LOOK

#796 MONOBLADE

WHITE PAPER

#SUMMARY

#INTRODUCTION

INTRODUCTION BY DR.HILHORST

DR. RENÉ HILHORST

1984	Master in aeronautics engineering at Sup Aéro (ENSAE).
1987	PhD in aerodynamics at Sup Aéro.
1990/95	Aerodynamics manager at Minardi Formula 1Team in Italy.
1995/98	Aerodynamics co-manager at Sauber Formula 1Team in Switzerland.
1998/04	Aerodynamics manager at Toyota Motorsport Formula 1 Team in Germany.
Since 2005	Creation and management of a consulting company specialized in aerodynamics.

Aerodynamics play an important role in cycling performance.
Although the speeds remain relatively low the air resistance still is the predominant resistive force for the cyclist as an example, one can take numerous cases of very high speeds reached by cyclists when pedaling behind a car big enough to “hide” the cyclist from the wind.

Even if the cyclist’s body has the biggest contribution to the overall drag, past work has shown that substantial performance enhancements could be made by improving the bike’s aerodynamic quality.
In addition, an important factor is the flow field modification by the cyclist on the bike.

This means that the bike has to be developed not in isolation but always taking into account the interaction with the cyclist. One great advantage of the LOOK bike is that the bike has been optimized for various cyclist positions, not only the high performance one but also the “more comfort” positions for longer stages or trips.

A lot of work had already been done by LOOK in the past, but there is always room for improvement. The development approach has been similar to the one used in Formula1 for aerodynamics: by development by looking at all single details of the bike and caring about the interaction between the elements.

The same tools have also been used: CFD (Computational Fluid Dynamics) by evaluating / calculating a large variety of configurations.
Wind tunnel testing has also been used for final confirmation and frame profile optimization. After every configuration result, the analysis then led to further ideas of improvement put into design and proposed once more for calculation. These cycles of calculation/analysis/design have been performed until final design release.

The Look 796 is the result of that approach.

INTRODUCTION BY LOOK

WHY WORK ON BIKE AERODYNAMICS

A cyclist moving forward faces four main resistances: air, gravity, rolling resistance and drivetrain frictions. Though there are some small variations, for a constant power developed by the cyclist, rolling resistance and drivetrain frictions are relatively stable on the road no matter how flat or steep the road is. These are also t,he two smallest resistances the cyclist has to “fight” against.

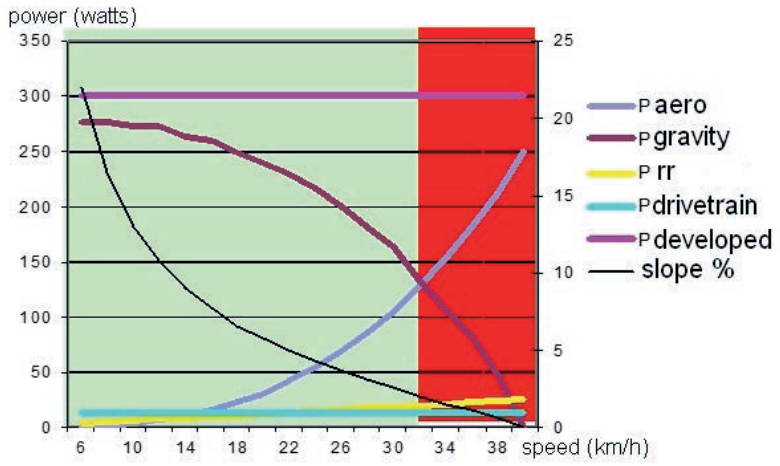
This leaves us with the two main resistances which are also the ones that change the most during a ride: air resistance and gravity. The bike industry and cyclists have been focused for a long time on the easiest one to fight against: gravity.

In order to fight gravity, all you have to do is to reduce weight without losing power. That’s how the stiffness to weight ratio became the gold standard for many years and probably still is for riders who enjoy fighting for KOM jerseys or for a personal best in the mountains. Truth is, it takes a big change in weight to make a real difference in performance over a climb; on the other hand it only takes small improvements in aerodynamics to save time in almost all riding circumstances.

LOSSES STUDY: 300 WATTS CYCLIST ON A ROAD BIKE

Below is a simplified study showing the “power cost” for each of the four main resistances with different road slope and a stable power of 300W.

The parameters: rider + bike system: 77kg, Frontal area: 0,33m², Cx: 0,9, drivetrain efficiency: 0,95%, rolling resistance: 0,0030, wind: none.



As can be seen on the graph, air resistance really starts costing “serious” watts at 20km/h and in this example, the switch to air resistance being the main resistance over gravity is at 32,5km/h.

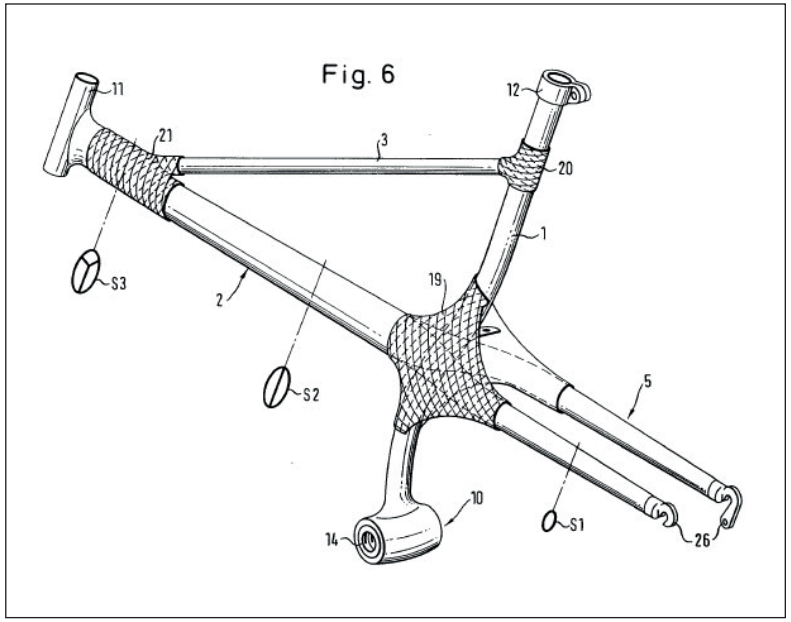
Thus, improving aerodynamics should not be a goal limited to professional cyclists riding time trial at 50+ km/h in the Tour de France: it is something any cyclist can benefit from. The best part is that aerodynamic gains are larger in percentage (or watts saved) for the fastest riders, but time gains over a given distance are bigger at slower speeds. It really motivates us at LOOK to make the best aerodynamic bikes, because we know it will benefit our Pro cyclists and triathletes as well as our customers, no matter the speeds they’ll ride our bikes at!

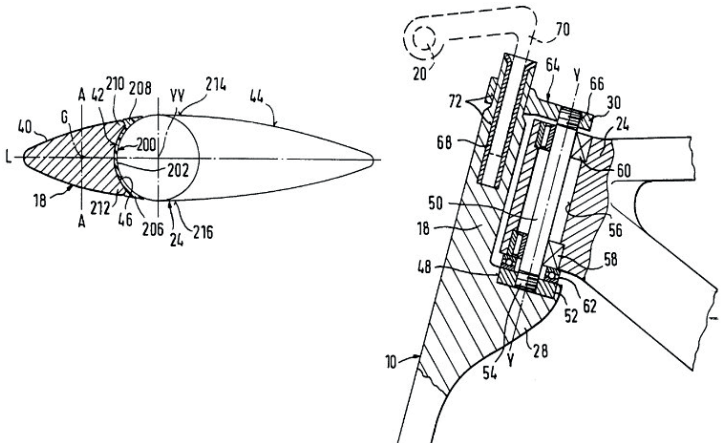
Not only must the bike be fast, but since rider drag represent more than 80% of the total drag, giving a huge range of adjustability so that the cyclist can achieve his/her optimal position while keeping the bike fast is also a big part of our work. This is why in the following paragraphs we will not only explain what makes the 796 a fast bike, but also detail all the possible adjustments that make this bike so special.

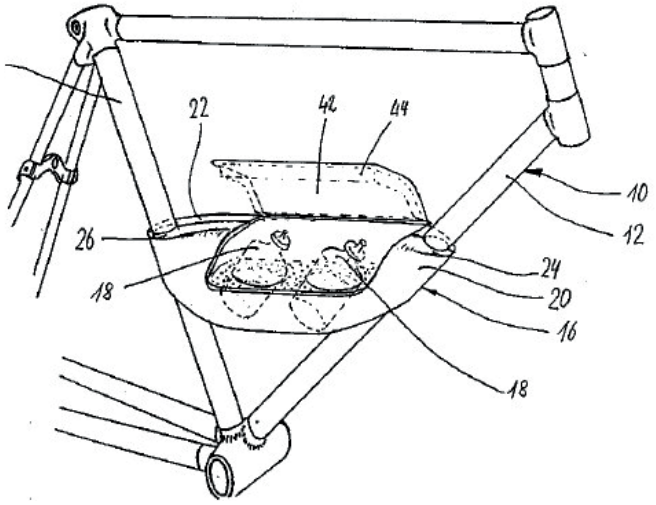
#HISTORY

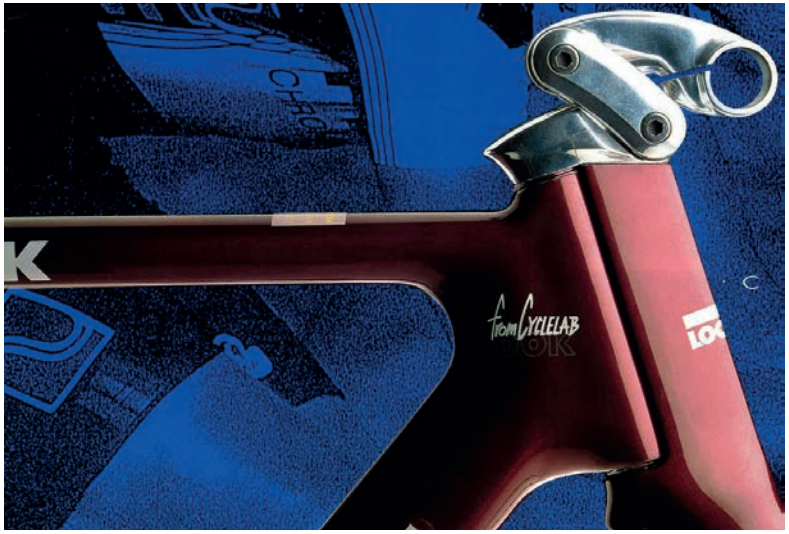
LOOK, CARBON, INNOVATION AND AERODYNAMICS

LOOK has a very long history in making carbon bikes, but also very aerodynamic bikes.
The LOOK Cyclelab project started at the end of the 80's and in 1989 and 1990, three patents were approved to address overall shape of an aerodynamic frame, lowest frontal area with the patent for the external-steerer fork and lastly carrying hydration in the most aerodynamic way.









