

★ Dynetics

Human Landing System Model

3D PRINTING INSTRUCTIONS



Dynetics
A Leidos Company

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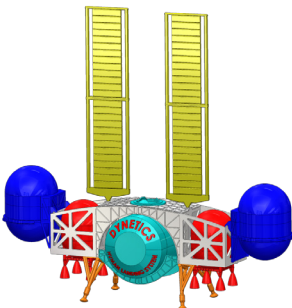
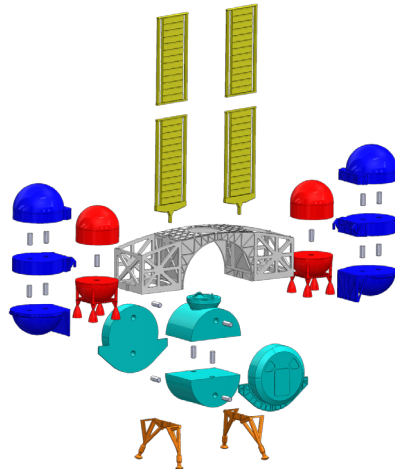
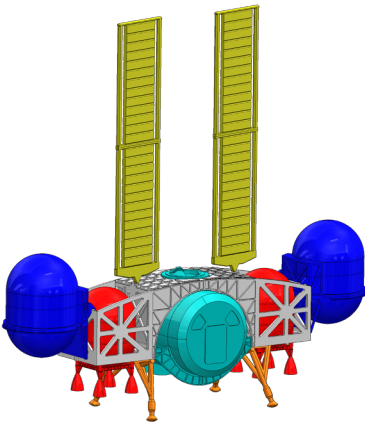
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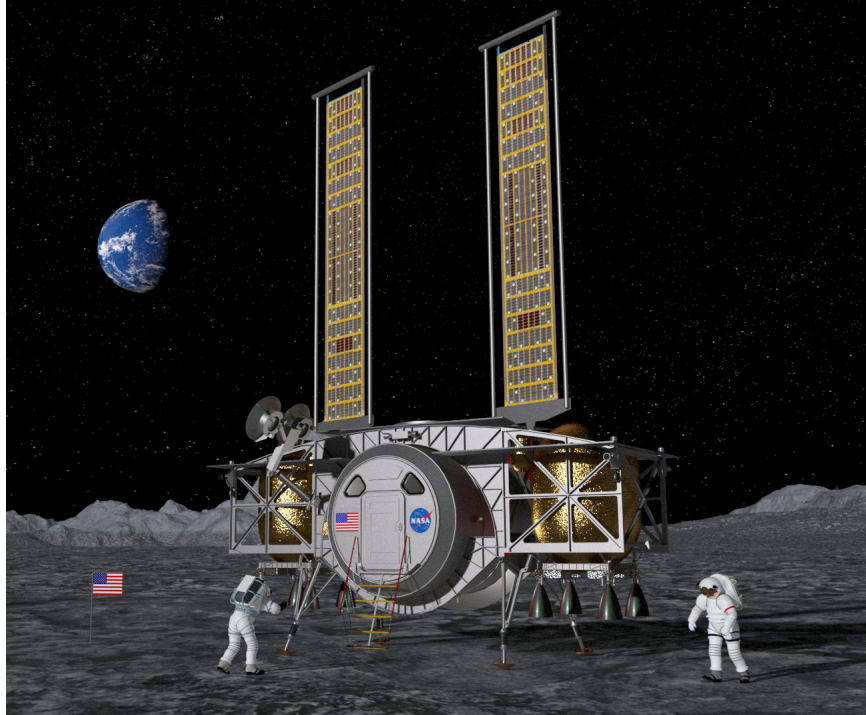
INTRODUCTION

Thank you for downloading our Printable Dynetics Human Landing System model! The following pages will guide you through the printing and assembly steps.

Remember that different 3D printers may need different settings to successfully print more complex parts.

If you experience difficulty printing, a variety of resources and communities on Reddit, Thingiverse, and Facebook can provide useful information.





MATERIALS AND PRINT SETTINGS

MATERIAL

This model prints best using quality PLA filament, such as Prusament, Taulman, ColorFabb, and Paramount. Other filament brands that have also been successfully used include eSun, HATCHBOX, SUNLU, and AmazonBasics.

PETG is also a viable material, though slightly more challenging. The printed models shown here are printed in several colors of PETG.

All model parts are assembled using small amounts of cyanoacrylate (CA) glue or super-glue.

NOTE: If children will be involved, substitute a child-safe glue.

PRINT SETTINGS

(Use these settings unless otherwise noted)

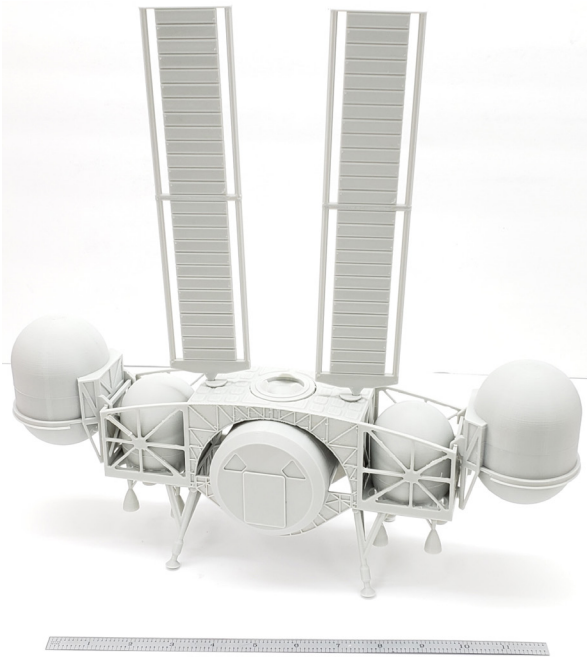
Recommended:

- 0.4 mm or smaller nozzle
- 3 perimeter layers
- 30% rectilinear or cubic infill
- Printed with supports

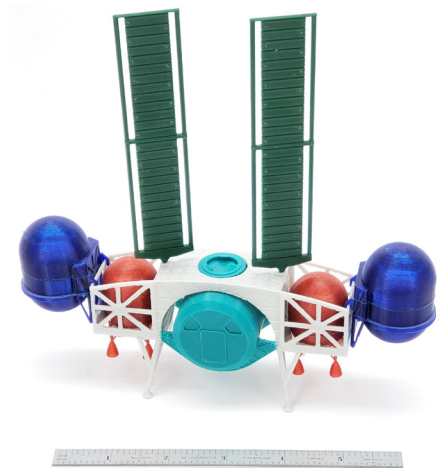
These settings should work on a wide variety of fused filament printers (e.g. Creality, Prusa, Ultimaker).

The colorful model (shown at bottom on page 7) is printed at 50% model scale. Smaller prints will be especially challenging on a fused filament printer due to feature size.

A 100% model scale gray model (shown at top on page 7) will fit within the print volume of a Prusa i3 MK3s, the printer used to make the models shown here.



100% Scale Model



50% Scale Model

OVERVIEW OF PARTS

There are 21 Dynetics HLS parts, plus 16 printed alignment dowels.

Several elements have been split into multiple parts to simplify the printing steps.

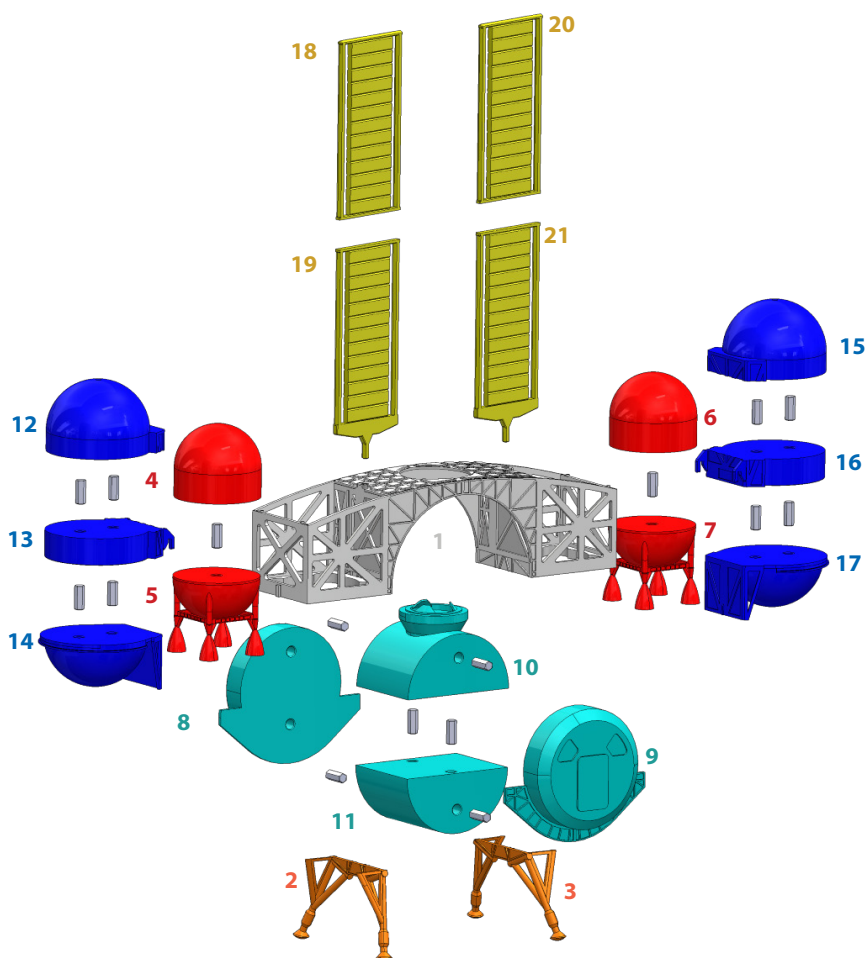
Depending on your printer, it is possible to set up a single print that creates several parts at once. For example, all 16 printed alignment dowels can be arranged into one print.

