ÖSSUR

LIFE WITHOUT LIMITATIONS

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6546

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"Live without limitations"

That's the motto of Ossur, one of the world's best manufacturing prosthetics company. Founded in 1971, Ossur is known as a "Technology Pioneer" by the World Economic Forum. They truly embody the motto of "Live without limitations" as the company works to better the quality of life for millions worldwide, collaborating with individuals, clinicians, and diverse communities.

Ossur is founded by Össur Kristinsson, an Icelandic prosthetist, who has contributed many life-changing products such as the world's first complete bionic leg. Ossur thrives on giving everyone a voice, and we want to do the same within our VEX community. We hear many different stories about different tech companies, but we often overlook the prosthetics company being regarded as in the evolving tech field. We reached out to the Singapore Prosthetic company not only to learn about the manufacturing of prosthetic limbs but also their process of designing a personalized prosthetic.

Overview:

The purpose of the design process is to personalize the end product crafted by either the team or outside factors such as stakeholders. To design a prosthetic, Ossur follows 5 fundamental stages: Evaluation, Planning, Testing, Operate, and Follow-up. Through Ossur's design process, we are able to see an emphasis on attention to detail in every stage of creating the prosthetic. Furthermore, we can also see many parallels to our team's engineering design process.

OUR TEAM'S DESIGN PROCESS

BUILD

TEST

DESIGN

IDEATE

MODIFY

COMPETE

OSSURS DESIGN PROCESS

| EVALUATION | PLANNING | TESTING | OPERATE | FOLLOW-UP |
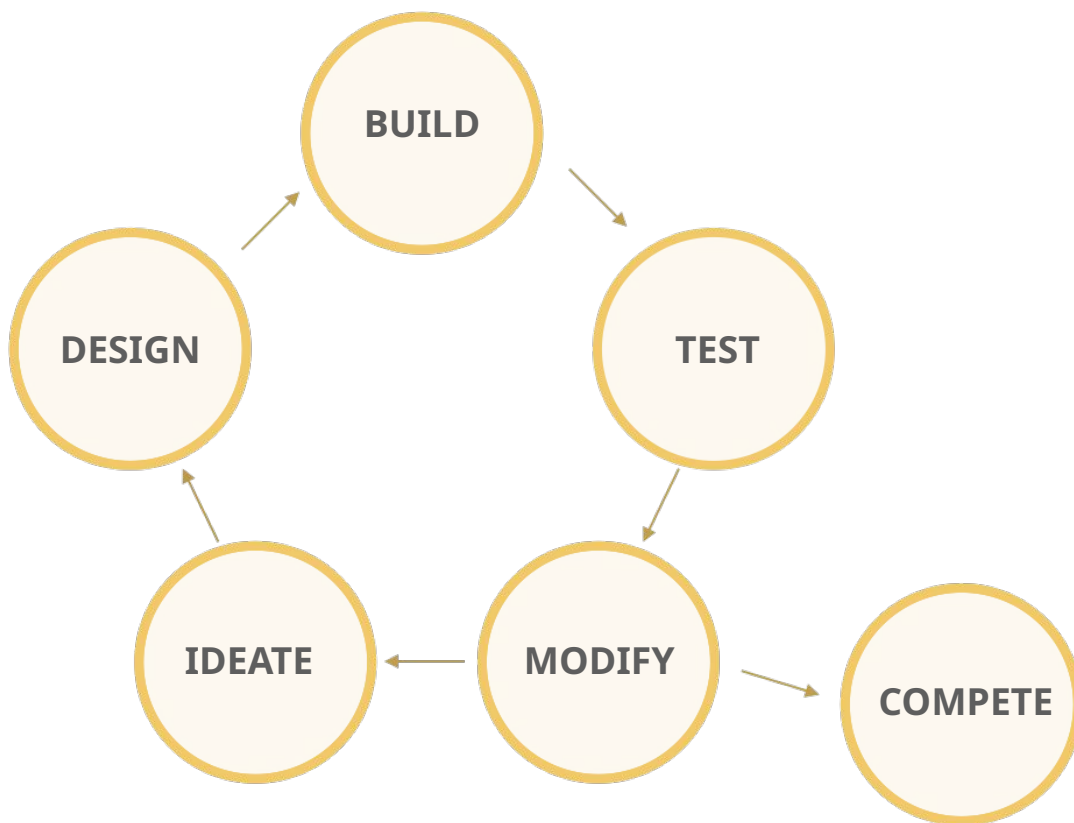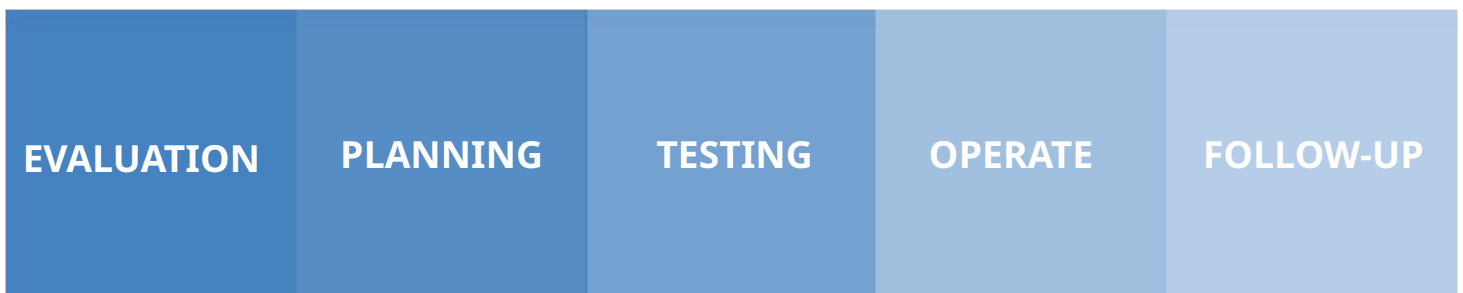
1 : Evaluation