From all those studies, the KG196 was created in 1991. it was the first aero road frame which was used in the pro peloton, but it was so revolutionary that it ended up being used in time trials and by the best triathletes, like Mark Allen and Simon Lessing.

From there, innovation and integration have never stopped. Bikes like the Twinblade for track and the KG296 with its different versions (track carbon, time trial carbon and time trial titanium) were completely aheady of their time, helping to win many Olympic gold medals on the Track in 1996 and also time trials in all the Grand Tours.

TWINBLADE Track record bike

KG 296 PKU

KG 296 CLM TITANE

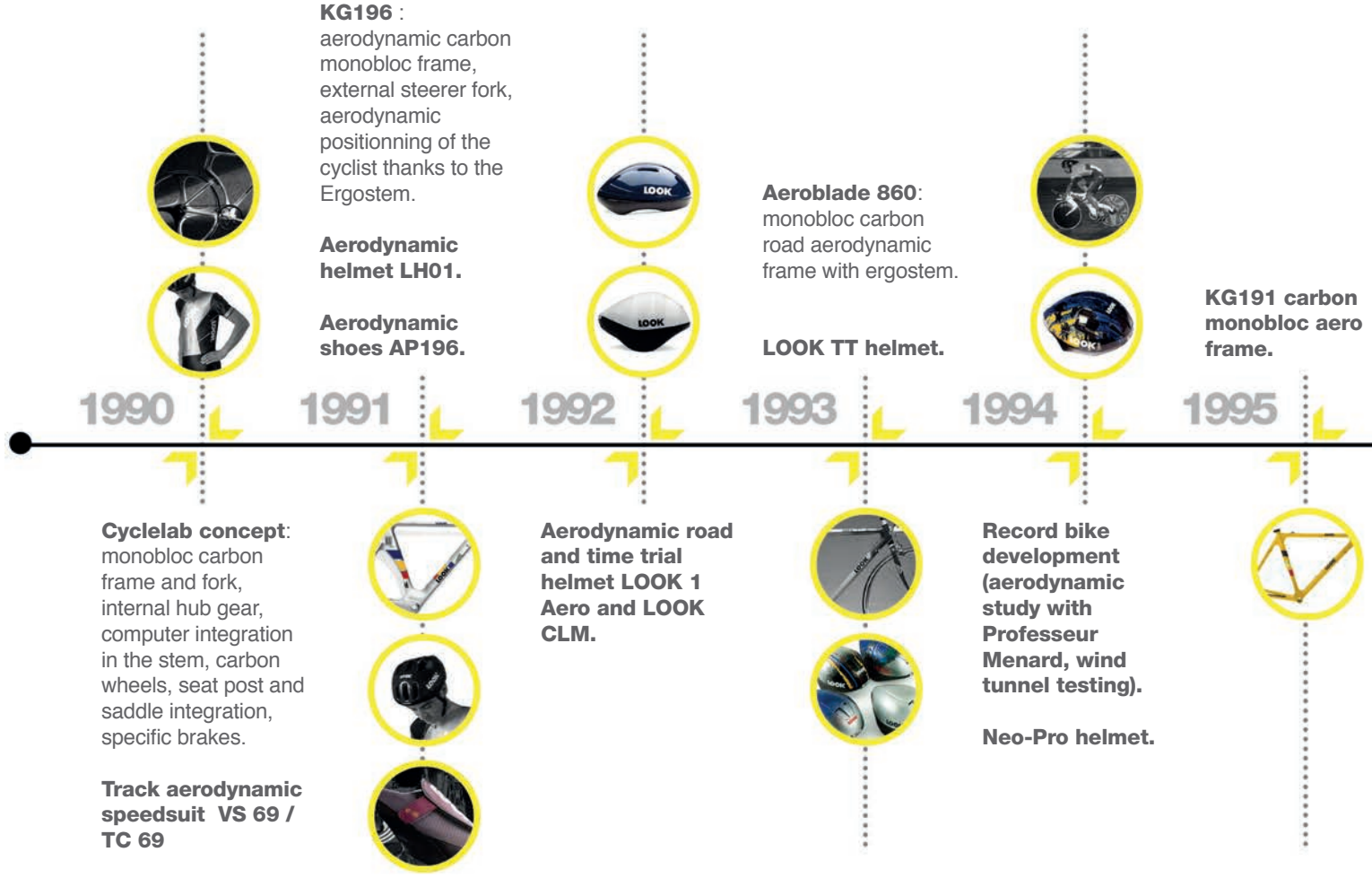
KG 296 CLM CARBONE

Integrated seatposts, stems, cranksets, cable routings and even brakes (concept bike 2002) have all been developed and tested over the years and the launch of the 795 aero road bike in 2014 was the time when we finally had it all on a ROAD bike.

Of course, the TIME TRIAL / TRIATHLON bike using all this technology and more was not far behind and this is how the 796 was born.

Integrated brakes patent and concept bike in 2002

LOOK 795 Aerolight in 2014


1990
1991
1992
1993
1994
1995
KG196 : aerodynamic carbon monobloc frame, external steerer fork, aerodynamic positionning of the cyclist thanks to the Ergostem.
Aerodynamic helmet LH01.
Aerodynamic shoes AP196.
Aeroblade 860: monobloc carbon road aerodynamic frame with ergostem.
LOOK TT helmet.
KG191 carbon monobloc aero frame.
Cyclelab concept: monobloc carbon frame and fork, internal hub gear, computer integration in the stem, carbon wheels, seat post and saddle integration, specific brakes.
Track aerodynamic speedsuit VS 69 / TC 69
Aerodynamic road and time trial helmet LOOK 1 Aero and LOOK CLM.
Record bike development (aerodynamic study with Professeur Menard, wind tunnel testing).
Neo-Pro helmet.

1996

KG296 and KG296 PKV frames : stem and fork integrations in the head tube of the frame, more aerodynamic seatstay connection with the front triangle.
KG296 Time Trial titanium: two titanium frame halves welded together, rear brake is hidden for smoother airflow, round seatpost hidden in the frame.
KG296 Time trial carbon: similar to the KG296 PKV frame with an improved rear wheel cutout and hidden rear brake.

KG286: monobloc carbon road aero frame.

KG486: monobloc carbon road aero frame.

2002

2004

496 track frame: reduced weight and frontal area.

595: integrated seat post E-Post.

2006

2008

576 E-Post : carbon triathlon frame with integrated seat post and specific triathlon geometry.

596 : new ZED integrated crankset, external steerer fork with integrated stem, study on wheels to frame and fork ideal distances to improve airflow.

2011

Keo Blade Aero : aerodynamic pedals.

496 ZED : integration of the ZED track dedicated crankset.

2012

596 Taaramae : special time trial 596 made for the COFIDIS Pro Team, specific stem and seatpost and full cable routing integration.

L96 : track frame with ZED track crankset, integrated seat post, integrated stem and new aerodynamic track handlebar.

695 Aero : brakes integration, front brake inside the fork, rear brake under the chainstays.

2013

695 Aerolight : Aerobrake and Aerostem.

Aerostem : aerodynamic handlebar clamping.

Keo Blade 2 : aerodynamic pedals.

2014

795 : aerodynamic road frame, integrated brakes, Aerostem, integrated cable routing, E-Post 2 seatpost, aerodynamic handlebar ADH.

Keo 2 Max Blade : aerodynamic pedals.

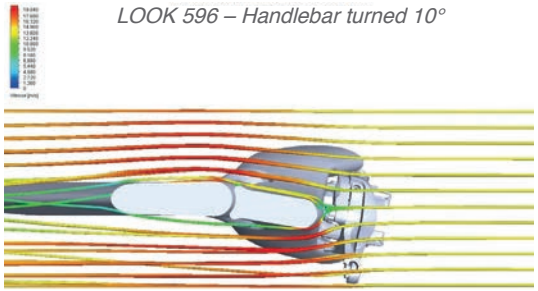
#AERO&INTEGRATION

LOWEST FRONTAL AREA ON THE MARKET

The UCI rules provided us with a challenge that could benefit both time trialists and triathletes: the main triangle tubes width must be at least 25mm and the maximum depth to width ratio is 3:1. This is what we aimed to achieve and we succeeded. We also went one step further than ever before by doing it without the use of an external-steerer fork. So the head tube, the down tube and the seat tube all have a maximum width of 25mm. In order to achieve that goal a very special “non-round” fork steerer had to be developed with a small section and lots of innovations on the processes and materials used. Even though the steerer diameter is very small, we still managed to integrate the front brake, with its housing and cable running through that narrow head tube.

There were multiple reasons why we wanted to develop a bike with a “next generation” standard fork steerer, the most important being that we thought we could improve the aerodynamics of the bike by having the wind face a one-piece head tube instead of two pieces, fork and then head tube, since this configuration requires a little gap in between the two pieces to allow the bike to turn. Besides, with a one piece head tube we can offer a very controlled aero section no matter where the wind comes from and regardless of the position of the handlebars. The external-steerer design allows us to control the global shape of the fork + head tube only as long as the handlebar is completely straight; as soon as it is turned ever so slightly, the aerodynamic shape is gone and the rider is left with a sub-optimal aerodynamic section to say the least.

LOOK 596 – Handlebar turned 10°



LOOK 796 MONOBLADE – Handlebar turned 10°

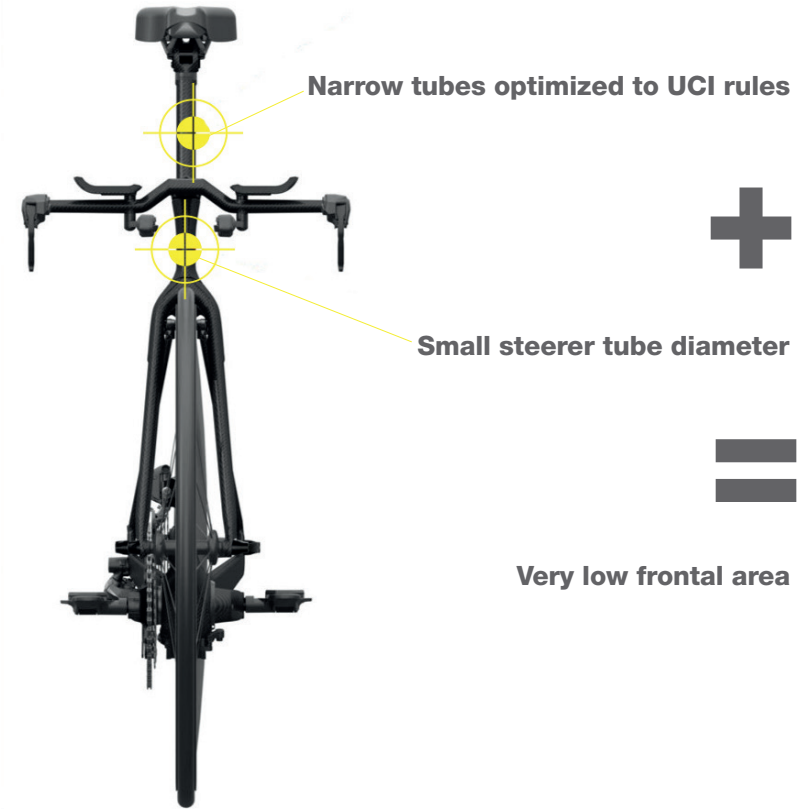
It's not just the head tube and fork that were optimized. The only tube that is wider than 25mm is the top tube, but that's because it's horizontal (so width has no influence on aerodynamics): it helps improving the torsional stiffness of the frame and also offers a flat surface ideal for bolted-on top tube storage for triathletes (cf. chapter on carrying nutrition and fluids).

