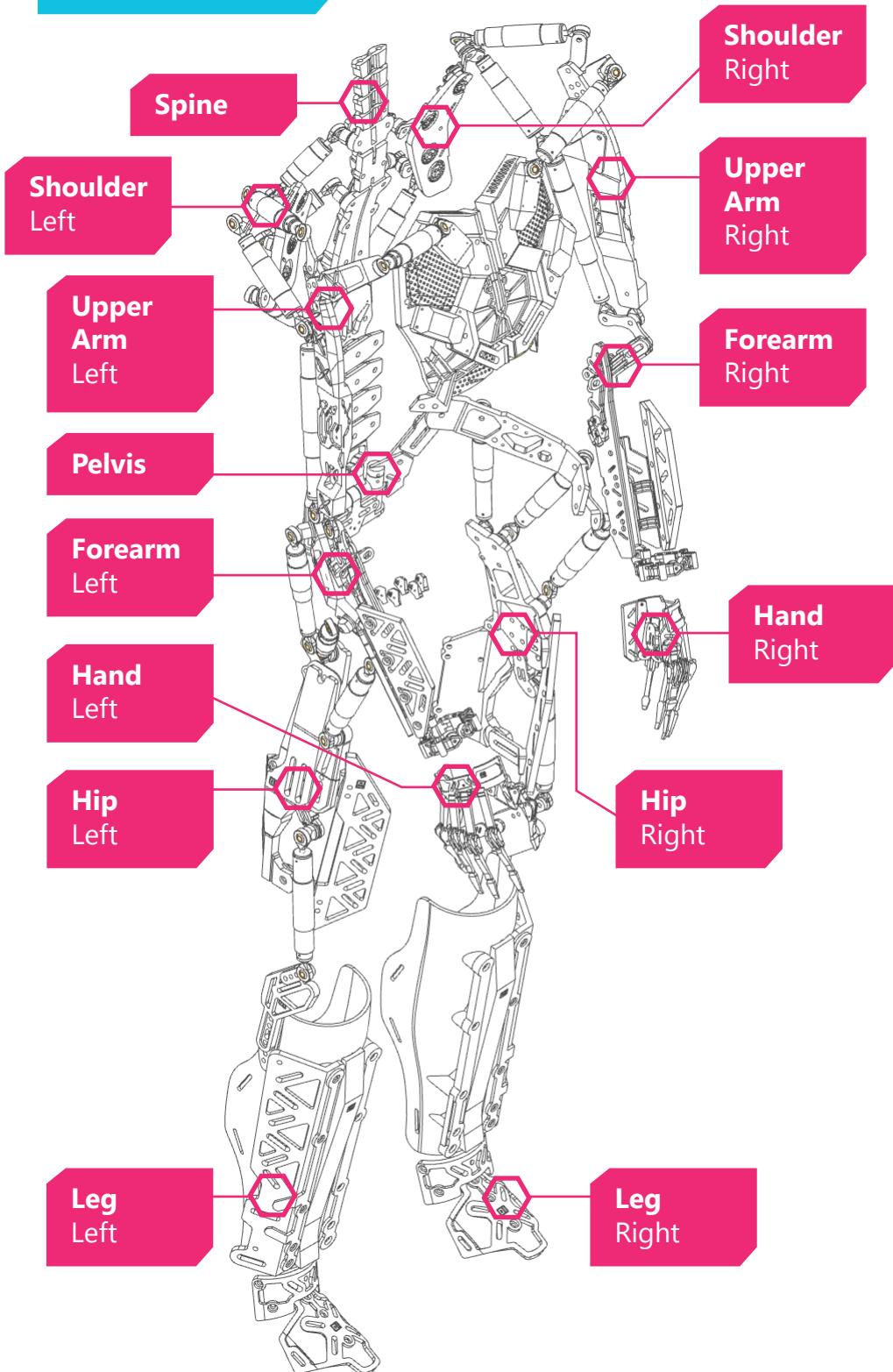
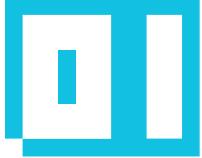


Elysium Max Exoskeleton Assembly Instructions

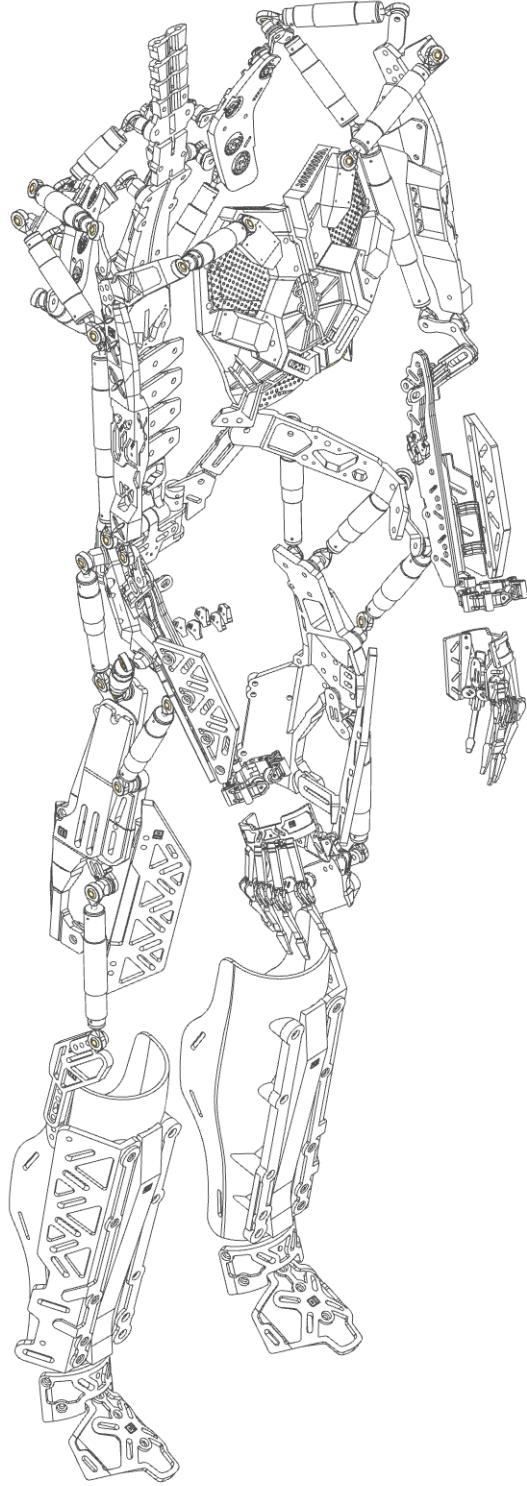
Overview





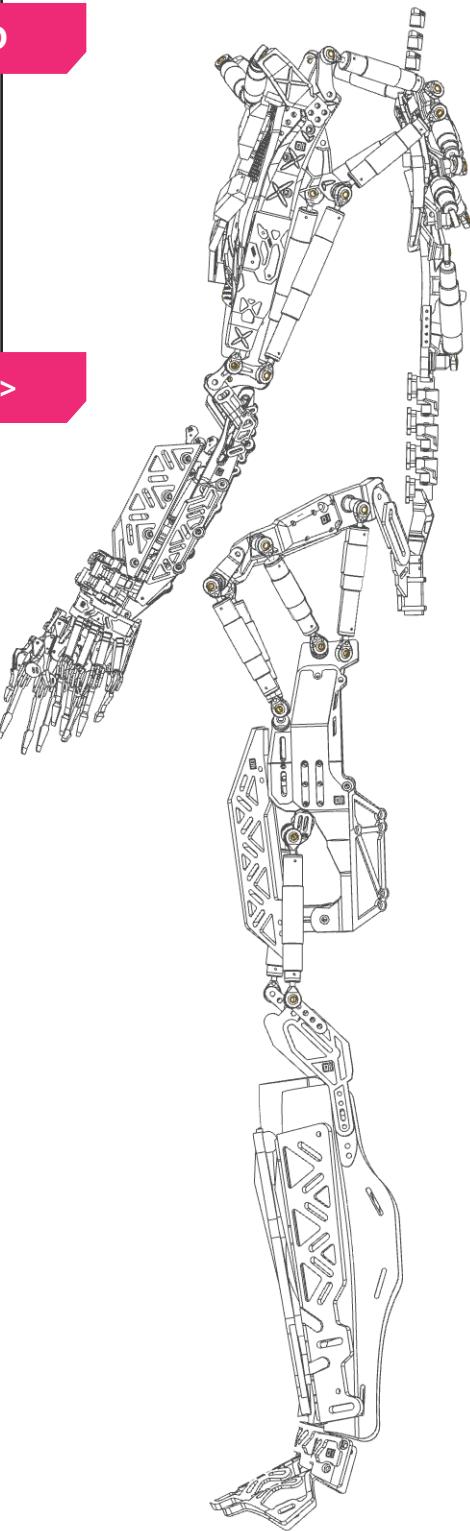
Elysium Max Exoskeleton Assembly Instructions

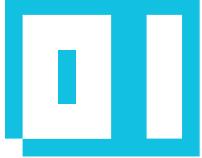
Overview



< ISO

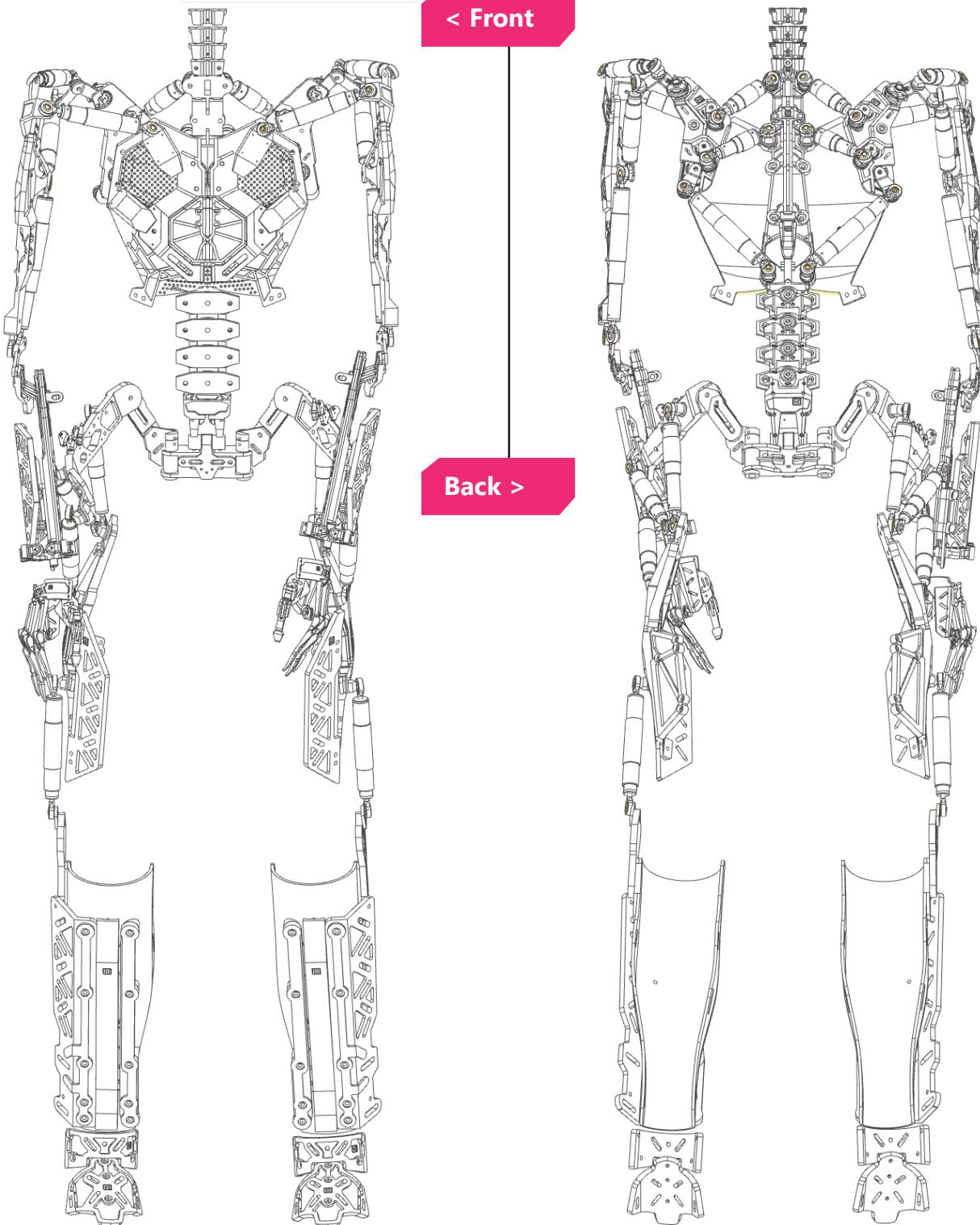
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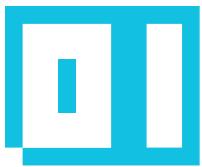