When designing an individual prosthetic, the Ossur company first goes through a complete evaluation with the prosthetists and the patient. The prosthetists will inquire about their goals and ambitions as well as their current lifestyle to better accommodate their specific needs. That's similar to how our team does an initial team meeting. We will list our goals for the robot and what we want to accomplish during the season. By having the initial evaluation, Ossur can emphasize clear communication between the designers and customers; we try to do the same in our team by recording our discussions in the notebook.

2 : **Planning**
Capturing the shape of
the residual limb

Utilizing the current technology, both Ossur and our team proceed to plan how to achieve our final goals. Ossur uses advanced digital scanning to capture an accurate virtual shape of the residual limb. Likewise, we use Fusion360 to also create a virtual CAD model of what we want our robot to look like. Doing so, we have a replicable blueprint with accurate measurements to start building and construction.

- LLMS segment model
- Transition interpolated (70mm)
- Patient residual limb model
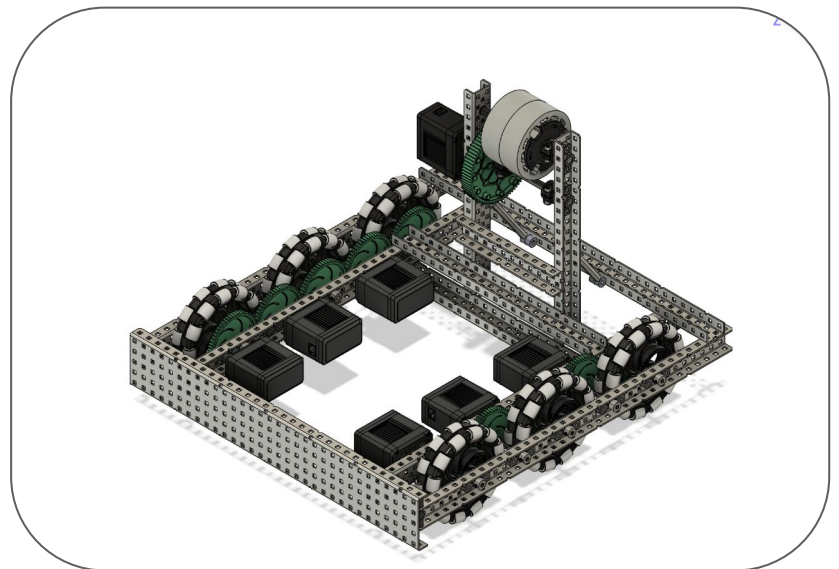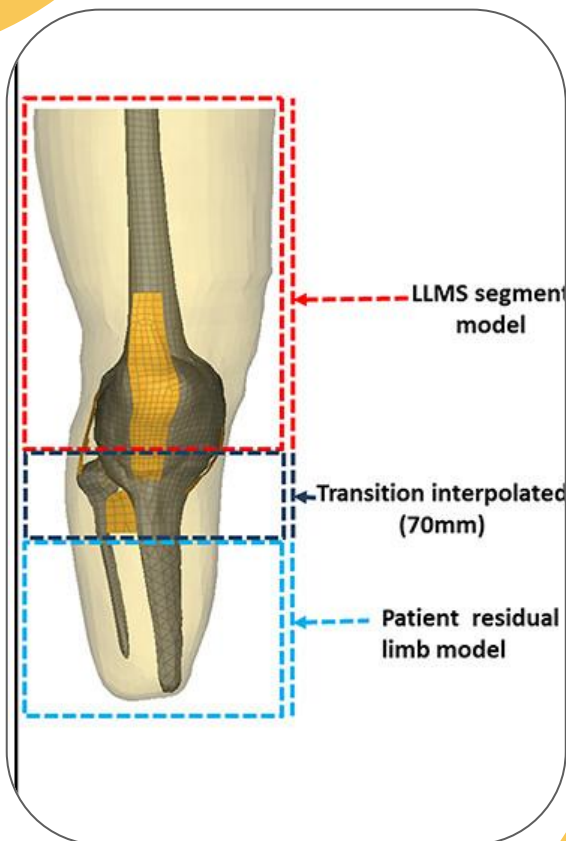
At the testing stage, prosthetists have to fit a diagnostic socket on the patient. This enables them to test and make alterations to better support or relieve areas that may have too much pressure in the residual limbs. In parallel, our team tests many different mechanisms on our robot and continues to make adjustments to ensure the robot's efficiency.

