Mockup and scale models

How to produce your scale models with Rapid Prototyping

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Introduction

To participate in celebrations or fairs in which show large systems or products (i.e. large aircraft) often our customers decide to build or the maquette mockup, that is the scale representations of the object in question.

Whether we talk about a 500mm or a 5000mm element we can always rely on the combination of rapid prototyping technologies to achieve the best possible result in functional and aesthetic terms. It is a mix of work because each component is studied in its structural and aesthetic functions by our technical department who chooses the best solution to offer our clients.

As you will see in the following pages we can get a scale model of a highway bridge by using stereolithography, CNC machining and finally painting the various components. To make this possible it is necessary that each component of the model is designed in 3D CAD file compatible with Additive Manufacturing or with CNC machining.

Often, this task is left to our mechanical design team both for the geometry optimization, both in the case in which it is necessary to completely develop the model.

Our projects are always covered by NDA so we will show you only those in which we have received the approval from the customer

Specification collection

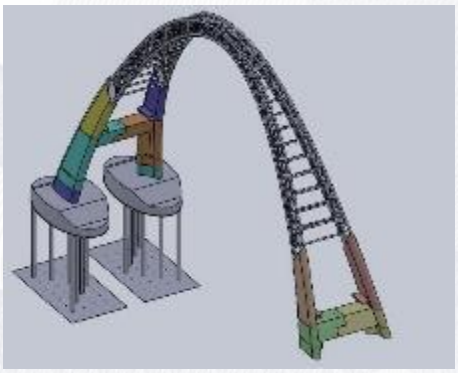
The starting point is always the sharing of the project with the customer. It is essential to share all the details about the model, dimensions, what functions and movements it should have, where the model should be installed and anything else that is useful for the realization.

The collection of specifications is essential for:

- choose the production processes and materials most suitable for making the model.
- Have a clear picture of the complexity of the project Define production times
- Define the costs of the project

Usually in these projects the variables are very numerous.

This is why it is very important to rely on a company with proven experience in order to prevent difficulties and unforeseen events that could compromise the realization of the model both in terms of delivery times and project costs.



Materials, production process, finishing and packaging

Once the specifications have been collected, it is necessary to choose the production processes.

As mentioned in the introduction, a 3D model in scale is always the result of a combination of different technologies to obtain the best possible result in aesthetic and functional terms.

For the more aesthetic parts stereolithography is the most suitable technology, while nylon sintering or MJF technology are the most suitable for functional parts.

Often we make components through mechanical processing in ureol or aluminum to guarantee the sealing areas and to make the parts with a rather simple geometry.

We also use laser cutting and plexiglass processing especially for the support bases.

All the pieces can be subjected to surface finishes such as painting, chrome plating or screen printing.

If necessary, we also take care of the packaging suitable for transporting the mock-up or box for desk models

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The 3D files

The next step to the choice of materials, production processes, finishes and packaging is the definition of the 3D files of the components.

The customer typically provides a 1: 1 scale product assembly file. To produce the scale model, our designer breaks down the assembly and modifies the individual files to make them suitable for the chosen production process. For this reason it is essential that he has a clear understanding of the specifications collected in the previous step.

The main activities that need to be carried out are

- Scale the file from actual size to required size
- During this operation the details could become very small so it is necessary to define them in order to make them visible without losing the overall proportions
- Adapt the thicknesses or insert ribs to make the model stable according to the production process
- Optimize the file for subsequent assembly steps
- Define the functional details of any kinematics
- Design the base or support system for the model
- Conceive and design the packaging suitable for transporting the model on a wooden or metal crate
- Design the packaging for the counter models

