



## Customized Aerospace Prototype Electronic Aluminum Rapid Prototyping

### Our Product Introduction

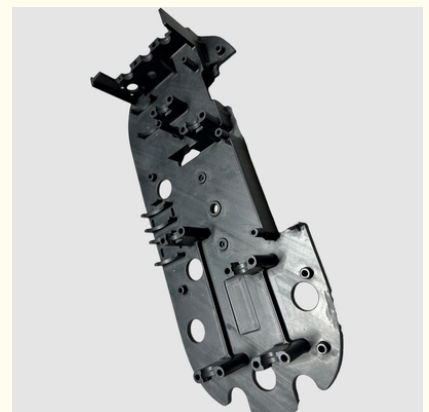
#### Basic Information

- Place of Origin: China Shenzhen
- Brand Name: Aerospace Prototype
- Certification: Polishing, Anodizing, Painting, Chrome Plating, Silkscreen
- Model Number: ABS, PC, PMMA, POM, PA, PTFE, PEEK
- Minimum Order Quantity: 1 piece
- Price: USD 30 piece
- Packaging Details: Carton, Plywood Box
- Delivery Time: 3 - 5 work days
- Payment Terms: T/T, Paypal
- Supply Ability: 1 piece per day



#### Product Specification

- Operating System: Customized
- Drawing Format: STP, IGS, X-T
- Technology: Vacuum Casting
- Appliance: Electronic Prototype
- Color: Silver
- Quality Control: 100% Inspection
- Logo: Customized
- Technology Type: CNC Machining Aerospace Prototype
- Highlight: **customized aerospace prototype, aerospace prototype electronic, electronic aluminum rapid prototyping**



