designer improves what they have already built. Each procedure has a different way of finishing. Lego publishes their set, whilst the VEX system communicates their results through competitions.

How is VRC Involved?

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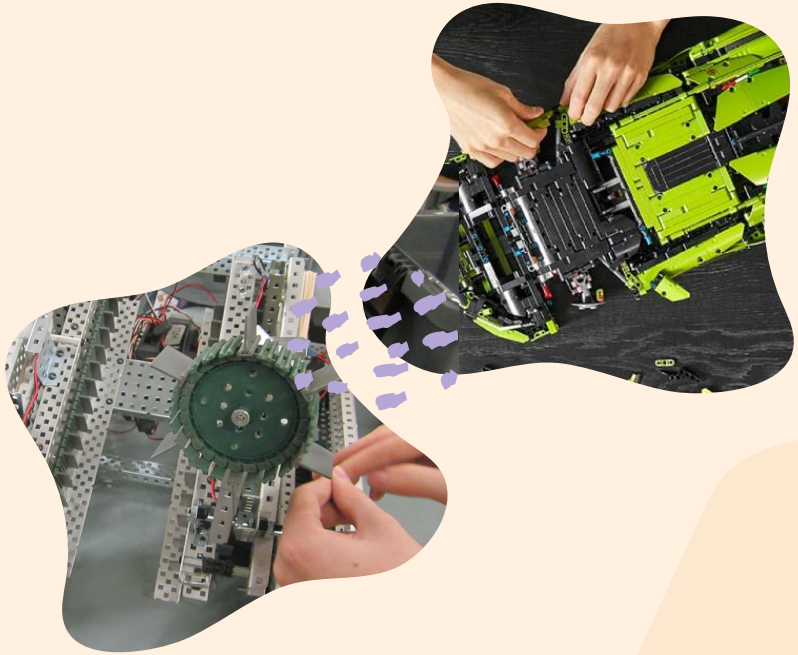
VRC

VEX requires a lot of effort in STEM and engineering. You're often pushed to use outside the box thinking and use multiple part combinations to create a result.



Lego Designer

To be a lego designer, you must have to have some experience in the STEM and engineering field. This job also requires you to be creative in order to make fun lego sets.

Interview

Interview with Mr. Mark Stafford

Mr. Stafford, a senior designer, is an esteemed Lego designer in Denmark and has been for the past 16 years. He has designed over 80 sets for Lego. We came in contact with Mark via email as we were looking for a deeper insight into the world of being a Lego designer.

Here Mr. Stafford is taking in his latest set, the Daily Bugle. This set is just under three feet tall!

Questions - Overall Role

What have you worked on?

"I have constructed multiple builds, but automatically, I think of big and memorable creations such as "Power Miners". To construct this set, we researched a mining museum in Germany, and even explored the main museum shaft. Besides this, I have also worked on a many superhero and Ninjago themes."

What is your specific role as a designer?

"I'm a senior designer at Lego. I enjoy designing sets for kids ages 4-7 and 9-12, while also tinkering with a few adult sets."

Here are some of the sets that Mr. Stafford has designed.
These sets vary in themes and are for all different ages.

Questions - Evolution and S.T.E.M.

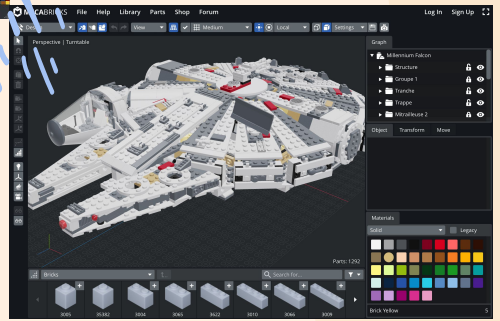
How do you believe this career field will evolve?

“It’s evolving quicker than we expected due to the coronavirus. We used to do a lot of building in the office, and we still build a lot, but now we use a lot more CAD. That’s probably the biggest change, we’re going to use more and more computers, but it’s never going to be the final step because at the moment, computers can’t replicate gravity. So the physical properties of lego will always remain a part of it.”

How does STEM relate to what you have worked on?

“We have to use many aspects of STEM to create our design. When we make new components, we use engineering and technology along with science techniques to create new parts. We also use CAD software to create our design, which can show us engineering flaws.”

As you can see, these are two different platforms that a designer may use to make a virtual build.



An upside of using CAD software for Legos is that you have an unlimited supply of bricks!

Questions - Obstacles and Characteristics

What characteristics should a Lego Designer possess?

“The main thing that the recruiting committee looks for is *communication skills*. In a design team, we believe that communication is key, as our job requires us to have versatile communication skills, as well as good management skills.”

What are some obstacles that Lego Designers face?

“Sometimes we have to ask to create a new mold for our new component, which can be a long process. However, we still face engineering and technological challenges, such as the variety of bricks we can use and the brick limit.”

Communication is a key skill in becoming a Lego designer because it helps you get your ideas across to fellow designers.

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We would like to give a big thank you to Mr. Mark Stafford for giving us the opportunity to interview him.

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Engineering Design Process illustration designed by 8838C team member Gianna Kozak