



# SCALABILITY:

## On-Demand Manufacturing with 3D Printing



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### OVERVIEW

The Poppy ecosystem, was developed by the FLOWERS team at the French lab INRIA and later transferred in 2018 to the association Poppy Station. Initially a research project, the Poppy Project has now become a community-centered robotics project, easily accessible across multidisciplinary communities such as researchers, teachers, artists, and robotic enthusiasts who can share their ideas and progress.

The Poppy project features 3 different experimentation robots, Poppy Humanoid robot (flagship robot), Poppy Torso robot, and Poppy Ergo Jr. robot which are distributed by Generation Robots. All three robots have been designed to be lightweight, easy to use, and versatile. They feature open-source hardware and software, allowing anyone to develop variations for diverse needs.

The most popular robot, Poppy Humanoid, is comprised of 33 different 3D printed components which can be customized per the client's needs. With an ever-evolving robot like Poppy, Generation Robots needed an adapted solution to meet the personalized needs of customers.

### CHALLENGES

1. The production of Poppy Humanoid kit with its 33 diverse components
2. Responding to end-customer orders with on-demand manufacturing

## Génération ROBOTS

Generation Robots, a french company based in Merignac, was founded in 2008 by Jerome Laplace. Challenged with finding spare parts for his robots, Mr. Laplace was driven to start his own company for the distribution of robots and their electronic components. Generation Robots was born and distributes robots throughout Europe and the world.

Generation Robots with its high quality and excellent service provides services to more than 3,000 educational institutions in Europe, as well as fablabs, media centers, and research institutes.

[Generation Robots](https://www.generationrobots.com)

“ 3D printing is an opportunity to easily reproduce the structure of a robot. More and more robots are being produced thanks to 3D printing. Additive manufacturing is a long-term trend for the robotic market, just as it is for aeronautic and automobile businesses ”

- **JÉRÔME LAPLACE** Director, **Generation Robots**

## Powder bed Industrial 3D Printing

Poppy Humanoid's biologically inspired frame comprises 33 unique parts. Rather than relying on costly and time-consuming injection molding, Generation Robots turns to additive manufacturing for its flexible production allowing for all of Poppy's parts to be printed together in the same batch. Producing all parts in one batch saves time and reduces the overall cost. Unlike common desktop printers which can only print parts on a 2D build plate, powder bed industrial 3D printing allows for parts to be stacked in a 3D build volume; meaning more parts can be manufactured at the same time.

Generation Robots chose the Selective Laser Sintering technology and Nylon PA12 material to produce Poppy's lightweight frame. This allows for Poppy to be printed without support structures and with an optimized, lightweight design. The 85cm Poppy frame weighs only 3.5kg while able to withstand the bumps and bruises of being a robot.

## On-demand Production:

Rather than maintaining an inventory of Poppy robots, Generation Robots relies on on-demand manufacturing to fulfill customer orders. They keep a digital inventory of all of Poppy's open-source components allowing them to order several of Poppy's parts with the existing STL files when they need them. Not only do they save on inventory costs, since the Poppy robot is constantly evolving, on-demand production also eliminates issues of damaged components and obsolescence as the project continues to evolve.

On-demand production also allows Generation Robots to be reactive to customers unique requests, to produce the robot in different colors and with different finishing options for different components. Using 3D printing technology, Generation Robots can produce parts with multiple finishings for different complex parts, simultaneously.

When an order is received by Generation Robots, they're able to quickly order a set of Poppy's parts from their digital inventory on Sculpteo's online platform. With this digital ordering system, Generation Robots is able to respond to customer orders more quickly and receive their parts within days of ordering.



Poppy head printed in Nylon PA12.



Close up of Poppy's Frame

## Material Spotlight: PA12

PA12 is the most used 3D printing material for scaled production. As a powder-based technology, the surface finish is uniform and smooth to the touch without visible layers. Available in unfinished form in both white (SLS technology) and grey (Jet Fusion technology), PA12 is the most versatile polymer, it's lightweight, and features good all-around mechanical properties.

Both SLS and Jet Fusion PA12 varieties offer various finishing options from dyeing to chemical smoothing, giving the quality and aesthetics of injection molded plastics.

[Learn more about PA12](#)