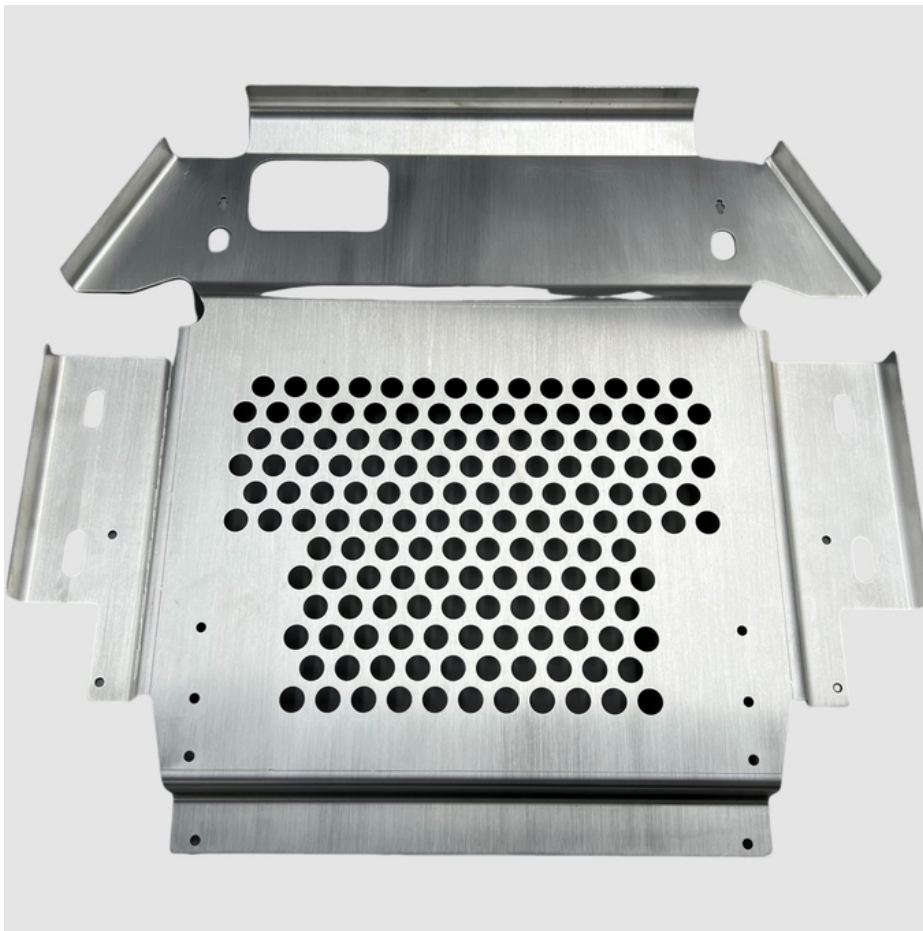
## Product Description

### what is aluminum rapid prototyping for Aerospace industry

Aluminum rapid prototyping in the aerospace industry refers to the use of rapid prototyping techniques and processes specifically with aluminum materials to quickly create functional prototypes of aerospace components or systems. This approach allows aerospace engineers and designers to rapidly iterate and test their designs, accelerating the development timeline and improving the efficiency of the prototyping phase.



Aluminum is a preferred material for aerospace prototyping due to its favorable properties, including its lightweight nature, high strength-to-weight ratio, good machinability, and excellent thermal conductivity. These properties make it suitable for various aerospace applications where weight reduction, strength, and heat management are critical factors.



The process of aluminum rapid prototyping in the aerospace industry typically involves the following steps:

**Design:** Aerospace engineers and designers generate 3D CAD models of the component or system they want to prototype. These models capture the geometry, dimensions, and functional requirements of the part.



**Selecting a Rapid Prototyping Technique:** A range of rapid prototyping methods are available for aluminum prototyping,

encompassing additive manufacturing (like selective laser melting or fused deposition modeling) and subtractive manufacturing (such as CNC machining or rapid tooling). The choice of method hinges on various factors, including the required detail level, complexity, precision, and the resources at hand.



Prototype Production: The aluminum prototype is fabricated layer by layer using the selected rapid prototyping technique in additive manufacturing, or it is carved from aluminum stock material in subtractive manufacturing. CNC machining is frequently employed for aluminum rapid prototyping, owing to its precision and detail in crafting parts.




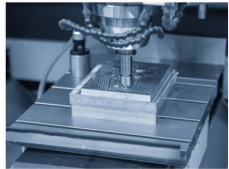



**Post-Processing and Finishing:** After the prototype has been created, it may undergo post-processing procedures like the removal of support structures, sanding, polishing, or applying surface treatments to attain the required surface finish and precision.





**Testing and Evaluation:** The aluminum prototype undergoes a series of tests and evaluations to measure its performance, functionality, and compatibility with other components or systems. These assessments may encompass structural testing, fit



and assembly verification, functional trials, and thermal analysis.