Our portfolio

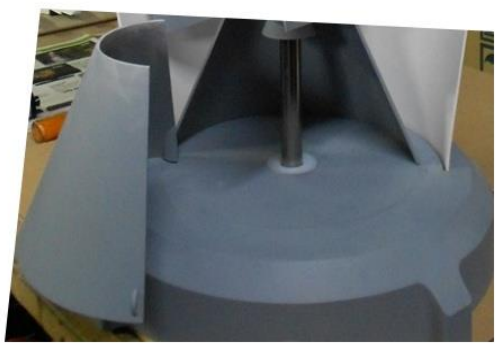
Many projects were not presented because they are covered by a Non Disclosure Agreement (NDA)

USV3 scale missile

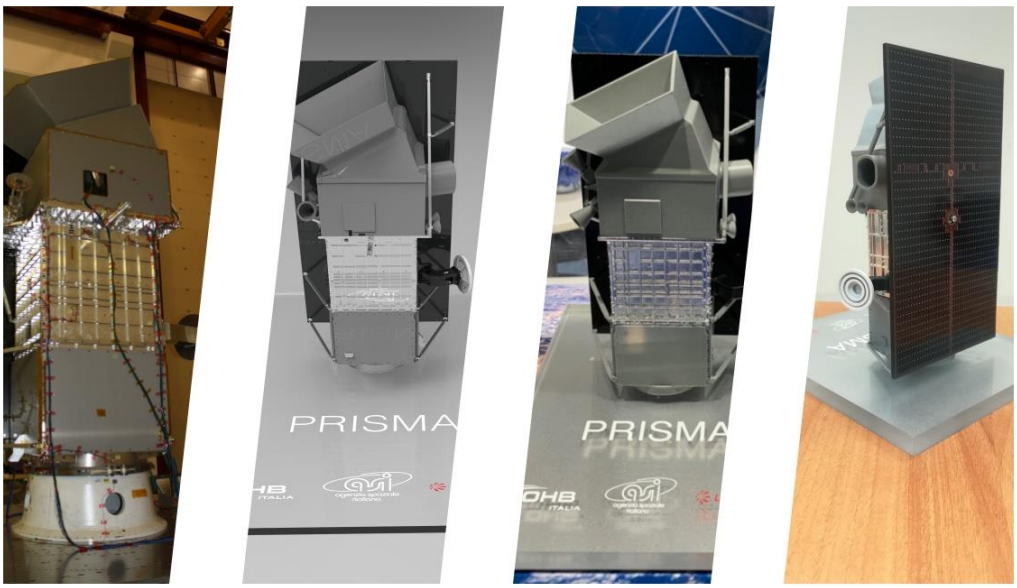
We followed this interesting project on behalf of "Cira Italian Aerospace Research Centre» to make the mock-up of USV3 vehicle in scale 1:7.

The customer furnished us the 3D file, then entrusted to us the choice of the best rapid prototyping technologies to use to make the perfect model for a trade fair.

We also made desk models with their customized packaging.



PRISMA Satellite



On this project, the request was to make 1:18 scale models

We advised the customer to use stereolithography to reproduce the central body and this master was used for the faithful reproduction of the other models. The prototype was refined with subsequent work to make the model similar to the real satellite.

A truly excellent result with attention to the smallest details, from the co-design phases for the resizing of the original model files, to the production of the prototypes, to the aesthetic finishes up to the transparent PMMA base designed for housing the prototype and the screen printing of the logo of partners.

Antenna for naval platforms

This model was made using rapid prototyping, milling and laser cutting technologies.

The gray areas were made in ureol and subsequently painted.

The transparent parts in stereolithography.

The base specially designed to support the model was produced by laser cutting in plexiglass.

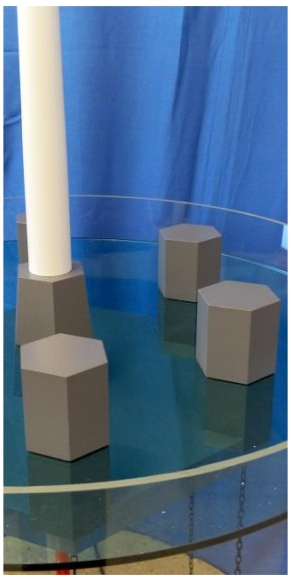
Off-shore system model

The mockup pictured is a floating platform for wind generation in 1:50 scale.

