

# MATERIALS

Polymers & Composites qualified  
for robotic LFAM platform **Heron AM**

**CARACOL**



## Print bigger, print better with Heron AM

The turnkey, integrated platform  
that will drive you to the  
**next manufacturing revolution**

Caracol created Heron AM - its Large Format Additive Manufacturing Platform - to evolve the possibilities of Additive Manufacturing on scale, shape, and materials.

The system works with polymer and composite pellet extrusion to 3D print large scale, industrial applications.

## Our Approach to Materials

Access best materials and ensure quality, control and repeatability on your prints and production process

To simplify your search for what pellets to use on your large scale projects and applications, Caracol has selected a broad range of best-in-class resins from leading material partners that you can purchase.



Caracol's Heron AM platforms are **made to process a broad range of materials**, that the company thoroughly tests and qualifies for direct, continuous printing: from advanced polymers and composites to recycled materials from upcycled waste or parts at the end of their life.

Our **MATERIAL LAB** constantly works to expand the range of resins available **qualifying only the best performing advanced thermoplastic and composite** materials for Heron AM™ platforms.

*Are you looking for a specific new resin or your projects require a specific compound?*

Heron AM machines are open, and we'd love to support you in developing, identifying, and qualifying new materials or new specific colors for your applications. Reach out to our team for more info at [bd@caracol-am.com](mailto:bd@caracol-am.com)

Each new material is investigated and studied in terms of mechanical, thermal, chemical properties on printed parts, to identify the best options on the market for our clients and guarantee reliable and repeatable production.

## Our Portfolio

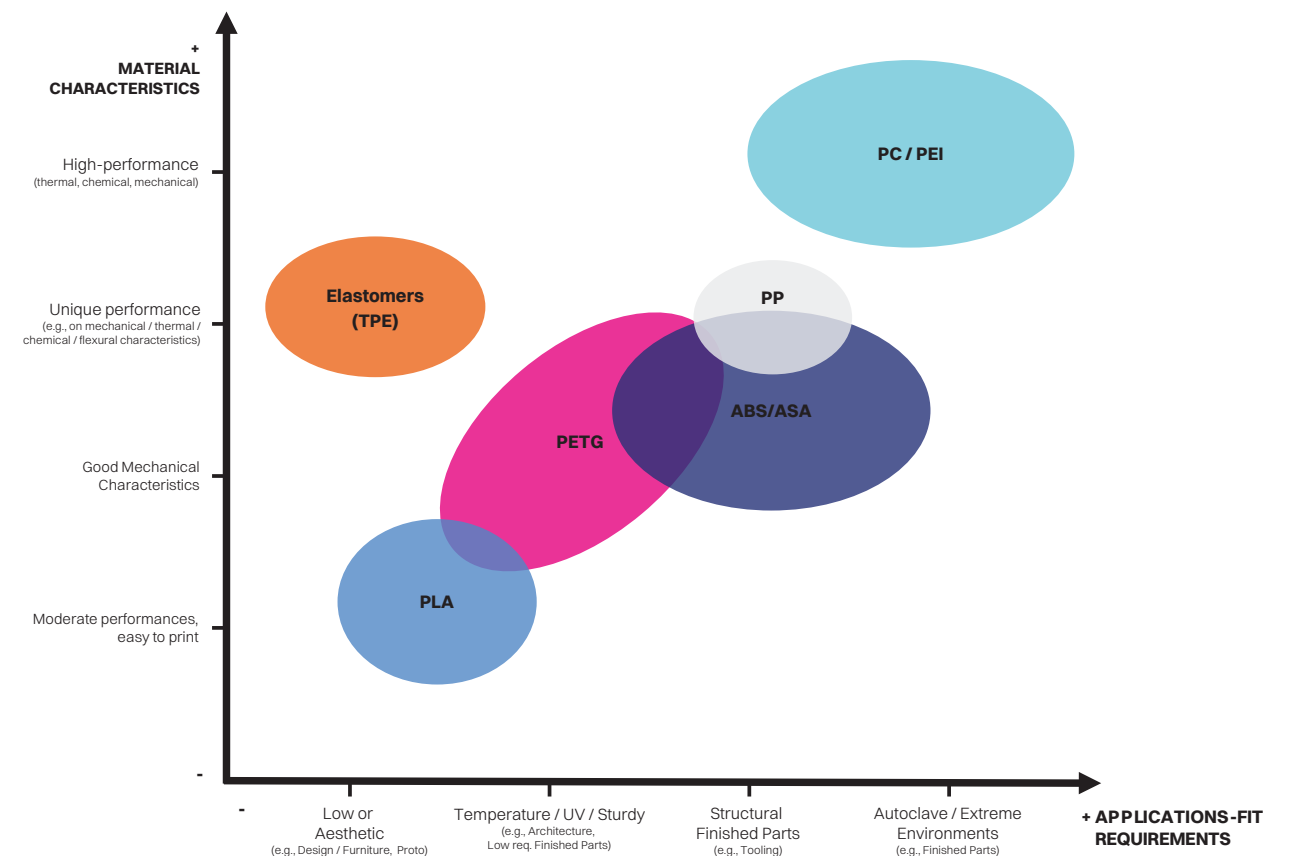
Caracol's materials selection aims to offer **broad production possibilities on LFAM across applications** - from aesthetic and low requirement parts, to advanced high performance components.