3 : **Testing**
## Fitting the diagnostic socket
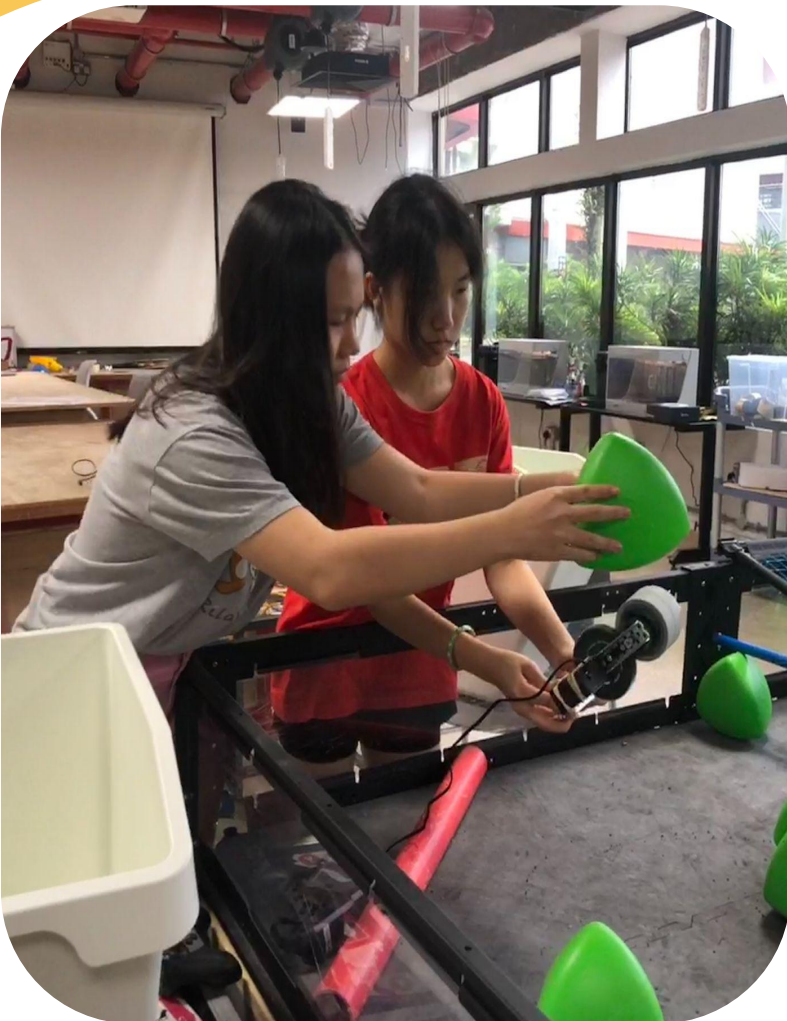
4 : **Operate**
Learning to walk

Once the prosthetic is built, the patient begins learning to walk. Ossur says, "Taking your first steps is a learning experience and an important part of the journey to reach your own potential." Taking those words to heart, our team went on our own journey of learning to drive. We would strategies to develop a strong drive team that can effectively score points during matches. When learning to walk, people initially experience discomfort and pain; as they become accustomed to the prosthetic leg, walking becomes increasingly more comfortable as your limb heals.