Similar parts can be printed in pairs when two are needed, since the settings for those parts are the same.

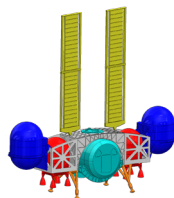
The red, blue, gold, and teal colored parts in the expanded view shown here can generally be printed with the same settings.

The following steps will guide you through printing each element of the Dynetics HLS.

- | | | | |
|----|----------------------|----|--------------------------|
| 1 | Frame | 12 | MPV-Top Left |
| 2 | Leg 1 | 13 | MPV-Middle Left |
| 3 | Leg 2 | 14 | MPV-Bottom Left |
| 4 | Tank-Upper Left | 15 | MPV-Top Right |
| 5 | Tank-Lower Left | 16 | MPV-Middle Right |
| 6 | Tank-Upper Right | 17 | MPV-Bottom Right |
| 7 | Tank-Lower Right | 18 | Solar Array-Top Left |
| 8 | Crew Module-Aft | 19 | Solar Array-Bottom Left |
| 9 | Crew Module-Foreward | 20 | Solar Array-Top Right |
| 10 | Crew Module-Top | 21 | Solar Array-Bottom Right |
| 11 | Crew Module Bottom | | |



1. FRAME



The frame is the most challenging part to print. Once you have printed this part, you can be confident that you can print all of the other parts, too.

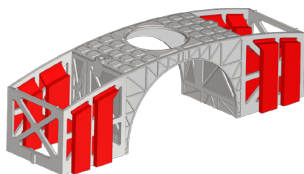
There are two frame files to choose from:

- One file includes pre-designed supports (the red elements) for certain parts of the frame. This version can work well for printing at 50% model scale.

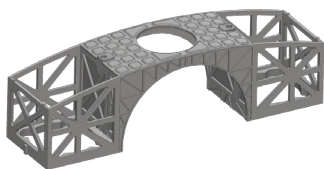
The supports are intended to replace slicer-generated supports in the “cage” areas on either side of the main arch. The resulting print can be much more easily freed from the model supports.

- One file does not include supports. Use this for 100% model scale prints, or if you prefer to let your slicer generate supports globally.

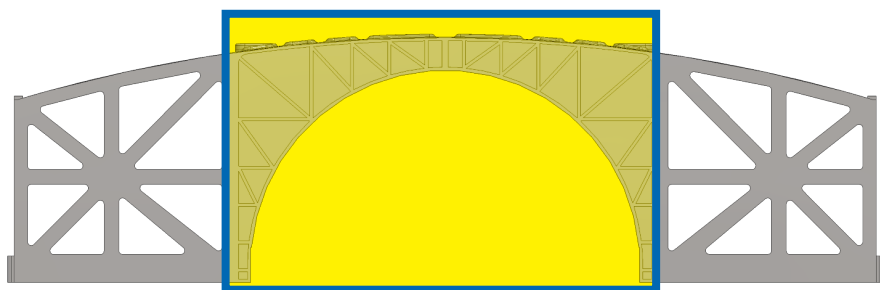
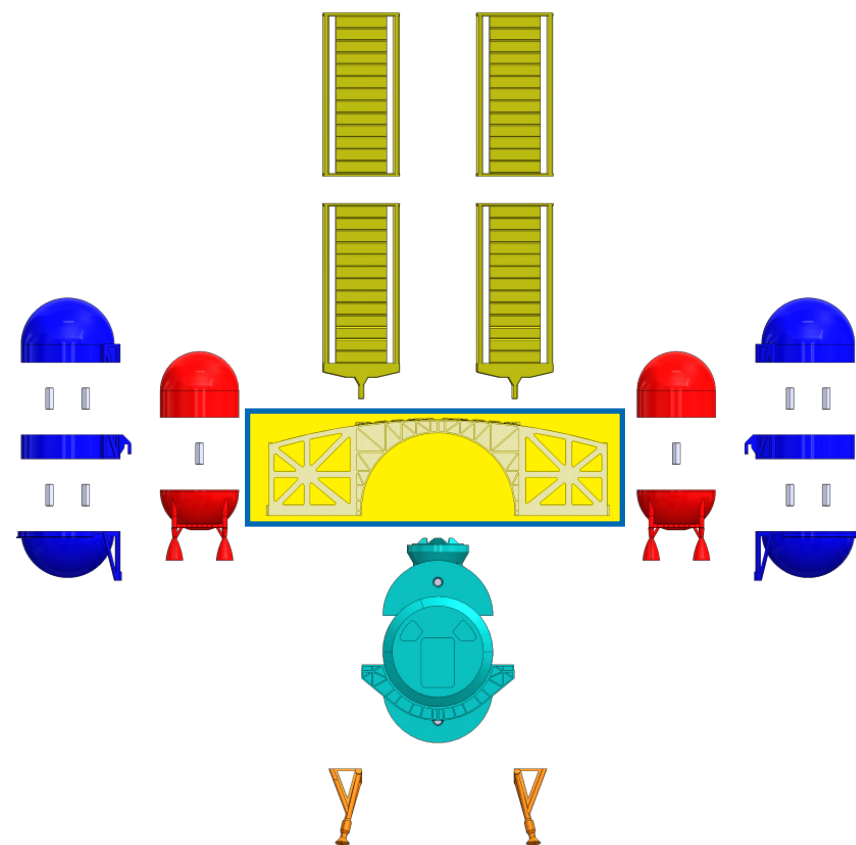
It is recommended to use slicer-generated supports for the center section, as shown by the highlighted section (bottom on page 11).



With pre-designed supports

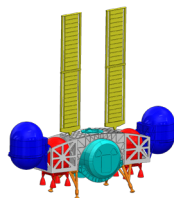


Without pre-designed supports



Always use slicer-generated supports for this portion

2. LEGS

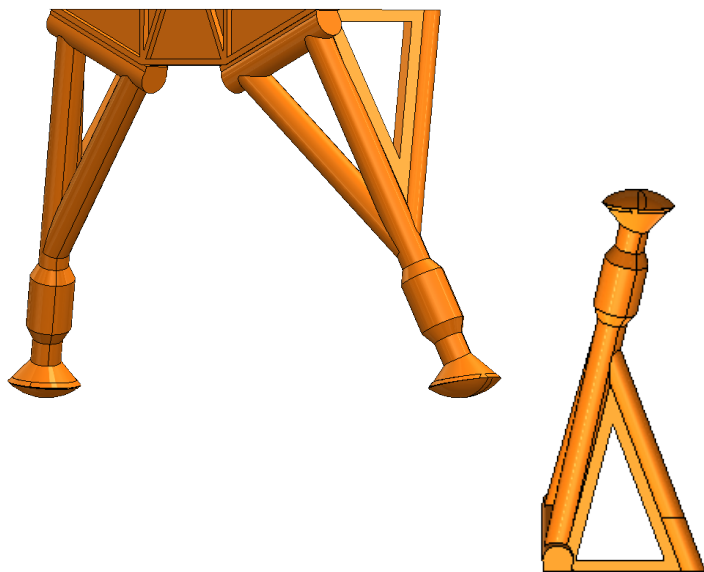


The legs are the second-most challenging element to print.