This is why in our portfolio we've included a range of materials from bio-based, recycled, to high-temperature materials such as autoclave composites, tested to guarantee efficient production, top technical properties, and minimizing costs and waste.

*Our application engineering experts are always glad to share our know-how on what are the best materials for each project with our clients.*

## QUALIFICATION PROCESS

- **INVESTIGATION**  
identify target material and best suppliers
- **TESTING**  
the material successfully extruded is tested to define its properties
- **CHARACTERIZATION**  
the material can be used for production
- **QUALIFICATION**  
parameters are defined to guarantee best printability, repeatability, and performance with the material





# PET-G

## Polyethylene Terephthalate Glycol

This polyester-based polymer can be found in recycled transparent, or glass fiber reinforced versions, and has excellent surface finishing and UV resistant properties. Maintains its dimensional stability up to 70°C (158°F). Ideal for PVC-like, outdoor and indoor finished parts, cold tooling, design and furniture applications and architecture sector.

NATURAL  
PET-G

COLOR  
Transparent

IDEAL FOR  
Finished parts in design, furniture, architecture applications, such as lighting

EXTRUDERS  
HV, HF

COMPOSITE & RECYCLED  
rPET-G + 30% Glass Fiber (UV resistant)

COLOR  
White, Grey, and Black

IDEAL FOR  
Great for finished parts for low temp tools, for design, and architecture

EXTRUDERS  
HV, HF



# ABS

## Acrylonitrile Butadiene Styrene

Recommended when glues, coating or other chemicals need to be applied, it has good mechanical properties and is stable during prints. Qualified for low temperature applications up to 80°C (176°F) like prototyping, vacuum tight molds and tools for trimming and gripping, and finished functional parts not subjected to mechanical pressure.

COMPOSITE  
ABS + 20% Carbon Fiber

COLOR  
Black

IDEAL FOR  
Tooling, mock-ups, finished parts for automotive & aerospace

EXTRUDERS  
HA, HV, HF

COMPOSITE  
ABS + 20% Glass Fiber

COLOR  
Natural white

IDEAL FOR  
Tooling, finished parts for marine & naval, or glass fiber industries

EXTRUDERS  
HA, HV, HF

### DESIGN & FURNITURE

#### Finished parts

## Recarlo redefines luxury retail with LFAM technology

Recarlo chose Caracol AM to create a sculptural 3D-printed wall for its first Milan flagship store.

The piece, evoking a velvet curtain, was printed in three sections (6000 x 3900 mm total) in 55 hrs each, leveraging recycled glass-fiber rPETG on the Heron 400 Rail system, then painted in Recarlo's signature blue.

The project shows how large-format additive manufacturing can bring design freedom and sustainability into luxury retail.