Elysium Max Exoskeleton Assembly Instructions

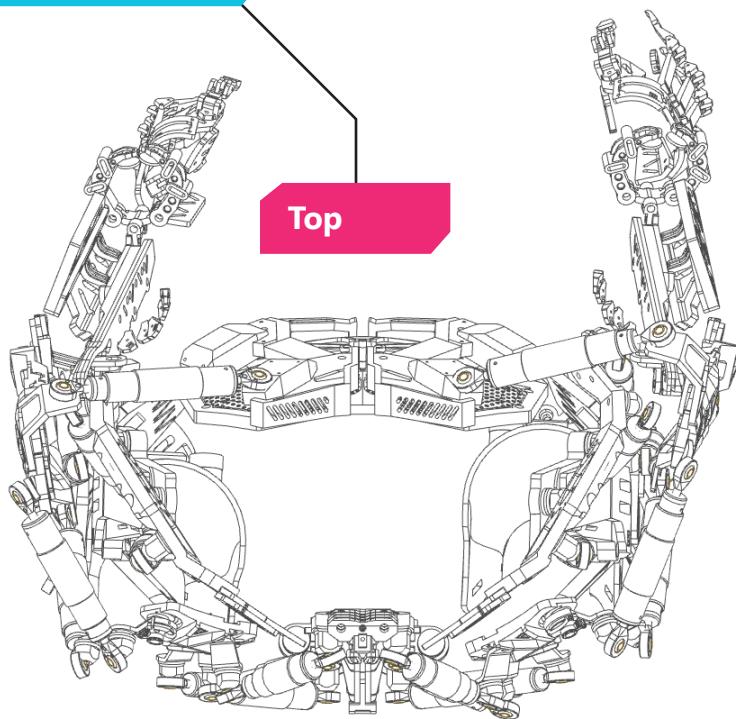
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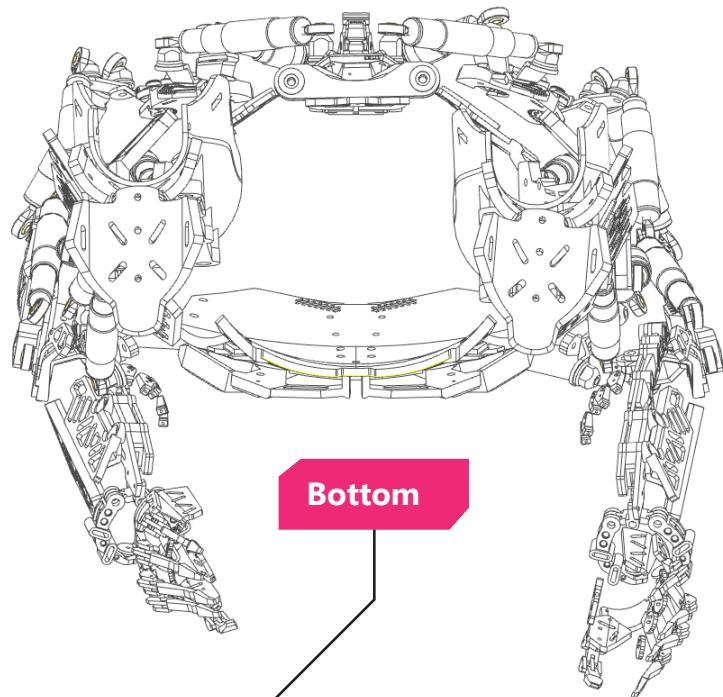


Elysium Max Exoskeleton **Assembly Instructions**

Overview



Top



Bottom



Elysium Max Exoskeleton Assembly Instructions

Fasteners

The suit is assembled using 6mm and 3mm socket head screws (buying in bulk as listed will cost around \$180). There is only one 12mm bolt, used to connect spine base to pelvis mount. The double joints used to connect metacarpus to proximal phalanges in the hand are 3mm set screws.

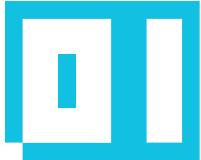
The following fasteners can be bulk ordered from [MSC Industrial Supply](#).

Part numbers are listed on the second line of Item field.

Item	Qty	Price
M6 X 15MM METRIC SHCS ALLOY ST-HK (# 75581157)	100	\$ 20.78
M6-1.00 X 20MM USA HK METRIC SKT HD CAP SCRW (# 75581207)	100	\$ 22.64
M6-1.00 X 12MM USA HK METRIC SKT HD CAP SCRW (# 75581124)	100	\$ 20.21
M6-1.00 X 25MM USA HK METRIC SKT HD CAP SCRW (# 75581256)	100	\$ 27.15
M3 X 8MM METRIC SHCS ALLOY ST-HK (# 67112128)	100	\$ 16.79
M3 X 20MM METRIC SHCS ALLOY ST-HK (# 67112326)	100	\$ 18.57
M3 X 5 MET ALLOY CUP PT SSS (# 68063361)	100	\$ 7.66
M3 X 6 MET ALLOY CUP PT SSS (# 68063403)	100	\$ 7.97
M3 X 8 CUP PT IMP METRIC SCKT SET SCR (# 68063445)	100	\$ 8.26

The following were ordered from [Linx Heli](#).

Item	Qty	Price
7 x M3x16SC-10 - Set Screw M3x16, 10 PCS (# M3x16SC-10)	7	\$ 28.00



Elysium Max Exoskeleton Assembly Instructions

Bearings

The rod-end bearings are [KARM-06](#) from **Igus** in Germany. An Inventor model of the bearing is included. Ordering 24 of these for the whole suit is will cost approx. \$80.

Printing

Build Volume:

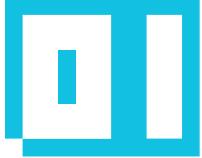
5592770 mm³ (341.3 cubic inches) according to Inventor iProperties.

The exoskeleton has been printed in several orders from [Protolabs](#) (online manufacturer) and [RapidMade](#) (in Portland, Oregon). The approx. cost is \$8,000 when ordering as-is (simply uploading all the parts and hitting submit on the order).

[Accura Xtreme White](#) material was used for **SLA** and (unfilled) [Nylon 12](#) for **SLS**. Parts that have to bear a lot of stress have been printed using laser sintering due to high elongation on break properties. SLS is also great for tapping and drilling. All other parts where cosmetic appearance was more important were printed using SLA.

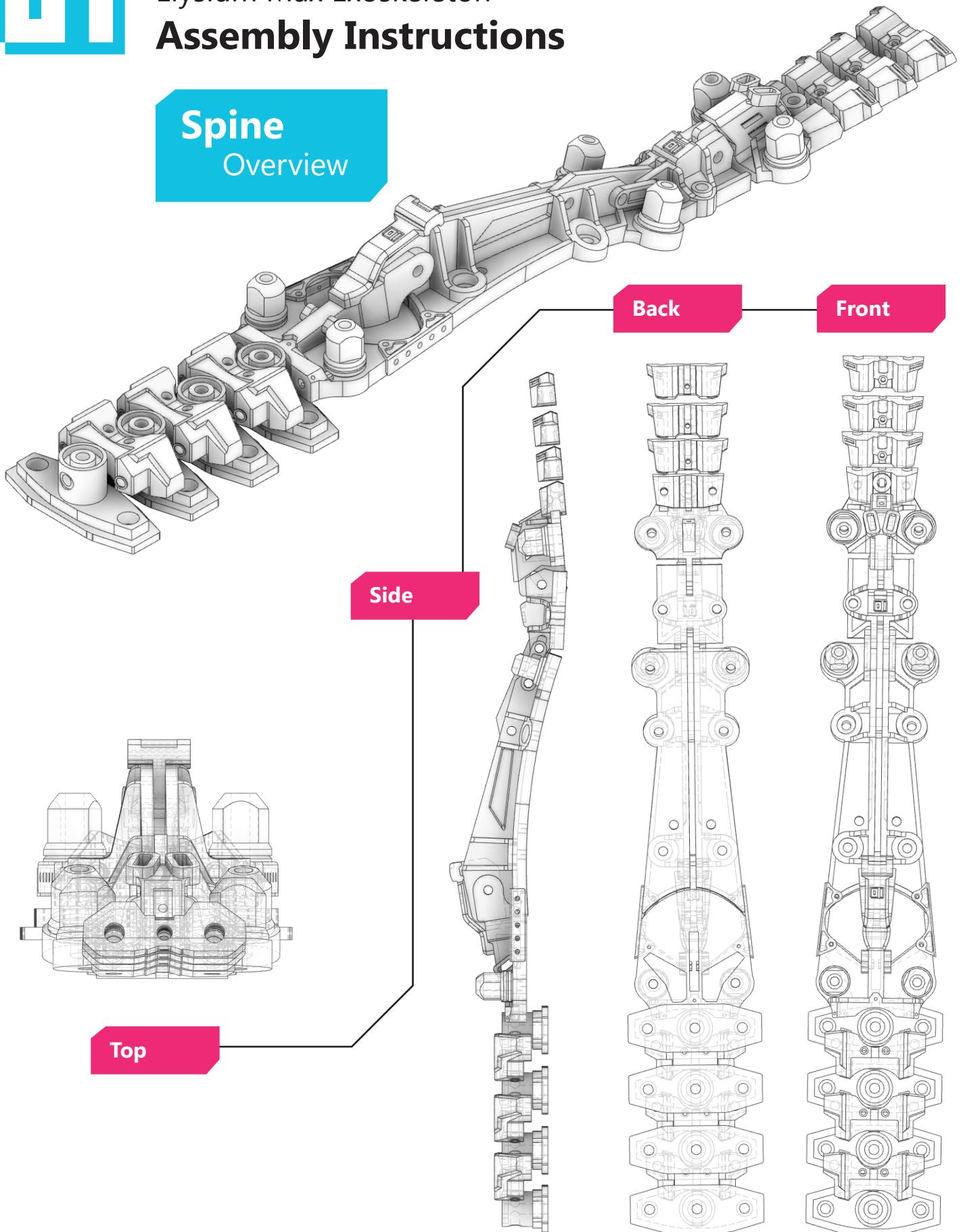
Electronics

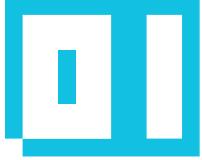
Two [brushless DC cooling fans \(12 V\)](#) powered by 9 V batteries can be installed in the **chest piece**. The fans are modeled in Inventor to show them in the assembly and carve out the perfect negative space where they can be snapped in. The fans complete two copies of the same circuit with fan, battery and switch. The **Upper Arm** and **Hip** parts have cavities were LED lights with small batteries can also be installed.



