

The goal: Mariana would fly in her bike



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Pictures: Research Group / Ángela Amaya

Around the bike,
University and Enterprise,
working together
to be 2016 Olympic
champion in BMX.

In 2008, in Beijing, BMX reached the maximum competition in world sport: the Olympic Games. This discipline is characterized by speed. The official website of the maximum global competition explains this sport for those who do not have closeness to the theme: "Eight riders compete in a track full of jumps, sharp turns and obstacles for 40 seconds."

Inspired by motocross, the sport was born in the late 1960s in California, United States. The BMX grows in popularity and acceptance that in 1982 the First World Championship takes place. In our country also it is growing interest in "bicicrós", as it is also known this



Bioengineering Center, under the direction of researcher John Bustamante Osorno, participated in the project with regard to the application of strain gauges for structural characterization of bicycles. It means, measuring how much the bike is deformed during actual use of the machine on a track.

sport. Its practice began in Antioquia and then spread to Bogota and Cali. Perhaps that is why Colombia has in Mariana Pajón Londoño a BMX Olympic champion and in Carlos Oquendo a BMX Olympic medalist.

It turns out that our Mariana, because she became a national hero after winning various championships, in preparation for the 2016 Olympics in Brazil, sought to HA Bicycles, GW brand owners, sponsors and who also are the frame manufacturers of the running champion.

Together we design a bank of tests for bicycle frames. HA has manufactured the machine and donated it to the UPB to strengthen the research and development projects. The PBU now has a bicycle structural characterization laboratory.

What did Mariana want?

Elite cyclists need sponsors for their bike, said Andres Hernando Valencia Escobar, a mechanical engineer, researcher of the Research Group in Design Studies at the Pontifical Bolivarian University. "For example: the wheels are given by a brand, another company manufactures the

handlebars, pedals are made by another brand; in this case, Mariana's frame is given by GW". In that context, the athlete asked the sponsor for improving this part of her bicycle.

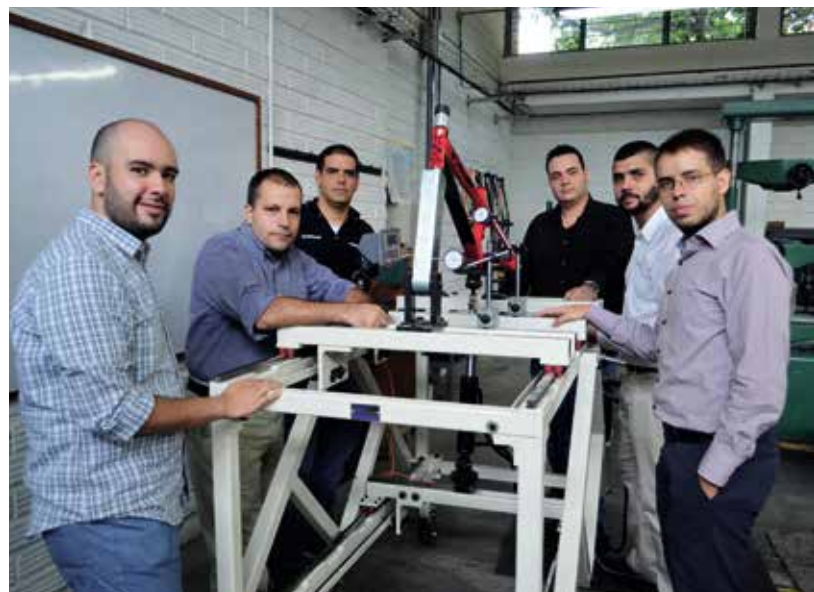
To the newly created Department of Research and Development of HA, led by the Pontifical Bolivarian University mechanical engineer, Carlos Alberto Rodríguez Álvarez, arrived Mariana Pajón with the frame concern. Thus, the Department first official project was to improve Mariana's bicycle frame to run the next Olympic Games.

Rodríguez Alvarez, without hesitation, contacted his colleague Andres Valencia in March 2015, with whom he has worked Bicycles for over five years on projects of an academic nature. "... It is the first time we conducted a research and development under these conditions. On other occasions developments were made, but not giving the scientific nature has been achieved with the support of the University," says Rodríguez A.

The bicycle

A bike is a structure based on triangles, which are made of particular material, says engineer Valencia. That is, three aspects can intervene: the tube material, its shape and the way they are joined together to form the frame.

The joint development achieved by the PBU and HA will be protected via patent.



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Andrés Hernando Valencia Escobar, Carlos Mario Oquendo, Mariana Pajón, Vincent Pelluard, Alejandro Alberto Zuleta Gil, Santiago Betancur Parra y Carlos Alberto Rodríguez Álvarez.

At the request of the athlete, the team of researchers led by Valencia and Rodríguez began with a structural related diagnostics to determine which the functional level of the frame was: the material, the shape of the tubes or structure. This phase looked a comparative analysis with the brands the other athletes use. From there they condensed the goals of the improvements and how to achieve them.

On September the 10th 2015 was introduced to the athlete the diagnostic results. The study allowed defining the design criteria for the new framework and some formal approaches. Then, it was concluded that it was necessary to design the new framework, sending to produce prototypes to China, and validate them, expressed Valencia Escobar.

The role of the athlete is crucial in this process: it is a primary source; it provides first-hand information and validates what has been studied and identified by researchers.

PBU and HA is a winning partnership that consolidates the University on the topic of bicycles. "It's very interesting when you generate knowledge and knowledge is applied. And you have to apply it for Mariana to win, and win by much and that the Company will consolidate its brand as one of the best in the world," says Andres Valencia in his interview to Universitas Scientific Journal.

HA is the only Colombian company that develops bicycles and has its own brand: GW.
"With this partnership we refine tools and knowledge to improve the bike to a global level of quality and technology."
Carlos Alberto Rodríguez, HA.

Technical sheet

Project name: Structural improvement of bicycle frames
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