The cockpit has not be forgotten in this quest for lowest possible frontal area possible: there are two stem lengths available for the 796 and both are completely horizontal: the base bar is reversible so no matter which drop you are looking for with your base bar, frontal area is not affected; spacers and/or bridge to adjust pad height are aerodynamically shaped to offer the least amount of drag no matter where you want your elbows on the bike; finally, the routing of brakes and derailleurs housings, cables and wires is well integrated in order to maintain the incredible aero performances of the bike.

ADVANTAGES OF A NARROW BIKE: many aero bikes and aero bikes parts were developed based on the assumption that the wind most often hits the rider and his/her machine at yaw angles in the range of 10° to 30°.

While these yaw angles are encountered, our studies and many other bike manufacturers' recent studies have shown that even in the Kona Ironman, which is known for its strong side winds, the rider spends most of his/her time facing winds in the 0° to 10° yaw angles range. During most other triathlon or time trial events in the world, time spent in the 0° to 10° range is even higher and can represent >90% of the ride.

Of course, the faster the rider goes the lower the yaw angles, but the opposite is also true which is why we designed the 796 to be the fastest in the world at low yaw angles for the faster riders while still offering very good performances in a large range of wind conditions and riders speed.



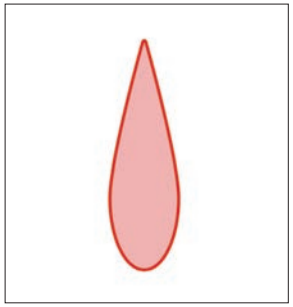
To give you an idea of how narrow the LOOK 796 is here a comparison with the CERVELO P5, both in UCI legal configurations and with aerodynamic brakes (actually the triathlon fork and accessories of the CERVELO P5 do not change the frontal area, they only improve the shapes). CERVELO P5 on the left / LOOK 796 on the right.

DR. RENÉ HILHORST COMMENTS:

“Aside from the in depth work on the aerodynamic quality of the body shapes through the reduction of their drag coefficient (Cd), we also paid attention to minimize the frontal area to get to a very low S. Cd directly related to the resistive force”

TUBE PROFILES AND CFD RESEARCH

Using computational fluid dynamics (CFD) and testing different prototypes in the wind tunnel, we chose the best NACA* profile available for each tube of the frame and fork, but also for the handlebar.



NACA Profile

** National Advisory Commitee for Aeronautics*

Our experience with the 596 and our work on the 796 confirmed what we were the first to say back in 2008, when we launched the 596: it is very important to take into account the rotation of the wheels when designing a bike. As a consequence the 796 uses meticulously calculated distances between the wheels and the fork and frame so that the airflow created by the rotation of the wheels (mainly attached to the tires) does not slow the rider down when it meets the airflow created by the speed of the rider.

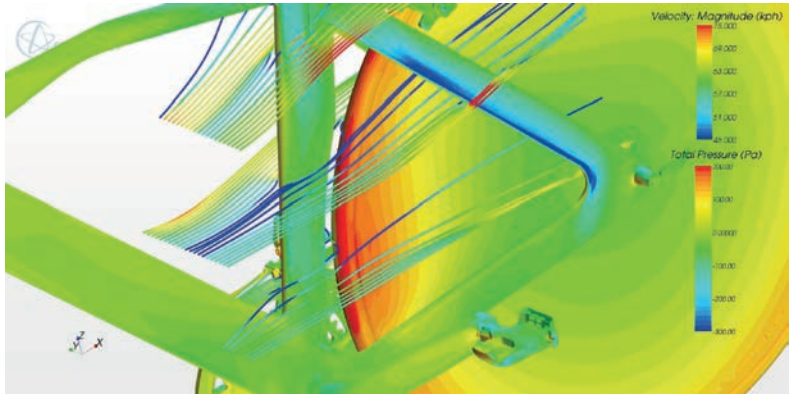
Our studies also indicated that designing a bike that was very narrow in the front without the use of Bayonet style fork was well worth the effort. The external-steerer fork obviously adds some drag when it is slightly turned but even when completely parallel to the bike's direction, the transition between the fork and frame creates a little gap that the air flow has to work its way around. See below comparison of the 596's head and the 796's head tube: the air flow stays attached much better on the 796's head tube.

LOOK 596 – front brake and external steerer fork disturb the airflow

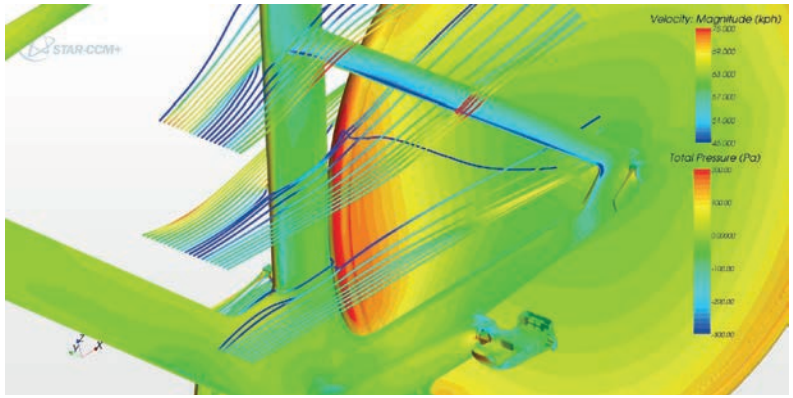
LOOK 796 MONOBLADE – integrated front brake and aero profile head tube keep the air flow smooth

The 796 seat tube has a new cutout so that the seat tube to rear wheel transition is now faster than on the 596. An aerodynamic heritage from the 596, we left a gap big enough to take into account for the turbulences created by the rear wheel spinning with tires in the 21 to 25mm range with an optimum labeled section of 23mm (which often measure up to 26mm on modern wide clincher rims), yet still close enough so that the airflow can transition smoothly from the seat tube to the rear wheel.

LOOK 596



LOOK 796 MONOBLADE



DR. RENÉ HILHORST COMMENTS:

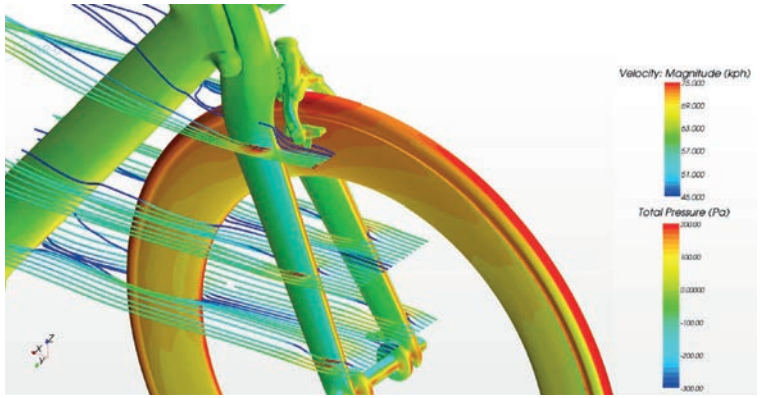
"The work in the wind tunnel lead to the optimized profile design for low drag over the representative range of yaw angles. In addition, specific attention was brought on the gap between the rear wheel and the bike frame to minimize interference drag"

NEW 796 FORK AND FRONT BRAKE

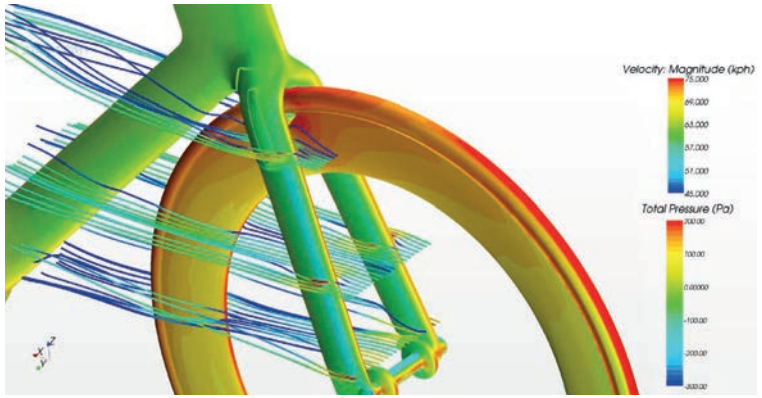
The 796 uses a new innovative fork that's all about functions. It uses aerodynamically shaped legs of course, but there is much more than that.

First, it integrates the front aero brake as used on the Look 795 Aerolight with a different front cable routing specific to the narrow steerer of the LOOK 796 fork. The brake is compatible with all wheels width up to 28mm at the brake track. A comparison of the 596 front brake (aero aftermarket brake) and fork configuration against the 796 configuration shows a clear reduction of drag in that area.

LOOK 596



LOOK 796 MONOBLADE



The carbon dropouts of the fork are asymmetrical, with a longer profile section on the right side of the bike and a smaller one on the left side to integrate the quick release lever better into the fork's shape.

At the bottom of the steerer, there is an anti-rotation device that prevents the fork from rotating too much and hit the deep section of the aero down tube of the frame. There is also a patented contact zone created between the fork and the frame that prevents the fork steerer from breaking in case of a crash.

Finally going up, the master piece of the LOOK 796 fork is its ultra-narrow "non-round" steerer. New processes made such a small section possible for the first time without affecting stiffness, safety and ride quality of the bike. Without this fork, achieving a 25mm external width for the head tube of the frame wouldn't have been possible.

FORK AND BRAKE PATENTS:

Fork rotation stop: EP15159848.9
Small steerer diameter + safety contact between fork and frame: EP15159502.2 , FR1453531
Integrated brake: FR2977560, EP2543583,US2013009380

NO VISIBLE CABLES, HOUSINGS OR WIRES

Our testing in the wind tunnel on the 596 with the COFIDIS TEAM in 2012 and 2013 showed that hiding all the exposed cables and housings saved about 4 watts at 50km/h on the 596 TT bike.

Di2 routing: Junction box hidden in top tube and no cable visible, except for a small piece of housing for the Shimano Direct Mount rear brake that creates no extra drag in our testing since it follows the down tube and bottom bracket. While the junction box is hidden, all its functions (checking for battery status and adjusting the derailleurs) are still accessible without removing the cover thanks to a push button and light windows. Please only use Shimano Junction Box reference SM-EW90 B with your 796 to have access to the DI2 functions.

Mechanical routing: All cables hidden, exept for two small pieces of housings that come from the back of the extensions to enter the top tube and a small piece of housing for the rear brake.