Elysium Max Exoskeleton Assembly Instructions

Spine Overview

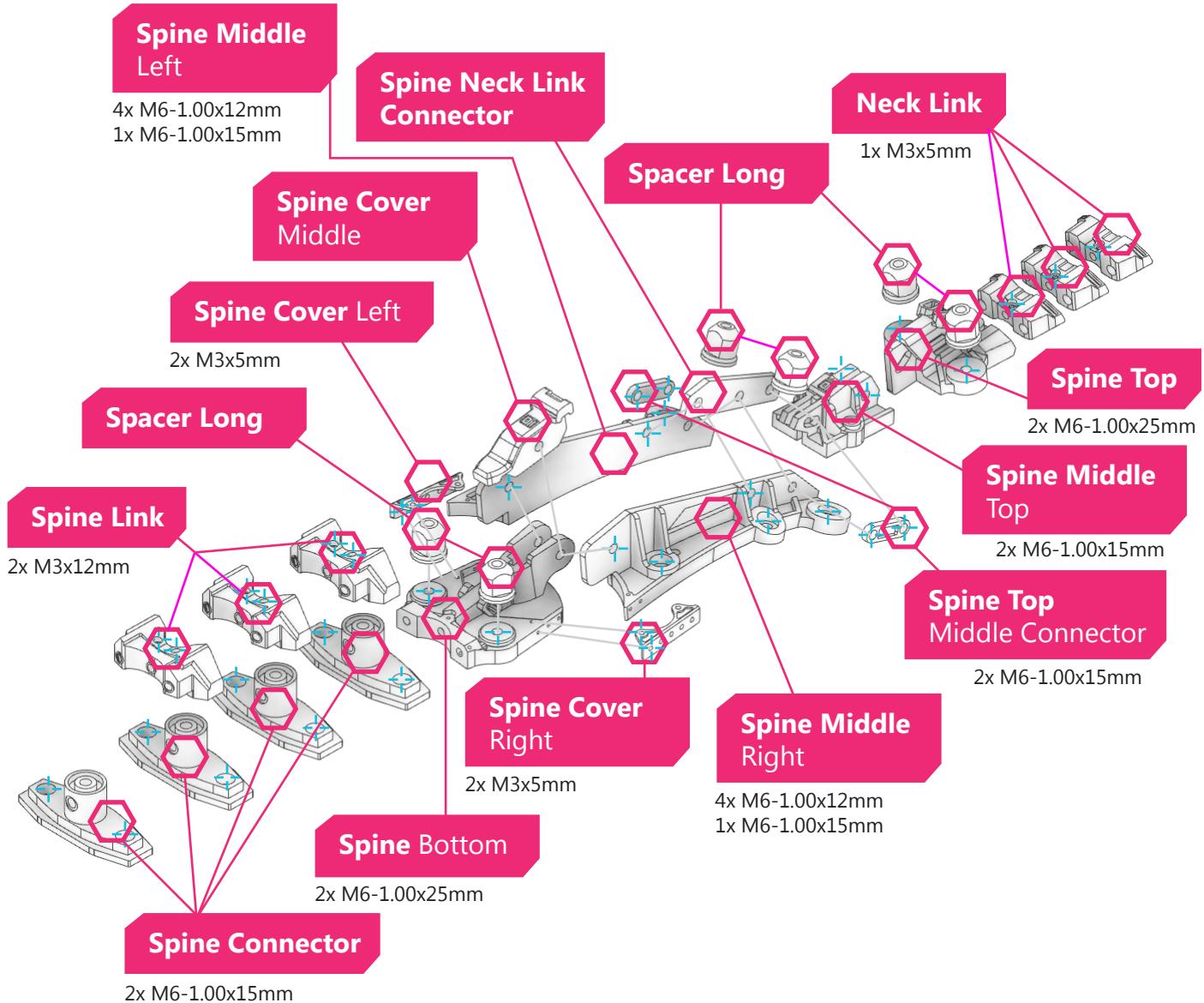


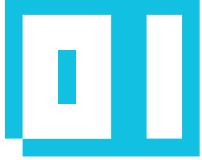


Elysium Max Exoskeleton Assembly Instructions

Spine

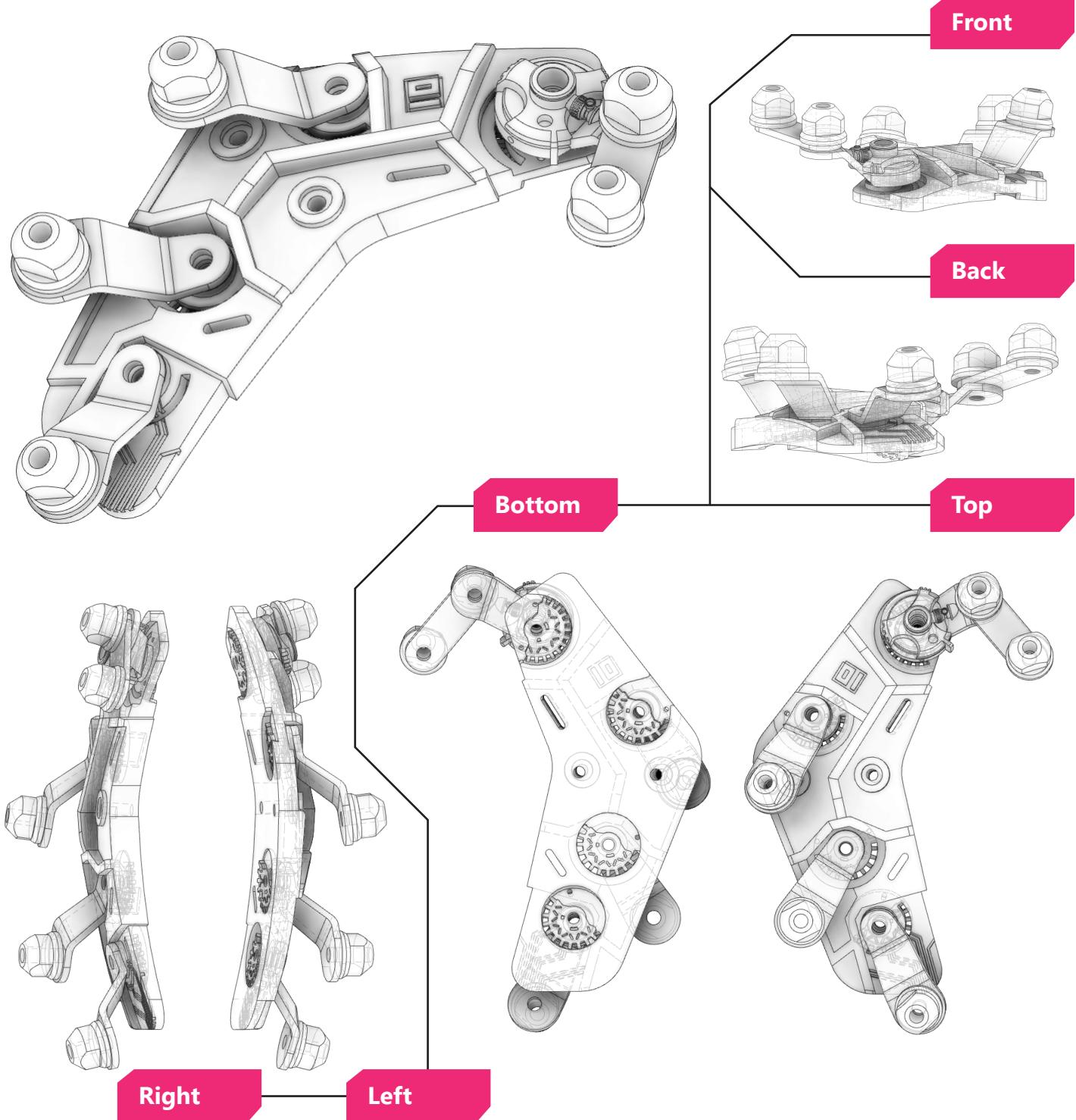
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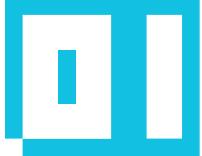




Elysium Max Exoskeleton Assembly Instructions

Shoulder Overview

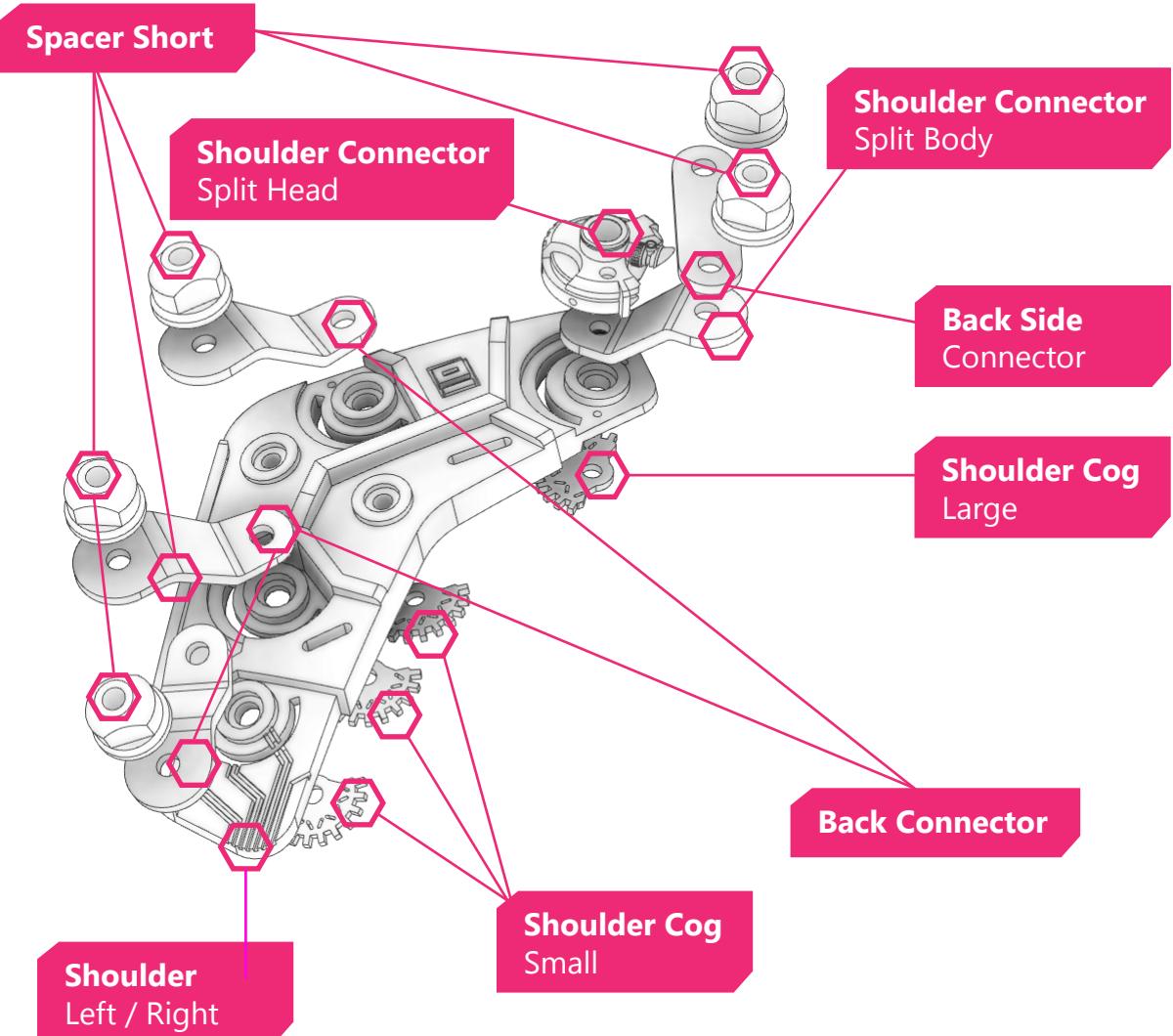


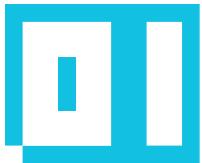


Elysium Max Exoskeleton Assembly Instructions

Shoulder

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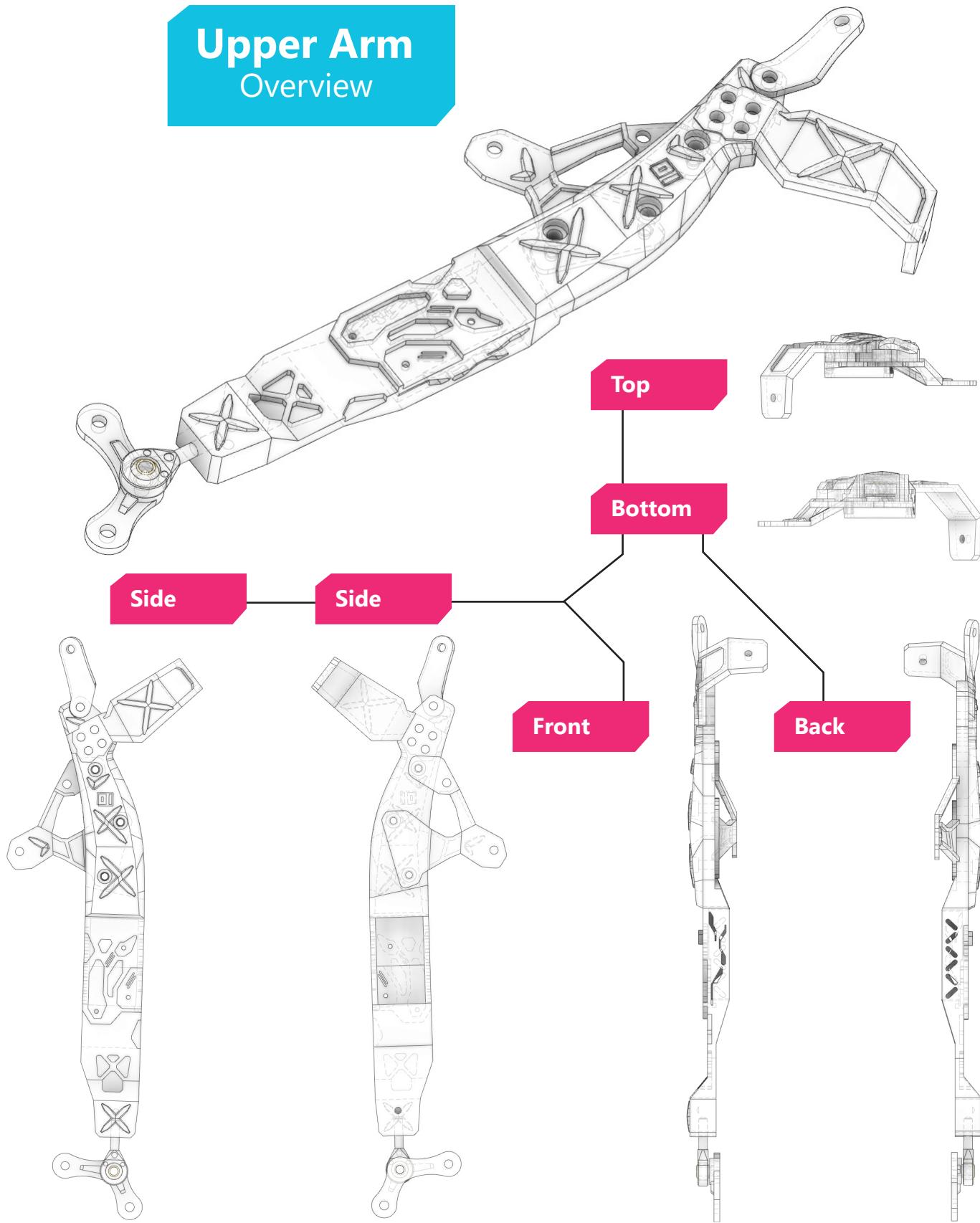