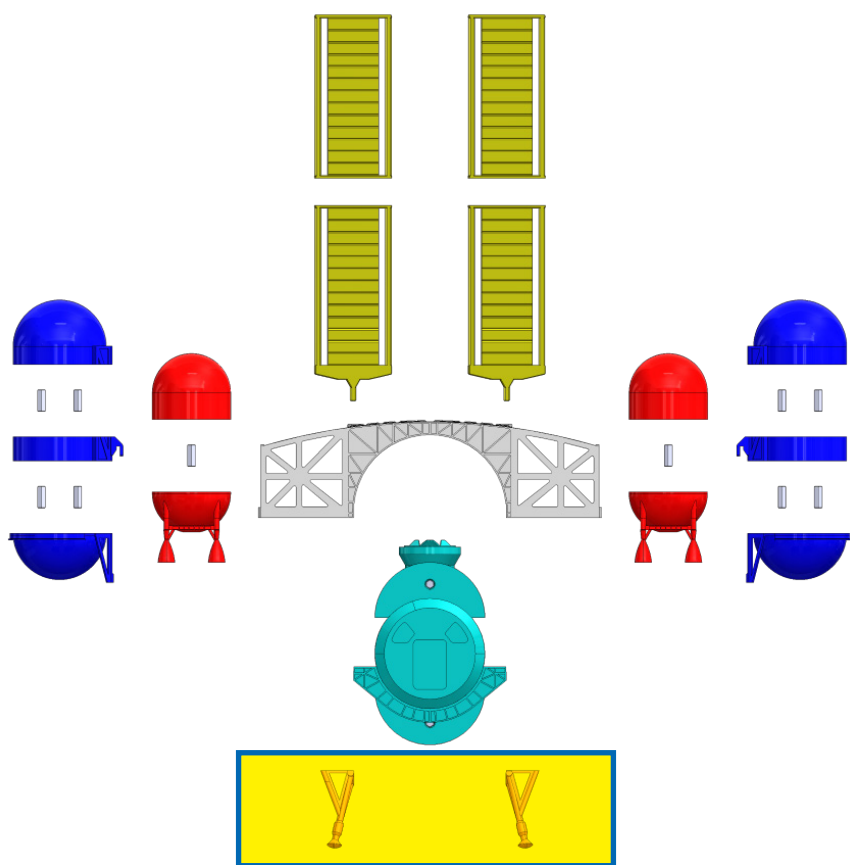
Print two copies of the legs file. Each copy will have two landing legs joined by some structure.

Recommended print settings:

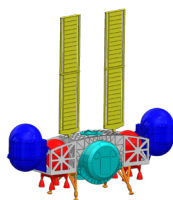
- 3 perimeter layers
- 100% infill
- Printed without supports
- Printed with a “brim” at the base to reduce part warping and to eliminate detaching from the build plate during printing



Print this end down

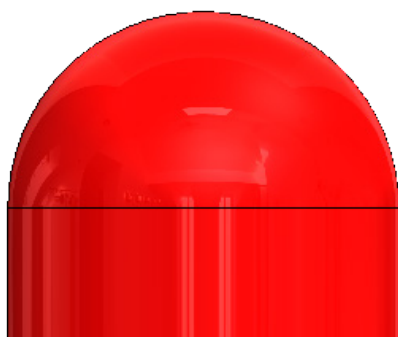


3. TANK

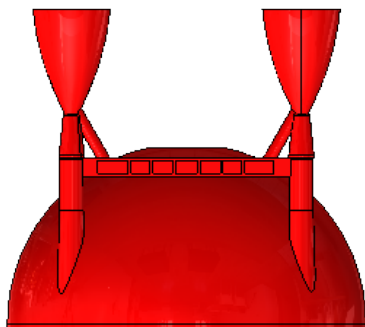


Print each section flat side down.

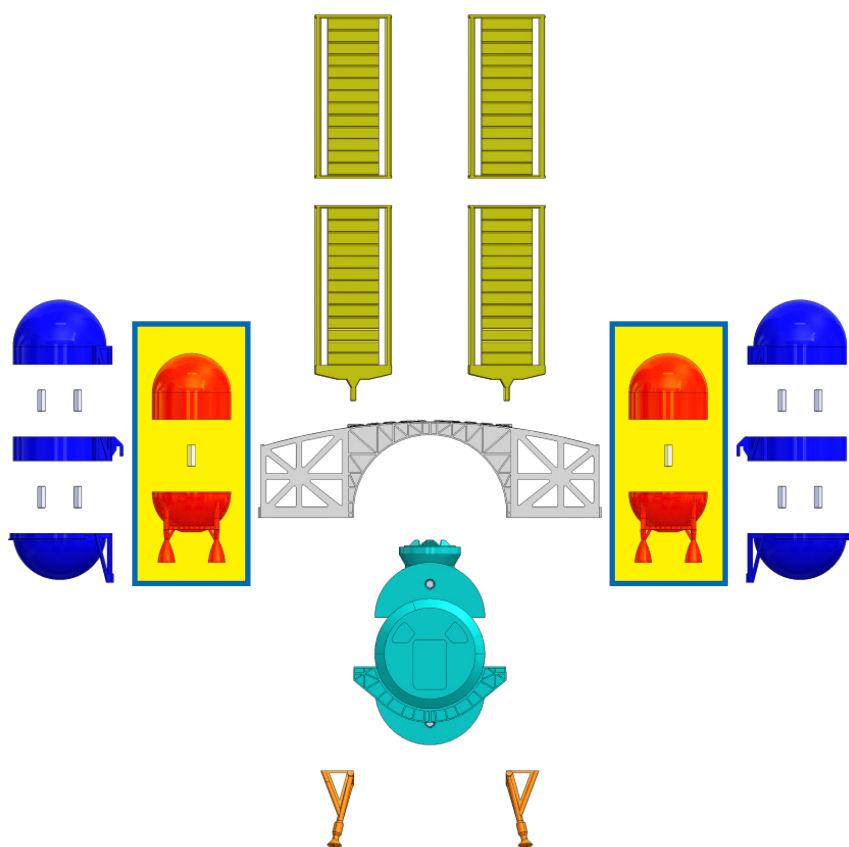
The printed engines will be delicate. Handle with care!



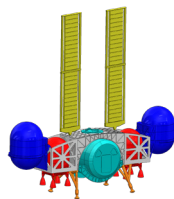
Print this end down



Print this end down



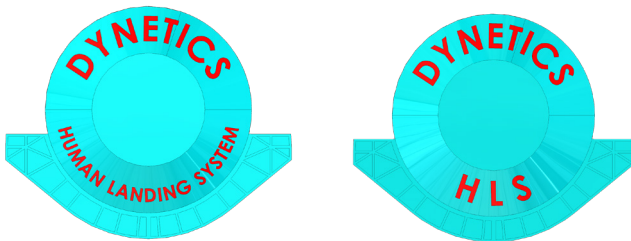
4. CREW MODULE



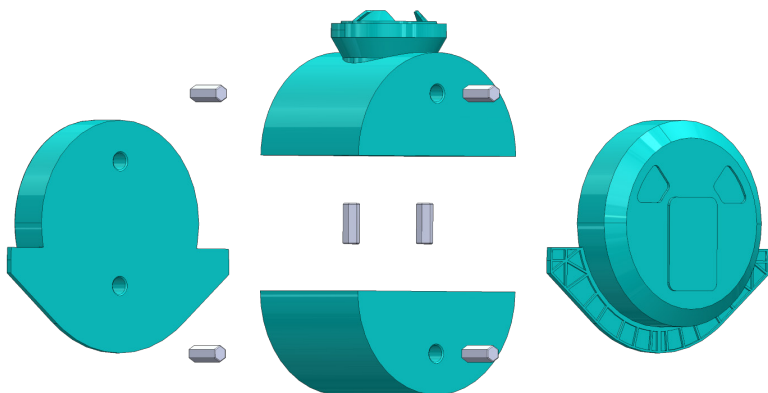
Print each section flat side down.

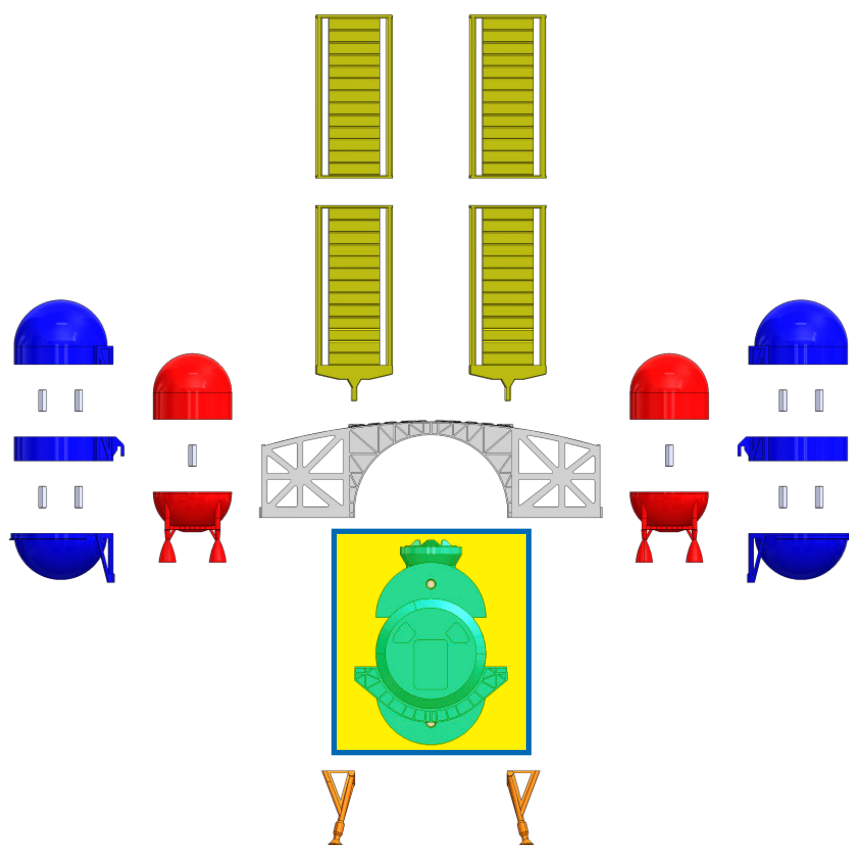
There are two versions of the aft end of the Crew Module:

- One version reads, "Dynamics HLS." This version prints at any scale, and is suitable for 50% model scale.
- One version reads, "Dynamics Human Landing System" and is suitable for 100% model scale. The smaller letters may not print properly at small print scales.



