

# The Science Behind **PIXAR**

Take a peek inside.

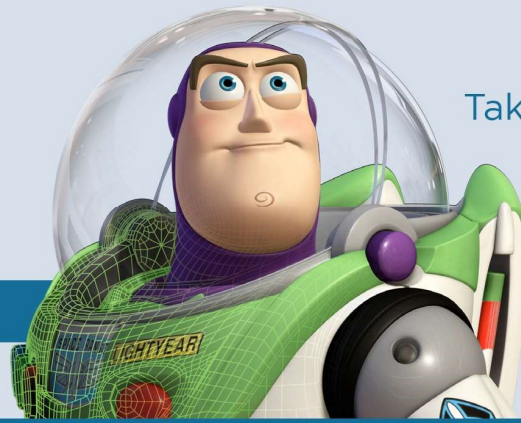


Exhibit Opens Oct. 11, 2019

## Fun Facts

“The Science Behind Pixar” exhibition is organized into sections focused on steps in Pixar’s technical process and showing how an idea results in a finished product: Modeling, Rigging, Surfaces, Sets and Cameras, Animation, Simulation, Lighting and Rendering.

### MODELING (creating virtual 3D models based on art designs)

- In “Cars,” the opening race featured 60,000 cars seated in the stands and an additional 700 cars in the infield and aisles. The final race had 100,000 seated cars and 1,500 cars in the infield and aisles. There are nearly 13,000 cars entering the stadium to find seats for the final race.
- Ninety percent of all the monsters in “Monsters, Inc.” have Mike’s tongue.

### RIGGING (creating virtual joints and muscles so the models can move)

- In “Finding Nemo,” Bruce the great white shark has 202 teeth, and each is individually animated.
- To save production time during “Ratatouille,” the artists at Pixar skipped one detail — none of the human characters have toes.

### SURFACES (creating the object’s appearance using computer programs called shaders)

- To develop the desired look for Queen Elinor’s emerald dress in the film “Brave,” the art department took real matte silk fabric samples and painted metallic colors onto the fabric, adding other subtle embellishments. Shading artists replicated the look in the computer.
- Lightning McQueen has 14 different paint variants in “Cars,” ranging from subtly different amounts of dirt and dust to the completely new paint jobs near the end of the film.
- The nearly 35,000 texture maps in “Toy Story 2” occupy about 40 GB of disk space. There are more than 10,000 texture maps for the humans alone.
- It took more than a month to digitally paint Al’s car for “Toy Story 2.”

### SETS AND CAMERAS (building the film’s virtual world)

- All of the bedroom doors in the Door Vault in “Monsters, Inc.” were created from combinations of 26 paint colors, 12 styles, eight wood colors, 10 decals, six door knobs and three hardware types.
- For “Ratatouille,” Pixar filmmakers created about 270 pieces of food in the computer. Every food item was prepared and styled in a real kitchen, then photographed for reference and eaten.
- There are roughly 1,000 unique props in the interior of the truck in “WALL•E.” It took a team of five modelers and five shading artists more than a month to create them all.
- “Brave” was the first Pixar film with a castle, so the production team visited, researched and studied a number of castles for reference. DunBroch castle was designed from the ground up, inside and out.

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Produced by



**Museum of Science.**

Everything from the architecture of the structure itself to the tapestries in the hall and the moss on the stone walls was designed and built as computerized 3D models.

**ANIMATION** (bringing the story to life and posing characters for scenes)

- During the production of “Up,” each animator produced an average of four seconds of animation per week.
- The most animation produced in one week of production on “Toy Story 2” was five minutes and 42 seconds.
- A technical director hand-animated the hairs on Sulley’s fingers to make them react to Boo’s touch near the end of “Monsters, Inc.”

**SIMULATION** (creating hair, clothing, and other effects)

- In “Monsters, Inc.” Sulley has 25,336 “key” hairs that guide the motion and shape of the other 2.3 million hairs.
- Merida, in “Brave,” has more than 1,500 individually sculpted curly red strands that generate about 111,700 total hairs.

**LIGHTING** (lighting each scene and enhancing the emotional impact)

- There are 21,566 lights in four different shots when Lightning McQueen and Mack first get on the road to California in “Cars.”

**RENDERING** (turning all of the data and programming into the final 2D images)

- “Monsters University” took 100 million CPU hours to render, which is equivalent to 10,000 years for a single computer.
- It took almost two weeks to render the most complicated shot on “The Incredibles.”

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