Top tube DI2 5-port junction box

Click to watch the 796 MONOBLADE vidéo.
Available on YOUTUBE: lookcycletv / 796 Monoblade

CABLE ROUTING PATENT:

Integrated cable stops FR2970235, EP2474463, TW201231343, CN102582752

DR. RENÉ HILHORST COMMENTS:

"Every disturbance like the brake cables are adding local contributions to the total drag through their own drag as well as the interference drag they generate. The integration of all those cables within the frame has hence removed this contribution to drag."

EASY FOOD AND HYDRATION CARRYING + COMPUTER MOUNTS

TIME TRIAL:

UCI only allows the rider to have bottles in “standard” positions, so we have placed one bottle cage insert on the seat tube for one bottle since it is the fastest option for a bottle inside the main triangle on the LOOK 796. We strongly recommend the use of an UCI-legal aero shaped bottle cage / bottle combination.

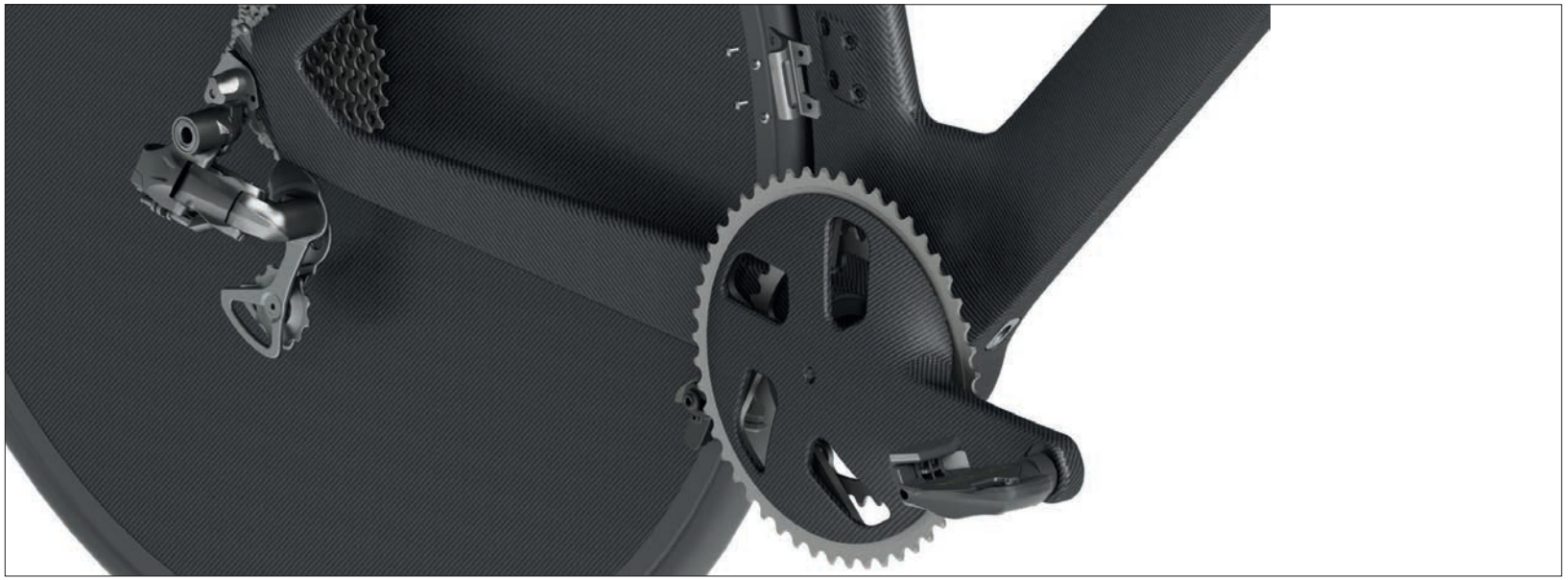
TRIATHLON:

Triathletes spend up to 6-7 hours on their bikes, so it was very important to offer them aerodynamically clean solutions to carry everything they need during the bike leg of a triathlon. A bottle can be carried with the LOOK bottle cage support when the bridge is used, but when it is not used, a bottle cage can be installed on the 22.2mm extensions using an aftermarket support.

Computer mounts: since the LOOK 796 uses 22.2mm external diameter extensions, it is compatible with many of the aftermarket TT bike computer mounts.

BOLTED-ON FRONT DERAILLEUR HANGER

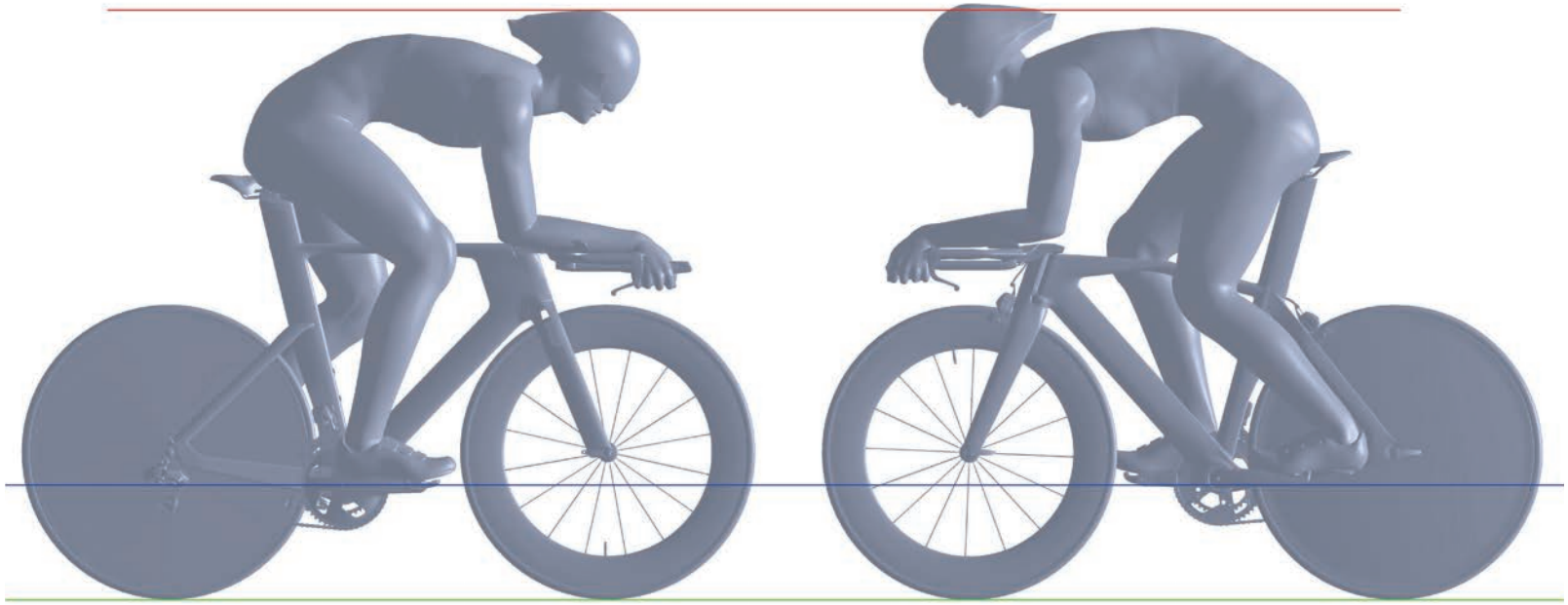
Single chain ring drivetrain are becoming more and more common in all disciplines. It started with mountain-bike, then cyclo-cross, but now road, triathlon and time trial are concerned too. In order to offer the best aerodynamic advantage to cyclists or triathletes who decide to build their 796 with this kind of drivetrain, we decided not to use fixed rivets for the front derailleur hanger on this frame, but bolts instead. This way, if the front derailleur hanger is not used, it can be removed. this provides an advantage to the 796 over most competitors' frames, which leave an empty front derailleur hanger on the bike when not in use.



BOTTOM BRACKET DROP

We designed the LOOK 796 with a 75mm drop, which is 7 to 10mm more than what we use on our road bikes. By lowering the position of the bottom bracket, we move the rider position down on the bike and we achieve a reduction of the frontal area by this simple change. It also happens to make the bike more stable by lowering the center of gravity, so it is an added bonus when riding in the aero position. The only drawback to this is less cornering clearance, so the rider has to be a bit more careful when pedaling in corners. However, with the trend of using shorter cranks on TT bikes, it seems that lowering the bottom bracket a few millimeters was a logical step for this bike.

LOOK 796 (left) VS LOOK 596 (right) , rider in the exact same position



LOOK 796 MONOBLADE

LOOK 596

LOOK KEO BLADE 2 PEDALS

The LOOK 796 can of course be used with all sorts of pedals, but we strongly recommend the use of Keo Blade 2 pedals in order to optimize the aerodynamics of your bike even more. After the original Keo Blade was developed, we started working with our pro athletes on an aero version of the Keo Blade, after developing different versions of a structural carbon aerodynamic shape for the Keo Blade, we went to the wind tunnel to see what kind of improvements we could get from an aero version of the Keo Blade and it was so convincing that we decided to introduce the Keo Blade Aero to the market soon after.

After that, when developing the Keo Blade 2, aerodynamics were included in the development from the start, while also reducing pedal stack height. Now the cyclists don't have to choose between the lightest LOOK pedals and the most aerodynamic ones: the Keo Blade 2 offers both characteristics in one model. It really makes sense to build the fastest bike available with the fastest pedals available.

BLADE PEDALS PATENT:

CN101362498, US2009031850, EP2020373

#GEOMETRY

THREE SIZES WITH
LOTS OF ADJUSTMENTS

The LOOK 796 is offered in three sizes, with two different stem lengths and a very adjustable reversible aero handlebar. It can cover pad stack from 496mm to 710mm, pad reach from 440mm to 560mm and all that with a fair amount of overlap in between sizes so that the rider can fine tune his final size choice based on saddle height and favorite stem length.

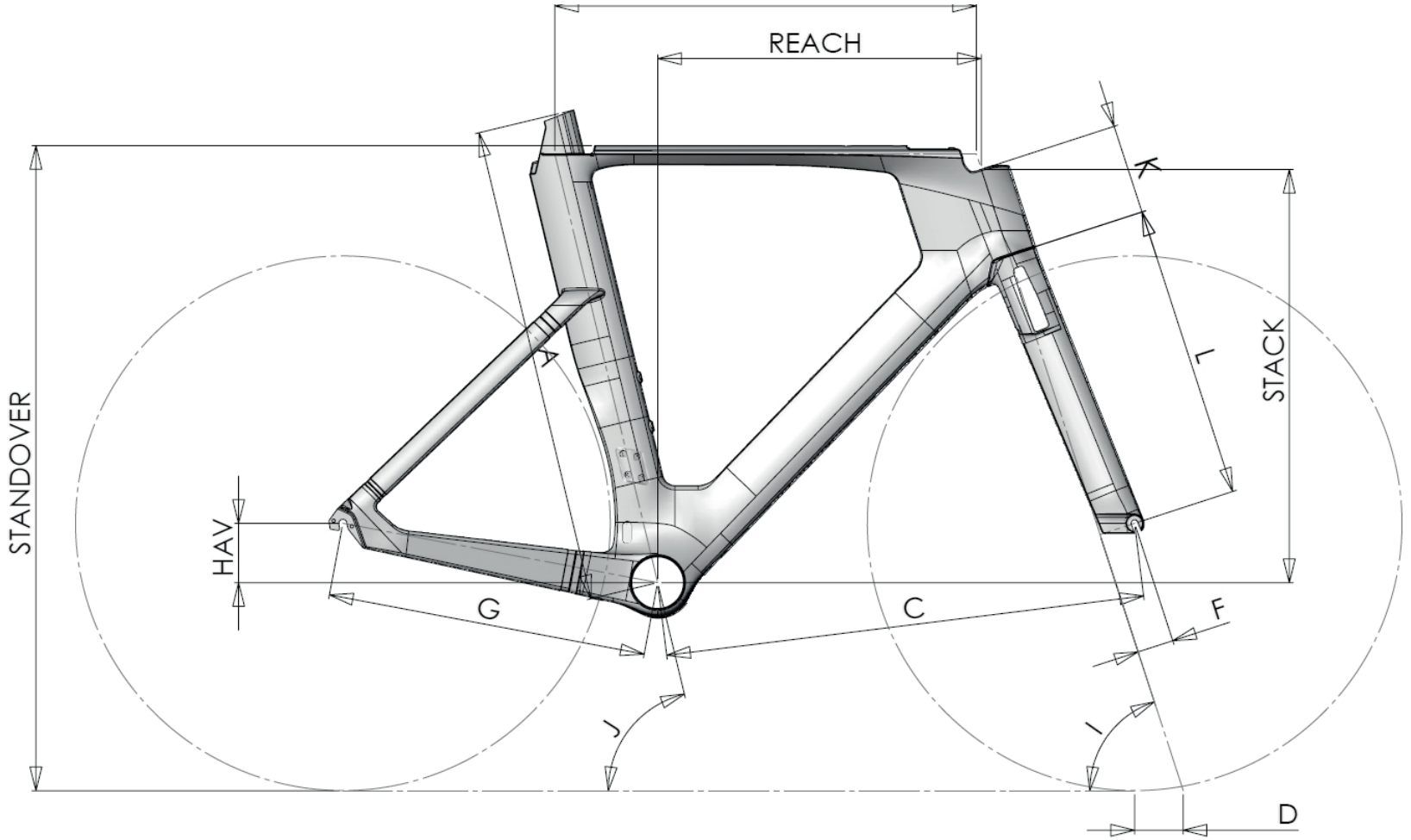
The 76.5° seat tube angle associated with the two reversible seat post heads allow cyclists to reach UCI legal positions and triathletes to have a more forward positions.

The 72° head tube angle associated with the 46mm fork offset gives which give a 61mm trail with a 23mm tire, providing a stable ride in the aero bars that's also agile enough for more technical courses.

DR. RENÉ HILHORST COMMENTS :

"Eventually, it is the drag of the bike + cyclist ensemble that will contribute to the overall resistive force. Hence, a lot of attention has been paid to the interaction bike-cyclist in the definition of the new geometries."

Below is the geometry of the frame/fork assembly.

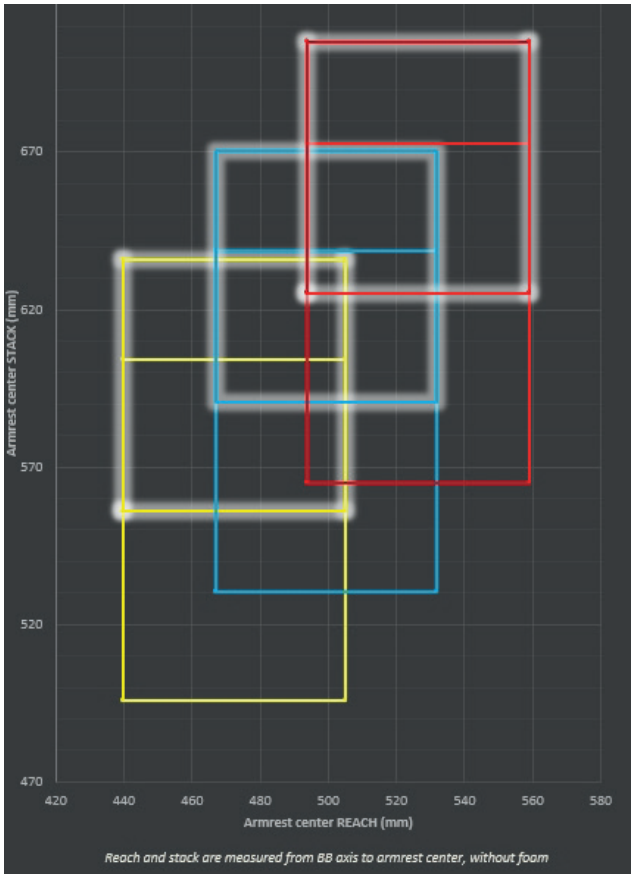


796 CLM / TRIATHLON

	Stack (mm)	Reach (mm)	I (°)	J (°)	A (mm)	B mm)	C (mm)	D (mm)	F (mm)	G (mm)	K (mm)	L (mm)	HAV (mm)	Standover (mm)	Wheels diameter (mm)
XS-S	488,0	382,0	72,0	76,5	570,0	498,0	570,0	61,5	46,0	405,0	77,7	371,5	75,0	781,0	676
from XS-S to S-M	*34,5*	*27,0*													
S-M	522,5	409,0	72,0	76,5	606,0	533,0	608,0	61,5	46,0	405,0	114,0	371,5	75,0	815,5	676
from S-M to L-XL	*34,5*	*27,0*													
L-XL	557,0	436,0	72,0	76,5	641,0	568,0	646,0	61,5	46,0	405,0	150,3	371,5	75,0	850,0	676

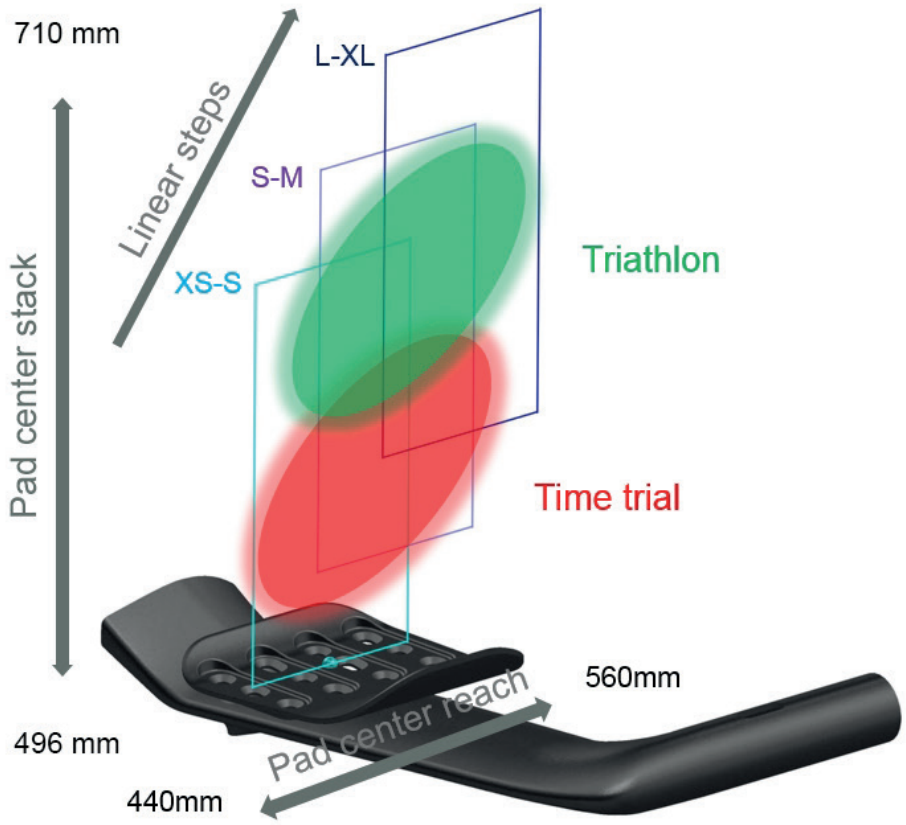
And here is the most important information for TT bike positionning: the arms pad reach and stack than can be achieved for each frame size.

Armest Reach & Stack Adjustment



XS-S size / without bridge
XS-S size / with bridge
S-M size / without bridge
S-M size / with bridge
L-XL size / without bridge
L-XL size / with bridge

Armest pad Reach & Stack



COCKPIT

The cockpit of the LOOK 796 offers the largest range of adjustability of any time trial / triathlon bike on the market.

REACH ADJUSTMENT:

Starting with the stem: 2 lengths available, 85mm and 110mm, both positioned completely horizontal on the bike. Then, the pads can be positioned centered (0mm), forward (+20mm) or rearward (-20mm) on the handlebar. Thus, for each frame size, when you consider the two ways of adjusting arm pad reach, you get a total range of 65mm of adjustment that is not influenced by later stack adjustments.

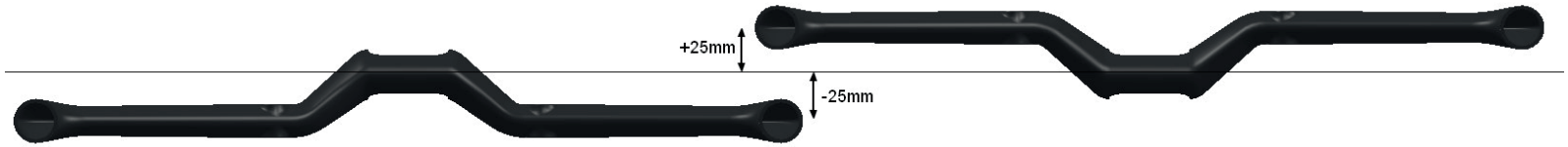
STACK ADJUSTMENT :

The base bar is reversible with a drop of 25mm, so the brake extensions can be positioned at -25mm or +25mm relative to stem center. Position of the base bar influences how high or low the pads and extensions can go.

Extensions can be positioned under the base bar or in between the base bar and the pads.

Finally, pad height is adjustable with the help of aerodynamic spacers or by using the bridge, which helps creating a stiff platform for higher positions. It is a better solution than cumulating a lot of spacer to achieve the desired pad stack.

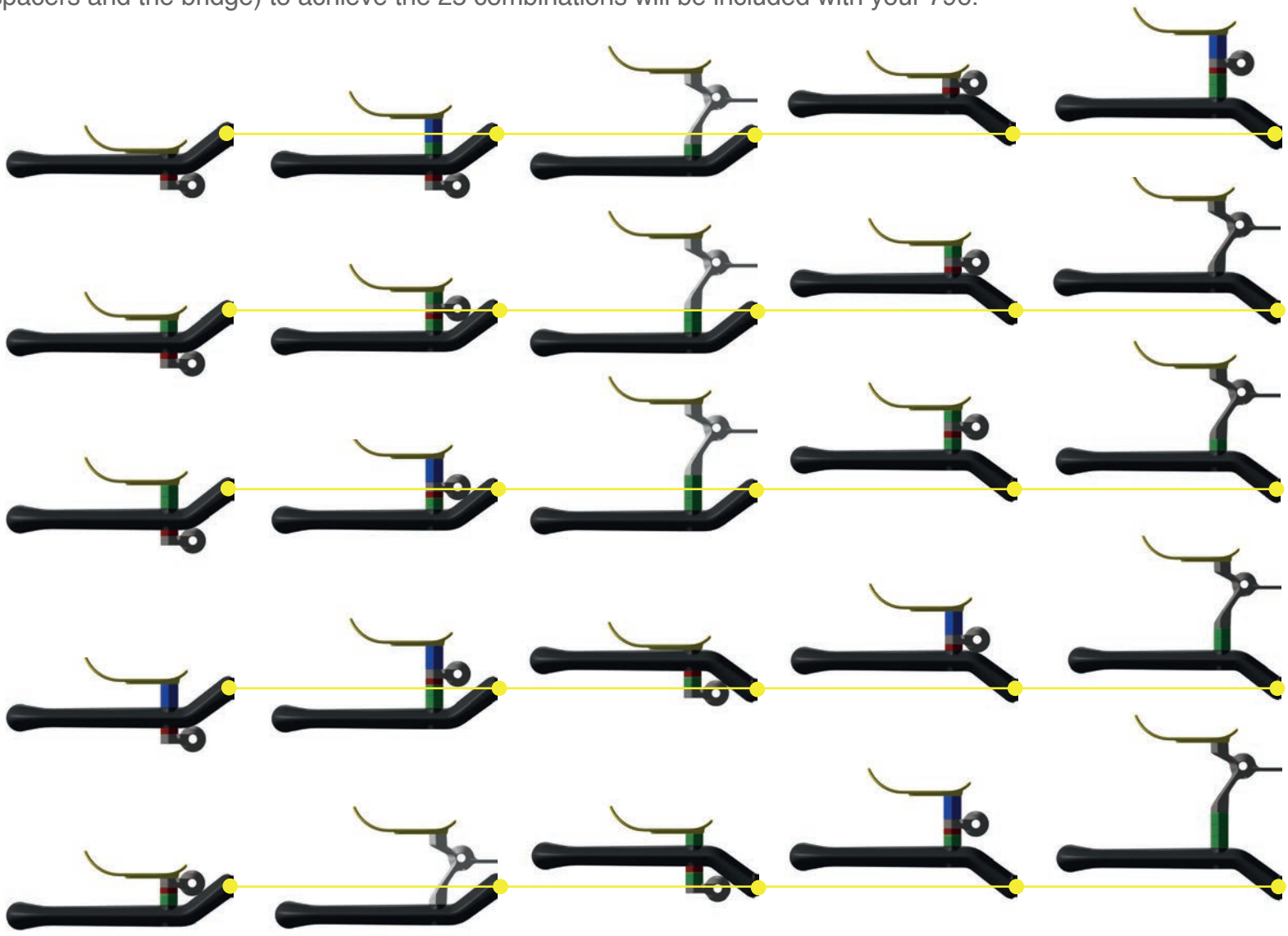
The bridge and spacers can be used separately or in combination to achieve an optimal stack adustment.



Base Bar + Bridge

Base Bar + Spacers

Overall there are 25 combinations of adjustment for the arm pad stack and everything you need (all bolts length and spacers and the bridge) to achieve the 25 combinations will be included with your 796.



Yellow line represents base bar center
Positions shown from lowest (top left) to highest (bottom right)

Spacers 5mm
Spacers 10mm
Spacers 20mm

Bridge

Low arm pad stack height assembly example with straight extensions

Higher arm pad stack height assembly example with bridge and anatomic extensions

PAD WIDTH ADJUSTMENTS :

The pads can be adjusted with center to center widths of 135mm, 165mm and 195mm. For each width, the pads can be angled anatomically to create a good elbow to writst alignment. In the 135mm position, angle can be adjusted from 0° to 6°, for the 165mm position, from 0°

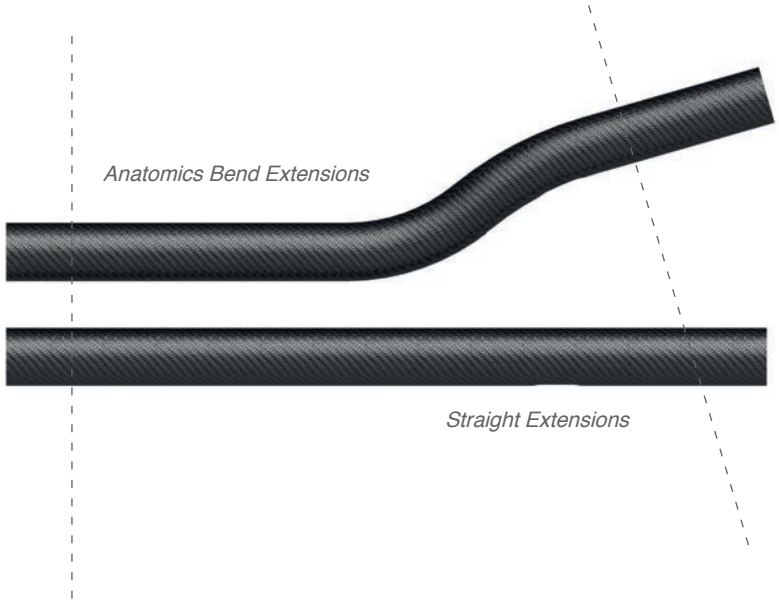
135mm pad width

165mm pad width

195mm pad width

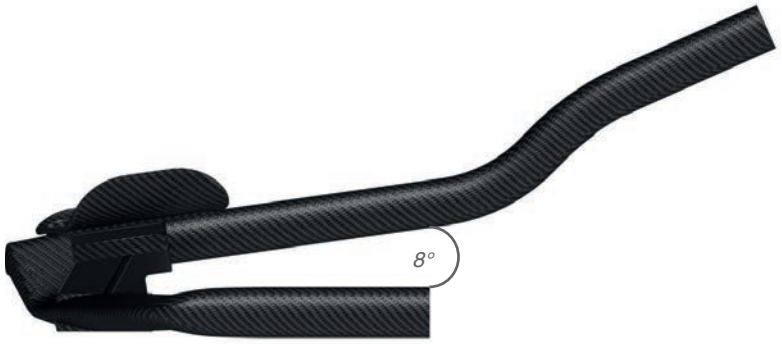
TYPE OF EXTENSIONS:

The LOOK 796 is offered with a choice of straight or anatomic S-Bend extensions that can be cut to lengh on both sides to achieve the desired forearm angle and hand position. Since it is compatible with all 22.2mm round extension other aftermarket shapes can be used.



PADS AND EXTENSIONS ANGLE:

The final adjustment that can be made to the cockpit is the pad and extension angle. For the cyclist who wants to ride with the hands signyficantly higher than the elbows, an 8° optional kit is available. The kit is added right on top of the base bar to create the angle and its is compatible with all the spacers and/or the bridge needed to achieve the desired pad stack adjustment. With the kit installed, the reach is slightly increased at the bottom to take into account for the angle that will actually decrease the reach progressively when pad stack is increased.