Two versions of the aft end of the Crew Module





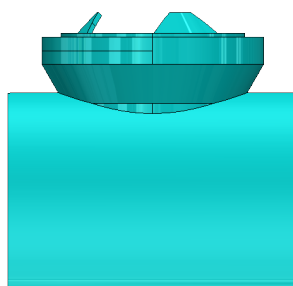
Print this end down



Print this end down

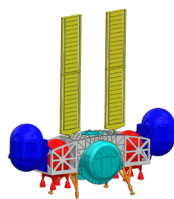


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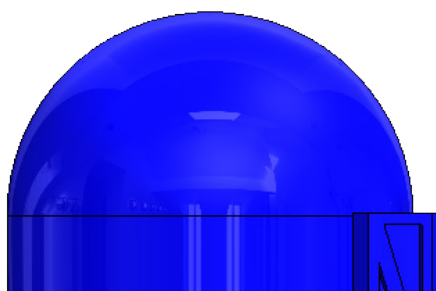
Print this end down

5. MPV

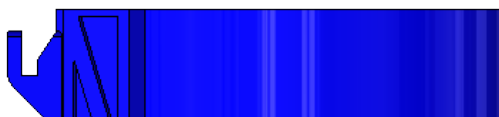


Print each section flat side down.

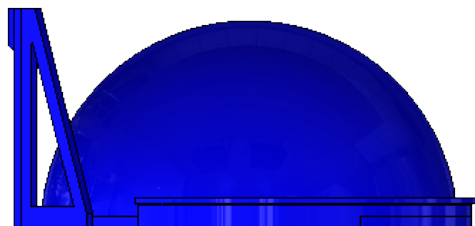
The center section should be printed with the hook facing up as shown.



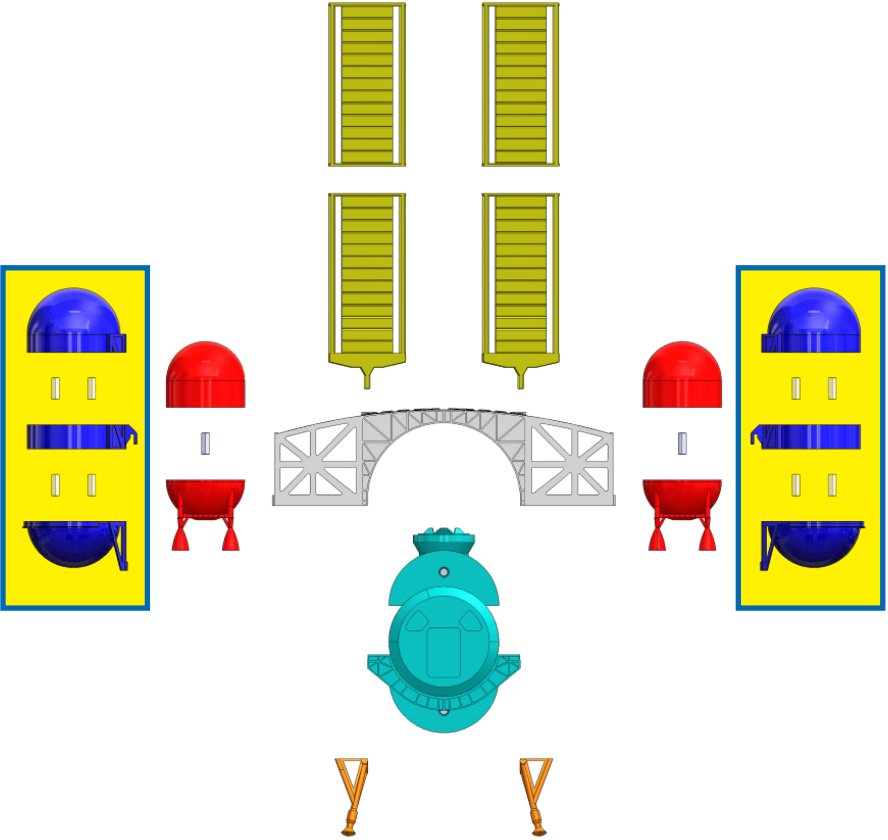
Print this end down



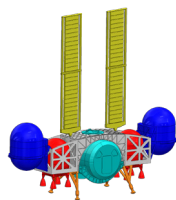
Print this end down



Print this end down



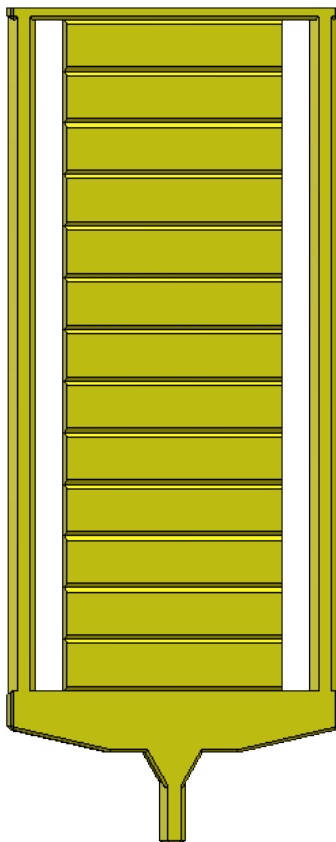
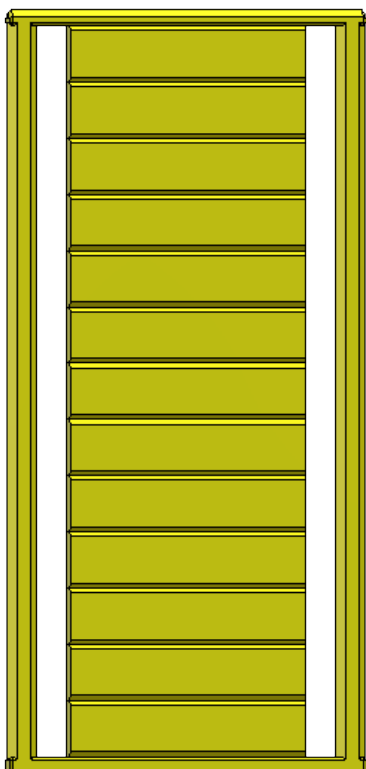
6. SOLAR ARRAY

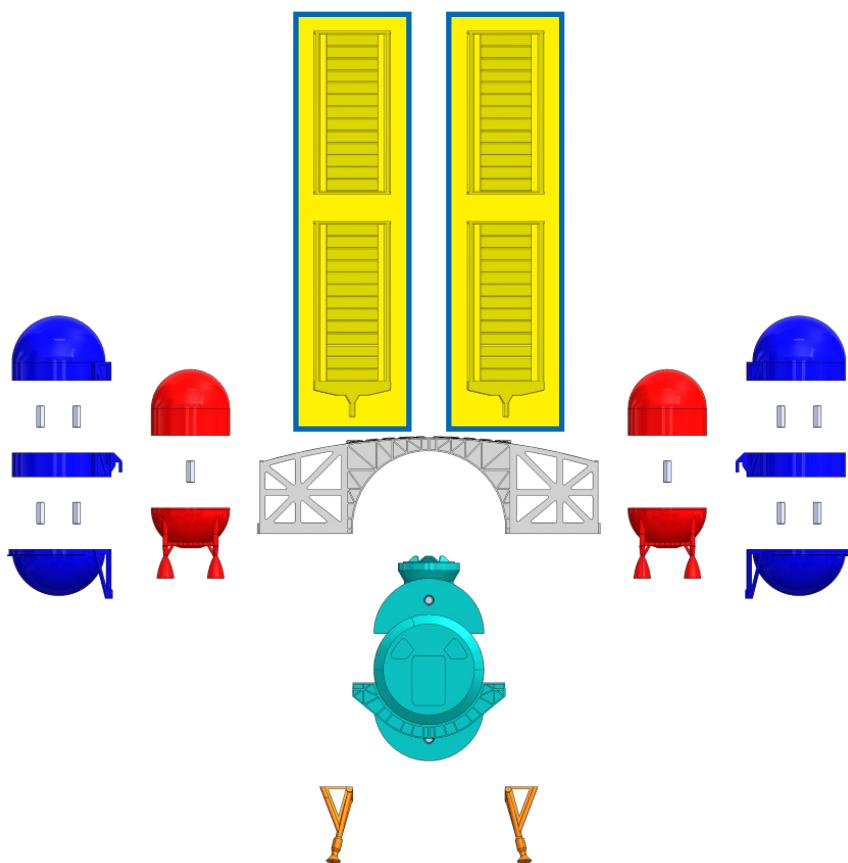


Print each section flat side down.