### AUTOMOTIVE & MOTORSPORT

#### Custom bodywork

## Optimizing custom Legend Car bodywork production with LFAM

Castelletto Circuit teamed up with Caracol to 3D print the entire bodywork of a custom Legend racing car using Heron AM technology, with no molds or traditional tooling involved.

The project, developed with Garroni Design, TNT Garage and Sabic, cut production times significantly and shows how large-format 3D printing can make one-off and small-series automotive manufacturing genuinely viable.



| MANUFACTURING SET UP |                                     |
|----------------------|-------------------------------------|
| SYSTEM               | HERON 300; HV Extruder; 5 mm Nozzle |
| MATERIAL             | ABS 20% CF                          |
| POST-PROCESSING      | Surface sanding and painting        |
| PRINT TIME (hr)      | 150                                 |
| WEIGHT (kg)          | 173                                 |
| SIZE (mm)            | 3600 x 1900 x 1200                  |



PP  
Polypropylene

Highly resistant to solvents and chemicals, lightweight polymer, with good mechanical properties and impact resistance. It is qualified to produce functional parts in several sectors, suitable also for marine applications.

COMPOSITE & RECYCLED  
rPP + 30% Glass Fiber

COLOR  
Natural white

IDEAL FOR  
Prototypes, end-use parts,  
ideal for naval sector

EXTRUDERS  
HA, HV, HF



ASA  
Acrylonitrile Styrene Acrylate

Recommended when glues, coating or other chemicals need to be applied, it also stands out for its UV resistance, good mechanical properties and high thermal resistance, up to 90°C (194°F). This material is qualified and employed for marine components, outdoor applications, design and furniture finished parts.

COMPOSITE  
ASA + 20% Glass Fiber

COLOR  
Ivory

IDEAL FOR  
Finished parts for design,  
furniture, art and architecture

EXTRUDERS  
HA, HV, HF

MARINE

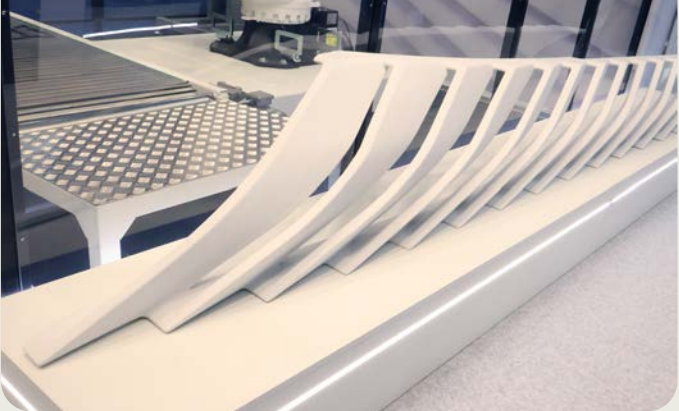
Finished parts  
The first functional monolithic catamaran additively produced

Caracol and V2 Group built the first functional monolithic catamaran for open waters, with the entire 6-meter hull 3D printed in a single uninterrupted run using recycled material on the Heron AM platform.

The whole process, from design and testing to finishing, was developed with industrialization in mind, paving the way for scalable, mold-free and more sustainable boat production.



| MANUFACTURING SET UP |                                     |
|----------------------|-------------------------------------|
| SYSTEM               | HERON 400; HF Extruder; 8 mm Nozzle |
| MATERIAL             | rPP 30% GF                          |
| POST-PROCESSING      | Surface sanding and painting        |
| PRINT TIME (hr)      | 160                                 |
| WEIGHT (kg)          | 1200                                |
| SIZE (mm)            | 6000 x 2300 x 1500                  |



MARINE

Custom superstructure  
Production of Pershing  
GTX116 aerodynamic grilles

Ferretti Group commissioned Caracol to 3D print the air intake grilles and windshield visor of the Pershing GTX116, a 35-meter sports yacht.

