

# Straight Talk from 3D CAD Users

Hear what designers are saying about Pro/ENGINEER®



**DID YOU KNOW**

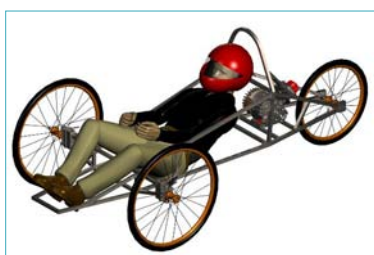
**“With the Pro/ENGINEER Manikin Extension, I was able to successfully complete a challenging student project: the design of a lightweight, eco-friendly vehicle.”**

Constantijn Romijn is in the final year of his studies at the Department of Automotive Engineering at the Hogeschool van Arnhem en Nijmegen (HAN) in the Netherlands. Mr. Romijn has been working with 3D CAD software, including both SolidWorks® and Pro/ENGINEER, for nearly one and a half years. “I personally prefer working with Pro/ENGINEER, which I learned through a part-time job working for an engineering consultant,” explains Mr. Romijn. “Through this experience, I have also had access to the Pro/ENGINEER Manikin Extension, which helped me to complete my recent semester project with great results!”

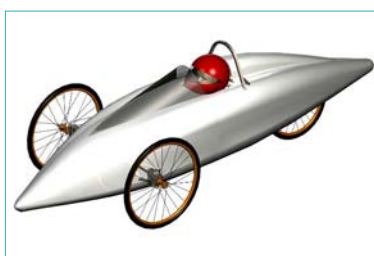
Continues Mr. Romijn: “As part of our educational program, we were challenged to build a vehicle that travels further, using less energy. Major challenges encountered at the beginning of the project were optimizing the vehicle dimensions and dealing with the rigidity of the components. Using CAD by itself, there is typically no information on the target population for which the design is made, and even less ergonomic input with the design. This information is critical when you are designing a vehicle which needs to be just big enough to accommodate one person, and also has to be as light as possible.”



Constantijn Romijn, Student  
Hogeschool van Arnhem en Nijmegen,  
Netherlands



A manikin, created using Pro/ENGINEER Manikin Extension, served as the basis of the design, and the frame and body of the vehicle were carefully designed around it.



The finished, lightweight vehicle designed by a team of automotive engineering students in the Netherlands.

## Why Pro/ENGINEER is So Effective

“Without any training, I was able to create a manikin in Pro/ENGINEER Manikin Extension. Using the tools provided by the Extension, I positioned and manipulated the manikin until it was perfect to simulate the driver task. Instead of using the Pro/ENGINEER manikin to analyze my designs, I used it to create my design—it formed the basis of the design. Carefully, I modeled my frame and body around it. These design concepts were then evaluated and optimized using Pro/ENGINEER Mechanica® and a CFD program. The result was a very light frame and a body with very low air resistance.

One interesting aspect was to use the center of gravity and the mass properties of the manikin in order to define the rigidity of the frame. The frame had to be strong enough to support the manikin weight distributed inside the vehicle. At first, I did not trust the information and built the frame bigger. After validation tests with other applications and a physical mockup, I realized that the structure was too big and reduced the size of the structure to match the initial information provided by Pro/ENGINEER Manikin. If I had trusted my manikin right away, I could have saved a lot of time in my design process!

At the end, I used Pro/ENGINEER Manikin again to analyze other ergonomic aspects of the design. One great opportunity was the possibility to gain a driver’s perspective of my vehicle. With this, I could see what the manikin could see and adjust the design (fuselage and the canopy) accordingly.”