

GO WITH THE FLOW



Innovative Pool-Cleaner Motor Developed In Half The Time With Additive Manufacturing

“It would have been impossible to design a machine of this complexity and originality without the capability to quickly build prototypes.”

— Henk van der Meijden, Henk and I

Zodiac Pool Systems in San Diego, California, is a global leader in swimming pool products, including automated pool cleaners that travel around the pool powered by the filtration pump. The company recently set out to design a pool cleaner with a low-speed, high-torque motor that reduces the number of moving parts and potential for failure by eliminating the need for a reduction gear box. This type of motor would also operate well at lower flow rates provided by energy-saving filter pumps.

Henk van der Meijden of industrial design firm Henk and I in Johannesburg, South Africa, worked with Zodiac to design the new pool cleaner. “Our goal in this project was to go beyond the boundaries of traditional automated pool cleaner design,” van der Meijden said. “So it was critical at every stage of the design process to produce physical prototypes that we could see and touch and test to get the feedback we needed to ensure we were moving in the right direction.”

Henk and I’s first task was the innovation and refinement of a unique low-RPM motor. The large impeller blades swivel 90 degrees so the entire incoming flow bears on the blade much like a piston. This design inherently provides high torque and low speed.

“Without having the ability to make highly detailed physical prototypes it would have been much more difficult to develop such a completely different motor,” van der Meijden said. In the past, the firm relied on a service bureau for rapid prototypes, with a lead time of up to 10 days. By the time engineers received the parts, they were often obsolete because they had moved in another direction. To work efficiently in the highly iterative process needed for this new motor, Henk and I required an onsite machine that could keep pace with its engineers’ ideas.

Russell Oosterlaak of 3D Solids, a Stratasys reseller in Johannesburg, worked with van der Meijden to help select the right 3D printer. “Henk and I has mostly office space so it needs a 3D printer that is clean and quiet to fit right into their office environment,” Oosterlaak said. “They also need to make tough parts that can be assembled and used for functional testing. The Dimension 3D Printer addressed these challenges at a very affordable price.”

“The Dimension 3D printer gives us the ability to produce parts throughout the entire design process,” van der Meijden said. “We have the machine continuously busy and can produce most parts in a single day or overnight on the machine. As we developed the concept for the machine we built FDM parts to fully understand the design and communicate our ideas. Besides functional models, we also built aesthetic models and shared them with marketing to help them choose a design look. Later in the design process, we built the parts for a complete assembly and put everything together to see how it worked.” Finally, when the design was ready, 30 working prototypes were built and sent to sites around the world for functional testing.

“It would have been impossible to design a machine of this complexity and originality without the internal capability to quickly build prototypes at key points during the design process,” van der Meijden concluded. “If we had to rely on a service bureau, we would have spent much of the development process waiting for prototypes. By using our own in-house 3D printer, we were able to complete the design process in about half the time.”



Zodiac's MX 8 pool cleaner works on a motor that has few moving parts, reducing potential failure. Working FDM prototypes (above and bottom) helped design firm Henk and I develop the motor iteratively.



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