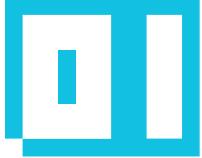


Elysium Max Exoskeleton

Assembly Instructions

Upper Arm Overview

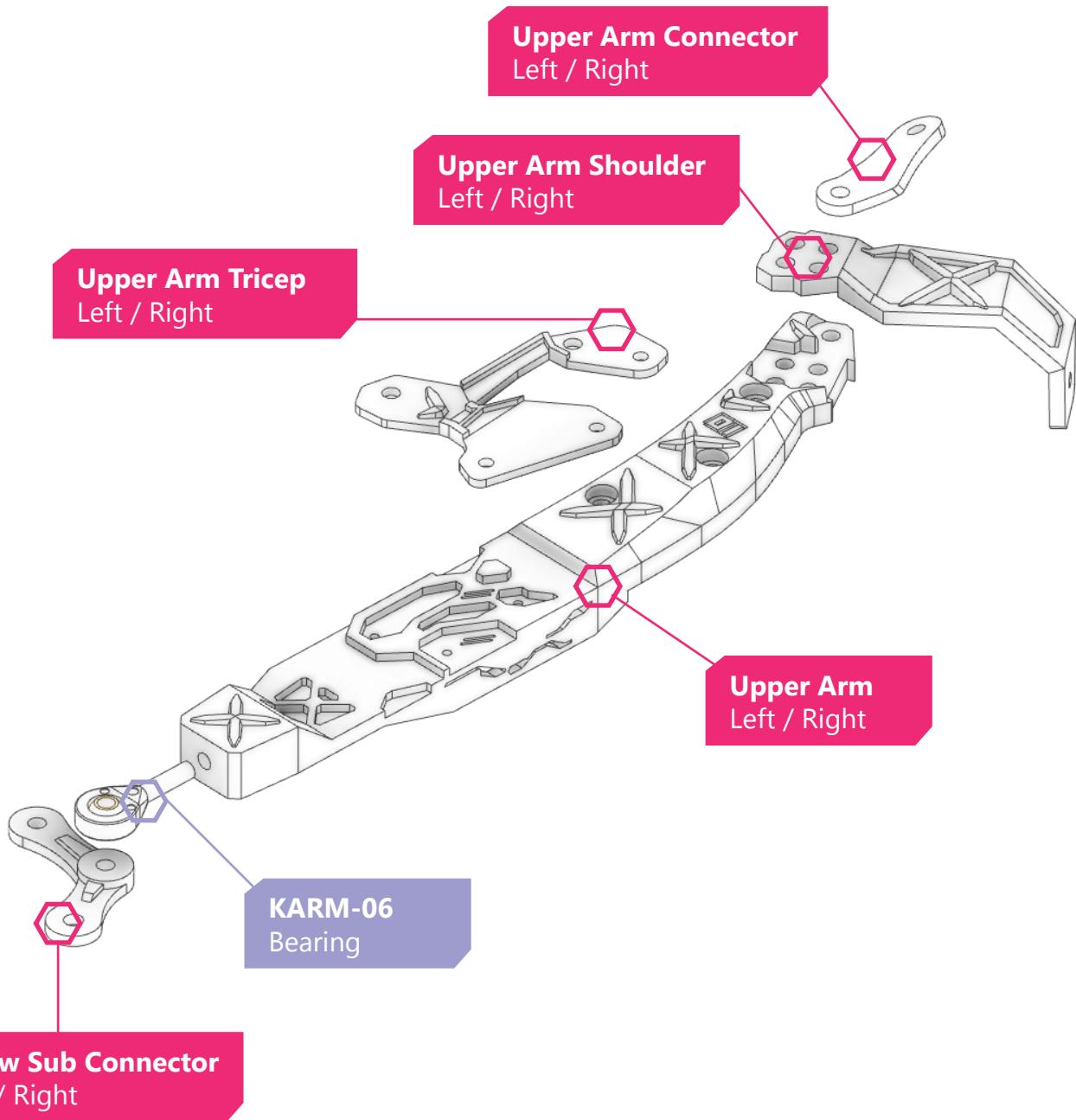


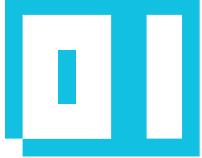


Elysium Max Exoskeleton Assembly Instructions

Upper Arm

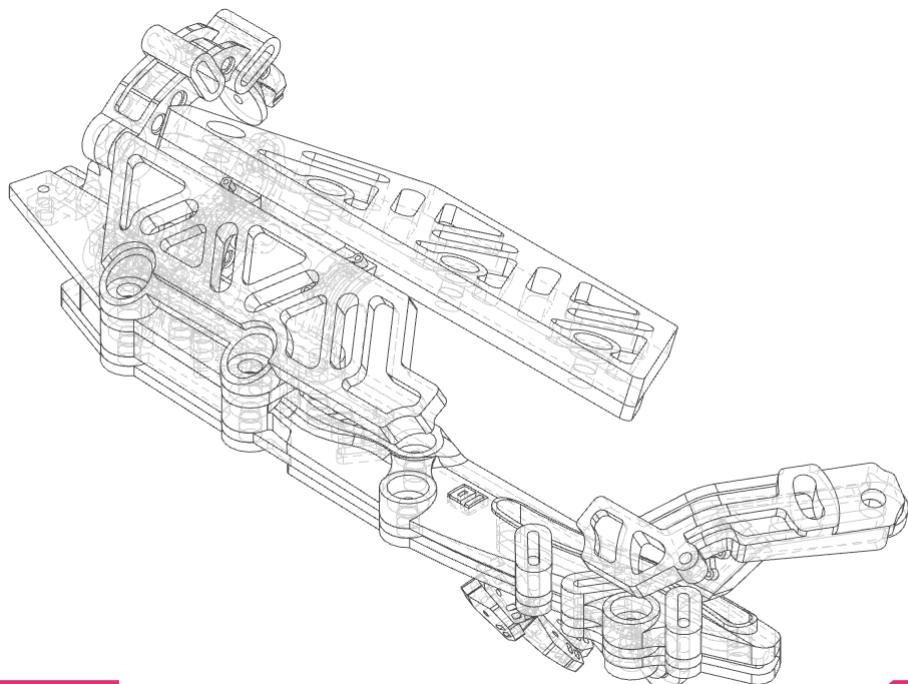
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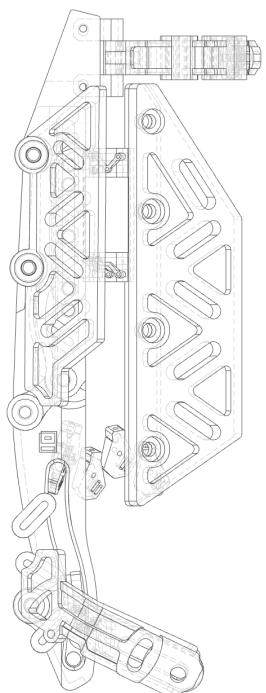


Elysium Max Exoskeleton Assembly Instructions

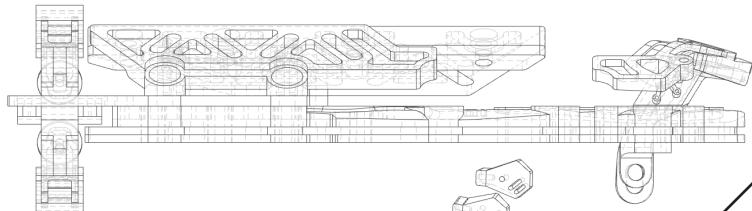
Forearm Overview



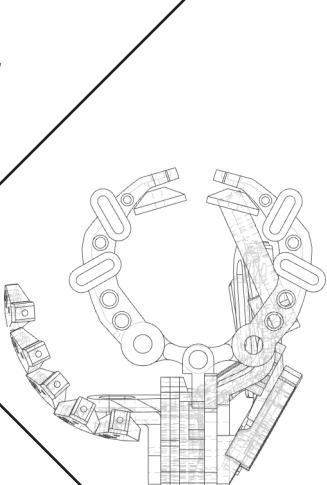
Bottom



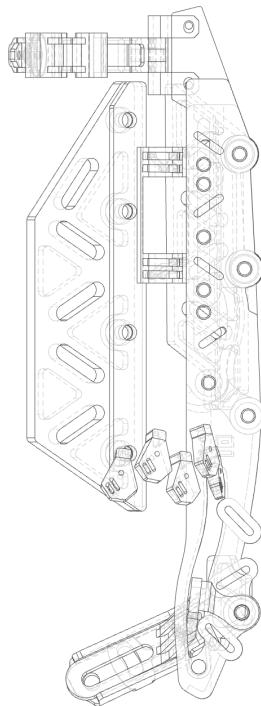
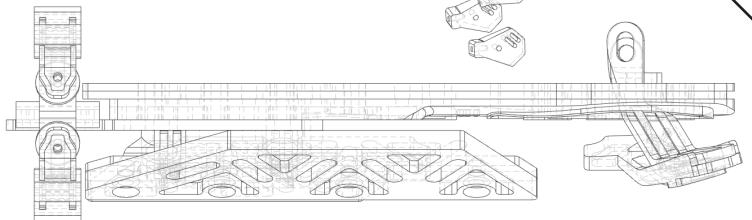
Side

