

Natrix Natrix
(Natrix² – a recumbent for her)
www.natrix2.com

Text by Jana Novotna:

The following contribution discusses Natrix² -Women's Recumbent Bicycle, Eva Navratilova's thesis. She designed this bicycle as the subject of her thesis to finish her Master's study at the Studio of Product Design of the School of Fine Arts in Brno. Eva Navratilova went on various fellowships abroad between secondary school and university. Also during her university studies, she went on several work placements in her home country and abroad. Besides, she regularly participates in architectural competitions. Naturally, neither the theme of her thesis, nor its title, is accidental. The title refers to the Latin name of the ring snake (Natrix Natrix), a fact that the author of this article will explain in the following text. And in terms of the theme of the thesis?

She chose this type of bicycle as the subject of her thesis because she is a passionate cyclist with a special liking for “adrenaline” sports. Her favourite word is speed, and that is the reason why she incorporated this word in the title of the written part of her thesis (Design For Speed). At the same time, this word can be applied to characterize her lifestyle.

Briefly speaking, she is enchanted by speed-related sports. She grew fond of riding a recumbent bicycle so much that she decided to tackle it as the theme of her thesis.

“Anyway, it is a theme, which I come across everyday”, she says in her thesis and goes on: “I own a bicycle myself. It is a bicycle whose parameters make it possible for me to go over the chosen distance more quickly than if I use a classical bicycle with the same parameters.”

After she had construed this unconventional bicycle, defended her thesis and finished her study, she “lay down” on her bicycle and left for Holland. Let's hope that she will come back, and the Czech Republic will not lose another promising designer.

Text by Eva Navratilova:

As a collocation, women's recumbent bicycle does not exist in fact. And the number of women, who would be attracted by this unusual means of transport, is not very high. In general, women perceive bicycles as being too technical and too dangerous for them. Bicycles often show striking colours, and together with the rider, they attract the attention of most of the passers-by whose reaction is not always flattering. So, is there a point in designing a recumbent bicycle for women? Do they want it at all? I started to doubt at the very beginning of the project.

After four years of riding this type of bicycle, my opinion is that it is the most comfortable bicycle in general. With the same efforts, I can go over longer distances, I can reach a higher speed more easily and I don't suffer from pain in my back, neck and crotch. It may be just here that the problem lies - I made a “tailor-made”, to-my-state bicycle.

An average Czech, or European woman respectively, is 167 cm tall. If I want to offer her a bicycle fit for the roads and the traffic in the Czech Republic, a bicycle with typical and affordable components and, at the same time, one that meets her requirements of comfort and aesthetics, I have to start from the very beginning. Most recumbent bicycles suitable for Czech female population are too high and too long, or their design is not suitable - they are equipped

with a non-standard 20"/ISO 406 front wheel, and they weigh between 16 and 18kg, thus being too heavy.

I immediately gave up my initial idea of sketching the frame shape on paper with a pencil. So, the recumbent bicycle became a design emerging from conditions, which were very often not homogenous. I had to bend the frame that, in consideration of the length of women's legs, the seat and the bottom bracket are not too high*, which would, on the contrary, add to the feeling of uncertainty and non-controllability of the bicycle. Therefore, carbon laminate appeared to be a right solution to the S-shaped curve of the frame. Despite the fact that carbon laminate is an expensive and not too environment-friendly material, it is very popular in bicycling since it reduces, in lot manufacture, the weight, gives the designer a lot of space to think of the shape, and - if the visibility of the fabric pattern is preserved - it creates a very strong, almost magic atmosphere, which is, in addition, very serious. Another impulse, why I decided to use lamination technology, was an offer of a Slovakia company, Comp-Let, making parts of ultra-light aircrafts. An enthusiastic director of the company welcomes students of design to realize their dreams.

To further reduce the weight of the recumbent bicycle, I designed a front-wheel drive. It is a non-traditional solution, which results in the necessity to adjust the front fork. Primarily, this solution reduced the length of chain by half. Secondary, it avoids complicated routing of the chain line to the rear wheel. So, the total weight of the bicycle in general could be reduced too. Sized 26"/ISO 559, the wheels are, besides several other advantages, typical of the territory of the Czech Republic. The Optima seat is fitted with "U-shaped elements", which enable to fix it to the frame and move it fore- and backwards. So, the single-size frame is fit for persons 162 cm -175 cm tall. The steering unit and the gear unit are made up of components, which are commonly available on the market in the Czech Republic. The practice suggested that it is advisable to fit the wheels with shorter cranks.

It sounds logical from the ergonomic point of view. However, all vertical bicycles, with the exception of those designed for children, are equipped with cranks 170 mm to 175 mm long. Natrix² has 140 mm-long cranks. They force the female rider to increase the pedalling rate, thus eliminating health risks.**

I tried to "calm down" this complex of technical details - the way the bicycle might be called too - and "consolidate" it through a fine, snake-shaped curve of the frame, through which the carbon fabric, reminiscent of a snake skin, gleams. It is a ring snake, the most frequently occurring snake in my country. The ring snake is a venomous snake, but it will never bite you.

*** The seat and bottom bracket height**

Most of all dual 26" wheels recumbent bikes have the seat height between 65 and 70 cm. As a 167 cm tall person you can not comfortably touch the land by your feet and you feel unsafe. Natrix² offers a 52 – 55 cm seat height.

The bottom bracket should not be higher than 25 cm above the seat height to avoid blood flowing out of the feet. Natrix2 has the difference 18 cm.

**** The crank length should be proportional to the inseam of the cyclist**

What is the correct crank length? Each of us has a different leg length. But the market offers mostly only 170 mm or 175 mm long cranks. This fits with leg lengths (measured inseam) between 770 and 820 mm, let's say a 167-178 cm tall person. In the case of the average European woman (167 cm tall), her inseam can be long circa from 75 to 80 cm. Therefore cranks on her bike should be 162 – 165 mm long.