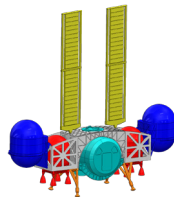
The parts are symmetric, so either flat-side can be printed face-down.

Support is not needed for these parts.





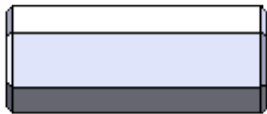
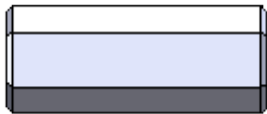
7. PRINTABLE DOWELS

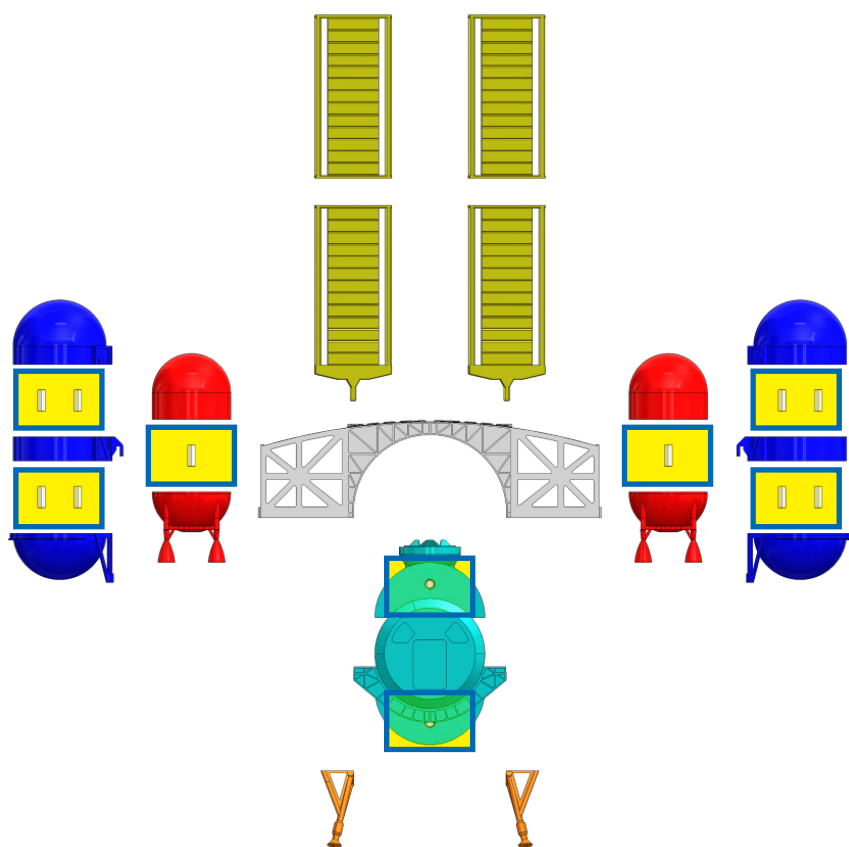


Print at least 16 printable dowels.

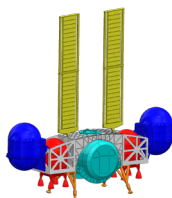
The parts should be printed horizontally.

Support is not needed for these parts.





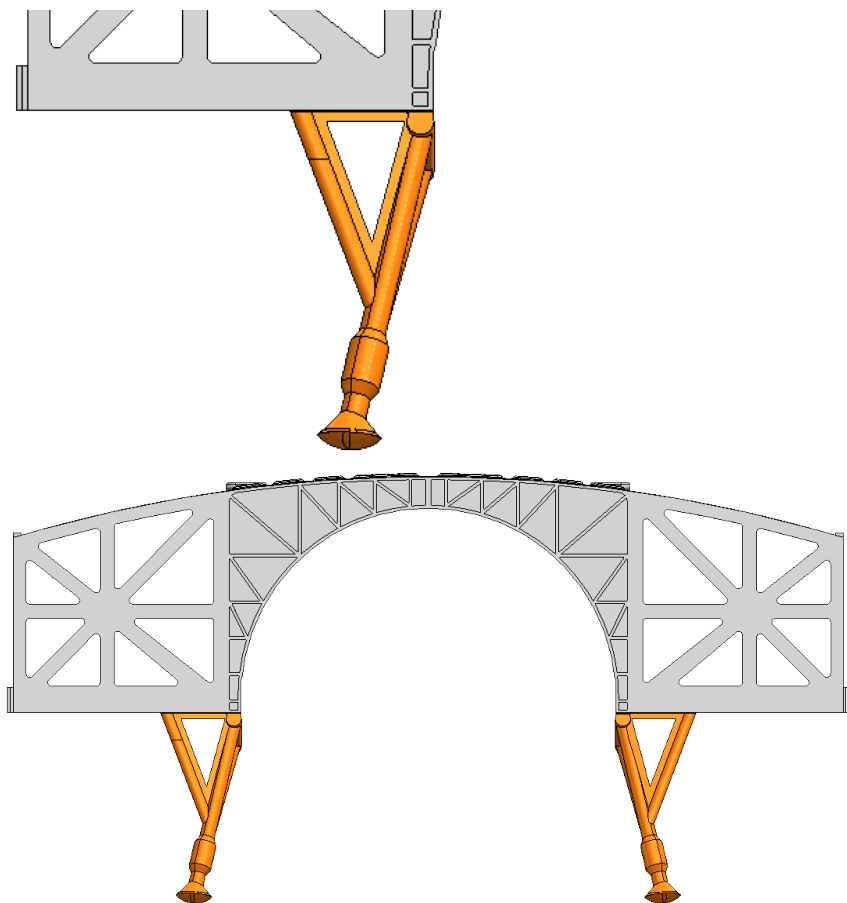
8. ASSEMBLY: LEGS TO FRAME

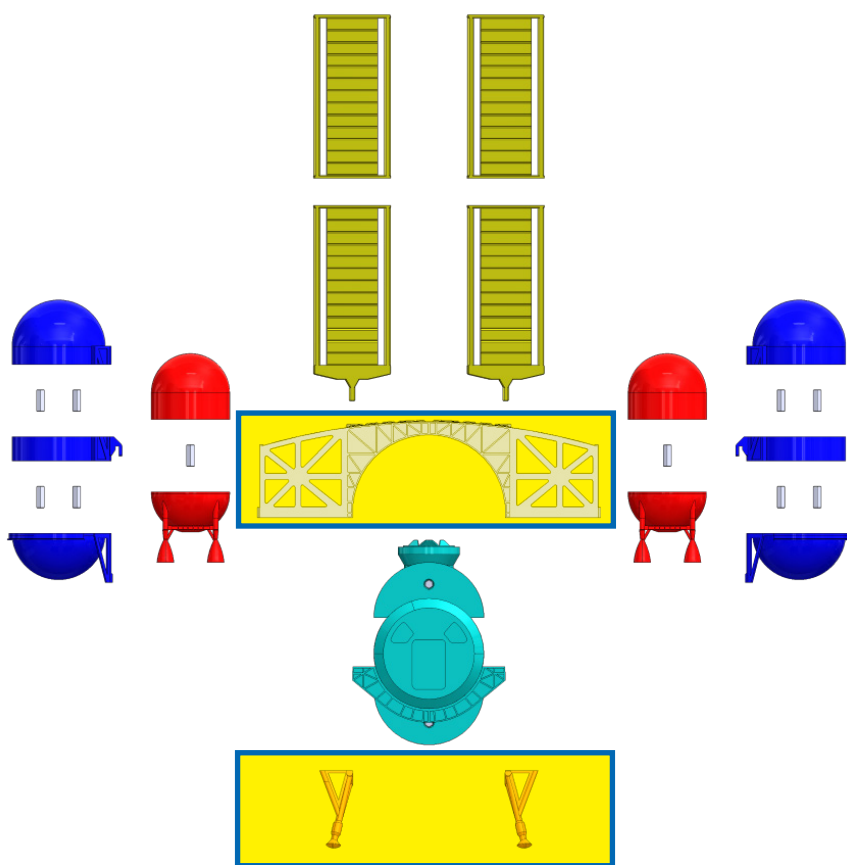


The legs are glued as shown.

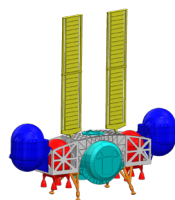
The leg support structure lines up with geometry on the frame.

Helpful Hint! Take your time! These two glue joints will support the entire model, so they need to be strong.