The manufacturing of the prosthetic is both a science and an art. The most important aspects of a good prosthesis are a well-fitting socket and the correct alignment of the prosthetic. A prosthetist takes outstanding care to ensure a socket fits the residual limb perfectly and that the components align correctly. Similarly, our team makes some extra modifications to our robot and ensures there is good alignment between the programmer and driver.
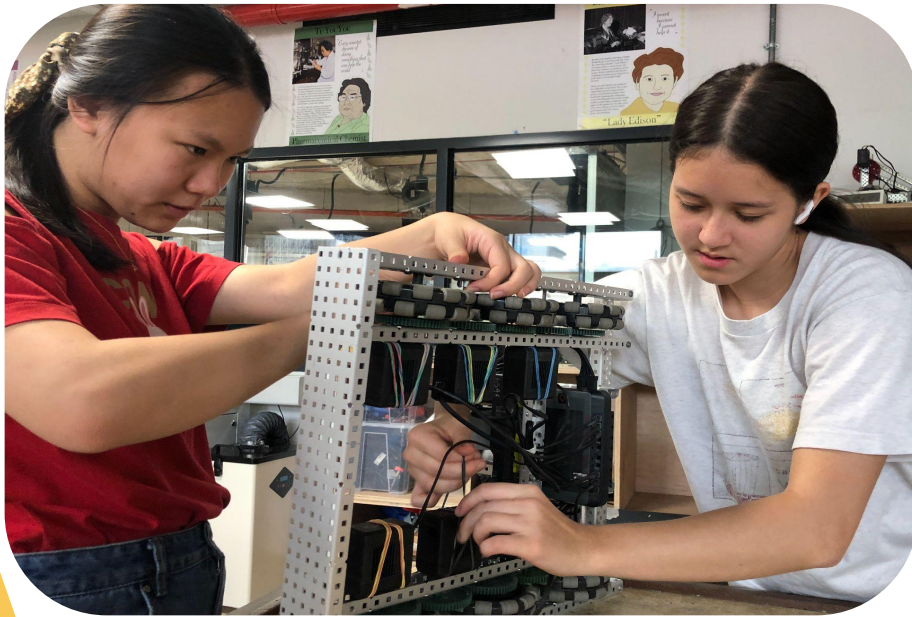

5 : Modifying
Modifying the final prosthesis

Finally, Ossur lets the patients return to their current lifestyles, with simple checkups. The patients can use the trained mobility skills in their everyday lives. Whether when going on a walk or painting a mural, this is a chance for them to execute their achievements after the long journey. In VEX, our way to show our accomplishments is not just by competing in competitions, but also by sharing our journey through the engineering notebook with other teams and supporting our school's and nation's sister teams.


6 : Follow-up

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Engineering
Notebook

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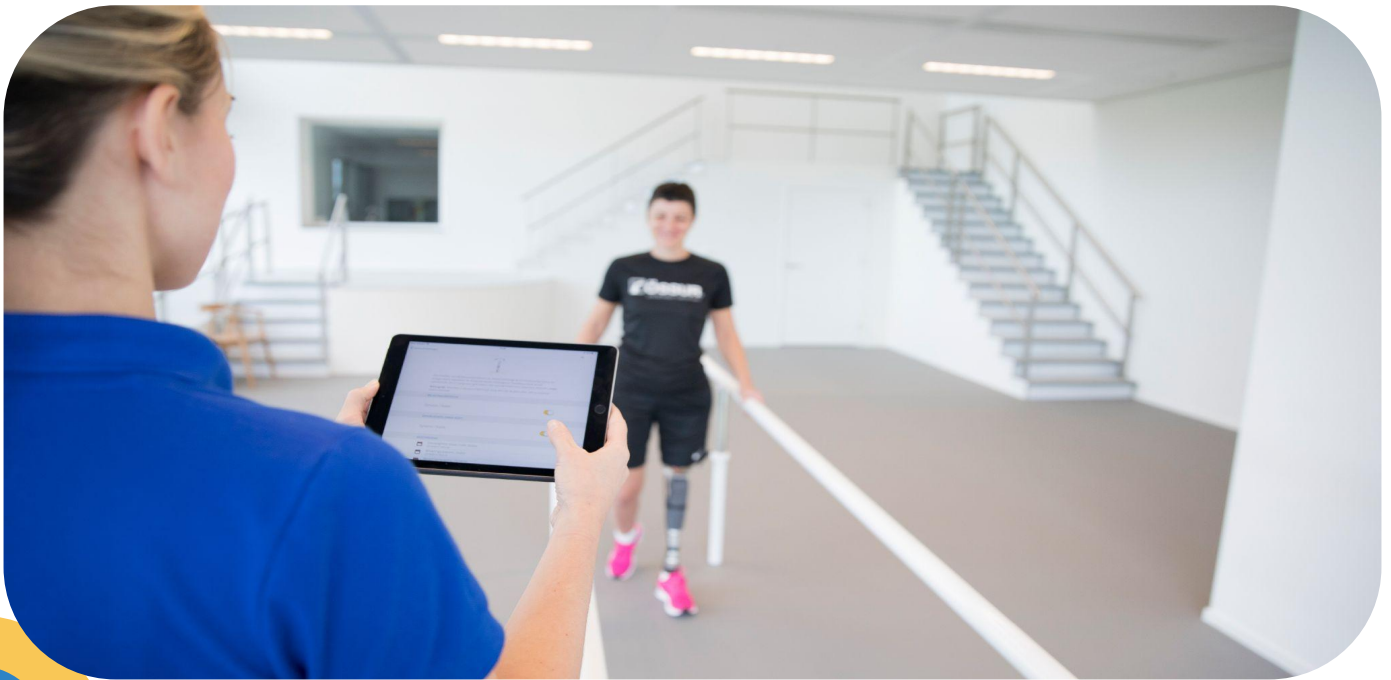
Learning about "Life without Limitations" allowed our team to realize the skills we learned in VEX can help prepare us for the future. We understand that each project will have it's own constraints and creating goals along the way is crucial during the design process. Taking notes in the notebook will help us keep track of all the steps along the way but also create a clearer communication among team members.

