The bike company Swi, based in Padua, northern Italy, have created an exclusive, state-of-the-art bike whose roots are in high performance and the rarefied world of high-end jewellery. *Rouleur* visits their factory to see a gold-standard bike being manufactured

A fine balance

words and photographs by
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At first glance, the intricacies of fine art jewellery design and carbon-fibre frame technology may not have a lot in common. But for Stefano Cenere, they have a world of similarities. And after spending years in his family's jewellery business, he has spent much of the past decade in pursuit of producing a unique monocoque carbon bicycle frame. But what started out as his own personal pursuit of perfection promises to make a very distinctive splash in the bicycle industry in 2024.

"All of my life has been about producing things for exclusivity. It wasn't really about the exclusivity, but I just love the idea of making something that is perfect," explains Cenere from the office of a factory just outside of Padua in northern Italy. "I have never cared about price, for example. When you are pursuing perfection, price is not a factor. And the same is with our bikes. I have always loved cycling. I have always ridden a lot and was always thinking about what would be the perfect bike. I had very specific ideas about what needed to be done. I knew, for example, that I wanted a true one-piece monocoque frame and not something glued together."

The result of Cenere's pursuit for cycling perfection is the Aequus, the flagship model of his new monocoque carbon bicycle brand, SWI.

"SWI combines the first letters of Switzerland and Italy and is the fruit of a historic link between the Lombardy region in Italy and the Ticino region of Switzerland. In the Middle Ages this region was known as Insubria," says Cenere. "But the link is still very much alive today, and our bikes are a product of the best of both areas."

The Cenere family earned their reputation working with intricate pieces of gold, noted for hollowed weight-saving links that sold for thousands and tens of thousands of dollars. But while Cenere is no longer interested in making jewellery himself, many of the industry contacts he made helped him develop his dream bike.

"I knew where to go when I was looking for the most cutting edge carbon or for developing the moulds. And a lot of that is being done in Switzerland," says Cenere. But while he may have relied heavily on Swiss technology, he also understood that his product needed real hands-on experience from cyclists. And for such input he found early support in two veteran Italian professionals, Olympic gold medalist Paolo Bettini and veteran classics rider Luca Paolini.

The key to the revolutionary SWI design is an unmatched level of carbon fibre coupled with the use of an autoclave oven, the most-air tight, high pressure oven in the field of carbon fibre.

SWI frames, forks, seatposts, integrated bars and stems all use North Thin Ply Technology (NTPT) carbon fabric. Developed and produced in Switzerland, NTPT has been used widely on sail boats competing in the America's Cup as well as the intricate chassis for Richard Mille watches, sported by cycling champions such as Mark Cavendish and Julian Alaphilippe. NTPT textiles have an exceptionally dense carbon fibre weave of up to ten ply, while the average carbon fibre fabric is often only four ply. As a result, the NTPT fabric produces a significantly higher stiffness-to-weight ratio than those found on most production bikes. The state-of-the-art carbon fabric is then enhanced within the Autoclave oven, where the monocoque frame mould is heated at six bars of pressure for six hours at 125 degrees.

"We have the mould and we drape or wrap the carbon around an internal plastic/silicon bladder," explains Cenere. "And then when the frame is finally in the mould, we wrap it in a sealed vacuum bag. And then when we put it in an autoclave oven, we compact it with no less than six bars of pressure. You see, the higher the bar of pressure, the more the carbon fibres are pressed together. An autoclave oven is essential for us. Most manufacturers don't use such an oven but that is my only way to get such high pressure that is completely airtight."

From a workroom in the corner of the Karbon Tek factory, Mariana painstakingly lays strip after strip of carbon as she prepares a frame mould. For the initial stages of production, SWI has partnered with this high-end carbon-fibre designer, specialising in producing prototype pieces for the Italian moto and automotive racing industry. Mariana has spent the past 15 years at Karbon Tek, honing her skills in carbon lamination, and Cenere quickly made her one of the sous-chefs at SWI.

Somewhere in the early afternoon she finished draping one side of the carbon mould and began the second side. But she said that even though she is halfway through preparing this mould, she still has a full day's work ahead of her. "I can do perhaps two bikes per week," she explained. "It is simply a very time-consuming process. There are no shortcuts."

At one point in the afternoon, however, she did take a break from the draping process to remove another frame mould from the autoclave oven. Along with Ali, another sous-chef, the two worked the large CNC made aluminium mould out of the oven and meticulously unwrapped and uncovered it.

"What you see here is essentially the finished product," says Cenere. "We still need to sand it down a bit to remove the excess particles of carbon from the mould and prepare it for painting and finishing. But the frame is essentially ready to be built up."

Together, the frame and fork of the Aequus weighs a slight 1.1 kilos, while the complete bike can easily be as low as 6.5 kilos, essentially as light or lighter than the most high-end bike in the Tour de France.

Cenere, however, also understands that a bike's performance is not simply a matter of weight. It is also about handling and feel.

Enter Bettini and Paolini, two of Italy's top professionals over the past 25 years. Bettini won multiple Classics, while Paolini was a Gent-Wevelgem and Omloop Het Nieuwsblad winner, and one of the most respected road captains in the peloton. Both were immediately attracted to the SWI concept, and both have been involved in the testing and production, in an effort to fine tune Cenere's design.

"I was instantly impressed by the frame that Stefano came up with," says Paolini as he oversees the daily production. "The frame was incredibly stiff, but it also has this amazing springlike capacity that I have honestly never felt before. When you attack and push down on the crank arm, it responds by catapulting you into your next stroke. I think it is one of the real advantages to the monocoque design. It is really unique."

But while Paolini was immediately impressed with the initial prototypes, he did see room for improvement. "I told Stefano that I thought we could still improve on stiffness in the headtube and bottom bracket area. As a result, we have more than doubled the layers of carbon in those areas. In the head tube we have 21 layers of UD carbon and in the bottom bracket we have 28 layers of carbon, where each layer is oriented in a different direction."

"Aequus is Latin for equilibrium, and that describes our bike perfectly. Our bike is the perfect balance between performance and comfort."

"Since our NTPT fabric is so thin and dense, we can increase the layers of carbon in certain areas of the frame without making a huge difference in weight," says Cenere. "To be honest, I think that with Paolo and Luca we have obtained the frame I dreamed of. We call this model Aequus for a reason, because Aequus is Latin for equilibrium, and that describes our bike perfectly. Our bike is the perfect balance between performance and comfort. Both Luca and Paolo understood this instantly."

Throughout our visit Cenere discusses and shows us every step of SWI's frame building process. We are told upon entering the Karbon Tek factory that we cannot photograph any of the prototypes of the motorcycle or automotive components, as they are all confidential. But with his bicycles there is a sense of what can only be described as radical transparency.

"I can be very transparent here with you because I want you to understand every step in our process," says Cenere. "Also, when you really understand the technology behind our bikes, you will understand that it simply will not be possible to mass produce these bikes. The process is simply too costly and expensive. I don't have any problem explaining and revealing every step of our process. Just our raw materials can cost up to 10 times the price of that used in a mass-produced bike. Our handlebar alone includes more than 400 Euros in raw materials."

Starting at 9,900 Euros for the frameset, that include frame with fork, handlebar and seatpost, Cenere understands that his Aequus will not be readily available on the journeyman's market. And at best, he admits that he will only be able to produce about 200 bikes per year. But for Cenere, such considerations are easily justifiable. For Cenere, it is all part of the price for perfection. ●