

*Crisp* TITANIUM

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F.A.Q.

## **1. HOW MUCH DO YOUR FRAMES COST?**

The starting price for a Crisp custom road or mtb frame has not changed since January 2009. This includes project planning, analysis of anthropometric data, geometry development, drawing and revisions, fabrication, graphic and personalization development, hand satin finish, and custom etching. Please see CRISP PRICING sheet for the most up-to-date price with options.

## **2. HOW MUCH DOES SHIPPING A FRAME COST?**

Shipping costs vary from country to country. Shipping costs also vary based on the quantity of goods shipped (frame only, frame + fork, complete bike). Typically, a frame shipped via express courier, insured for its declared value will cost from Euro 30-60.00 in Italy. A frame shipped outside Italy via express courier, insured, usually costs between Euro 70-100.00. This does not include packing, packing material or packing labor as this depends again on the quantity of material being shipped. Detailed quotations are provided to the prospective client before starting a project.

## **3. WHAT GRADE TITANIUM DO YOU USE AND WHY?**

I use many types of ASTM-certified titanium. For bicycle frames, I prefer to use straight-gauge CWSR American grade 9 (3Al/2.5V) seamless and Grade 5 (6Al/4V) titanium as it has been time-tested and offers the highest quality for bicycle frame building. For butted tube sets, I prefer Reynolds quality triple-buttet tubing for specialty frames. I prefer braze-ons and machined parts from Paragon Machine Works in California.

## **4. DO YOU USE ALLOYS LIKE GRADE 11 OR GRADE 2?**

No. I prefer grade 9 for its mechanical characteristics and overall ride quality. Grade 11 and 2, among others, are not aerospace grade alloys. They are typically designed for industrial applications where high resistance to corrosion is necessary (boilers, heating elements, acid baths). They have inferior mechanical characteristics when compared to Grade 9.

## **5. WHAT ABOUT GRADE 5, ISN'T THAT THE BEST?**

I use Grade 5 on machined parts (BB shells, dropouts, braze-ons) because of its strength and machinability. I do not use Grade 5 tubing because it does not exist commercially in seamless form with regard to tubing. The Grade 5 tubing that is used for bicycles is formed from sheet and welded to make tubing. While the exterior surface of the tubing is ground flush after welding, the interior surface is not. On bicycle tubing, where wall thickness is typically from 0.5mm – 0.9mm, having inconsistent grain structure within this space (caused by the weld seam) is not advisable. The resulting difference of the two grain structures, when placed under stress (riding the bicycle), can propagate stress risers and cracking, which in turn can lead to tube and frame failure.

## **6. WHAT ARE THE PRIMARY DIFFERENCES BETWEEN THE VARIOUS GRADES OF TITANIUM?**

The attachment shows various grades of titanium as outlined by ASTM standards. As you can see, grades 1-4 are considered commercially pure (CP) titanium and are relatively inferior in strength to GR9. By adding small quantities of alloy, specific characteristics can be achieved based on the use of the material.

## **7. IS TITANIUM MORE FLEXIBLE THAN CARBON?**

This is a question that I get frequently. I am not an expert on carbon fiber, so my capacity to respond at a technical level is limited. I know that both materials can be formed in various ways to achieve objective goals of strength, stiffness, and light weight. Carbon fiber may be manipulated with changes in fabric density, lay-up orientation, thickness, shape, epoxy/resin type and quantity. I prefer to achieve these goals with titanium by manipulating tube length, tubing diameter, tube shape, cold bending, wall thickness distribution, and geometry of the frame to meet the design criteria. I can make a frame more or less flexible depending on the desired effect. I do, however, question the marketing strategies of those who promote carbon, using both stiff/rigid and shock-absorbing in the same sentence.

## **8. DO YOU USE A WELD CHAMBER?**

This response is more directed to my Italian reader as there is a multitude of advertising propaganda touting the benefits of welding in a sealed vacuum chamber. Here's my procedure and an explanation of my technique: I weld all my frames under purge which simulates (and is actually preferable) the chamber. My fixtures are from Anvil, USA ([www.anvilbikes.com](http://www.anvilbikes.com)) and they are plumbed for purging in a vacuum. These fixtures are designed to weld titanium bicycle frames. The argon chamber is typically not used in bicycle manufacturing, however some producers like to make the consumer believe that they are built this way for purity. This is typically not true for a number of reasons: Merlin, one of the oldest producers of production titanium frames has been producing such frames for over 20+years. The current fabrication tooling is developed in this way and has been proven more effective for quality and speed. If you build with a purge chamber, you have to fill it up with argon completely before welding, which usually takes 1-2 hours. You have to put all of your work inside before filling the tank. This means that you can only work on a limited number of pieces at a time.