| Our Low-volume Manufacturing Capabilities                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                 |                                                                                            |                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------|
| Barana Rapid has over ten years of low-volume manufacturing services and a robust supply chain. It can produce various parts for you and provide high-quality low-volume manufacturing services. At the same time, we have an experienced team to assist customers in optimizing designs, selecting appropriate processes, reducing costs, and realizing rapid mass production. |                                                                                                                                                                                                                                                                 |                                                                                            |                                             |
|                                                                                                                                                                                                                                                                                                | <b>CNC Machining</b><br><br>CNC machining is used to control a wide range of complex machinery. It is a computerized manufacturing process that uses pre-programmed software and codes to control the movement of production equipment.                         | Type                                                                                       | Tolerance                                   |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Linear dimension                                                                           | ±0.025mm-±0.001inch                         |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Hole Diameters                                                                             | ±0.025mm-±0.001inch                         |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Shaft Diameters                                                                            | ±0.025mm-±0.001inch                         |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Part size limit                                                                            | 950 * 550 * 480 mm(37.0 * 21.5 * 18.5 inch) |
|                                                                                                                                                                                                                                                                                                | <b>Plastic Injection Molding</b><br><br>Plastic injection molding is the process of melting plastic resins (thermosetting/thermoplastic polymers) and injecting them under pressure into a mold cavity, where they fill and solidify to form the final product. | Standard capabilities                                                                      | Description                                 |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Mold cavity tolerances                                                                     | ±0.05 mm                                    |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Standard lead time                                                                         | 15 business days or less                    |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Part to part repeatability                                                                 | ±0.1 mm                                     |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Production grade                                                                           | 1-100,000 cycles                            |
|                                                                                                                                                                                                                                                                                              | <b>Sheet Metal Fabrication</b><br><br>Sheet metal fabrication converts flat sheets of steel or aluminum into metal structures or products by cutting, stamping, folding, and assembling.                                                                        | Dimension Detail                                                                           | Description                                 |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Edge to edge, single surface / Edge to hole, single surface / Hole to hole, single surface | ±0.05 inch                                  |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Bend to edge / hole, single surface                                                        | ± 0.010 inch                                |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Edge to feature, multiple surface / Over formed part, multiple surface                     | ± 0.030 inch                                |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Production grade                                                                           | 1-100,000 cycles                            |
|                                                                                                                                                                                                                                                                                              | <b>Vacuum Casting</b><br><br>Vacuum casting is a manufacturing process where the material goes into a silicone mold with a vacuum to produce complex production parts.                                                                                          | Standard capabilities                                                                      | Description                                 |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Maximum build size                                                                         | ±0.025 mm-±0.001 inch                       |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Standard lead time                                                                         | Up to 20 parts in 15 days or less           |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Dimensional accuracy                                                                       | ±0.05 mm                                    |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Layer thickness                                                                            | 1.5mm - 2.5mm                               |
|                                                                                                                                                                                                                                                                                              | <b>Die Casting</b><br><br>Die casting is a process of manufacturing parts by pouring or forcing molten metal into steel modes to create various kinds of parts.                                                                                                 | Standard capabilities                                                                      | Description                                 |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Maximum build size                                                                         | ±0.025 mm-±0.001 inch                       |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Standard lead time                                                                         | Up to 20 parts in 15 days or less           |
|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                 | Dimensional accuracy                                                                       | ±0.05 mm                                    |

|                                                                                   |                                                                                                                                                                                                                         |                       |                                                                                      |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------------|
|                                                                                   |                                                                                                                                                                                                                         | Layer thickness       | 1.5mm - 2.5mm                                                                        |
|  | <b>Aluminum Extrusion</b><br><br>Aluminum extrusion facilitates the manufacture of complex parts through the process of plastic deformation. Material is forced through a mold or orifice to achieve the desired shape. | Standard capabilities | Description                                                                          |
|                                                                                   |                                                                                                                                                                                                                         | Press sizes           | 450T - 3000T                                                                         |
|                                                                                   |                                                                                                                                                                                                                         | Standard lead time    | 2 weeks for small molds, 4 weeks for larger molds                                    |
|                                                                                   |                                                                                                                                                                                                                         | Minimum order volume  | 0.5 ton aluminum for smaller machines, 1.0 ton of 6063 aluminum for larger machines. |
|                                                                                   |                                                                                                                                                                                                                         | Post-processing       | Full service CNC cutting, threading, slotting, face milling, etc.                    |
|  | <b>3D Printing</b><br><br>3D printing is a manufacturing process in which a three-dimensional part or object is created from a digital 3D or CAD model.                                                                 | Standard capabilities | Description                                                                          |
|                                                                                   |                                                                                                                                                                                                                         | Min. wall thickness   | 1.0 mm                                                                               |
|                                                                                   |                                                                                                                                                                                                                         | Layer height          | 50 – 300 µm                                                                          |
|                                                                                   |                                                                                                                                                                                                                         | Max. build size       | 250 * 250 * 250 mm (SLA), 420 * 500 * 420 mm (SLS), 500 * 500 * 500 mm (FDM)         |
|                                                                                   |                                                                                                                                                                                                                         | Tolerance             | ± 0.5% with a lower limit of ± 0.5 mm (± 0.020")                                     |

