MULTI-PURPOSE PROSTHETIC LEG

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Situation:
- Growing need for prosthetics in the world
- Prosthetics need to be developed that demand as little change as possible in user's lifestyle
- Current prosthetic legs do not allow multi-functionality in their usage
- Three main areas of focus: usability, structure and design

Usability

Problems:
- Biocompatibility of prosthetic material
  - Skin allergies
  - Stump Edema Syndrome
- High cost of prosthetic material

Solutions:
- Better fitting prosthetics
- Using natural biocompatible material at the interface
- Replacing high cost materials in prosthetics with low cost alternatives

Structure

Problems:
- Half of the athlete's weight needs to be carried by the prosthetic leg
- Non-vertical load
- Greater chance of bending, leading to flexure [Figure 2]

Solutions:
- Highly irregular shape [Figure 3]
- Pre-deformed structural element
- Thin design made from composite

Evaluation:
- Foot has a high surface area giving better load transfer to the ground
- Able to perform at any angle whether tilted or upright making it perfect for athletes
- Thin shape saves material, providing economic practicality

Design

Problems:
- Most prosthetic leg users face restricted movement
- Lack of multi-functionality with basic prosthetics

Solutions:
- Three components
  - One prosthetic leg with multiple bases
  - Latch and lock system
  - A kit with all the necessary gear that is easy carry

Evaluation:
- Convenient to carry
- Easy to use
- Ability to enjoy multiple sports
- Appendage can be changed with ease

References: