



**FOIL
TECH & FACTS
REPORT**
—
WIN EVERY RIDE



SETTING A MILESTONE

Back in 2010, SCOTT introduced the Foil featuring the novel F01 Aero Technology. As an aerodynamically optimized road bike, the Foil featured truncated airfoils which are now used on most aero bikes today. SCOTT was one of the first bike manufacturers to file a patent for this specific airfoil shape. With the truncated airfoil, SCOTT's Aerodynamic Science unit intended to work around the drawbacks of UCI-regulations that give a limit of a 3:1 airfoil ratio. As a consequence of this regulation, aerodynamic tube shapes, with their traditional tear drop profile often lacked stiffness or were heavy resulting from additional material required to improve stiffness. The truncation of the airfoil solves this issue. While the aerodynamic performance of the airfoil is comparable to a traditional tear drop airfoil, stiffness and weight characteristics are substantially improved. The Foil is an aero bike to the core, maintaining impressively low weight and high stiffness values.

WIN EVERY RIDE!

Since its introduction back in 2010, heaps of races have been won on the Foil. To date (April 2015), the Foil holds 15 Grand Tour stage wins and three Classics. The Foil has been first across the finish line in 134 races at the highest level of cycling. The new Foil has been designed to win every ride! Regardless of whether you're competing, chasing a virtual segment or taking on your riding buddies in an imaginary sprint finale, the Foil is the ultimate machine for those striving to win.

108 | WORLD TOUR RACES WON

15 | GRAND TOUR STAGE WINS

3 | CLASSIC WINS





SPEED UPDATE

The new Foil features the same lightweight frame characteristics as its predecessor. With a frame weight of 945g and a fork weight of 335g (size Medium, including small parts) the new Foil is one of the lightest Aero Bikes on the market. Our World Tour riders count every gram. 6.8 kilograms is a magic number for them and despite its aerodynamic and stiff nature,

it's actually not a challenge to build the complete bike below this regulatory threshold. It took no time for the first Foil to gain a reputation for being extremely stiff and responsive with regards to power transfer and handling. In favor of our Pro riders and the customer base that prefers a stiff and responsive bike, the new Foil exhibits even higher stiffness values than its

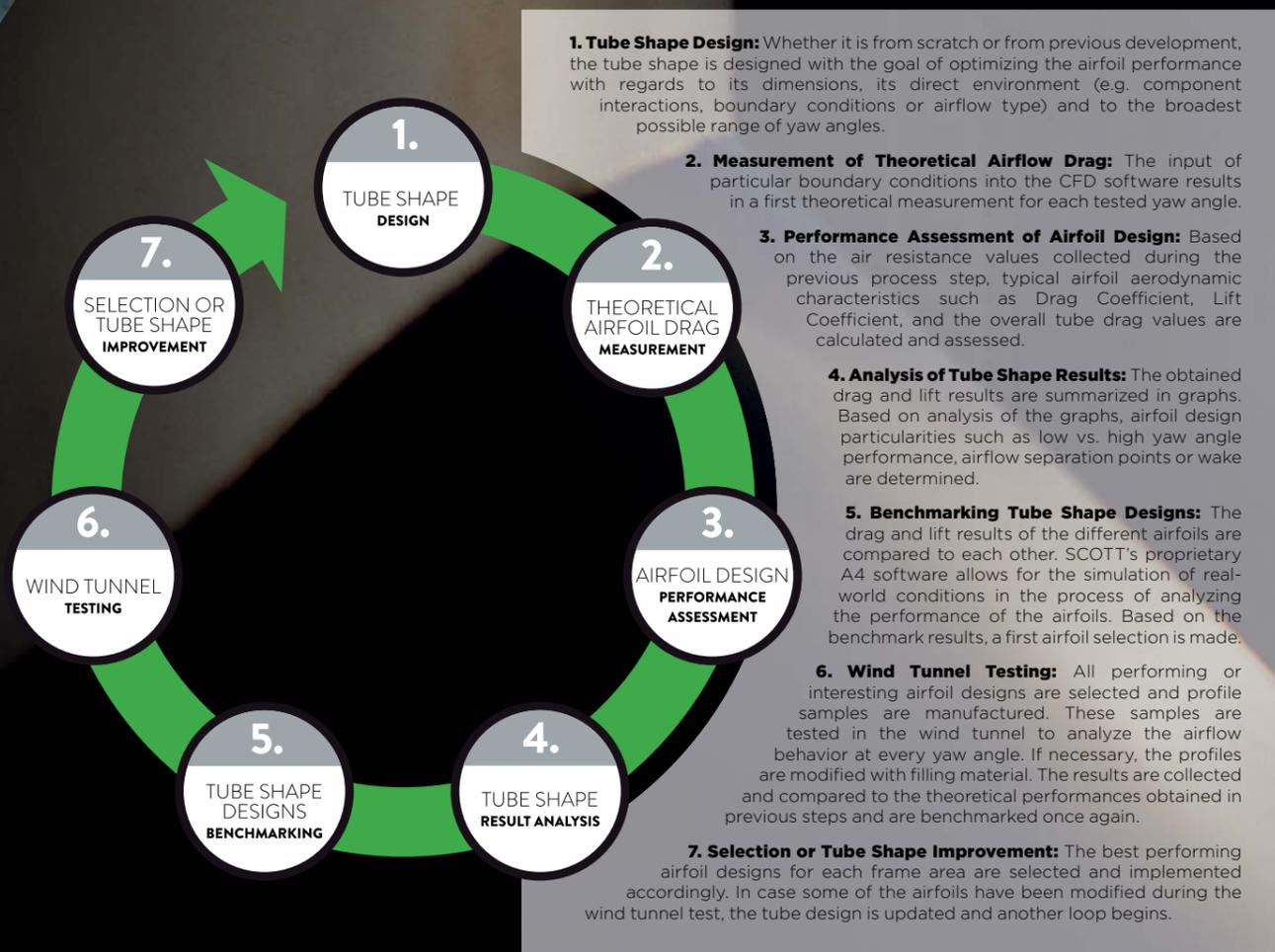
TECH AND FACTS REPORT / SCOTT / FOIL / 2016 5 predecessor. The frame aerodynamics of the bike have been reworked as a whole: all the vertical sections of the frame have been optimized independently and in conjunction with each other, component integration has been lifted to a new level and the bike features a fully integrated cockpit that saves precious watts.

Aside from the visible design enhancements with regards to aerodynamics and integration, the riding comfort of the new Foil has been elevated noticeably. The new Foil keeps the much appreciated characteristics of the original model but adds novel and innovative solutions to make it faster as a whole: It's a Speed Update!

SCOTT AERODYNAMIC SCIENCE

When the Plasma 3 project was initiated back in 2009, a team of several engineers was created that was fully dedicated to scientific research in aerodynamics along with the development of products based on the gathered findings. Over the past few years, the engineering team has spent a lot of time turning their research into class-leading products. After the successful introduction of the Plasma 3 Triathlon and Time Trial bike, the aero engineers translated their knowledge into the Foil representing a milestone in the history of aerodynamically optimized road bikes. In 2014, SCOTT introduced an all new Tri-

athlon and Time Trial line-up with the Plasma 4 and 5 models. In the same year, Sebastian Kienle won the most prestigious races in long distance Triathlon- the IM European Championships in Frankfurt and the IM World Championships in Hawaii on the Plasma 5. Matthias Brändle set a new hour record later in the year, riding on a Plasma 5 modified for the track. The new Foil constitutes the latest innovation from SCOTT's Aerodynamic Science unit and it's expected to follow in the successful footsteps of previous innovations from the SCOTT Aerodynamics Science Unit.



THE AERODYNAMIC SCIENCE UNIT



Paul Remy
Engineer

"The vertical frame sections of the Foil that are responsible for the vast majority of aerodynamic drag have been optimized aerodynamically both independently and in conjunction with each other using SCOTT's proven Aerodynamic Science process."



Benoit Grelier
Head of Engineering

"The Syncros RR1.0 Cockpit has been developed in conjunction with the new Foil. Aside from its excellent aerodynamic properties, this handlebar features state-of-the-art integration possibilities, an ergonomic shape and incredibly low weight."



Frank Oberle
Product Manager

"The new Foil combines excellent aerodynamic properties, high lateral stiffness, a compliant rear triangle and a frame weight that is among the lightest in the aero road-bike segment."



Lars Teutenberg
Tech Team Support

"The professional riders really liked the first edition of the Foil from the start. We made sure to maintain or even improve the characteristics of the first Foil that make it the ultimate race bike"



Michael Matthews
Athlete

"The Foil is what I would call a race bike to the core. It's incredibly stiff and responsive- it's fast but keeps a low weight. In a sprint final every watt and every speed gain counts- that's why the Foil is my first choice."

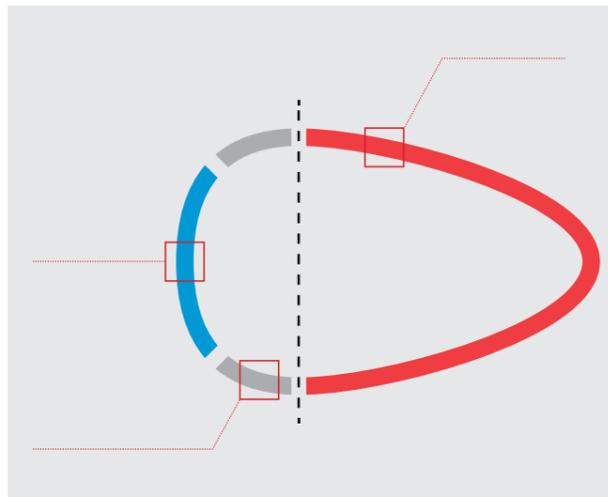


Matthias Brändle
Athlete

"While it's hard to determine how much more aerodynamic a bike has become while riding, the new Foil certainly feels much quicker. It looks built for speed."

F01 TECHNOLOGY

In the process of developing the first edition of the Foil, SCOTT patented a new airfoil design and introduced the F01 Technology. An airfoil consists of three sections that can be modified according to airflow conditions. F01 Technology defines the boundary conditions according to which the airfoil is modified. In theory, an infinite number of airfoils can be designed based on this concept. The following section explains the three crucial areas of an airfoil.



LEADING EDGE

This section of the airfoil first contacts the air. The leading edge is generally based on a 4-digit NACA profile. This type of profile offers particularly good characteristics with regards to airflow boundary conditions and tube dimensions generally encountered on a bicycle. The profile is entirely configurable thanks to equations that determine the cross-section of the airfoil. On the F01 airfoil, 10% to 60% of the NACA airfoil's front side portion is kept. The proportion of the used NACA airfoil on the F01 leading edge is also known as the Truncation Ratio. This portion represents 70% to 95% of the F01 airfoil depth.

TRAILING EDGE

This section consists of a convex shape, usually a circular-arc segment that either defines the best separation point location at high yaw angles or builds up an optimal airflow transition to components positioned behind.

TRANSITION RADIUS

This section consists of a convex shape, usually a circular-arc segment that builds a transition between the leading edge and the trailing edge. Its value has to be accurately defined and optimized because the separation point is located in this section at low yaw angles. The separation point has a direct impact on the wake and thus on the drag coefficient C_D of the airfoil. From a construction perspective this section is of great relevance. While in theory the transition between the leading and trailing edge could be an edge, this is detrimental to the material characteristics of carbon. Edges within a carbon structure should be avoided as the material loses its strength and more layers are required in order to overcome this issue, resulting in a higher weight of the construction. In order to maximize the beneficial characteristics of carbon, the F01 Technology defines a round transition radius which requires no reinforcements and adds to a lightweight structure.

AERODYNAMIC CONSTRUCTION

The vertical frame sections of the Foil which include the fork, headtube, seattube, seatstays and seatpost have been optimized aerodynamically both independently and in conjunction with each other. CFD analysis shows that at low yaw angles the front area of the frame is responsible for up to 50% of total drag. The headtube and the front-end of the bike have consequently been of major importance when frame aerodynamics were optimized.

HEADTUBE

The headtube on the new Foil features a head-to-toe aero profile with excellent aerodynamic properties especially at low yaw angles. The shape of the leading edge has been optimized with additional carbon layers in order to be as aerodynamic as possible.

The new Foil features a smooth and aerodynamically optimized integration of the fork crown. An aero profile ensures the perfect transition between the frame and the fork for maximum aerodynamic performance. In addition, the transition between the frame and fork and the connection between downtube and headtube have been lowered. These changes in construction remove the gap behind the fork crown which results in air stagnation and increased aerodynamic drag.



Superposition of the Foil 1 (blue) and Foil 2 (red): lowered seatstays and downtube avoid air stagnation.

SEATSTAYS AND FORK BLADES

The new Foil features a Shimano Direct Mount rear brake which is fitted below the bottom bracket. The lowered seatstays and the removal of the caliper brake bridge between the seatstays decreases the gap behind the seat tube and the seatstays avoiding air stagnation and consequently drag. In addition, the seatstay attachment to the downtube has been carefully designed with regard to aerodynamics in order to improve the airflow around this area of the seatstays. The airflow that

meets the fork blades and seatstays has been disturbed by the spinning wheels and in the case of the seatstays as well by the moving rider's leg. In-depth CFD analysis has shown that at low yaw angles the airflow is pushed away from the fork blades and seatstays if they exhibit a slight outward orientation. The fork blades and seatstays of the new Foil have been optimized in that regard resulting in an advantage at yaw angles between 3 and 5 degrees.



SEATPOST

As with the first model, the new Foil features a perfectly integrated seatpost clamp and a neat transition between the seat tube and the seat post to maximize aerodynamic efficiency while maintaining utility. The proprietary seat post follows the aerodynamic tube shapes of the frame and features a setback of 5mm or 20mm.



DOWNTUBE

The downtube on the new Foil features the same characteristics as on the previous model, however, the new downtube's diameter increases towards the BB. While this positively affects the BB stiffness of the new Foil, wind tunnel tests have shown that these downtube characteristics improve the aerodynamic performance compared to a straight downtube. The use of a wide down tube results in further advantages: firstly, the water bottle is hidden from airflow and secondly, the seat tube has to split less air affecting frame aerodynamics positively.



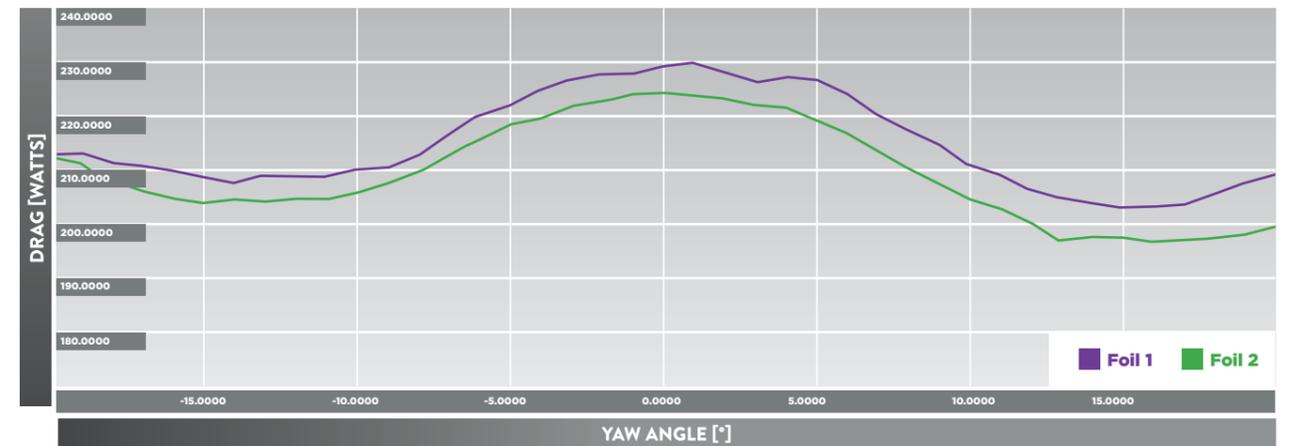
TIRE CLEARANCE

Wheel makers are going for wider, more aerodynamic rim designs and tires. Professional and recreational cyclists prefer wider tires due to advantages related to aerodynamic performance, rolling resistance and comfort. The new Foil has been optimized for 25C tires resulting in maximum aerodynamic performance in combination with drag-efficient wide rim designs..

AERODYNAMIC TEST RESULTS

The final wind tunnel test was carried out applying the testing protocols of the renowned German TOUR Magazine. A dummy with moving legs simulates real world riding conditions and ensures high testing reproducibility. The measurements were conducted at 45 km/h air and wheel speed in a full sweep

covering yaw angles from -20° to +20° with the leg dummy pedaling at 90 rpm. The test revealed that the new Foil saves 6 Watts on average over the tested yaw spectrum compared to its predecessor. This equals a gain of 27 seconds over 40 kilometers with an average speed of 45kph.



Drag Power [W] vs. Yaw Angle [°] at vapp = 45 km/h (Bike with moving legs / Shimano Dura Ace Di2 / Zipp 404 / 1 Bottle on Downtube)

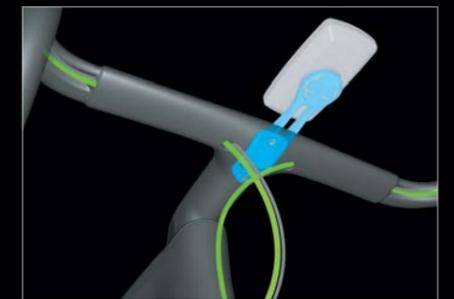
SYNCROS AERO RR1.0 COCKPIT

The all-new, fully integrated RR1.0 cockpit from Syncros was developed in conjunction with the new Foil and adds to the aerodynamic excellence of this bike. Its superior aerodynamic properties stem from its aero-optimized shape which includes an F01 profile on the horizontal part of the bar along with state-of-the-art integration possibilities. Full integration of brake cables, mechanical and electronic shifting cables and Shimano's Di2 junction box ensure a smooth transition between the cockpit and the frame, a clean look and aerodynamic cable

routing. Despite the aerodynamic bar design which even features a recess to ensure a smooth transition between the bar tape and the grippy top area of the bar where no bar tape is needed, the Syncros Aero RR1.0 Cockpit has been designed following ergonomic principles. Another major advantage of this integrated carbon cockpit is the ability to specifically tailor the performance of the carbon structure on one piece. Towards the connection with the bar, the stem flares out into a triangulated section which offers a larger contact point for

the bar to maximize rigidity and resist twisting. Removing the junction between stem and bar, in addition, increases the stiffness of the cockpit to a level that is impossible to achieve for a conventional setup. At the same time, the carbon cockpit weighs in at an impressively low 395g (42cm bar width/110mm stem length). While the bar angle is predetermined due to the one-piece cockpit construction, the engineering team has conducted an in-depth analysis of handle bar positions in order to create a neutral position. Two different mount options make

sure Garmin head units can be perfectly positioned in front of the cockpit and the rider has his data easily visible at all times. The Syncros Aero RR1.0 Cockpit is also available as an aftermarket piece. Thanks to a reducer shim it is compatible with both 1 1/4" and 1 1/8" steerers. Specific Aero Spacers have been designed for the new Foil in order to achieve a smooth transition between the stem and the frame. The Aero Spacers are available in 2mm, 5mm, 10mm and 20mm in order to fine tune the stack of the cockpit.



9 DIFFERENT COMBINATIONS AVAILABLE AS AFTERMARKET PIECES

395G

WEIGHT (AT 42CM / 110MM)

2 GARMIN MOUNT OPTIONS

INTEGRATION

CABLE INTEGRATION

The new Foil features one single entry for cables on the upside of the downtube. This solution has multiple benefits. First of all it is more aerodynamic than cable entries on the side of the head or downtube as the protrusion is not exposed to airflow due to its position behind the headtube. Additionally, this solution goes for an entry on the upside of the tube and not on the side of the structure which is important for maintaining high lateral stiffness. Furthermore, this solution requires only one opening in the frame, fewer reinforcements are needed and the added extra weight is lower compared to solutions where multiple openings are required. Lastly, a single port facilitates the use of one frame for both mechanical and electronic group sets as there is only a simple exchange of the adaptor required.



BRAKE INTEGRATION

Shimano Direct Mount brakes provide reliable braking thanks to their symmetrical dual pivot design while not compromising the aerodynamic performance of the bike. Additionally, the brakes can be unhinged quickly and easily for rapid wheel changes in races. The positioning of the rear brake below the bottom bracket offers benefits with regards to aerodynamic performance as outlined above.



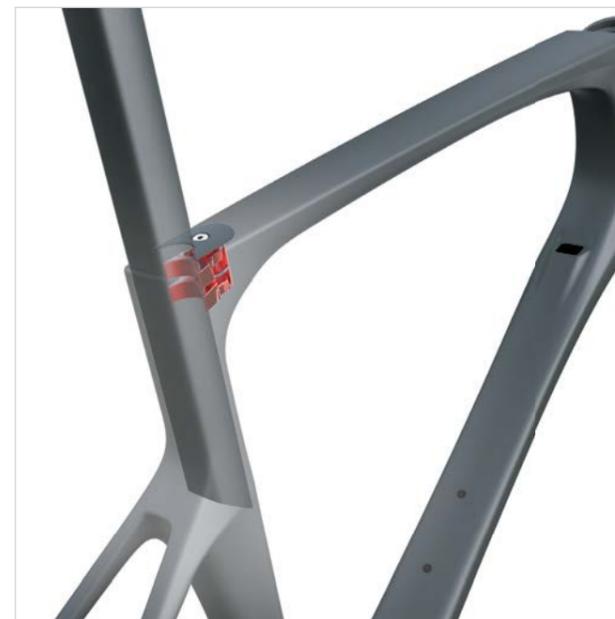
INTERNAL BATTERY MOUNT

Thanks to a proprietary adaptor, Shimano's internal battery can be mounted in the seat post and easily accessed by removing the seat post. The internal battery position adds to the high degree of integration on the new Foil.



SEAT CLAMP INTEGRATION

The removable seat clamp is located in a recess on the top tube and therefore hidden from the wind. Rips on both sides of the recess keep the seat clamp safely in place when the seat post is removed. The new seat clamp offers twice the contact surface between clamp and seatpost compared to the previous model. Consequently, fewer reinforcements are required on the seatpost due to the reduced torque needed to safely fix the seatpost. Thanks to this small detail the weight savings on the seatpost amount to 6-7g.



INTEGRATED CHAIN GUARD

The new Foil features a nicely integrated, removable chain guard.



POWER TRANSFER AND HANDLING

BB STIFFNESS

The PF86 bottom bracket allows for a wide connection of the downtube and the tapered seat tube to the BB box. Together with a stiffness-optimized lay-up and SCOTT's patented carbon manufacturing process, the BB stiffness of the new Foil has increased by 13%.



HEADTUBE STIFFNESS

The Foil achieves a perfect balance between quick and stable handling. The fork of the new Foil exhibits excellent stiffness values thanks to its tapered 1 ¼ to 1 ½ steerer tube which features an increased diameter compared to the first Foil. However, the new Foil features an identical headtube width with an increased bearing size compared to the first edition given that the alloy insert for the bearing that was used on the previous model has been removed and frees space that is used for the larger steerer. Overall, an increase of torsional headtube stiffness by 13.5% compared to the first edition of the Foil has been achieved. Additionally, the lateral fork stiffness has been increased by 6%. The one-piece Syncros cockpit in combination with the increased diameter of the tapered steerer tube and the increased bearing size make the new Foil respond directly to steering inputs and communicates clearly the condition of the road surface and how much grip is available in turns.



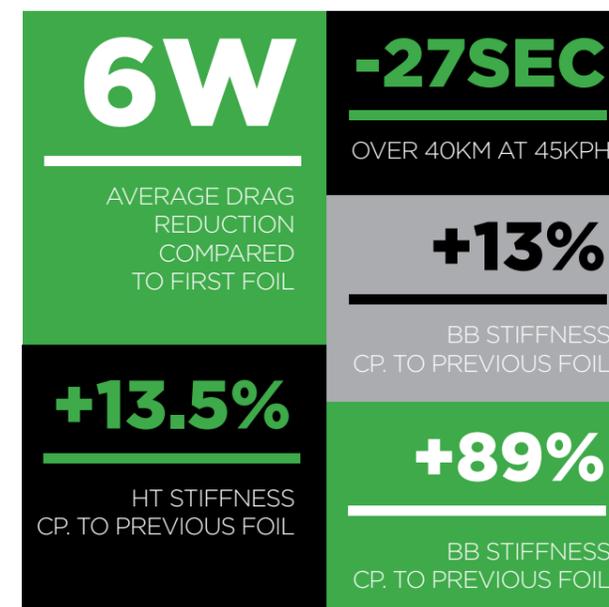
COMFORT ZONE CONSTRUCTION

While the first Foil has been praised for its direct power transfer, responsive handling, low weight and aerodynamic excellence, some riders yearned for more comfort. So we increased vertical compliance, making comfort a key point in the requirements specification of the new Foil. The new Foil features a low seatstay attachment which in combination with a modified and noticeably thin seatstay shape leads to a smooth riding experience even on rough roads. The focused approach to improve comfort on the new Foil resulted in an increase in vertical compliance by 86% of the seat tube area compared to its predecessor. Additionally, the fork compliance has been increased by 11% compared to the first edition of the Foil.



LIGHTWEIGHT IMP CONSTRUCTION

Lightweight is the shared bloodline connecting all SCOTT product segments. Early on, SCOTT invested heavily in the development of new carbon manufacturing technologies, the use of exclusive raw materials and the optimization of development processes. The continuous advancement of SCOTT's carbon expertise enables the release of stunningly lightweight products on a regular basis. The new Foil is no exception to this rule. The frame uses an HMX carbon fiber blend that has inherently excellent stiffness-to-weight characteristics. Thanks to SCOTT's proprietary IMP Technology and carbon expertise, complex frame areas can be manufactured while maintaining a low weight. The new Foil remains one of the lightest bikes in the Aero Bike segment.



SCOTT FOIL PREMIUM BIKE



FRAME FOIL HMX IMP, F01 AERO Carbon tech. Road Race geometry Replaceable Dropout STD Seattube / INT BB	FRONT DERAILLEUR Shimano Dura-Ace FD-9070 Electronic Shift System	HUB (FRONT) Zipp 404
FORK FOIL HMX 1 1/4" - 1 1/2" Carbon steerer Integrated Carbon Dropout	SHIFTERS Shimano Dura-Ace ST-9070 22 Speed Electronic Shift	HUB (REAR) Zipp 404
HEADSET Syncros Integrated	BRAKES Shimano Dura Ace BR-9010 Super SLR Dual pivot / Direct mount	CHAIN Shimano Dura-Ace CN-HG900
REAR DERAILLEUR Shimano Dura-Ace RD-9070 22 Speed Electronic	CRANKSET Shimano Dura-Ace FC-9000 Hollowtech II 52x36 T	CASSETTE Shimano Dura-Ace CS-9000 11-28 T
	BB-SET Dura Ace SM-BB92-41	SPOKES Zipp 404
	HANDLEBAR Syncros Carbon FOIL Combo	RIMS Zipp 404 Firecrest Carbon Clincher 18 Front / 24 Rear
	SEATPOST Syncros FOIL aero Carbon	TIRES Continental Grand Prix 4000 S II 700x23C
	SEAT Syncros RR1.0 Carbon	APPROX. WEIGHT 6.82 kg / 15.04 lbs

SCOTT FOIL 10 BIKE



FRAME FOIL HMF IMP, F01 AERO Carbon tech. Road Race geometry Replaceable Dropout STD Seattube / INT BB	SHIFTERS Shimano Ultegra ST-6870 22 Speed Electronic Shift	HUB (FRONT) Syncros RR2.0
FORK FOIL HMF 1 1/4" - 1 1/2" Carbon steerer Integrated Carbon Dropout	BRAKES Shimano Ultegra BR-6810 / 6810 rear Super SLR Dual pivot / Direct mount	HUB (REAR) Syncros RR2.0
HEADSET Syncros Integrated	CRANKSET Shimano Ultegra FC-6800 Hollowtech II 52x36 T Grey	CHAIN Shimano CN-HG600
REAR DERAILLEUR Shimano Ultegra RD-6870 22 Speed Electronic	BB-SET Ultegra SM-BB72-41	CASSETTE Shimano Ultegra CS-6800 11-28 T
FRONT DERAILLEUR Shimano Ultegra FD-6870 Electronic Shift System	HANDLEBAR Syncros RR2.0 Anatomic 31.8mm	SPOKES Syncros RR2.0
	HANDLEBAR STEM Syncros FOIL 11/4"	RIMS Syncros RR2.0 20 Front / 24 Rear
	SEATPOST Syncros FOIL aero Carbon	TIRES Continental Grand Sport Race Fold 700x23C
	SEAT Syncros RR2.0	APPROX. WEIGHT 7.50 kg / 16.53 lbs

SCOTT FOIL TEAM ISSUE BIKE



FRAME FOIL HMX IMP, F01 AERO Carbon tech. Road Race geometry Replaceable Dropout STD Seattube / INT BB	SHIFTERS Shimano Dura-Ace ST-9000 Dual control 22 Speed	HUB (FRONT) Zipp 60
FORK FOIL HMX 1 1/4" - 1 1/2" Carbon steerer Integrated Carbon Dropout	BRAKES Shimano Dura Ace BR-9010 / 6810 rear Super SLR Dual pivot / Direct mount	HUB (REAR) Zipp 60
HEADSET Syncros Integrated	CRANKSET Shimano Dura-Ace FC-9000 Hollowtech II 53x39 T	CHAIN Shimano Dura-Ace CN-HG900
REAR DERAILLEUR Shimano Dura-Ace RD-9000 22 Speed	BB-SET Dura Ace SM-BB92-41	CASSETTE Shimano Dura-Ace CS-9000 11-28 T
FRONT DERAILLEUR Shimano Dura-Ace FD-9000	HANDLEBAR Syncros RR1.1 Carbon Anatomic 31.8mm Oversize	SPOKES Zipp 60
	HANDLEBAR STEM Syncros Carbon FOIL 11/4"	RIMS Zipp 60 Clincher 18 Front / 24 Rear
	SEATPOST Syncros FOIL aero Carbon	TIRES Continental Grand Prix 4000 S II 700x23C
	SEAT Prologo Zero II Titanium	APPROX. WEIGHT 6.96 kg / 15.34 lbs

SCOTT FOIL 20 BIKE



FRAME FOIL HMF IMP, F01 AERO Carbon tech. Road Race geometry Replaceable Dropout STD Seattube / INT BB	SHIFTERS Shimano Ultegra ST-6800 Carbon Dual control 22 Speed	HUB (FRONT) Syncros RR2.0
FORK FOIL HMF 1 1/4" - 1 1/2" Carbon steerer Integrated Carbon Dropout	BRAKES Shimano Ultegra BR-6810 / 6810 rear Super SLR Dual pivot / Direct mount	HUB (REAR) Syncros RR2.0
HEADSET Syncros Integrated	CRANKSET Shimano Ultegra FC-6800 Hollowtech II 52x36 T Grey	CHAIN Shimano CN-HG600
REAR DERAILLEUR Shimano Ultegra RD-6800SS 22 Speed	BB-SET Ultegra SM-BB72-41	CASSETTE Shimano Ultegra CS-6800 11-28 T
FRONT DERAILLEUR Shimano Ultegra FD-6800	HANDLEBAR Syncros RR2.0 Anatomic 31.8mm	SPOKES Syncros RR2.0
	HANDLEBAR STEM Syncros FOIL 11/4"	RIMS Syncros RR2.0 20 Front / 24 Rear
	SEATPOST Syncros FOIL aero Carbon	TIRES Continental Grand Sport Race Fold 700x23C
	SEAT Syncros RR2.0	APPROX. WEIGHT 7.48 kg / 16.49 lbs

SCOTT FOIL 30 BIKE



FRAME	FOIL HMF IMP FOI AERO Carbon tech. Road Race geometry Replaceable Dropout STD Seattube / INT BB	SHIFTERS	Shimano 105 ST-5800 Dual control 22 Speed	HUB (FRONT)	Shimano WH-RS330
FORK	FOIL HMF 1 1/4" - 1 1/2" Carbon steerer Integrated Carbon Dropout	BRAKES	Tektro T531 / T541 rear Direct mount	HUB (REAR)	Shimano WH-RS330
HEADSET	Syncros Integrated	CRANKSET	Shimano FC-RS500 Compact Hyperdrive 52x36 T	CHAIN	Shimano CN-HG600
REAR DERAILEUR	Shimano 105 RD-5800-SS 22 Speed	BB-SET	Shimano BB-RS500-PB	CASSETTE	Shimano 105 CS-5800 11-28 T
FRONT DERAILEUR	Shimano 105 FD-5800	HANDLEBAR	Syncros RR2.0 Anatomic 31.8mm	SPOKES	Shimano WH-RS330
		HANDLEBAR STEM	Syncros FOIL 1 1/4"	RIMS	Shimano WH-RS330 16 Front / 20 Rear
		SEATPOST	Syncros FOIL aero Carbon	TIRES	Continental Grand Sport Race Fold 700x23C
		SEAT	Syncros RR2.0	APPROX. WEIGHT	8.06 kg / 17.77 lbs