Using Heron AM instead of traditional fiberglass lamination on molds, the parts were produced directly from digital models, achieving complex geometries with lighter weight, faster production and far less waste.



| MANUFACTURING SET UP |                                     |
|----------------------|-------------------------------------|
| SYSTEM               | HERON 300; HA Extruder; 3 mm Nozzle |
| MATERIAL             | ASA 20% GF                          |
| POST-PROCESSING      | Gel coat                            |
| PRINT TIME (hr)      | 72                                  |
| WEIGHT (kg)          | 40                                  |
| SIZE (mm)            | 4200 x 400 x 400                    |



# PLA

## Polylactic Acid

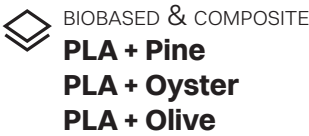
This biodegradable thermoplastic is derived from renewable plant resources like corn starch and sugarcane. It is easy to use, environmentally friendly and it is characterized by a smooth and glossy surface finish. It is used for decorative industry and indoor furniture. It is also available with bio-fillers.



COLOR  
**Transparent with yellow shades, available colored with masterbatch**

IDEAL FOR  
**Finished parts for design, furniture, art, architecture, and inexpensive prototyping**

EXTRUDERS  
**HA, HV, HF**



COLOR  
**Natural colors**

IDEAL FOR  
**Finished parts for design, furniture, art and architecture**

EXTRUDERS  
**HV, HF**



# PC

## Polycarbonate

Recommended for its great mechanical and thermal properties, up to 130°C (266°F). The carbon fiber-reinforced composite can withstand mid-temperature autoclave processes (up to 3-6 bars). It is ideal for functional and engineering applications, including autoclave molds and heat-resistant cure tools as well as lamination tooling.



COLOR  
**Black**

IDEAL FOR  
**Autoclave cure tooling and molds, lamination tools**

EXTRUDERS  
**HV, HF**



TOOLING & AEROSPACE

## Master mold composite lamination tools for aerospace

Formes et Volumes produced a large-scale composite lamination tool for aerospace, printed as a single monolithic piece with Heron AM and finished through a hybrid workflow combining CNC machining and autoclave post-processing.

Compared to conventional multi-part tooling, this approach removed assembly joints and their tolerance issues, cutting lead times, costs and waste significantly.

### MANUFACTURING SET UP

|                 |                                      |
|-----------------|--------------------------------------|
| SYSTEM          | HERON 300; HF Extruder; 18 mm Nozzle |
| MATERIAL        | PC 20% CF                            |
| POST-PROCESSING | CNC + Autoclave                      |
| PRINT TIME (hr) | 19                                   |
| WEIGHT (kg)     | 180                                  |
| SIZE (mm)       | 2200 x 2200 x 600                    |



## HDPE

### High Density Polyethylene

HDPE CF is a lightweight, high-density polyethylene reinforced with carbon fiber, ideal for harsh, chemically aggressive environments. It offers excellent rigidity, thermal resistance, and dimensional stability, with low moisture absorption.

COMPOSITE  
**HDPE + 20% Carbon Fiber**

COLOR  
**Black**

IDEAL FOR  
**Energy sector applications  
like oil and gas piping**

EXTRUDERS  
**HV, HF**



## TPE

### High Strength and Flex Elastomer

This TPE-based high-strength and flexibility elastomer is ideal for optimized pliable structures. It goes up to 70 Shore A and 80°C (176°F) as working temperature, and it is extensively used to print large-scale rubber-like parts for logistics, furniture, seating and design-related components.