With a bike frame, it must first be tacked and then checked for alignment on a table. This means taking the frame from the chamber (and emptying the argon). This process is done not only after tacking the frame, but also many times during the welding sequence as the frame is not welded entirely in one process. All-in-all, the frame must go in and out of the chamber 6-10 times, depending on building sequence. This is not an efficient way to build and is a waste of gas and time.

I have seen advertisements in magazines regarding the chamber as a necessity for clean welds. This is also not true as the cleanliness of welds depends on the tube preparation before welding. Tubes must be cleaned with acetone and synthetic abrasives before welding. This is true whether welding with a purge chamber or standard purged fixture. If the weld is compromised, 9 times out of 10 it is due to faulty tube preparation. This is not a factor that is influenced by the chamber, but instead buy the fabricator's neglect. The chamber will yield a compromised/polluted weld just as a dedicated purged fixture if the tubes are not prepared properly.

With titanium, you can see the quality of the weld as soon as the weld is completed. This allows the builder to judge the quality of the weld very easily without waiting to empty a purge tank. Titanium frame fabricators typically use a special titanium torch and trailing shield to protect the outer weld field (while the inner part of the tube is purge-protected by the fixture). This torch is much larger (up to 3x) when compared to a typical steel tig torch for greater weld field coverage. There is also a post-flow of argon after the weld is complete to cool the surface until the titanium has reached a non-reactive state (cooled off). Ti, depending on the alloy, melts around 1600-1700C deg, while it becomes reactive with air and surface-born particles at a much lower temperature. This is why the shielding gas is necessary. Also lint-free gloves must be worn when handling Ti as the natural oils from your hands can compromise the cleanliness of a weld.

As you can see, there are a number of factors that make Ti framebuilding more efficient when working with specific tooling and without a chamber. Additionally, the chamber is very cumbersome and you must weld with large, rubber gloves at a distance. This makes for a very difficult build as you cannot get close to the weld pool to see the real-time condition of the weld (where in many cases, the heat amperage must be changed when moving the weld pool along differing material thicknesses). The chamber is usually used in aerospace applications where repetitive welds are performed with constant heat and appearance is of less importance. It is also used for specific welding conditions where purging may not be possible, such as welding small pieces, solid pieces, or irregularly formed pieces of work. It is important to remember that the purge chamber will not make a better weld, even though we are led to believe this by the media.

## **9. HOW DO I ORDER A FRAME?**

Simple. You can call, email or fax your order. I request an initial non-refundable deposit of Euro 1000 to start a custom frame. This allows me to order the specific material that will be needed for the frame (to keep costs competitive I do not keep a large overhead of titanium material). It also locks in a reserved position on my "custom build" list. I work on one frame at a time in the shop and build them based on the deposit/order date. While I progress on existing orders, we'll work on the design development of the frame. I typically send the client some documents that are simple to fill out regarding body dimensions and current bicycle geometry and position. We also discuss these aspects as well as the desires and riding habits of the cyclist to accumulate the archive which becomes the starting point of the new frame development.

Distance is not a problem as I typically work with cyclists all over the world, normally via email, fax, or traditional post. I also work to spec and frequently build frames for cyclists who already have a specific geometry outlined or measurements by a biomechanic. Monday thru Thursday is usually dedicated to fabrication time while Friday

I tend to work mostly in the office on designs and communications with clients. Typically, to keep the projects advancing, I will tend to keep my communications with the client to a minimum until about 1 month before the building is scheduled. While this may seem like a long time, over the years I have noted that roughly 50% of my customers have had significant idea changes regarding their frame desires since the deposit. I believe that it is more efficient if I give them time to contemplate their project after they have taken the step toward purchasing a new custom frame. In addition, it allows me to concentrate fully on the advancement of projects in the shop to move them closer to our fabrication date.

Projects that are advanced in the development process, but are then radically changed when nearing the construction phase are rarely a problem, but it becomes a problem for other customers who patiently wait while the project is redefined at the expense of the queue. Please don't be concerned if you don't hear from me for a few weeks as this is common while I'm busy cutting and welding. I would like to make it perfectly clear that I am always available to my clients AT ANYTIME during the process if there are questions or comments to make regarding the project. The best way to contact me is via email as I typically don't answer the phone when I'm working on client projects in the shop.