**Iterative Design Optimization:** Based on the test results and evaluation feedback, necessary design modifications can be made to improve the prototype. The rapid prototyping process allows for quick iterations, enabling engineers to refine and optimize the design until it meets the required specifications and performance criteria.

| Our Vacuum Casting Tolerances                                                                                                                                                                                                                                                                 |                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Barana Rapid offers a range of vacuum casting tolerances to meet your complex custom requirements. Depending on the master model and part geometry, we can achieve dimensional tolerances between 0.2 – 0.4 m. Below are the technical specifications for our custom vacuum casting services. |                                     |
| Type                                                                                                                                                                                                                                                                                          | Information                         |
| Accuracy                                                                                                                                                                                                                                                                                      | Highest precision to reach ±0.05 mm |
| Max Part Size                                                                                                                                                                                                                                                                                 | +/- 0.025 mm<br>+/- 0.001 inch      |
| Minimum wall thickness                                                                                                                                                                                                                                                                        | 1.5mm 2.5mm                         |
| Quantities                                                                                                                                                                                                                                                                                    | 20-25 copies per mold               |
| Color & Finishing                                                                                                                                                                                                                                                                             | Color and texture can be customized |
| Typical Lead Time                                                                                                                                                                                                                                                                             | Up to 20 parts in 15 days or less   |

Aluminum rapid prototyping in the aerospace industry offers several benefits, including reduced development time, cost savings, improved design validation, accelerated design iterations, and the ability to test and validate concepts before committing to full-scale production. It allows aerospace engineers to quickly visualize, evaluate, and refine their designs, ultimately leading to the development of high-quality aerospace components or systems.



### What Separates Barana Rapid's Inspection Processes from the Rest?

Careful measurement, inspection and testing are necessary to ensure the conformance of your parts. We perform multiple inspections at every step of the product development journey, from incoming material verification to final 3D scanning. You will receive complete digital files and Certificates of Compliance so you can meet your own regulatory and performance goals.

#### An International Team with Unparalleled Experience

Quality inspection relies not only upon using advanced digital equipment but also having highly trained personnel with years of experience. As parts become more complex and tolerances more demanding for advanced applications, precision measurements conducted by professionals are the only way to ensure perfection.

#### Inspections and Review for Every Stage of Production

To ensure quality from start to finish, Barana Rapid provides the following inspection and review services:

Extensive incoming materials verification

Design for manufacturing reviews for all quotes provided

Contract reviews upon receipt of POs

First article and in-process inspections

Final inspections and testing with reports and certifications as required



Visual inspection



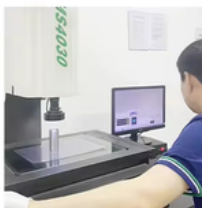
Touch test



Dimension inspection



High gauge



2D image  
measuring equipment



Hardness  
tester



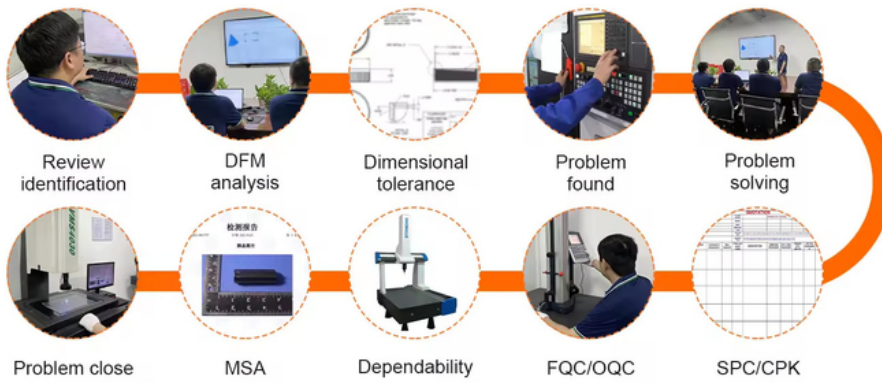
Tensile  
tester



Salt-spray  
testing machine



## Quality Inspection



## Packing



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