The customer has provided us with the 3D executive files and we agreed together production technologies and surfaces finishes.

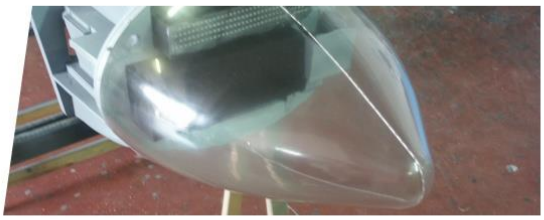
Most of the model was created through mechanical CNC machining of aluminum, obviously painted to get the accurate finish to the real model.

The cylinder had a bluish color to emphasize the ideal positioning of the platform at sea.



Missile model

The scale model of this missile was realized of course using a mix of rapid prototyping technologies. The supporting internal structure is obtained by machining sheets of PA. Even the maquette of the internal components (the parallelepipeds you can see through the transparent parts) are made in Ureol and also realized by CNC machining.
The exterior panels are instead of Stereolithography (painted after production) and also the transparent parts are made by stereolithography. Although not visible from the image above in the building there are some gold contacts that mimic antennas real ones, these has been realized by stereolithography then painted in gold.
Finally logos have been applied using transparent adhesive, molded according to our specifications.

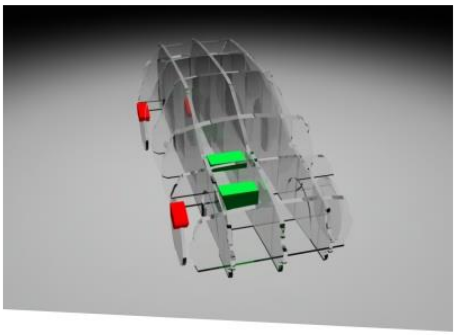


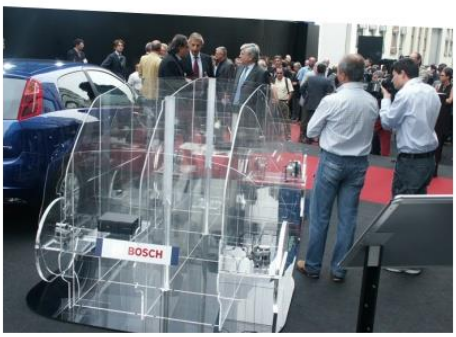
Car model for Bosch components

For Bosch we have designed a model of the new big point made of plexiglass.

The model was designed and built in 1: 1 scale and the choice of transparency was not random but specifically designed to make visible the Bosch components inside the car.

The maquette was used for a trade fair event.



