TITANIUM

LENSES & FRAMES
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While titanium is not new to the optical market, technology is yielding newer fabrications to provide the consumer with more fashionable, technologically advanced frames.

FROM THE LINKS TO THE FACE

The golf, cycling, and aerospace industries played a big role in introducing consumers to titanium. The "miracle metal" is often used in the manufacturing of golf clubs and bicycle frames, making them super lightweight, corrosion-proof and durable. It also appears as a component in makeup because of its hypoallergenic properties. Titanium offers both men and women the benefits of a non-corrosive, ultra-lightweight and super-strong eyeglass frame. And for those patients with a sensitivity to nickel and other alloys, titanium is completely hypo-allergenic.

A LITTLE R&D GOES A LONG WAY

Until recently, titanium's chief benefit, its Herculean strength, was the main obstacle to frame designers. It could only be extruded or pressed into frame shapes, limiting design possibilities. Etching or tooling is another method for creating temple detail, but the life of these tools tends to be very short because they quickly break or wear down due to the incredible hardness of titanium.

Also with titanium, the welding, coloring and plating processes are often difficult because of the need for antiseptic and oxygen-free environments. This limits the color palette immensely. In addition, some manufacturers rely on a layer of nickel for adhesion between the paint and the titanium frame. However, the frame is no longer hypo-allergenic once nickel is introduced. And that takes away one of the material's chief benefits.

Today, the metal can be melted and poured into molds allowing for more intricate, jewelry-like designs on temples and endpieces. Technology has allowed for new, stronger tools for etching with a longer shelf life.

Cost was always the prohibitive factor in producing titanium frames and companies didn't invest enough in machinery. But now, due to a strong market demand and higher volume, more intricate designs with fashionable styling can be produced at a competitive price. The cast molding process and innovations in soldering techniques are making this possible.

Until very recently, coloring presented a major obstacle, leaving few tint choices; but with a new process that creates a nickel-free primer over the metal to which color adheres, there are many more choices available in color and design. These choices now include metallics such as tobacco and slate and more hues such as purples and greens that were previously too difficult to produce.

Keeping the product pure so that dispensers can offer the hypo-allergenic benefits is key. If the product isn't predominantly titanium (excluding the screws and temples tips), you lose the non-corrosive and allergy-free benefits. The plating process uses charged ions rather than a nickel plating process to keep it pure.

THE NEXT GENERATION - BETA TITANIUM

However, because of its strength, titanium can only be cut so thin, further limiting the design possibilities. Just recently, the next generation called beta titanium became available.

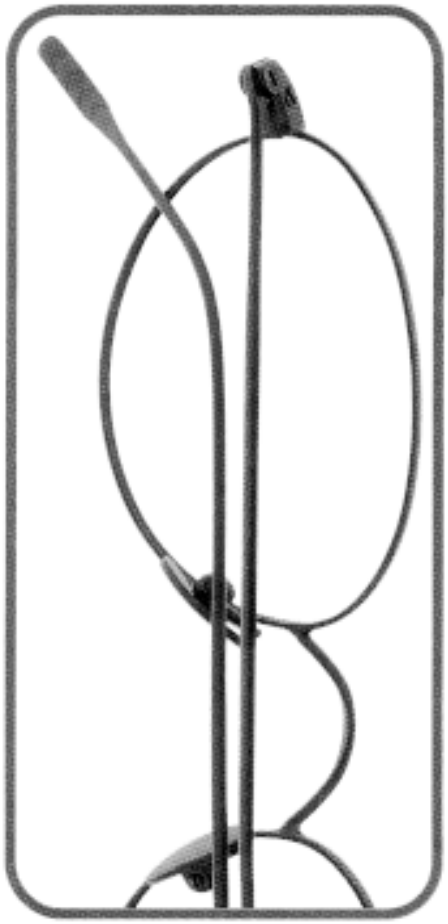
This alloy has all the benefits of its regular titanium (allergy-free, lightweight and non-corrosive) but with the new formula, which is 75 percent titanium, 15 percent vanadium (a lightweight metal) and 10 percent aluminum, it is now far more flexible. Frames made of this material can be cut thinner, thus creating the wire-like frames trending today.

With the new liquid casting process, ultra-lightweight frames in beta titanium with intricate design and wire-like looks can be produced. The alloy also has excellent memory, holding its shape while remaining very flexible. Its best application is as a temple piece.

So why not replace everything with this new alloy?

Cost

According to vendors, it can cost from 10 to 30 percent more to produce beta titanium. The increased cost comes from the alloying process and from the ultra-precise soldering process involving thinner parts in smaller areas. In addition, vendors and dispensers say that "thicker" titanium still has a place with those customers who demand a thicker frame. There are also those customers who still believe thin frames are weak and breakable. The substantial, yet lightweight properties, will maintain a niche for this first generation titanium.



Other Options

While the two titaniums drive the market, more traditional lightweight metals are still important.

Stainless steel, which introduced consumers to thin and lightweight materials, is moving the industry forward along with titanium. It has similar weight and strength benefits and takes color better, all at a lower price.

Beryllium, which also has incredible strength and lightness, is cropping up more. Like titanium, it can be liquefied and cast for depth and dimension. It also allows for micro-detailing previously done with gold and silver in fine jewelry. That technology has allowed more architectural components such as columns and drop shapes to be created in beryllium.

Designers are also rediscovering aluminum, because it is lightweight and has the ability to be produced in a palette of beautiful solids and matte finishes. But from a manufacturer's point of view, it is not user friendly because it breaks easily.

Today's consumer demands fashionable frames that are thin, lightweight and durable. Through an increased commitment to research and development, manufacturers are moving toward new material discoveries in metals to give the customers what they want.

A Plastic Alternative

What about those consumers who want all the same benefits as thin metals in an ultra-thin plastic? Until recently, acetates could only be cut to a thickness of 5 mm. Machinery did not allow for thinner frames and the product was too brittle and tended to snap if cut too thin. TZX, a harder acetate created through a compression molding process, has changed that. This acetate is harder, yet more flexible, than its predecessor and offers a viable alternative to the thin metals. Frames from this material can be cut down to 2 mm in thickness. Frames made of TZX shrink well around the lens making it an ideal material for thin high-index lenses.

Previously, the extrusion process used to create the acetate limited the colors available, but new technology has allowed for TZX in a wide palette of colors. The compression molding process creates the multi-layer laminates so popular today but with the necessary thinness consumers demand. Just about any pattern found in nature can now be duplicated in acetate, from feather moire fabric to watered silk. The fine grain of ivory for example, is created by taking two sheets of acetate of 0.25 mm in thickness, in two very similar colors. They are layered and spaced apart enough to create the grain and then pressed together in a mold.

Indeed, consumers recognize the rich quality and the strength and lightweight properties of this new acetate. However, it is not much less expensive than premium metals. The process requires time and precision and there is a lot of waste created for each frame. In fact, in a full sheet that is needed to make a frame, almost 70 percent is wasted.

These thin acetates allow for the opportunity to create frames with a lot of color effects, depth and a variety of thin, lightweight shapes, offering the consumer an alternative to the thin metals.