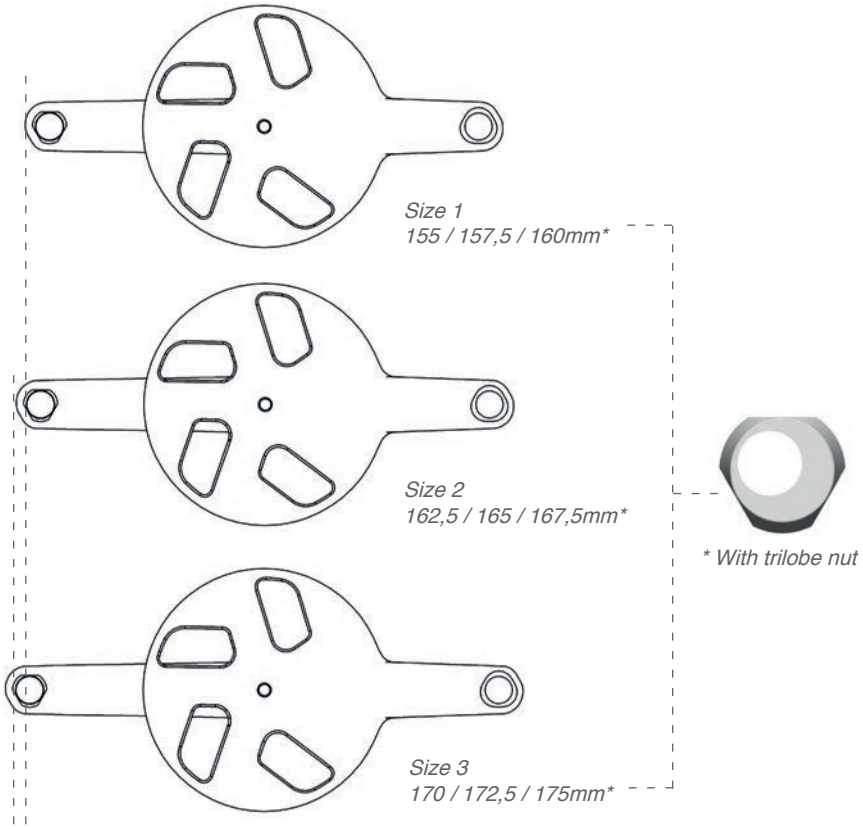


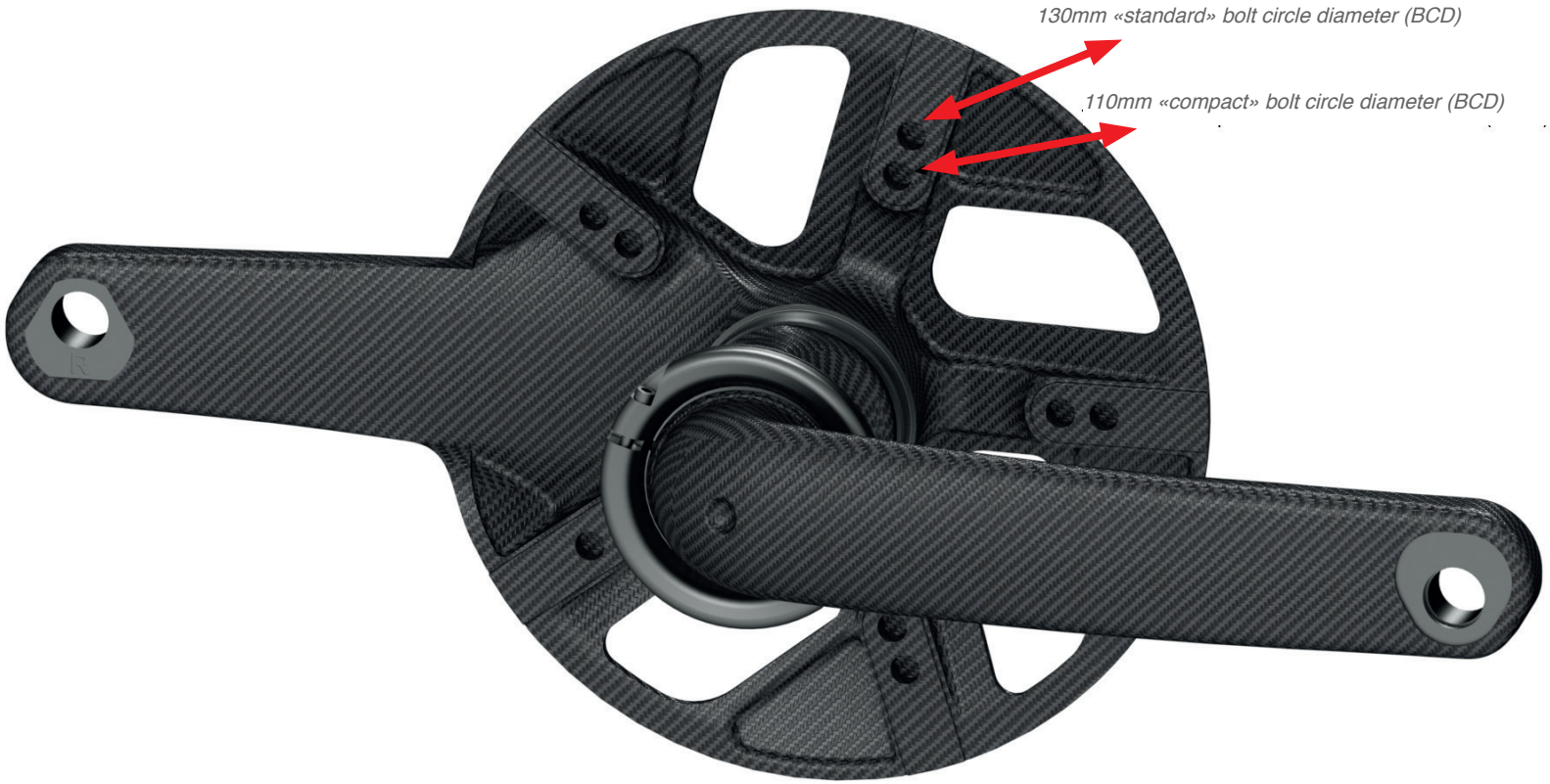
CRANKSET

An evolution of our patented monobloc carbon crankset, the new ZED 3 crankset is stiff, light and more aerodynamic than ever before. It is offered in 3 sizes and it still uses the trilobe insert, so now crank lenghts from 155mm to 175mm can be achieved which is ideal for smaller riders, but also to achieve more aerodynamic positions on time trial / triathlon bikes.

The ZED 3 crankset is still compatible with compact and standard chainring but the bolts are now tightened from the inside so they can't be seen when looking at the bike.

The ZED 3 crankset has its two bearings pressed inside the bottom bracket shell of the frame, which makes assembly and removal faster than on any previous version of the ZED crankset.





CRANKSET PATENTS:

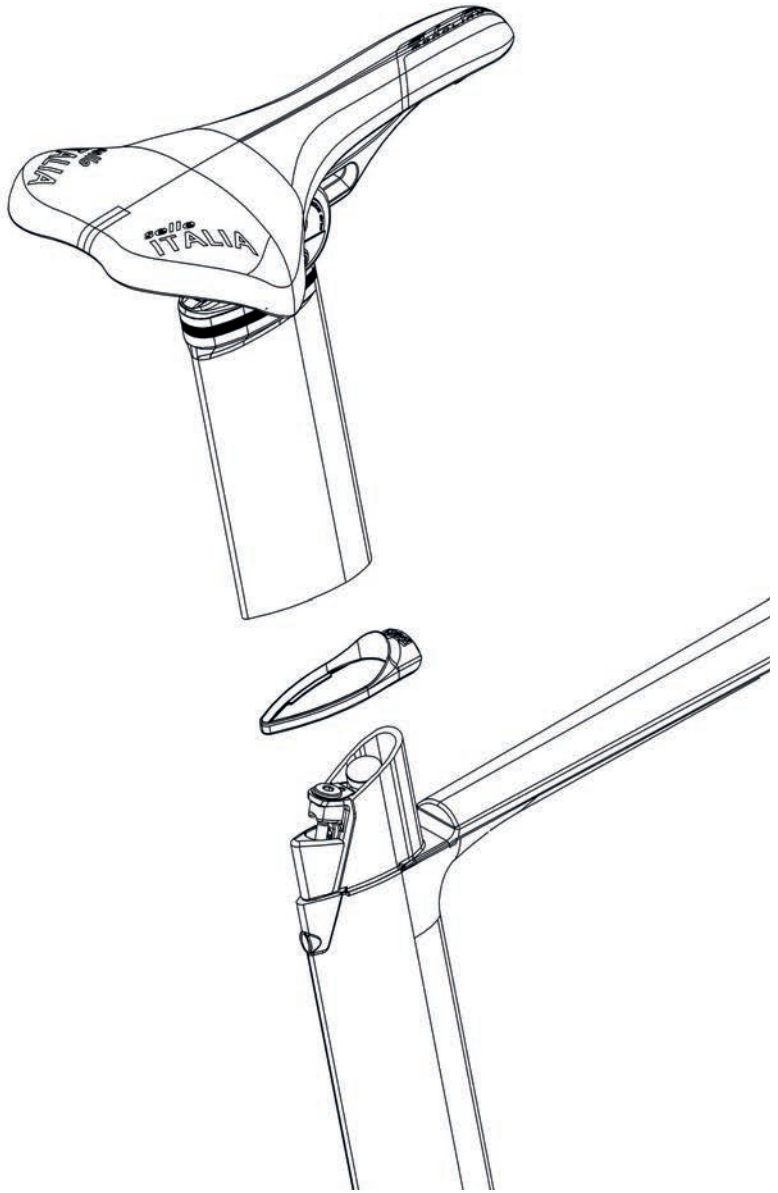
Trilobe crank lengh adjustment EP1878649, US7562891, TWI394685
Double BCD Compact 110 / Standard 130 chainrings mounting options EP1961651, US8721480, CN101249872

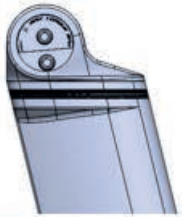
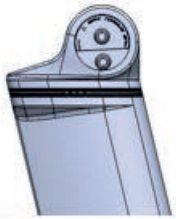
AERO SEATPOST

Depending on the seat tube head that is chosen and on your saddle height, the effective seat tube angle can vary from 73.10 to 81.1°, which answer the needs of the riders who are under the delicate UCI rules as well as the needs of the most agressively positionned triathletes.

The seat post is compatible with round and carbon rails, but also with Monolink saddles thanks to an optionnal kit.

One of the main advantage of the LOOK integrated seatpost has been maintained : the seat post sits on top of the seat tube and as a consequence can't slide inside the seat tube while riding. The bolt that secures the seat-post on the frame is hidden at the back of the seat tube, making it completely invisible to the wind. Thanks to that concept, the seatpost can be made lighter as it takes less effort to clamp it.There is also less overlap between seat post and seat tube, again making things lighter.



796 MONOBLADE - Effective range of possible seat tube angles based on saddle height					
Frame size	Saddle height (mm)	Effective seat tube angle (°)		Effective seat tube angle (°)	
		Long SP head rear	Short SP head rear	Short SP head front	Long SP head front
					
XS-S	minimum 674	73,1	75,5	78,5	81,1
L-XL	maximum 909	74	75,8	78	79,8

Saddle height adjustment is achieved by cutting the seat post at the bottom, then-tuned tuned with 1mm micro-spacers. Up to 12 of these spacers can be used, giving a 12mm range of adjustment after the seat post is cut.
The LOOK 796 is supplied with a seat post cutting guide specific to the aero shape of this frame.

Finally the seat post tube is sold separately (without any other accessory) in order to simplify the resale of the bike to a taller rider.

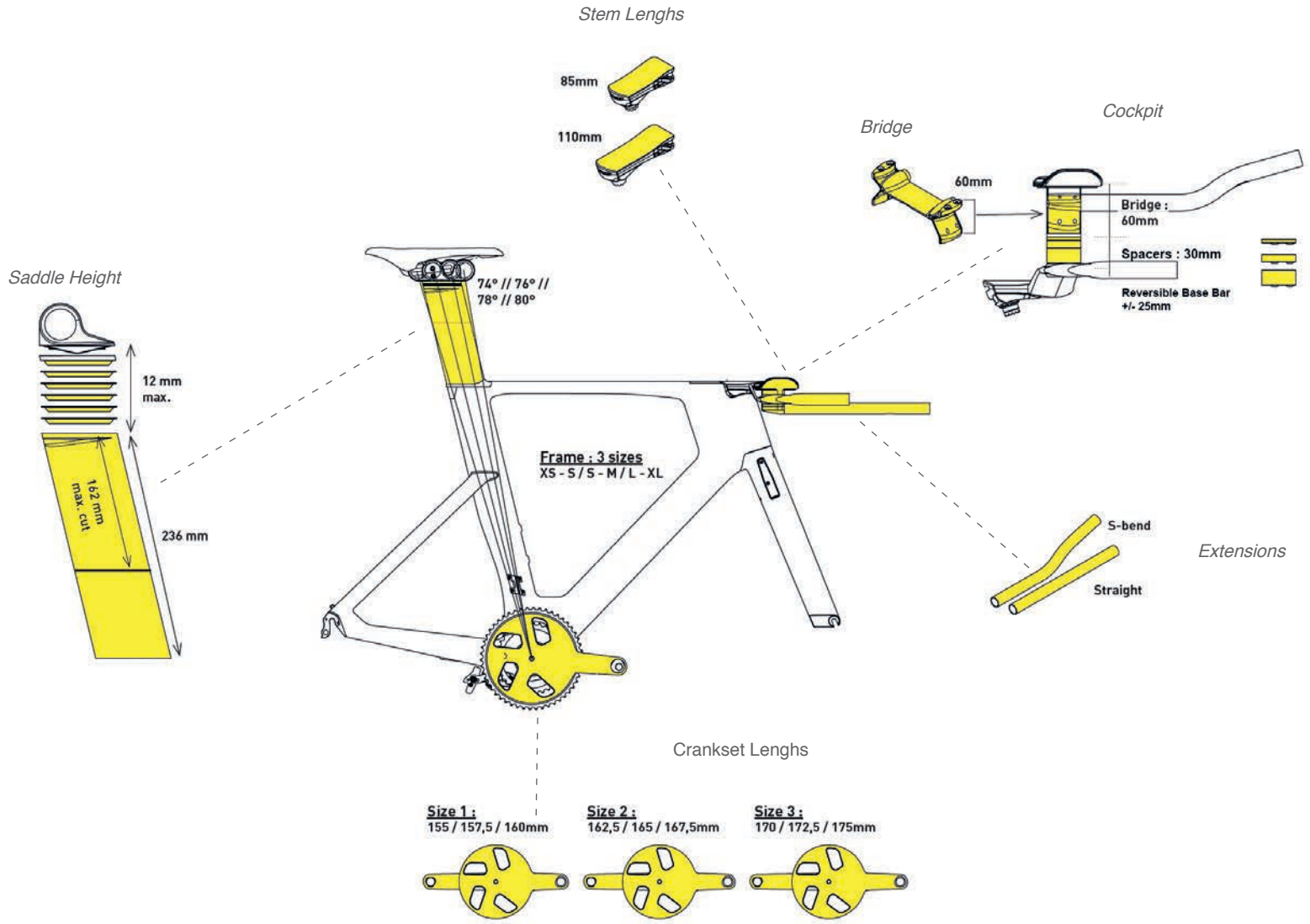
Micro Spacers (1mm)

