3D Printing set to support SISSA's research needs

IMAGE: • Fabrizio Manzino, Erik Zorzin and Marco Gigante with the "products" of the 3D printer (Credits: SISSA).

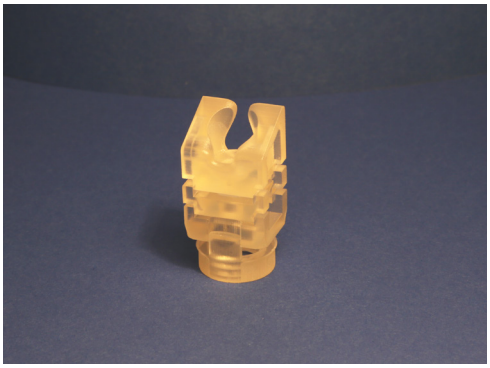
The arrival of a new 3D printer from 3D Systems marks the start of a "mechatronic" age at SISSA, the International School for Advanced Studies based in Trieste, Italy. The School is focused on conducting leading-edge scientific research and educating post-graduate students in new research programs.

The new laboratory being set up using 3D printers from 3D Systems will enable SISSA researchers to be increasingly self-sufficient in designing and constructing experiments, and building specialized machinery needed for their studies. With this sophisticated equipment, including a new-generation ProJet 3510 multi-jet 3D printer, and the laboratory's expertise, scientists will no longer have to adapt their research to the constraints of existing technology but will be able to work more creatively, developing technology that fits their needs better. "We have the opportunity for virtually endless creative possibilities," comments Marco Gigante, the engineer in charge of 3D design at SISSA's new Mechatronics Laboratory.

> *"We are excited by the vision of SISSA as they realize that 3D printing delivers the flexibility they need to go further in their research than ever before," said Alessandro Favaro, owner and co-founder of 3DZ Treviso Srl.*

The laboratory, headed by Mathew Diamond, a neuroscientist and coordinator of the Neuroscience Area of SISSA in Trieste, combines the fields of mechanics, electronics and informatics and supports all the research projects carried out within SISSA, a virtually unique center among Italian scientific research institutions. "Many experiments conducted by our research scientists rely on experimental setups that are designed in great detail and controlled electronically with extreme precision," explains Fabrizio Manzino, in charge of the laboratory's software development. "The research scientists come to us and we work together on the experimental setup until we're ready to construct the machinery in all its parts."

And, as of today, this activity will be even more creative: "This new machine prints at a high resolution – 16 microns – and allows us to develop highly complex objects and single-build assemblies, even with moving parts inside - something that cannot be done with traditional production methods", explains Erik Zorzin, in charge of electronics.



Before the arrival of the ProJet 3510, the process of crafting the mechanical parts was very complicated "and costly," adds Manzino. "We had to make somewhat imprecise molds and work by approximation. Often we couldn't build the object all in one piece, but we had to model the single parts and then assemble them."

The laboratory is equipped with other key machine tools, for example a Computer Numerical Control milling machine (CNC) to create electronic circuits necessary for controlling the mechatronic devices, and for cutting other metallic objects.

Also fundamental for the laboratory's work is software development, crucial both for designing (CAD/CAM) and for controlling the performance of the experimental setups. "The new laboratory, to which new machines will be gradually added, opens up important possibilities for research at SISSA. In the past we had to adapt experiments to the existing technology, whereas now we can adapt the technology to the experiments, and therefore to the needs of the research", explains Zorzin.

SISSA will also offer training courses on the specific software programs that are used in this type of activity: "We have the LabVIEW Academy certification, and we are among the few, around ten, who have it in Italy", explains Manzino.

Among the creative research projects on the laboratory's agenda is a collaboration with the newly set-up SAMBA (Sensing and Moving Bio-inspired Artifacts) laboratory of SISSA. SAMBA will host a number of projects, including the construction of tiny robots capable of moving in aquatic environments. The miniature aquatic robots are an implementation of the studies conducted by Antonio DeSimone and his team. So far, DeSimone's bio-inspired microrobots (which imitate the motion of unicellular aquatic organisms) only exist in a virtual form (as a computer simulation), but they will soon become a tangible reality.

The ProJet 3510 was supplied and installed by 3DZ Rapid Prototyping, Italian reseller with 5 offices across the country.

"We are excited by the vision of SISSA as they realize that 3D printing delivers the flexibility they need to go further in their research than ever before," said Alessandro Favaro, owner and co-founder of 3DZ Treviso Srl. "3D Systems' technologies are the only option when customers need serious industrial solutions for their work."

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