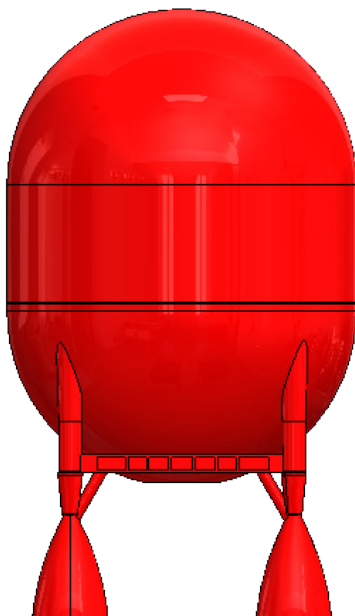
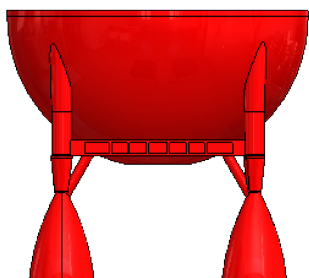
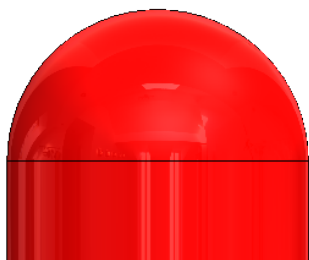


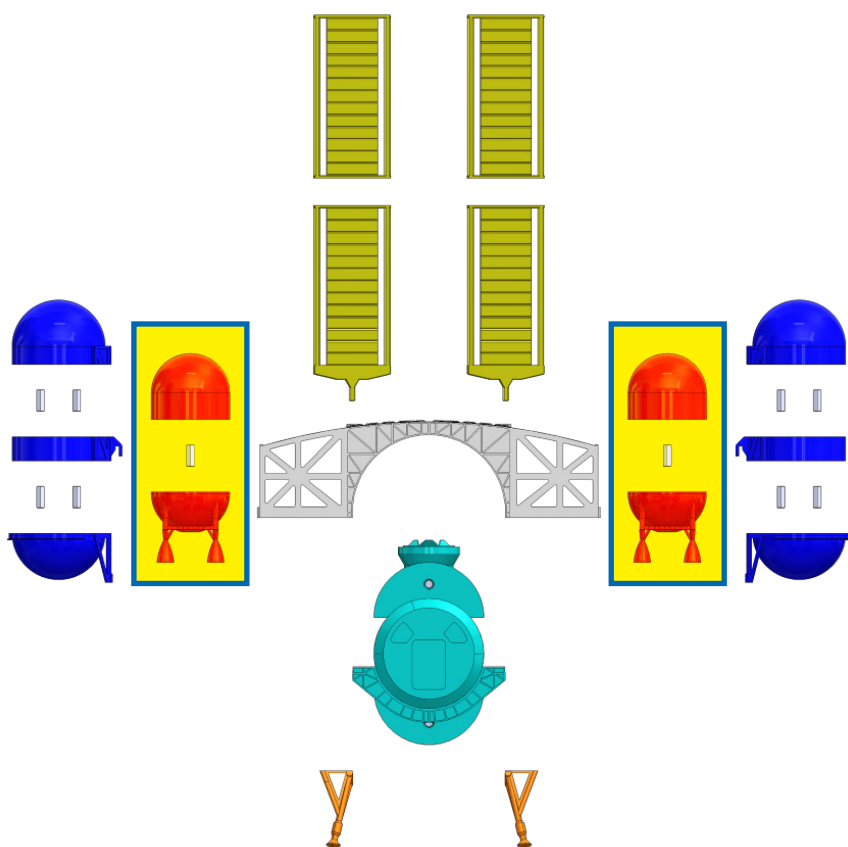
9. ASSEMBLY: TANK



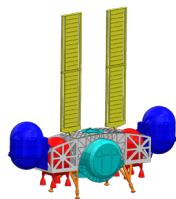
Assemble tank as shown.

Use a small amount of glue between the tank halves.



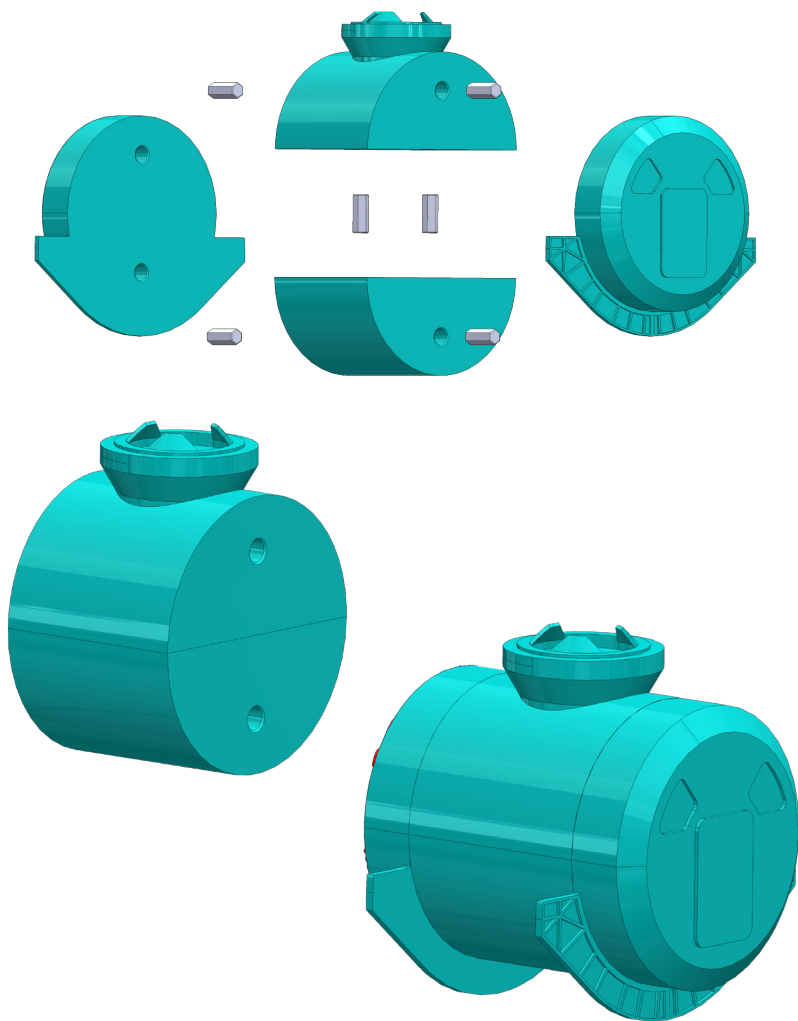


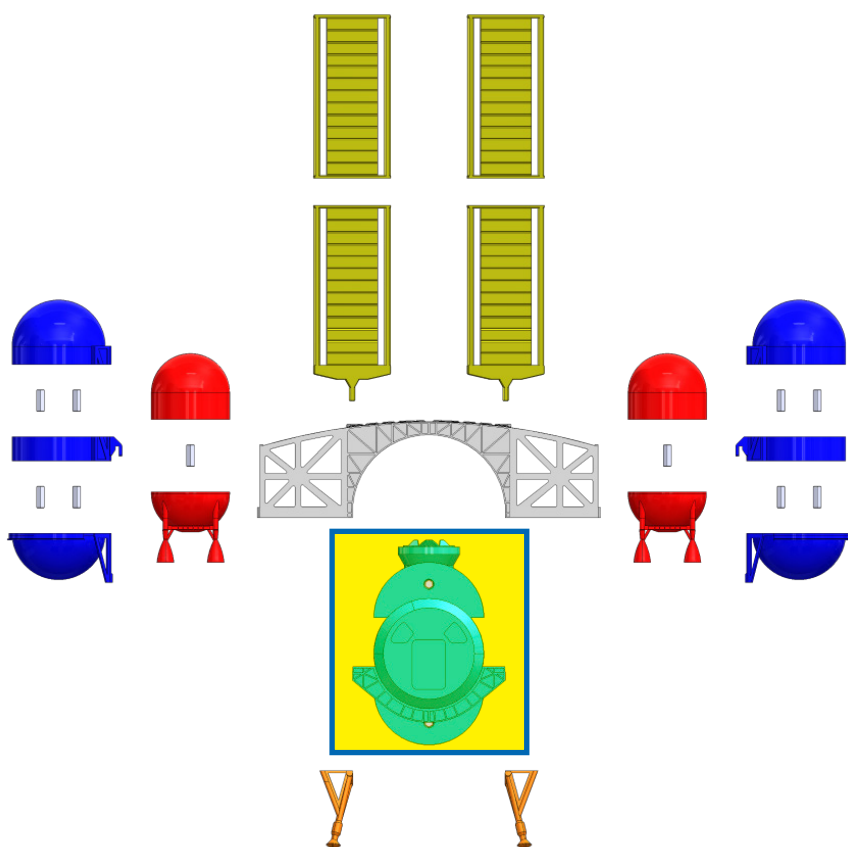
10. ASSEMBLY: CREW MODULE



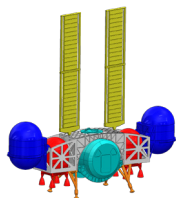
Assemble crew module in two steps:

- First, glue the top and bottom sections together
- Second, glue the fore and aft sections to the center section



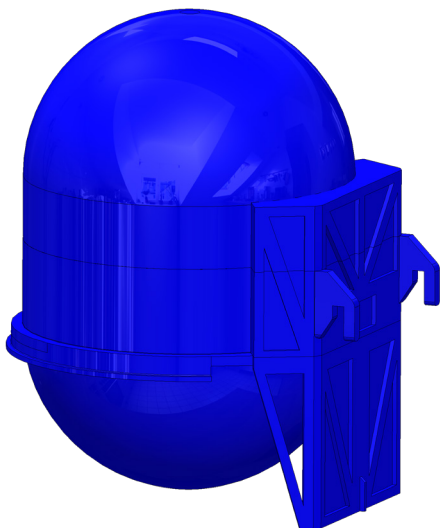
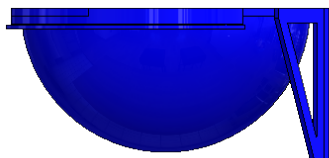
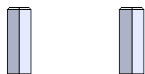
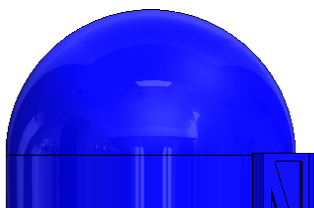


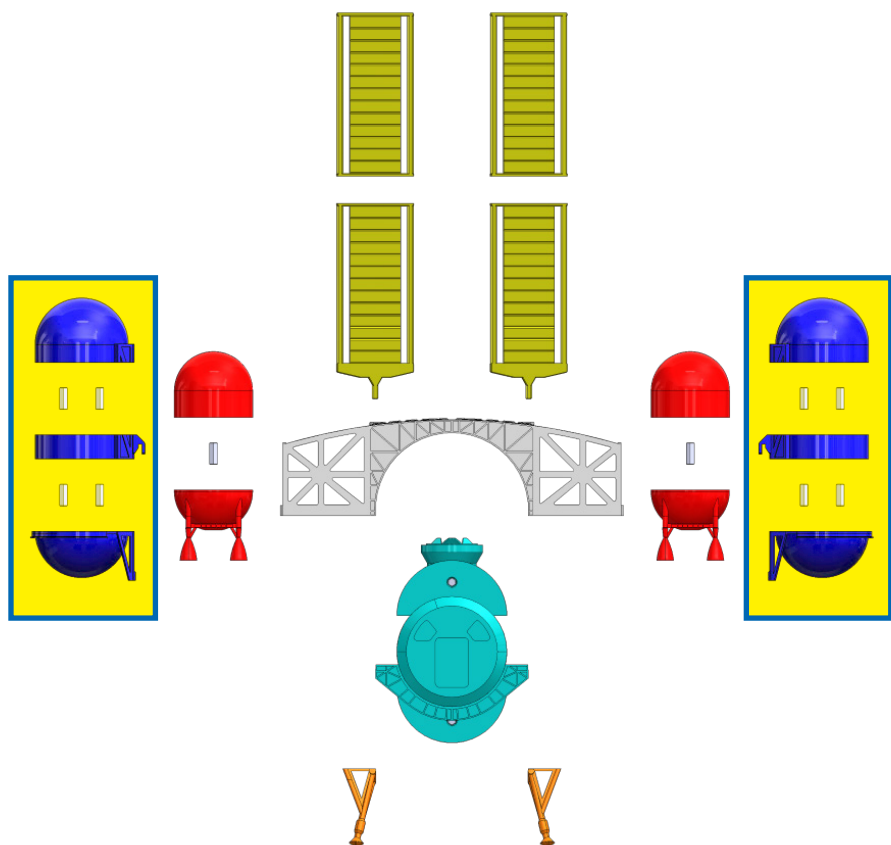
11. ASSEMBLY: MPV



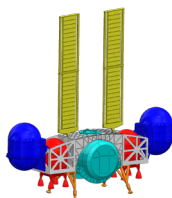
Assemble MPV as shown.

Use a small amount of glue between the sections.





12. ASSEMBLY: SOLAR ARRAY

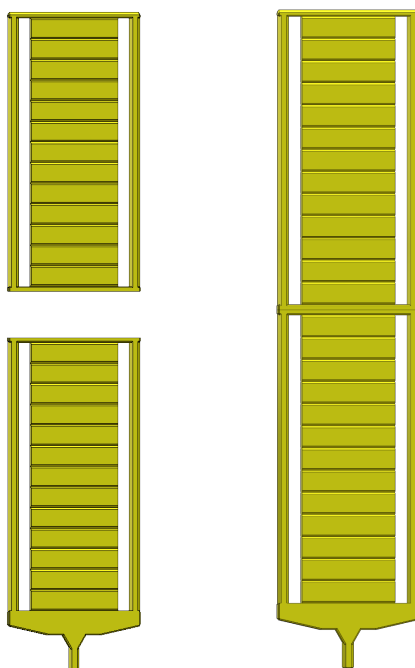


Assemble solar array as shown.

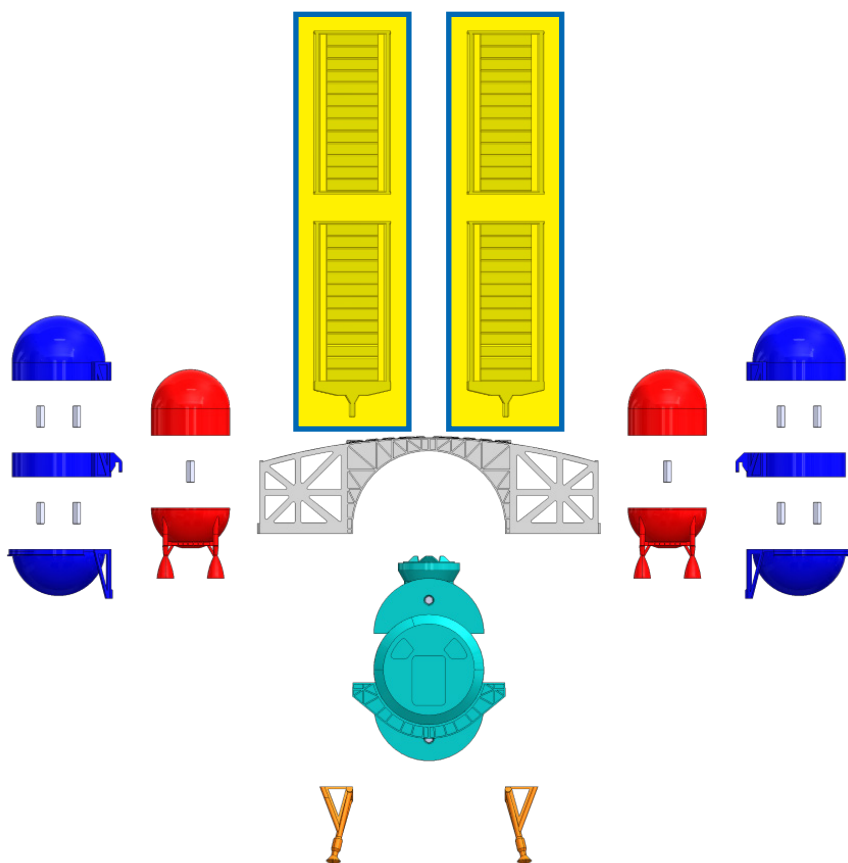
Use a small amount of glue between the sections.

Pay attention to the orientation of the upper section. The flat end is glued to the lower section.

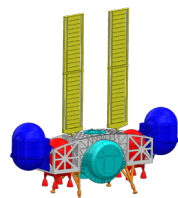
Lay the upper and lower sections on a piece of non-stick cooking parchment paper on a flat surface to align and mate the two sections.