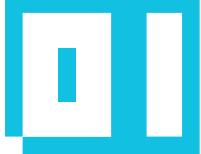


Top



Front

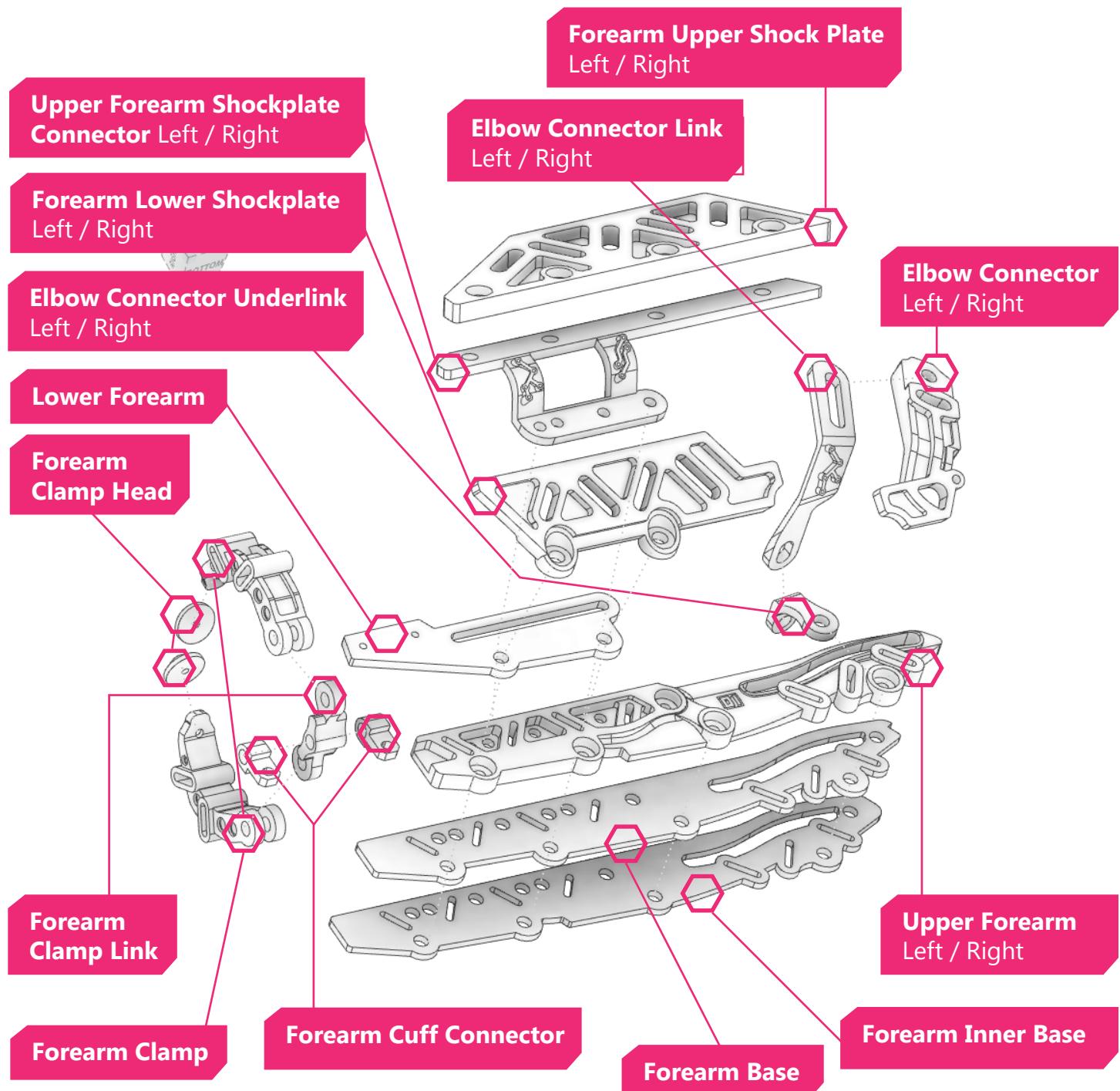


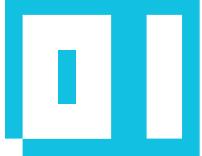


Elysium Max Exoskeleton Assembly Instructions

Forearm

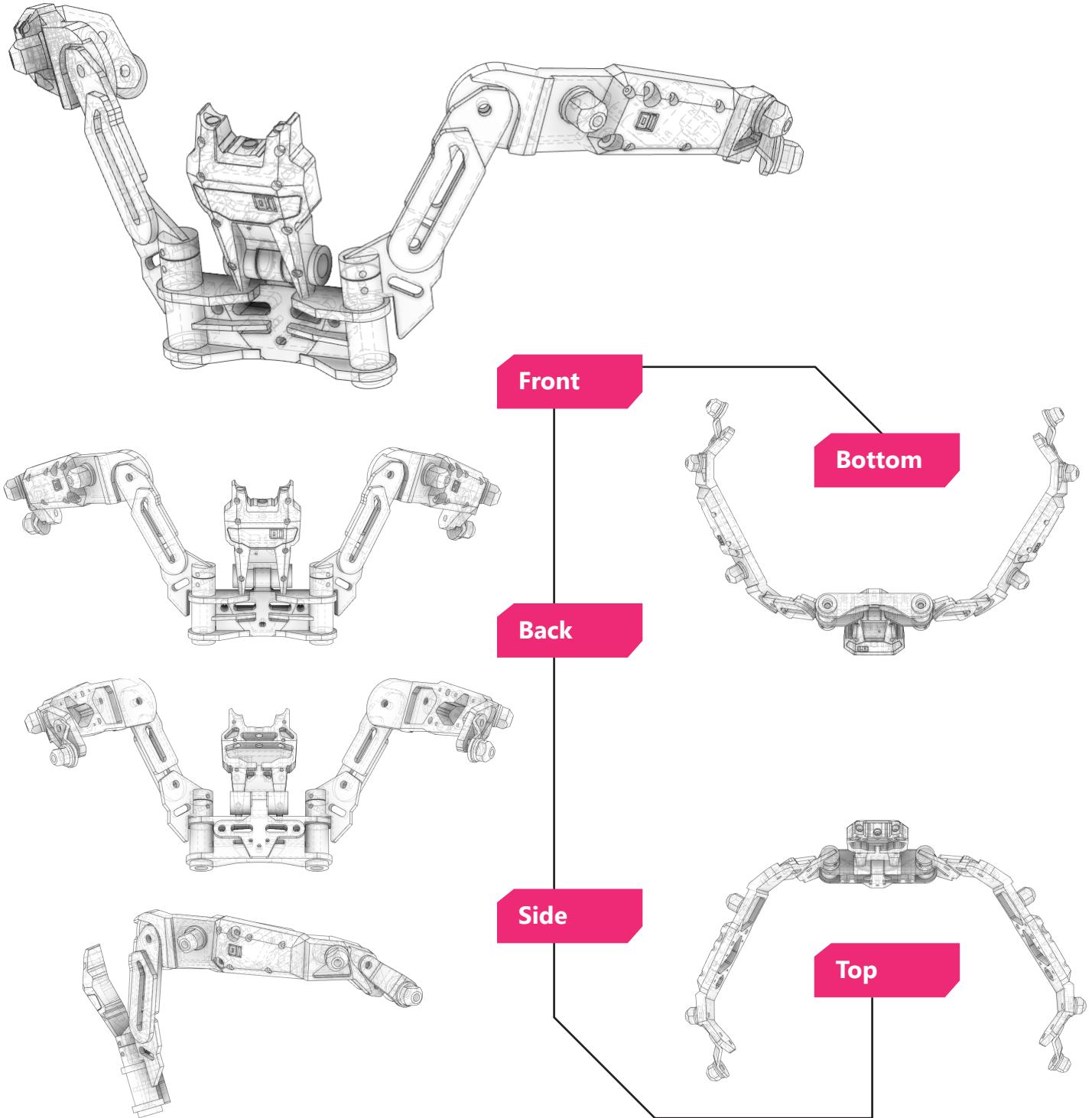
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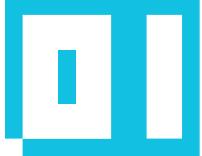




Elysium Max Exoskeleton Assembly Instructions

Pelvis Overview

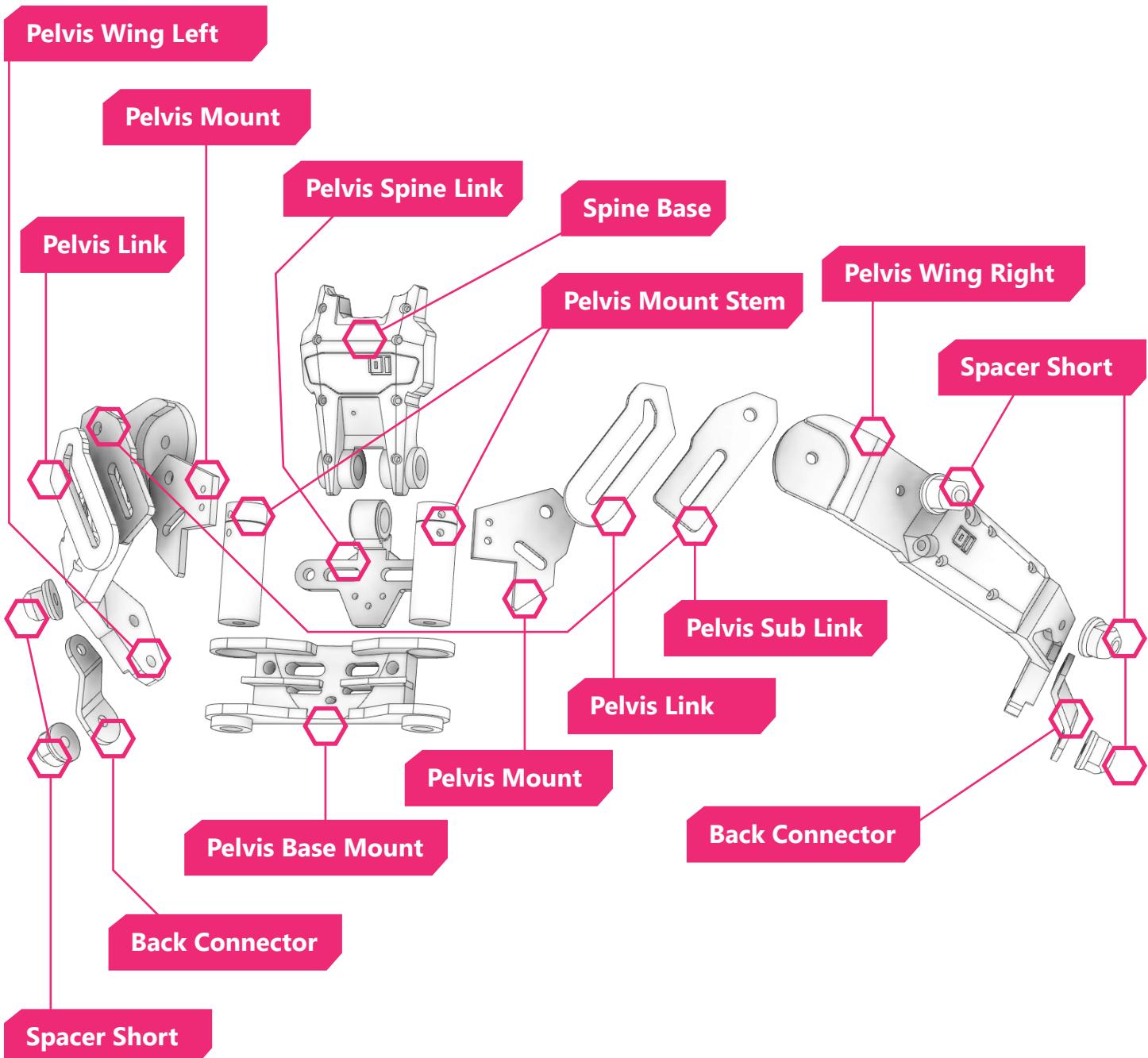


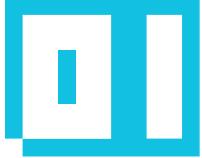


Elysium Max Exoskeleton Assembly Instructions

Pelvis

Click on the label or the hex shape to view the corresponding STL file on [GitHub](#).