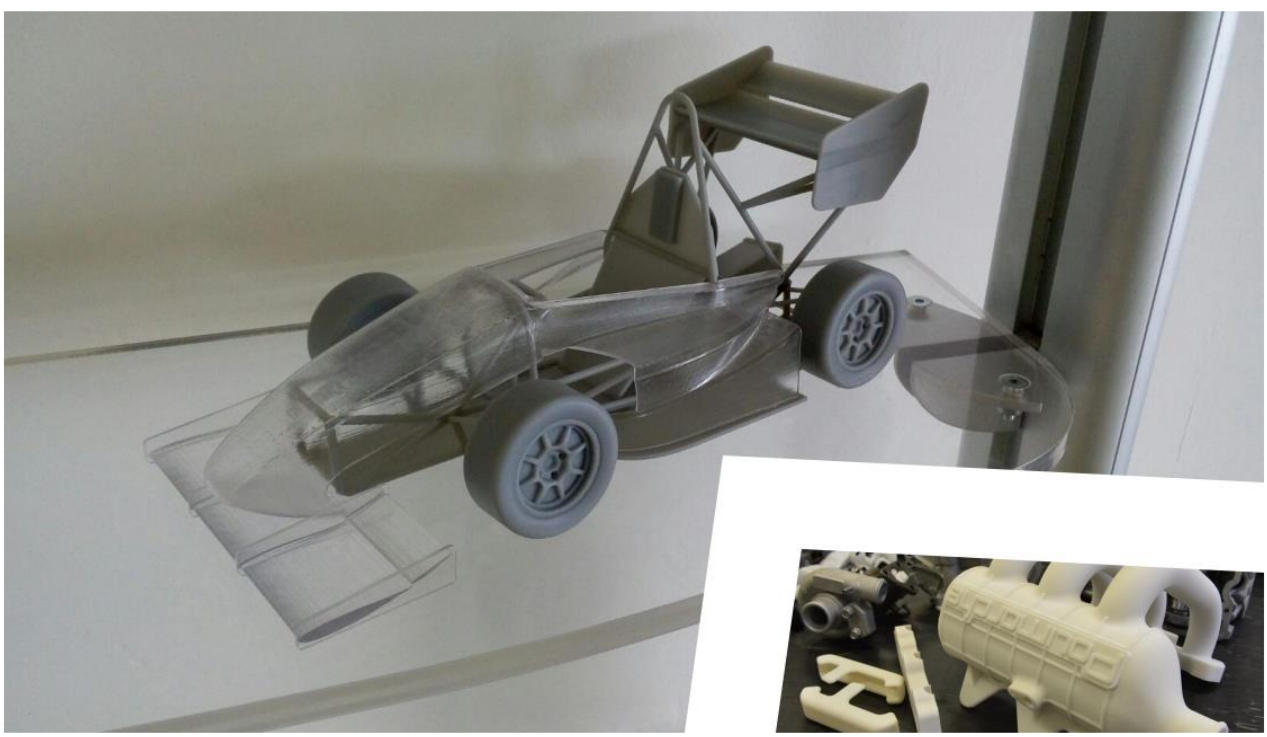


Racing car model

The collaboration with the guys from the Polimarche Racing team of the Polytechnic University of Marche was born in 2015, the year in which we married and shared their bet to create a new car for racing.

The goal was to verify that critical engine components were compatible with the production of additive technologies such as the sintering of glass-filled PA powders. The tests gave immediate positive results.

At the same time we created a scale model of the vehicle in stereolithography for dissemination and marketing purposes.



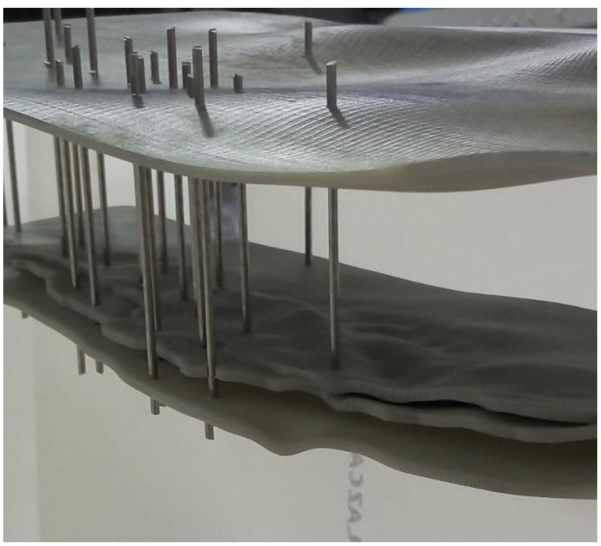
Oil field model

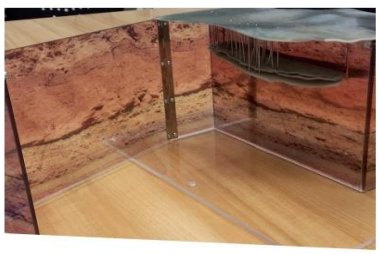
The objective of this project was to create a 3D model of a oil field for an experience of knowledge "view & touch" and to spread greater transparency and awareness on the environmental impacts of drilling projects.