LOOK 796 seatpost cutting guide

SEATPOST PATENT:

Clamping patent: US14/574442, TW103145285, EP14 196 820.6, FR1453533

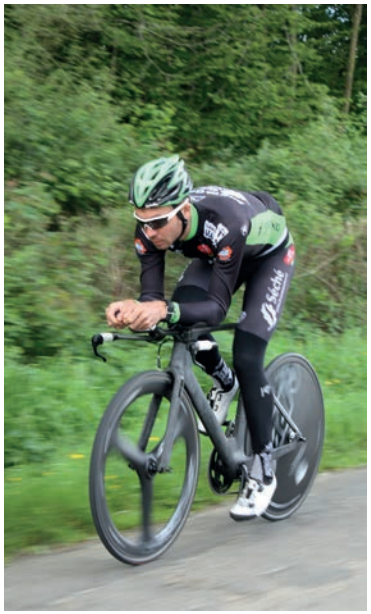
SUM-UP OF ALL
THAT CAN BE DONE ON THE 796



RIDE QUALITY
AND LOW WEIGHT

We couldn't just design the most aerodynamic bike available and be happy with it if it didn't have the road feel LOOK carbon bikes are known for. This is why from the first prototype made we started testing with professional cyclists from the Bretagne – Seché Environment Team, with our pro triathletes and also with amateurs in order to find the perfect carbon lay-ups to obtain the type of ride we were looking for. All those prototypes had the same shapes, yet they rode differently and we only stopped when all the types of riders were happy with the results.

Testing an early rideable prototype Pierre-Luc Perrichon (winter 2014/2015)*



Testing an improved prototype Pierre-Luc Perrichon during (spring 2015)*

** Bretagne-Séché Environnement Team*

Still working on cables routing at this point…

Another quality that is secondary for a time trial / triathlon bike, yet was not forgotten, is weight. Aero trumps weight in almost every situation (cf. intro) on this type of bike so we knew what the priority was, but in the end, if we could keep the weight as low as possible while being as aero as possible, then it could only make for a better ride ! Not all triathlon and time trial courses are made flat, so it's a good thing that the 796 as sold with Shimano Dura-Ace Di2 components and Mavic CXR80 wheels weighs under 8kg in size S-M.

#USER-FRIENDLINESS

EASY TO TRAVEL WITH

A common complaint about TT bikes is that they can be hard to travel with and particularly to fly with when going to races. The 796 still needs to be protected during your trips, but it is as easy as it gets to make it fit into a bike case:

- Always remove your pedals.

- Remove your wheels and rear derailleur and protect them in order to prevent damages.

- Unscrew your seatpost with the single bolt located at the back of your seat tube and pack it separately.

- Finally remove the bolts on the bottom of your stem and have the handlebar protected and maintained on the side of the frame/fork.

The 796 is very compact when packed in this way and will be easy to re-build when you arrive to your new location since you haven't lost any of your adjustments in the process (seat post is cut to length, handlebar stays adjusted).

FOR AMATEUR TEAMS : ONE 796 FOR MORE THAN ONE RIDER

The 796 is a bike that is going to work very well for teams which don't use time trials bikes very often during a season and prefer to keep as few time trial bikes with them as possible.

For riders of similar sizes, it is very easy and quick to adjust the bike by having one seat post per rider with his/her name sticked on it. To go from one rider to the next, install the rider's dedicated seatpost. If also necessary adjust crank length easily with the tri lobe insert and finally, even a quick adjustment of arm pad and extension stack are possible if needed.

STACK & REACH
796 MONOBLADE

Using the following step you will be able to easily reproduce the position you have on your current Time Trial / Triathlon bike on a 796 with its specific cockpit.
The most important coordinates on a Time Trial / Triathlon bike are arm pad stack and reach which we will calculate by taking a few measuremen,ts on your current bike. When the steps are completed and the simple calculations made, you will be able to find what is the best option to replicate your position in the 796 positionning table. This will help you choose :

1 / Frame size.

2 / To achieve desired reach: Stem lengh and pad reach position.

3 / To achieve desired stack: handlebar position + use of spacers and/or bridge if necessary.

4 / If the desired position can be achieved with multiple configurations you can make your choice based on preferences: saddle height, brake extensions stack, shorter or longer stem, etc.

HOW TO PROCEED

1 / Place your current bicycle on level ground and against a wall. The tyres must be inflated.

2 / Remove your pad foams from your arm pads, only keep the arm pad base plates.

3 / Measure the distance between the top of your arm pad base plates and the ground in millimetres (M1).

4 / Measure the distance between the center of your bottom bracket and the ground in millimetres (M2).

5 / the distance between the center of your arm pad base plates and the wall in millimetres (M3).

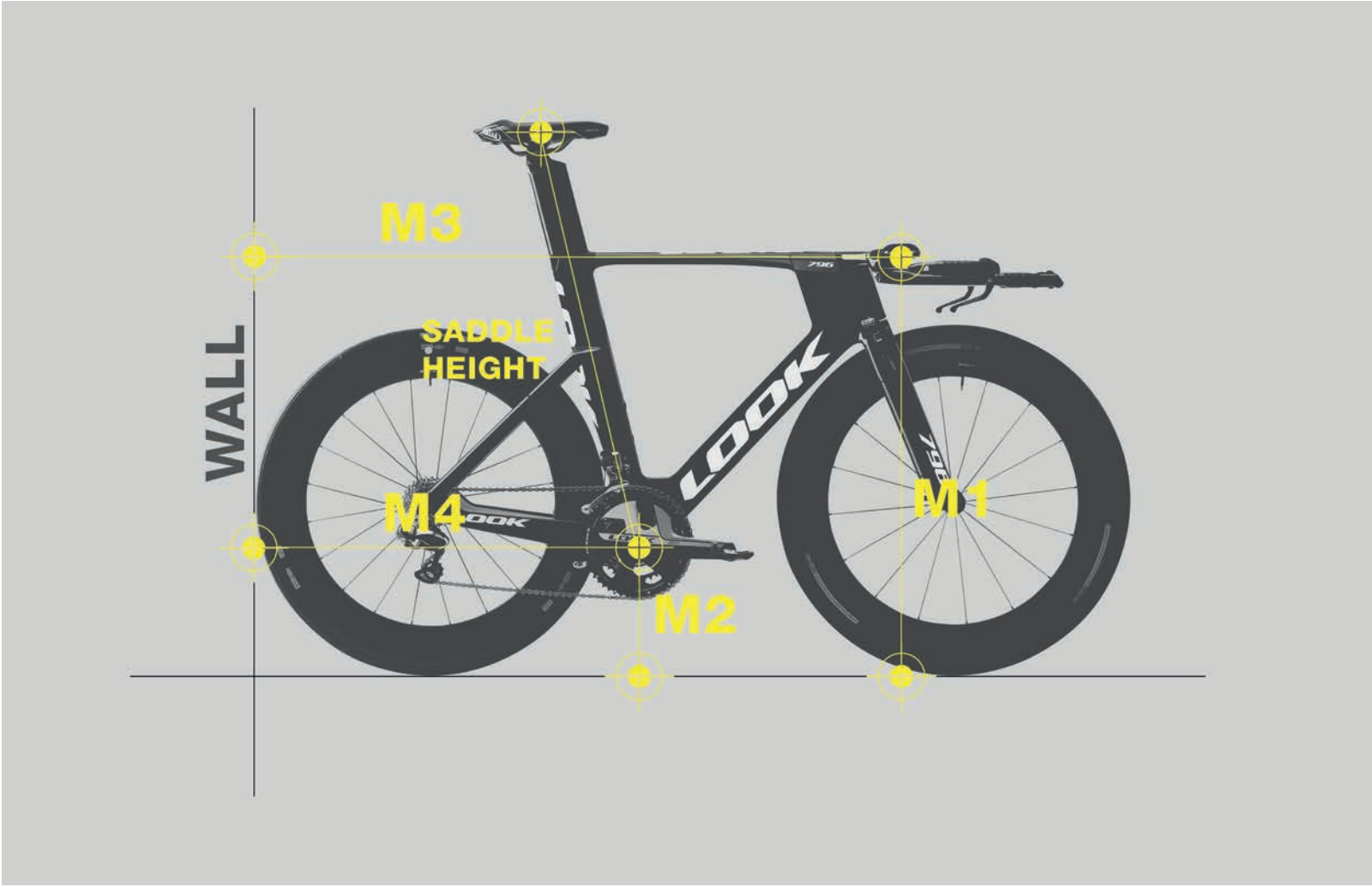
6 / Measure the distance between the center of your bottom bracket and the wall in millimetres (M4).

7 / Measure your saddle height between the center of your bottom bracket and the top of your saddle (at 80mm width on your saddle is a good average point to measure saddle height).
Refer to the diagram below to view the measurements to take.

8 / Enter the 4 measurements in the corresponding boxes.

9 / Read the results which gives the stack and reach of the arm pads, then with this information and taking into account your saddle height, refer to the following table to find which combination of frame size / stem lengh / handlebar osition / brige and spacers options is ideal to match your actual position on your bike.

ARM PAD STACK = M1 - M2
ARM PAD REACH = M3 - M4



M1: ..... **M2:** ..... **M3:** ..... **M4:** ..... **SADDLE HEIGHT:** .....

ARM PAD STACK = **M1** - **M2** = ... - ..... = ... mm

ARM PAD REACH = **M3** - **M4** = ... - ..... = ... mm

STACK	XS-S (saddle height min 674mm - max 836mm)				S-M (saddle height min 710mm - max 872mm)				L-XL (saddle height min 746mm - max 909mm)			
	Handlebar downward (brake extensions stack : 482mm)		Handlebar upward (brake extensions stack : 532mm)		Handlebar downward (brake extensions stack : 516,5mm)		Handlebar upward (brake extensions stack : 566,5mm)		Handlebar downward (brake extensions stack : 551mm)		Handlebar upward (brake extensions stack : 601mm)	
	85mm stem	110mm stem	85mm stem	110mm stem	85mm stem	110mm stem	85mm stem	110mm stem	85mm stem	110mm stem	85mm stem	110mm stem
705											494/514/534	519/539/559
700												
695												
690												
685												
680												
675												
670							467/487/507	492/512/532			494/514/534	519/539/559
665												
660												
655									494/514/534	519/539/559		
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635			440/460/480	465/485/505			467/487/507	492/512/532				
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	REACH											

Stack positions included in grey blocks are with spacers / in yellow blocks with bridge.
Reach positions are presented pads rearward/pads centered/pads forward.