Place the two sections on a sheet of non-stick parchment paper with glue applied between them

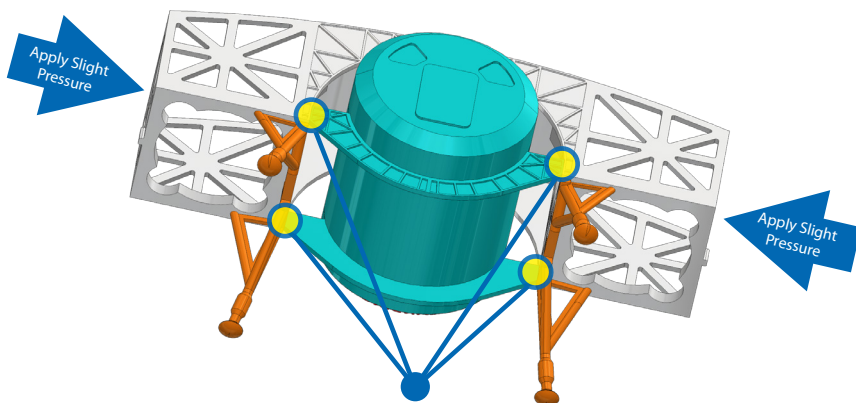


13. ASSEMBLY: CREW MODULE TO FRAME

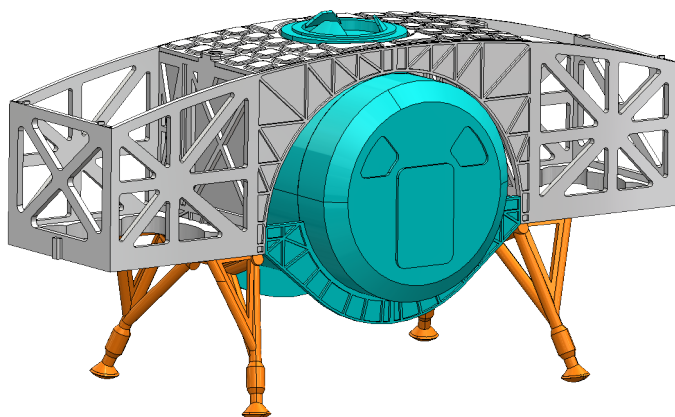


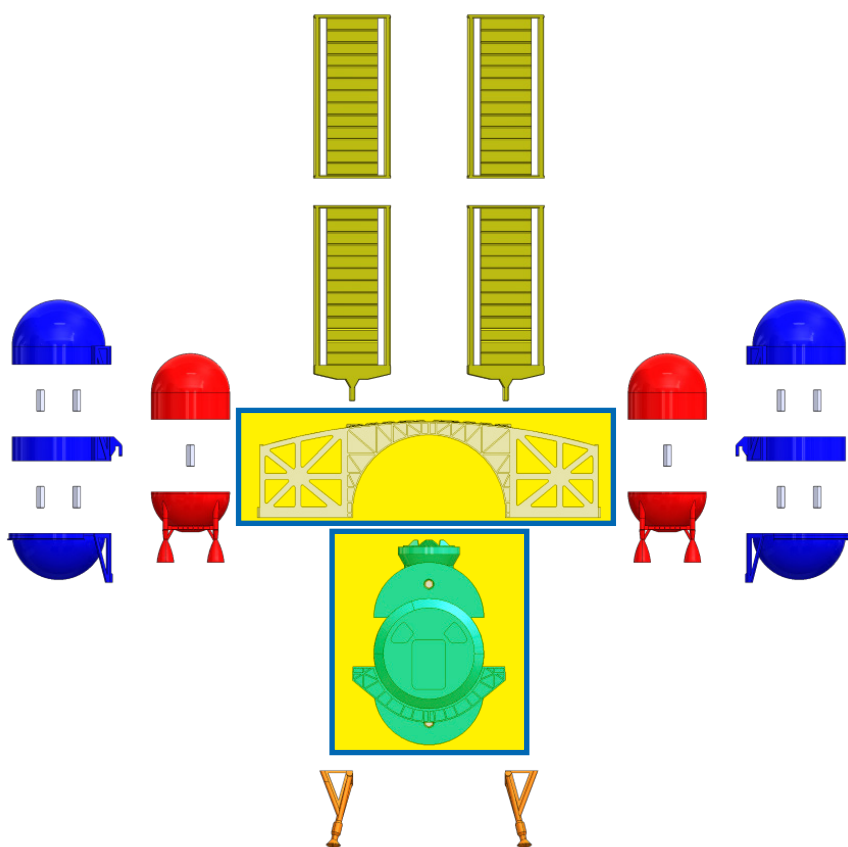
Use a small amount of glue at the four locations indicated.

It can be helpful to apply slight pressure to the frame as the glue cures to “trap” the crew module against the frame.



Apply glue in these four areas



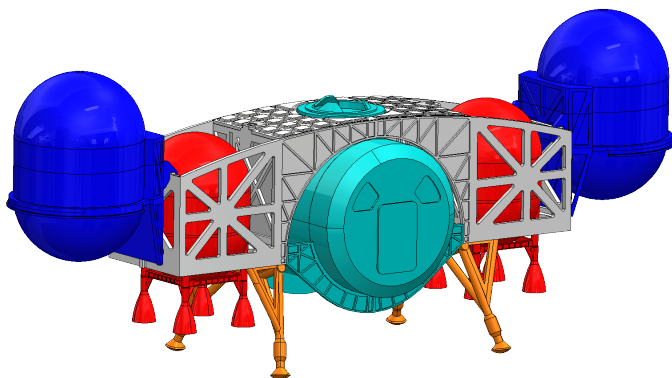
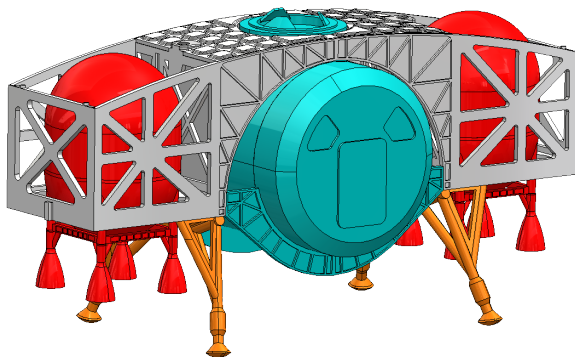


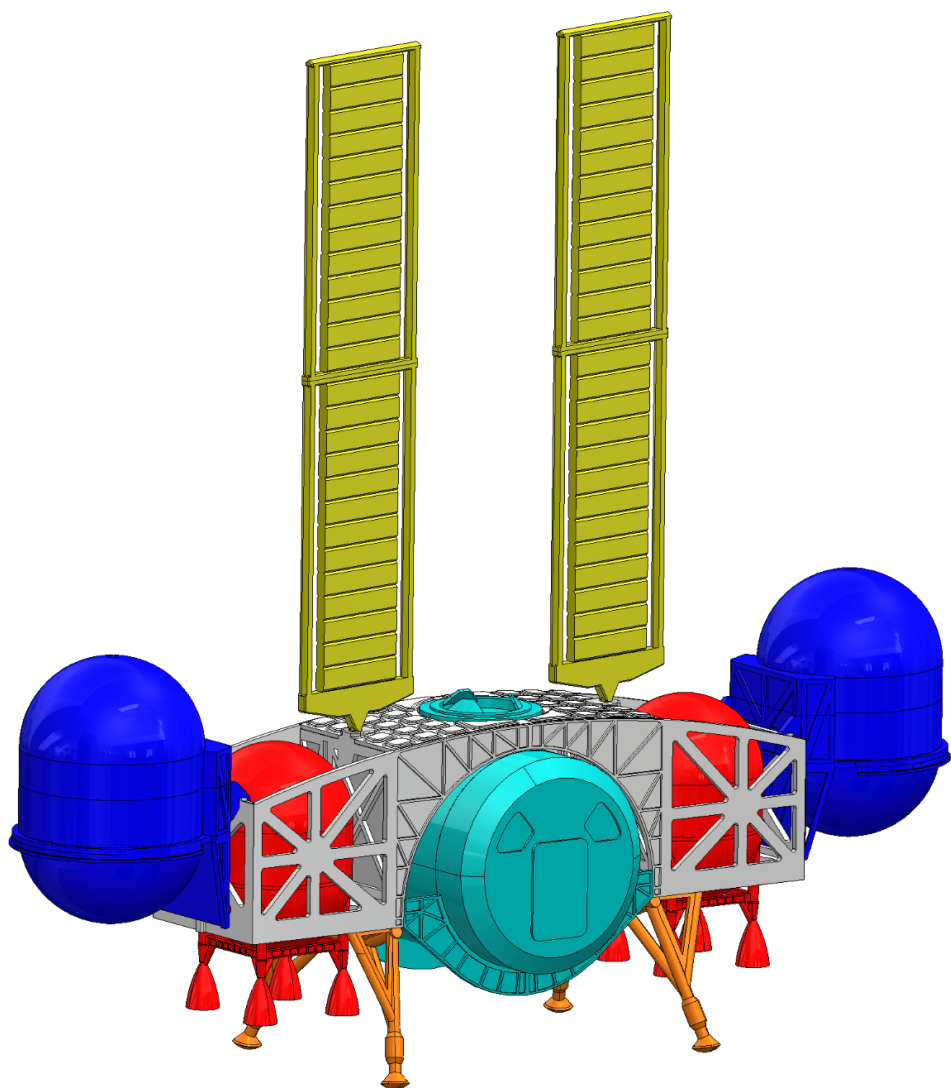
14. ASSEMBLY: DYNETICS HUMAN LANDING SYSTEM

Place tanks (red) in cages. Optionally, you can glue the tanks to the frame.

Place MPVs on cages, using the hooks.

Place the solar arrays on the frame. Note: it may be necessary to clean the printed holes and/or clean up the solar array stems.





CONGRATULATIONS! YOU'RE DONE!

You have completed the Dynetics Human Landing System
Printable Model!

Be sure to share your success with your friends online!

#DyneticsHLS