### **10. WHAT IS THE LEAD TIME FOR A CRISP CUSTOM TITANIUM FRAME?**

Lead times are determined by current workload. Currently, projects can be delivered from start to finish with a year minimum lead time. I work by myself and do not compromise the quality of my client's dream bike based on anxiety or cutting corners to get more frames out the door. I am thankful for each order I receive and give my customers the full attention necessary to meet their design goals and to make their perfect bike. I even offer specific suggestions when asked what type of components would lend themselves to a project.

I work alone, and unfortunately this fact has a definite influence on my lead times. I am very efficient at what I do but must consider that I can only offer tentative lead times, never definitive delivery dates as I personally must respond to the needs of my business, especially the administrative tasks and commercial side of things which take away from my shop (cutting and welding) time. I also have frequent unannounced visitors who arrive at the shop to see display bikes and to inquire about custom projects. I don't want to make excuses, but I'd rather NOT realize a project in a "promised" time rather than delude a client for this reason. Therefore, I ask that you organize yourself accordingly so as to not be without a bike during the design and build phase of the project.

If you find it difficult to comply with these requests, I'd ask that you simply reevaluate your purchase. My business is not about selling bikes, it's about the journey of making a custom titanium bike for a person as passionate about them as I. I'd like to add, however, that I've NEVER had an unsatisfied customer. If there is a setback in the delivery schedule, the client is always satisfied that I took the time necessary to complete the job with their interest at heart. Whatever delay is incurred is quickly forgotten as soon as the first pedal stroke is made.

### **11. DO YOU HAVE STANDARD FRAME SPECS OR MODEL TYPES?**

No. All of my work is 100% custom. I do not make, sell, or have an inventory of stock sizes. I think this may be why I am so busy.

### **12. DO YOU DO ALL THE FABRICATION YOURSELF?**

Yes. I collaborate with machinists on some occasional projects for special machining requirements, but I do all the cutting, filing, welding, finishing as well as the administrative duties such as material ordering, shipping, email, and accounting.

### **13. WHAT SEPARATES A CRISP FROM THE REST?**

The way I see it, you can buy a titanium frame from a multitude of sources. You can buy the \$600 frame from the Far East or the \$5000 frame from the boutique dealer. Many cyclists have and are very content with their purchase. No objections here. I started Crisp Titanium, because for me, the difference is the journey. I took that journey myself back in 1995 when I built the first CRISP frame (which I still use and enjoy today) and loved that whole process of starting with an idea. I loved it so much that I committed myself to helping other passionate cyclists achieve those same sensations, offering them the means to make their own journey. I have the tools, the tubes, and the know-how. Let me hear about your dream.

**14. HOW MUCH DO YOUR FRAMES WEIGH?**

Frame weight varies from project to project based on design, size, and material selection. Weights generally fall into a range from 1200-1500g. Frequently, a lot of emphasis is placed on ultra light frames. It is important to consider when working with titanium, however, that the lower the weight, the less material is being used. Following this procedure one begins to lose the quality characteristics that make titanium such a great material for bicycle frames. I prefer to concentrate on quality fabrication and correct geometry, bike fit, etc., while keeping an eye on weight. It makes more sense to shave grams on the moving mass like the wheels and drivetrain. I've easily built bikes under 6.0kg and if you want to go that extra step, we can go sub 5.0kg, less pedals. Invest in the frame which will last a lifetime, play with the components to keep it fresh and to meet your weight needs.

**15. WHAT KIND OF WARRANTY DOES A CRISP FRAME HAVE?**

Crisp frames, built with straight gauge Grade 9 CWSR titanium tubes, carry a limited lifetime warranty for the original owner.

Please note I can build integrated seat mast frames. I do not, however, I do not offer a lifetime warranty this type of frame.

**16. DO YOU DO FRAME REPAIRS OR MODIFICATIONS?**

This depends on the work and my current workload. Please email or call for specific repair or modification inquiries.

Bank coordinates for ordering a Crisp Titanium custom frame:

Custom Frame Depost: Mr./Mrs. XXXXXXXXX  
Personal ID/Social Security number: XXXXXXXXXXXXXXX  
Address: XXX XXXXXXXXXXX  
Tel: XXXXXXXXXXX

Bank Coordinates:

Bank BANCA POPOLARE DELL'ETRURIA E DEL LAZIO  
Branch CASTIGLION FIORENTINO  
CORSO ITALIA,18/20/22  
52043 CASTIGLION FIORENTINO AR  
ABI 05390  
CAB 71410  
Nome/Account Name: Crisp Cycle Group di Darren Mark Crisp  
Conto Corrente/Acct. 00000091122

CIN ABI D

BBAN D 05390 71410 00000091122

IBAN (elettronico) IT83D053907141000000091122  
IBAN (su carta) IT83 D053 9071 4100 0000 0091 122

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