

## Description

Most amputees not only want to have a functional prosthesis, but something that is esthetically pleasing<sup>5</sup>. Concerns about body image have been directly linked to depression in amputees, and the appearance of the prosthesis can affect their acceptance of it<sup>33-36</sup>. Appearance of the prosthesis also has a role in the societal reaction towards the amputee<sup>1,7</sup>. If the patient chooses so, a cosmetic cover can be applied to the endoskeleton of the prosthesis<sup>2</sup>. These covers also provide the functional role of protecting the inner prosthetic components<sup>2</sup>.

## Foam Covers and Skins

Foam covers are a common choice of cosmetic and can be custom shaped based on measurements of the individual's unaffected limb<sup>2</sup>. These covers are flexible, lightweight and fire retardant<sup>4,5</sup>. Additional finishes can be added to the foam cover such as waterproofing, and custom coloring<sup>5</sup>. Skins can also be applied overtop of foam covers to give additional protection and cosmetic appeal<sup>2,6</sup>. If the foam cover is worn without a finish this may lead to water damage and premature breakdown<sup>2</sup>.



Flexible foam cover for knee joints by Otto Bock<sup>5</sup>

Cosmetic skins are made out of a variety of materials including silicone, latex, and polyvinyl chloride (PVC). Skins vary in appearance, durability and cost<sup>11</sup>.

The most advanced cosmetic skins and restorations are made out of silicone<sup>12</sup>. Silicone is stain resistant, flexible, easily cleaned and can last up to 5 years<sup>13-15,28</sup>. Custom made silicone covers can have color blended right into them giving the skin depth, and details such as freckles, veins, and tattoos can be painted on<sup>11, 12, 28</sup>. These high definition covers can cost upwards of \$1000, however the cosmetic advantages are unparalleled<sup>12</sup>.



High-definition silicone cosmesis<sup>29</sup>

Some covers may be made out of latex, however they have serious drawbacks<sup>17,18</sup>. The tear strength of latex is low, and it is common for clothing dye to be picked up by the latex skins<sup>17,18</sup>. The advantage of latex is that it is inexpensive and lightweight<sup>28</sup>.

PVC covers do not tear as easily as some types of silicone and are generally less expensive than silicone covers<sup>16</sup>. One problem with PVC covers is that they stain easily, and need replacement about every 6 months<sup>11</sup>. Also, in cold temperatures PVC tends to stiffen and in warm temperatures the outer layer may be prone to peeling<sup>17</sup>.



PVC skin cosmesis<sup>30</sup>

## Fairings

Fairings are named after the panels on a motorcycle that provide the sculptural design<sup>19</sup>. Prosthetic fairings aim to do this by giving the individual back their limb symmetry and a sense of individuality<sup>3,8</sup>. The main companies producing fairings are UNYQ in partner with 3D Systems/Otto Bock and ALLELES<sup>20,21,24</sup>. The fairings are created using 3D scanning and printing technology, making it relatively easy to create personalized designs<sup>9,22</sup>. The covers are removable and weigh between 1-1.5 pounds depending on the choice of design<sup>9</sup>. The stock fairings start around \$395 while custom fairings will cost upwards of \$750<sup>10,23</sup>. The main appeal of fairings is that they are modular and stylish giving the user a sense of confidence that may not come with

foam covers and skins<sup>25,26</sup>.

Though 3D printing is a great manufacturing technique for producing custom products, it has limitations such as material choice and product durability<sup>39</sup>.



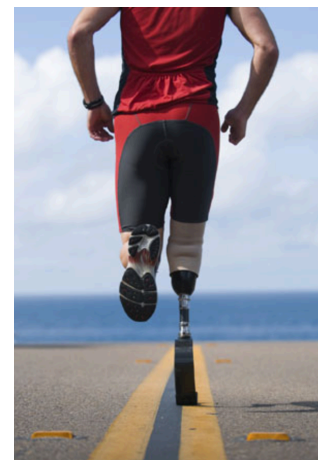
Spring/Summer 2014 collection by ALLELES<sup>32</sup>



Extreme Orange AK by UNYQ<sup>31</sup>

## Uncovered

Some amputees will decide to leave their prosthesis uncovered<sup>2</sup>. This is popular for athletes as it allows the components to function without any hindrance and keeps the prosthesis lightweight<sup>27</sup>. Others are proud of the technology and like the appearance of the uncovered prosthesis<sup>37</sup>.



Prosthetic running blades<sup>38</sup>

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