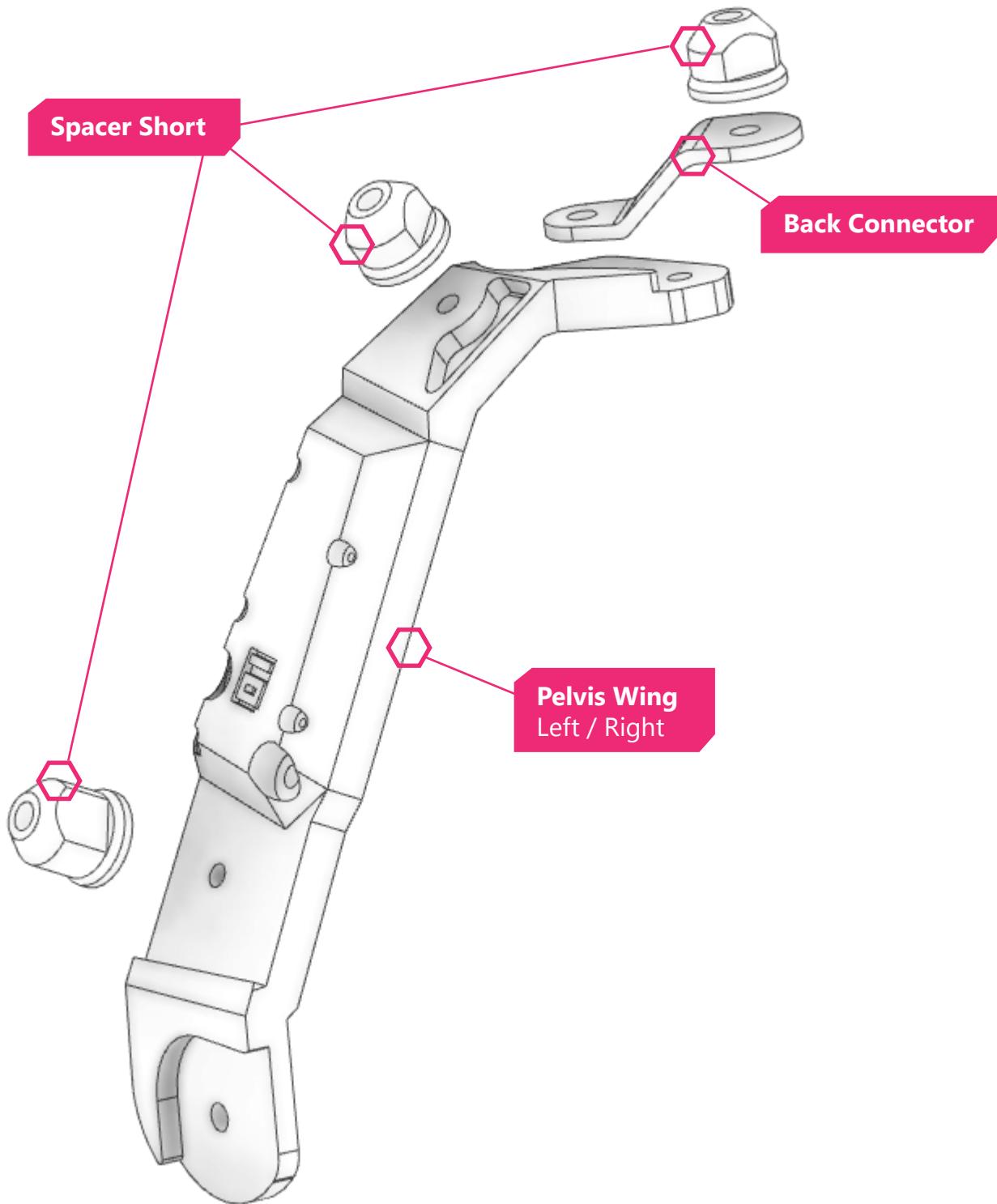


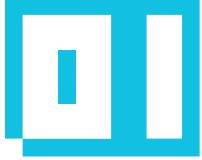
Elysium Max Exoskeleton

Assembly Instructions

Pelvis

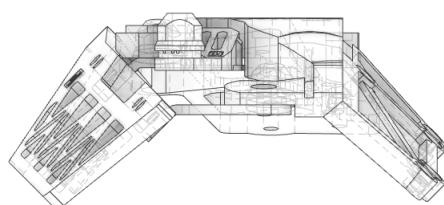
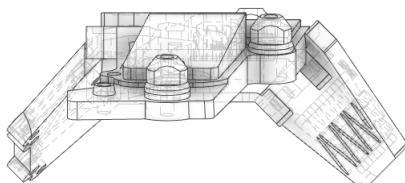
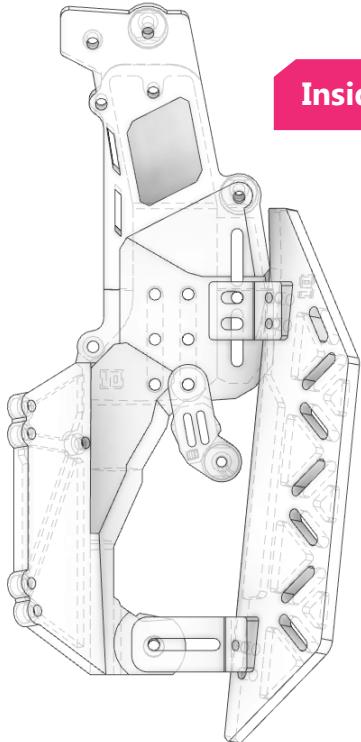
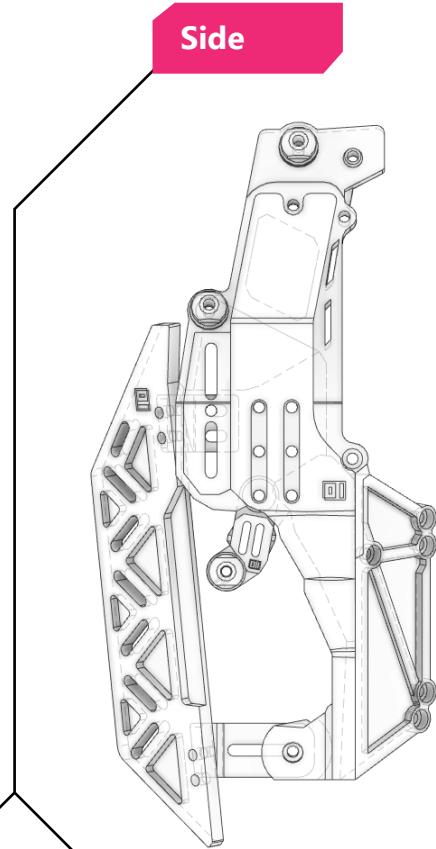
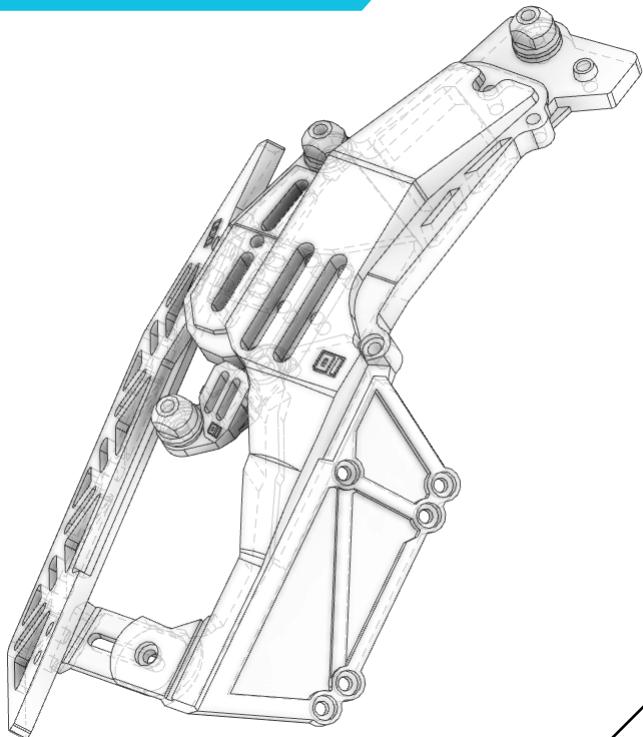
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the corresponding STL file on [GitHub](#).





Elysium Max Exoskeleton Assembly Instructions

Hip Overview



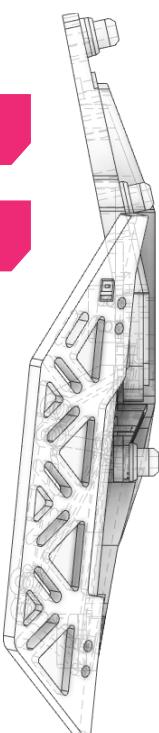
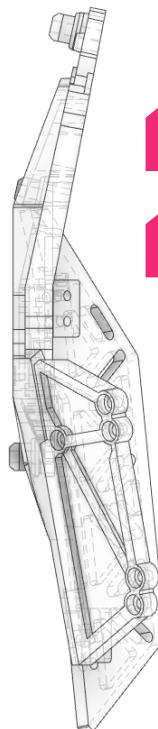
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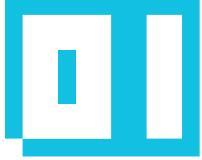
Inside

Bottom

Front >

< Back

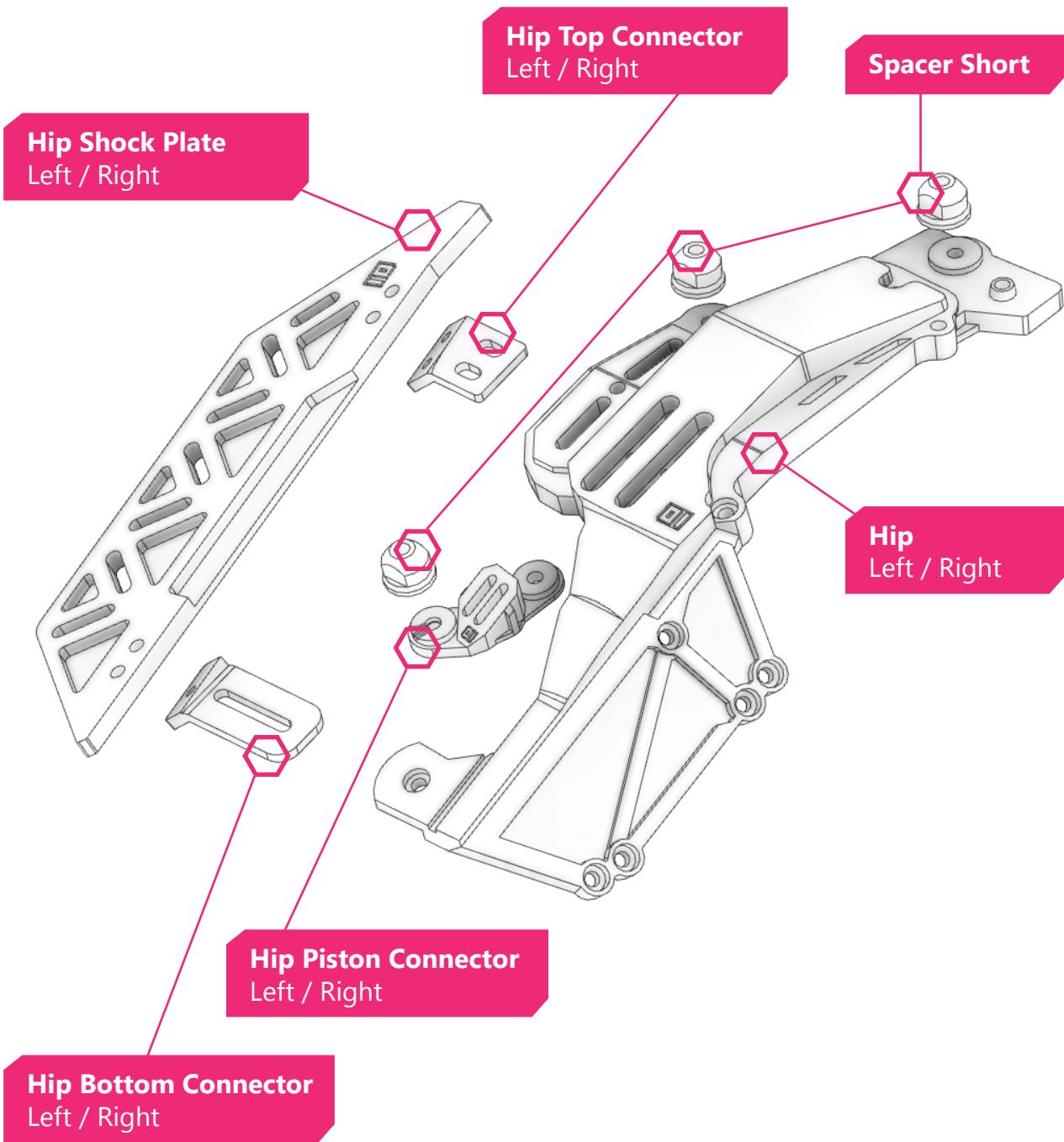


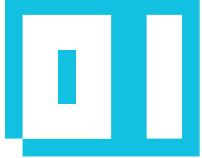


Elysium Max Exoskeleton Assembly Instructions

Hip

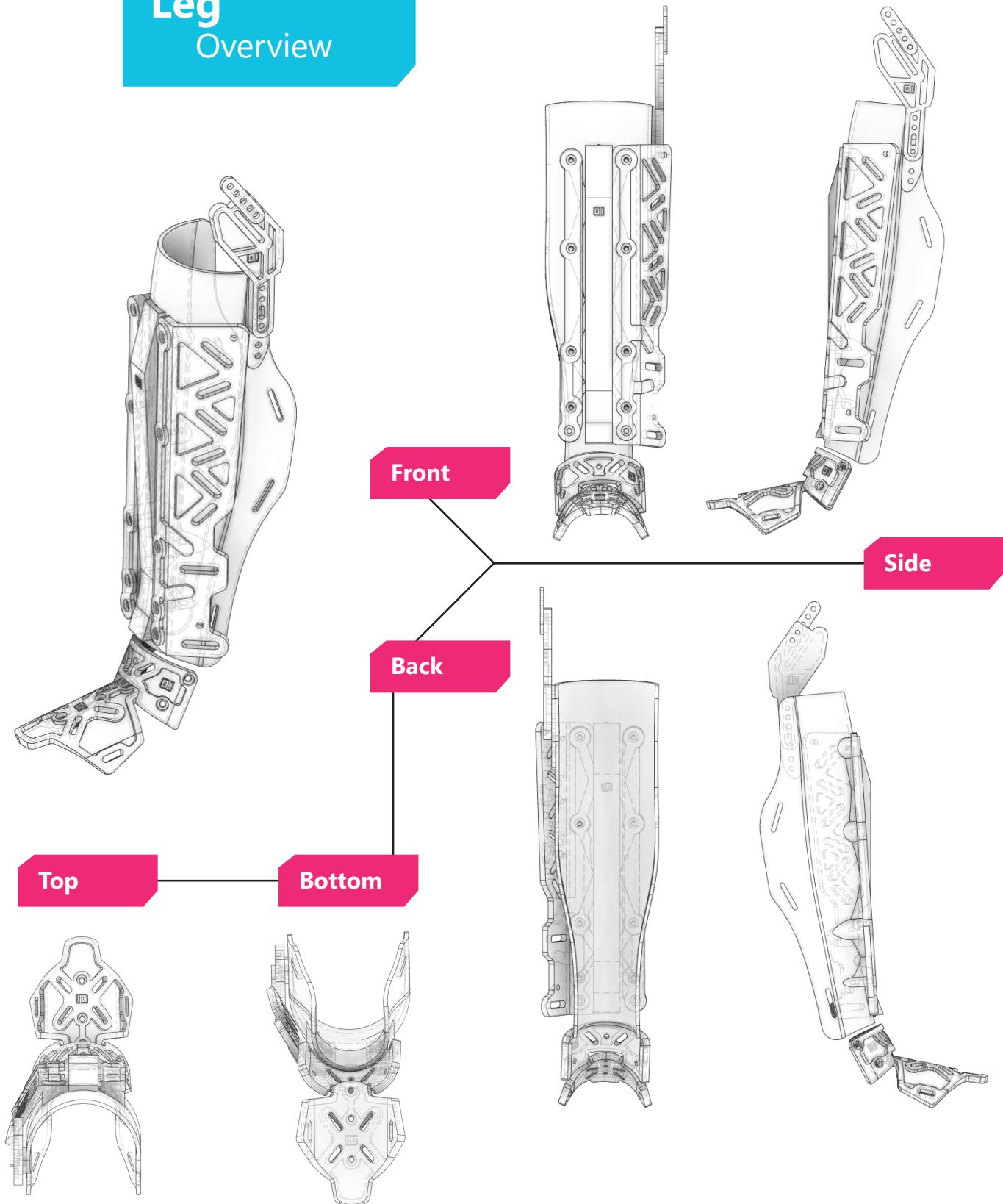
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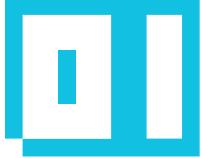