NATURAL  
**TPE**

COLOR  
**Natural white**

IDEAL FOR  
**Large rubber-like topologically optimized pliable  
structures, like cushions and seating**

EXTRUDERS  
**HA, HV, HF**

OIL & GAS

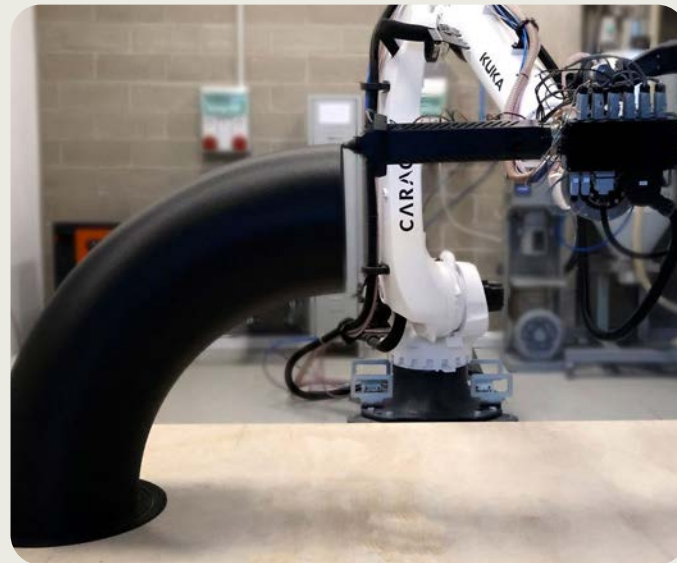
### Custom piping

#### 3D printing piping for the energy industry

Caracol adopted Heron AM to produce non-metallic piping components for the energy sector (curved sections, connectors and x-way joints) geometries that traditional methods struggle with.

The parts were printed in HDPE with carbon fiber and recycled polypropylene with glass fiber, materials already qualified for energy applications, exploiting multiplanar printing made possible by the robot's six-plus axes.

Results: production times cut by up to 50% and raw material savings of around 20%, plus corrosion resistance and lighter weight compared to metal piping.



ARCHITECTURE & CONSTRUCTION

### Architectural installation

#### Reimagining construction: advanced robotic LFAM at Biennale Architettura 2025

Kengo Kuma & Associates on “Domino 3.0: Generated Living Structure” chose Heron AM for its installation at the Biennale Architettura 2025 in Venice, curated by Carlo Ratti.

Fallen trees from Storm Vaia were 3D scanned and joined together using custom flexible joints printed in TPE, a thermoplastic elastomer Kuma chose over PETG after visiting Caracol.

The components, measuring 400 x 650 x 700 mm and weighing between 27 and 54 kg depending on their shape, were produced on a Heron 300 with HV extruder and 5 mm nozzle, using multiplanar printing to follow the timber's irregular organic surfaces, with no post-processing required.

The installation shows how robotic 3D printing and natural materials can come together to rethink construction.





## PA Polyamide

Technical polyamide with outstanding flame resistance, V0 rated per UL94 and EN 45545-2 R1 HL2 certified for railway applications.



COMPOSITE

**PA66 + 25% Glass Fiber**

COLOR

**Natural**

EXTRUDERS

**HV, HF**

IDEAL FOR

**Railway, and construction, with flame-retardant grades ideal where fire safety standards apply.**



## PEI Polyetherimide

Excellent flame retardancy with UL94 V0, outstanding heat-resistance, stable dielectric properties, excellent mechanical properties, high strength and stiffness up to 200°C (392°F), and great chemical resistance to fluids such as hydrocarbons and alcohols.



COMPOSITE

**PEI + 20% Carbon Fiber**

COLOR

**Black**

EXTRUDERS

**HV, HF**

IDEAL FOR

**Autoclave cure, oven and self-heating tools, master molds, and structural parts.**



## PURGE

Non-abrasive purging compound designed especially for pellet-fed additive manufacturing printers; it can be used over a wide range of temperatures. Purging is a fundamentally important step to remove residual carbon buildup after printing, to favor material and/or color change, and to keep the extruder in good condition.

# BUILD BEYOND POSSIBLE

with Advanced Robotic  
Manufacturing

**Caracol is a leader in advanced manufacturing, developing robotic platforms for complex industrial production with composites and metals.**

## Application-first approach

Since 2015, Caracol has built its tech around one principle: provide the tools for companies to solve their real production needs, so they can produce complex, high-performance applications while cutting costs, lead times, waste, and providing greater flexibility in their parts engineering and value chains.

**The company's mission is to change the manufacturing paradigm, making it more efficient, flexible, and sustainable.**

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