Our client used the data of the subsurface scans to get 3D shapes of the underground elements (ground water, reservoir, rocks) and realize them by stereolithography because of the ease of finishing the resin surface.

To create the environment suitable and facilitate the understanding of the model the box was made of plexiglass decorated with adhesive prints and walls can be folded to make it easily transportable.

All internal components and top models of vessels and platforms have been realized in stereolithography then painted according to the needs of the chart pattern.

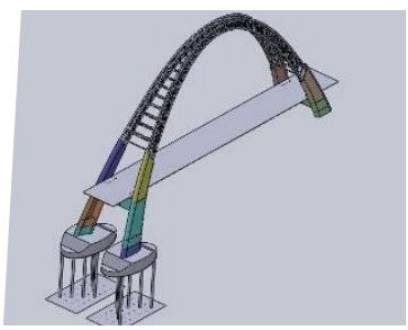




Bridge scale model

To study the impact of a bridge over the Panaro river, Autostrade Centro Padane turned to us to engineer the mockup in 1:50 scale to be created through a mix of rapid prototyping technologies and milling processes.

The first task performed by our team was therefore to design the 3D model of the bridge, bases, pillars and arches in CAD and choose the most suitable technologies for their construction and final seal at the time of testing.



Bridge scale model

Designer and head of mechanical processing have agreed to make the details with two technologies: CNC machining for bases, pillars and side arches, stereolithography for the upper arches.

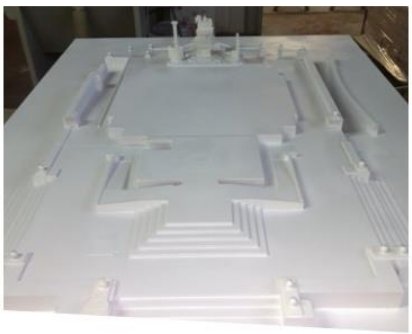
The choice was weighted on the basis of the weight that the individual parts were required to bear and the external stresses due to the final test… in water!

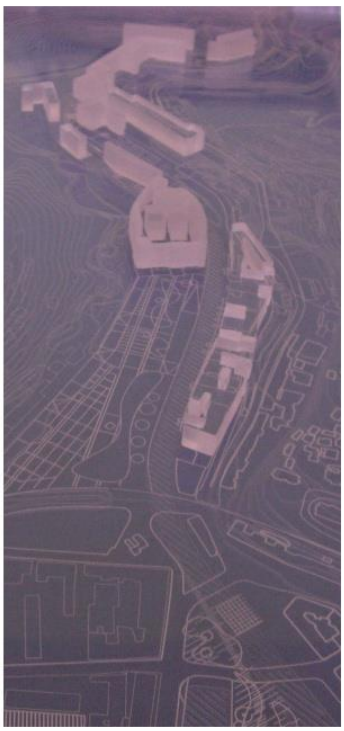
Architectural models

Also in the architectural field often rapid prototyping can be a valid support to quickly produce your project. As always, it is necessary to have 3D files of the parts to be created and to choose the technology that best suits the individual project,

In the photo project, the base was made of ureol by CNC machining and the church in nylon sintering (SLS),

For the transparent plastic, the base was made in laser cutting and the raised houses in transparent stereolithography (SLA),

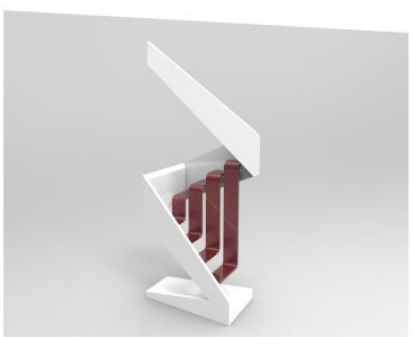




Special awards

An original and technological way to design a special prize totally customized from the idea to production through rapid prototyping.

This is the common thread of the projects that you will find below, all prizes conceived and produced in the logic of product design and made in additive manufacturing.



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