Elysium Max Exoskeleton Assembly Instructions

Leg Overview



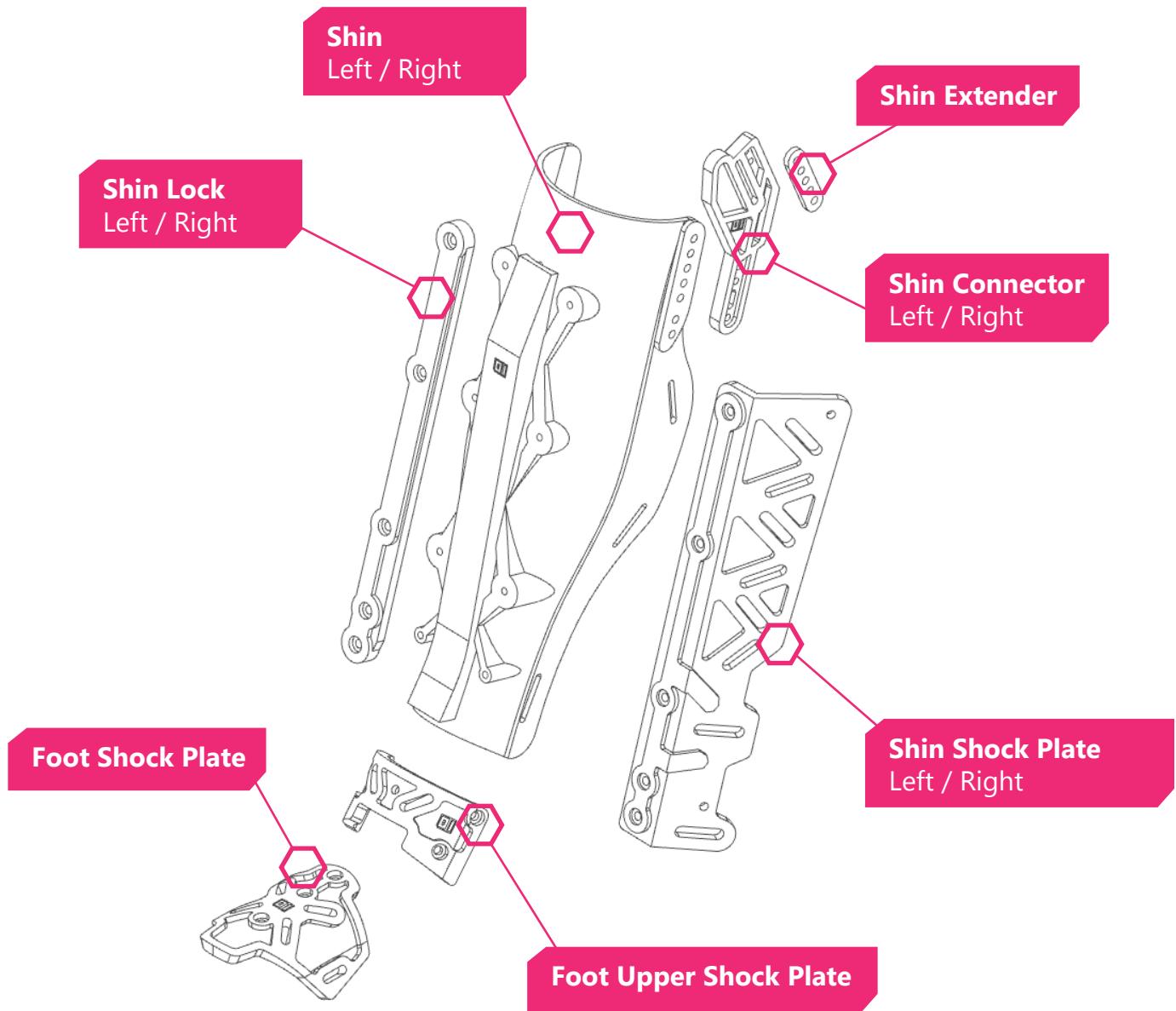


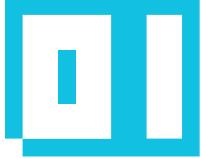
Elysium Max Exoskeleton

Assembly Instructions

Leg

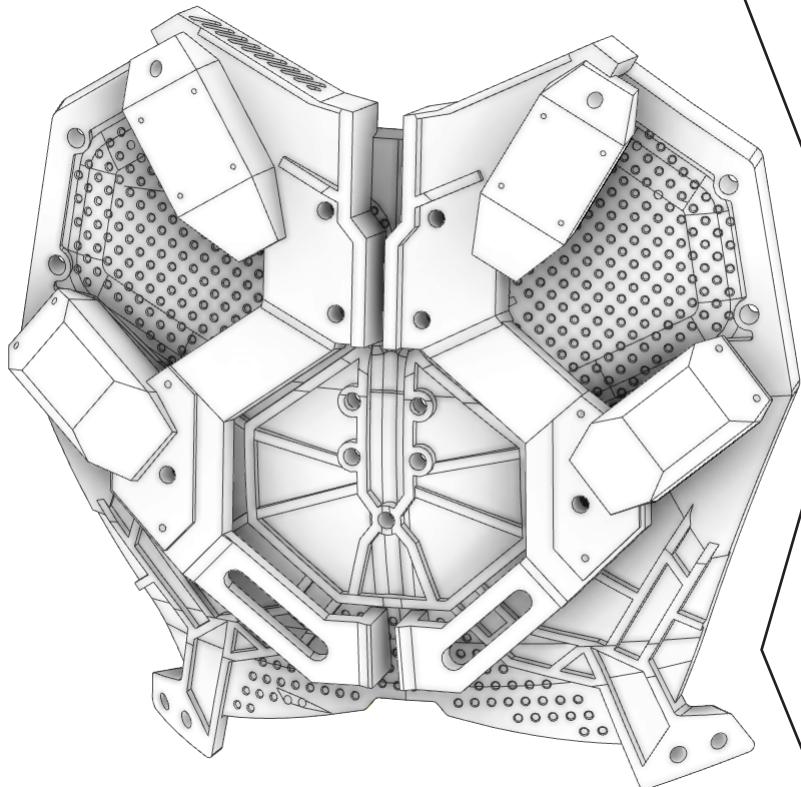
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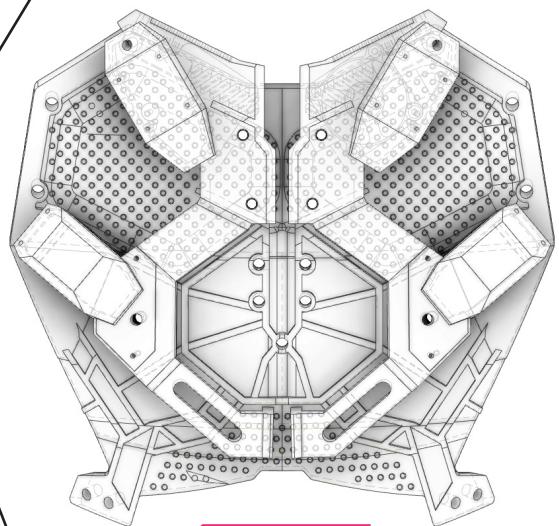


Elysium Max Exoskeleton Assembly Instructions

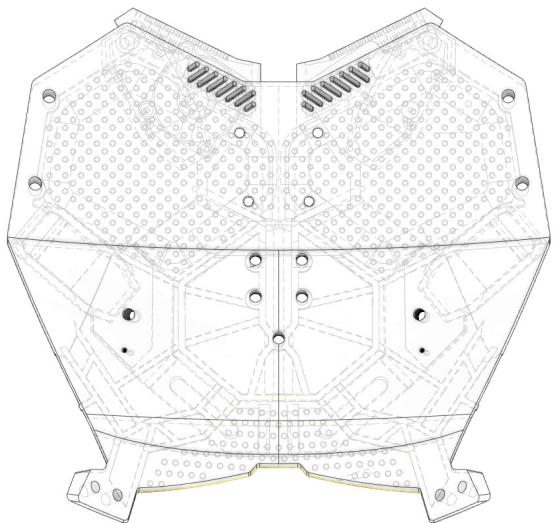
Chest Overview



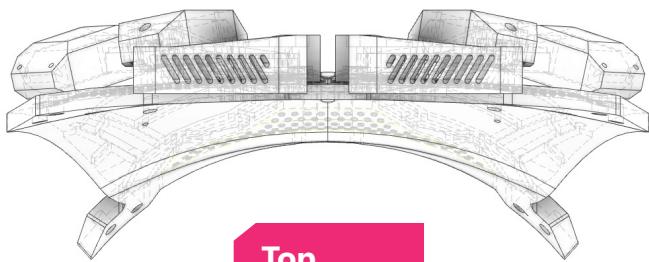
Front



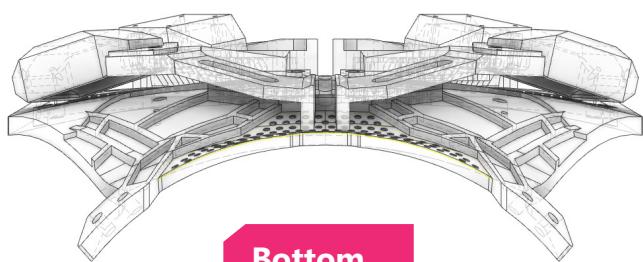
Back



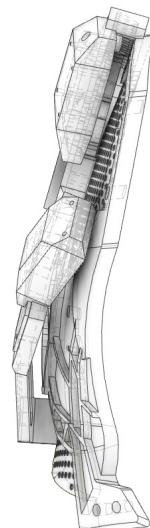
Side

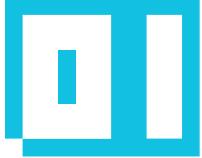


Top



Bottom

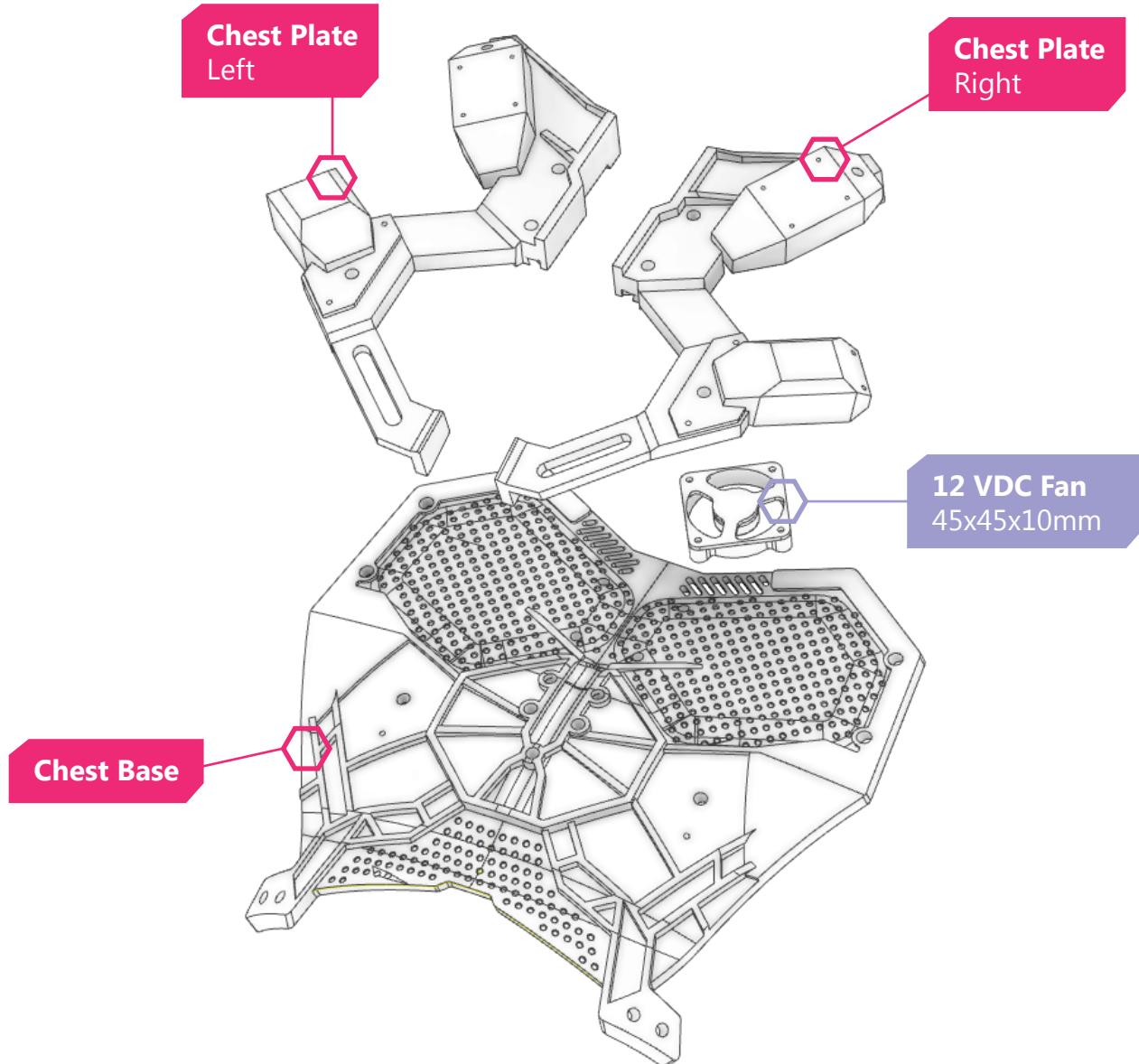


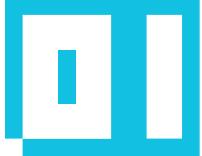


Elysium Max Exoskeleton Assembly Instructions

Chest

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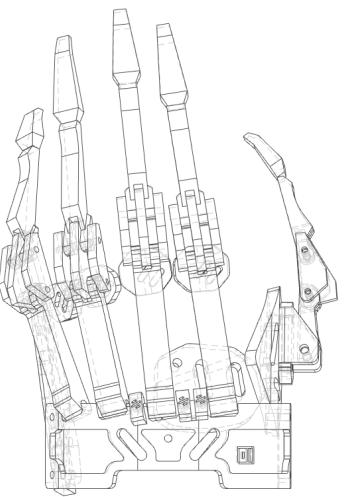