We wanted to apply the new prosthetic knowledge learned through this challenge and share it to others. We did so by hosting a prosthetics workshop for elementary schoolers. So that they could not only learn new facts about prosthetic limbs but also the skills we've developed in VEX as well and how they help in the future.
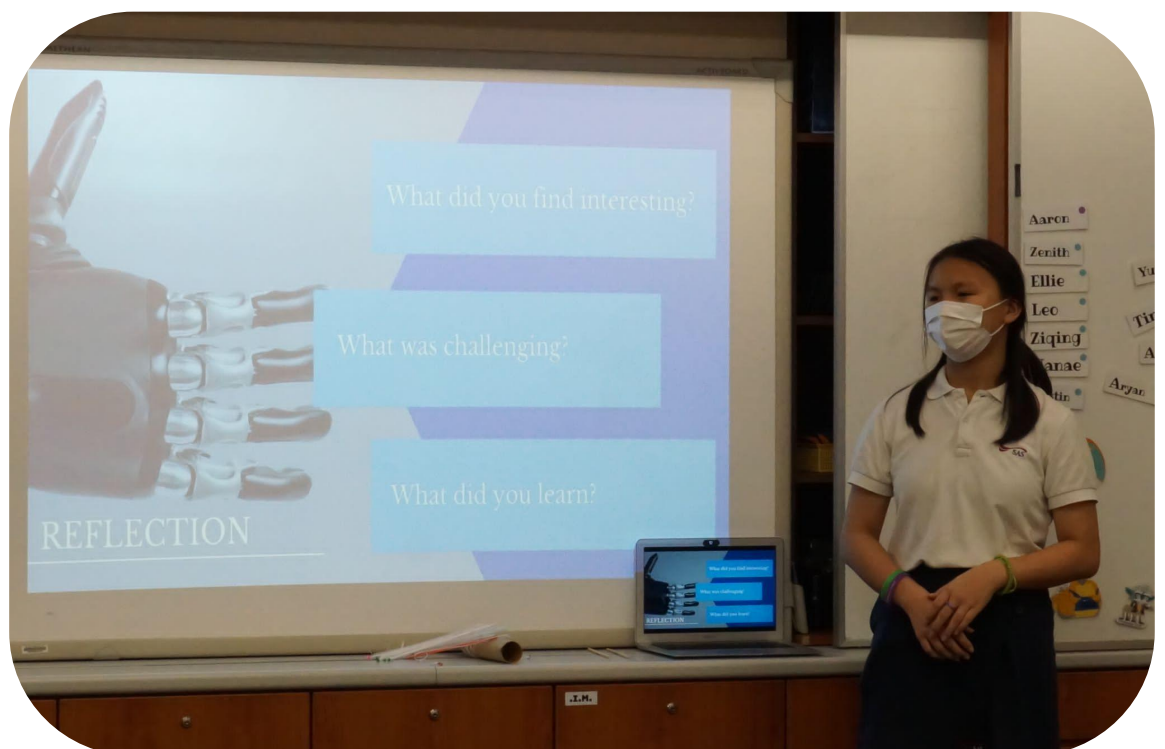
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