



CASE STUDY /

Computer Simulations for Better and Faster-to-Market Products in Mexico's Medical Devices Industry — Bioana

“Developing medical devices is a great challenge: Ansys enables us to stay right in line with our competition and provide solutions to test and refine our new devices.”

Adriana Torres Flores

COO / Bioana SAPI de CV

Before a medical device can be implanted in a patient, testing must be done to discover the life span of the device, the best choice of material for fabrication, the stresses it must withstand, etc. With simulation, several devices can be tested simultaneously and refined in terms of material and shape to create an optimized solution.

/ Company Description

Bioana is dedicated to the design and development of medical technology. Its innovations grow from the recognition of real medical needs and the use of simulation software to create new technology in the fields of cardiology, diagnostics and orthopedics. Bioana works closely with other companies and institutions to leverage resources, machines and personal to advance medical devices in Mexico.

/ Challenges

Within the biomedical engineering field, there are many design challenges to overcome before products are deemed safe for sale. For instance, prosthesis must be designed to withstand the loads generated by body motion and weight, without failing or significant deformation. Likewise, vascular stents must supply optimal blood volumes with predetermined flow rates. Simulation is crucial to evaluate performance of these and many other medical devices.

/ Technology Used

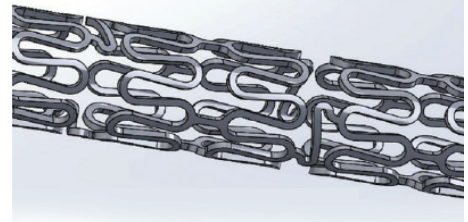
As part of its biomedical design process, Bioana employs:

- Ansys® Mechanical™
- Ansys® Explicit STR™
- Ansys® CFX®
- Ansys® Fluent®
- Ansys® Discovery SpaceClaim®

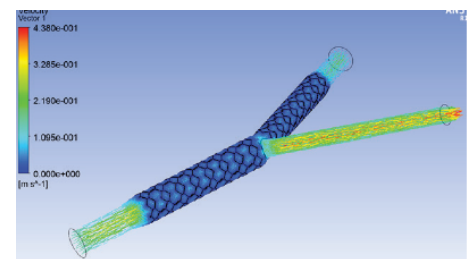
/ Engineering Solution

Ansys CFX software helps Bioana to reproduce the flow conditions of the artery blood stream and analyze the vorticity, shear stress, blood velocity and pressure generated by the vascular implant.

- Blood properties are defined using the software's modeling tools and equations, making it easy to create new materials such as biomaterials and composites.
- The static structural module offers multiple tools to establish proper boundary conditions for accurate reproduction of loads on new prosthesis designs. Interaction and contacts within the geometries and/or human body parts are also possible to build in, to create highly predictive simulation models and results.



Velocity and pressure generated by the vascular implant.



Fluid simulation of a stent deployed on a bifurcated coronary artery, which shows the velocity of the blood and stagnation of blood near the implant. Simulation is used to refine the design of a coronary bifurcated stent (patent pending).

/ Benefits

Working with Ansys offers Bioana many benefits, especially cost reduction — testing protocols have been nearly cut in half due to simulation in the early design phases. In addition, material characterization can be done completely through the software, allowing Bioana to acquire only the material from the final design iteration to manufacture its functional prototypes. And, because simulations enable simultaneous developments (up to four medical devices can be designed), Bioana's productivity has increased three-fold and revenues have jumped more than \$30,000.

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