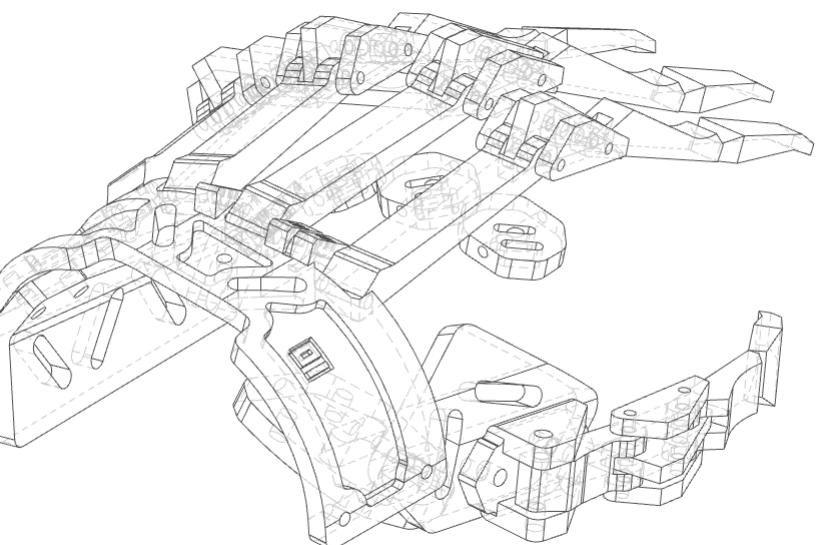
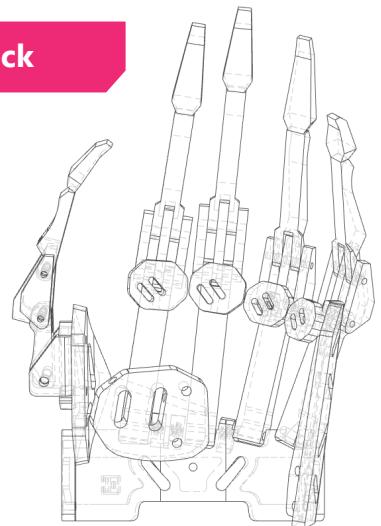
Elysium Max Exoskeleton Assembly Instructions

Hand Overview

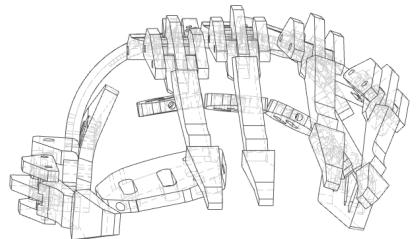
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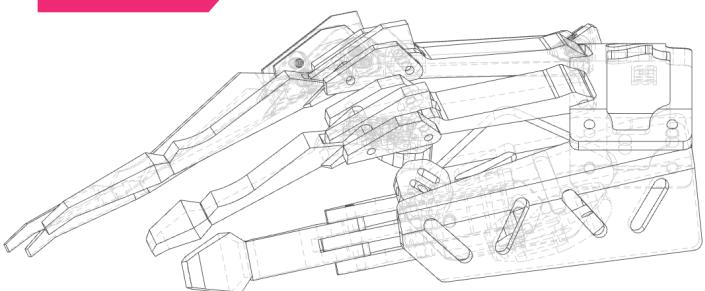
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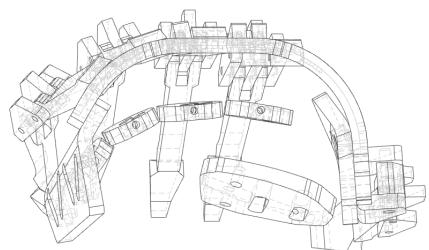
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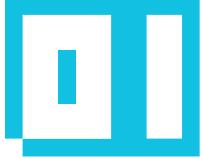


Side



Top

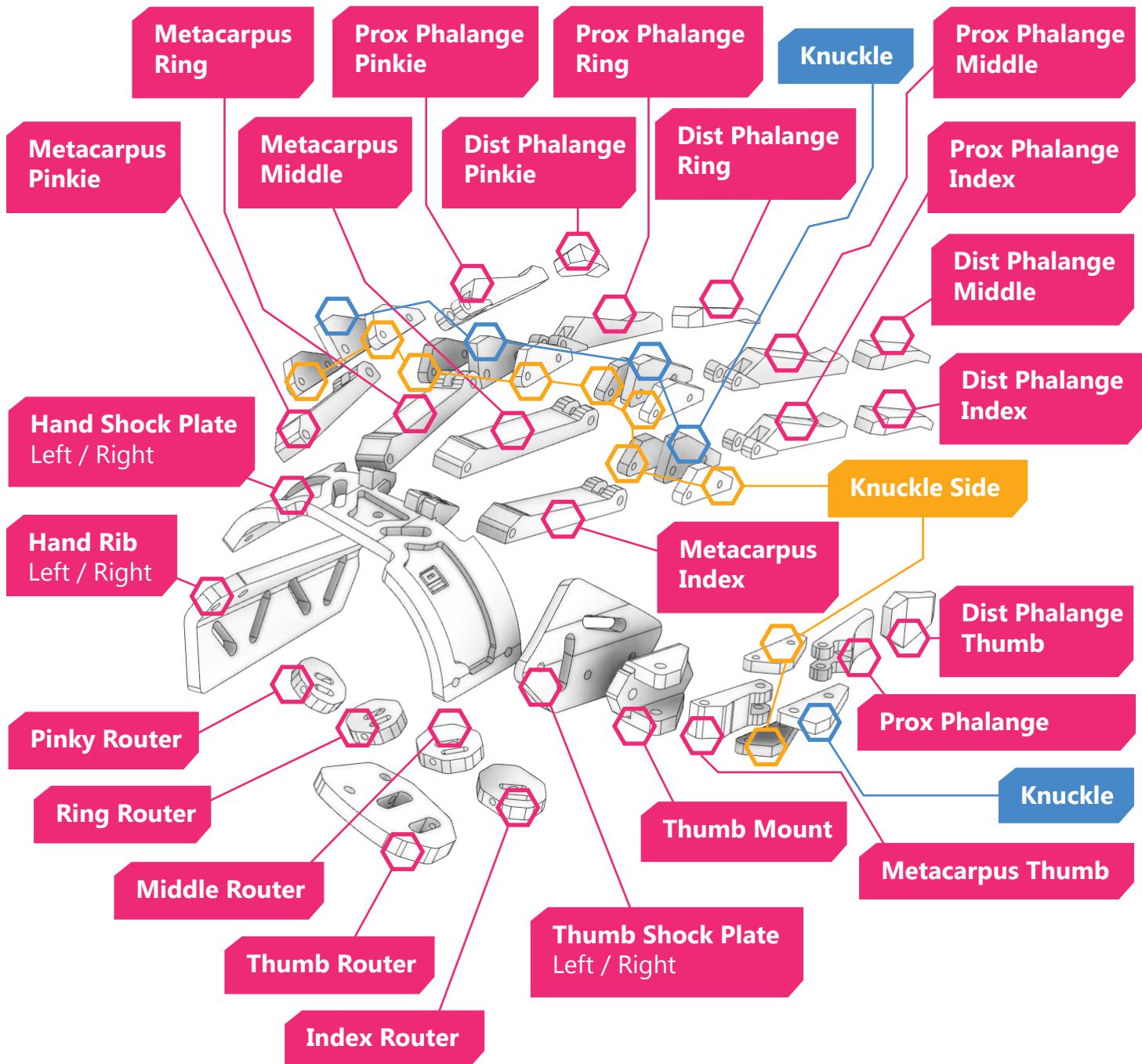


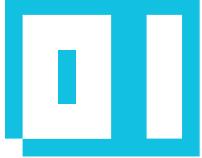


Elysium Max Exoskeleton Assembly Instructions

Hand

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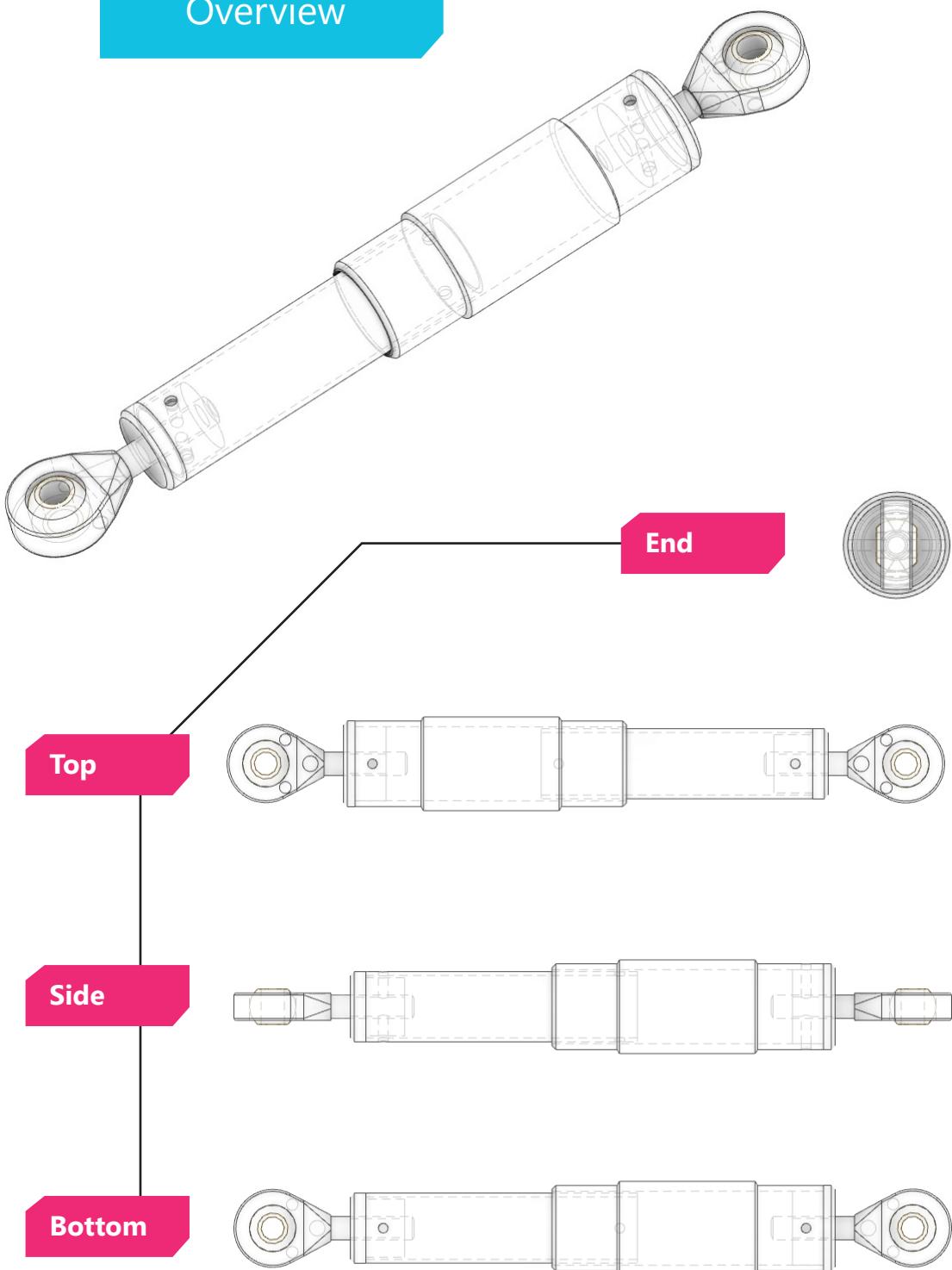


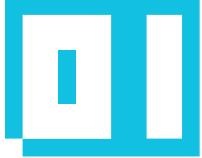


Elysium Max Exoskeleton

Assembly Instructions

Piston Overview

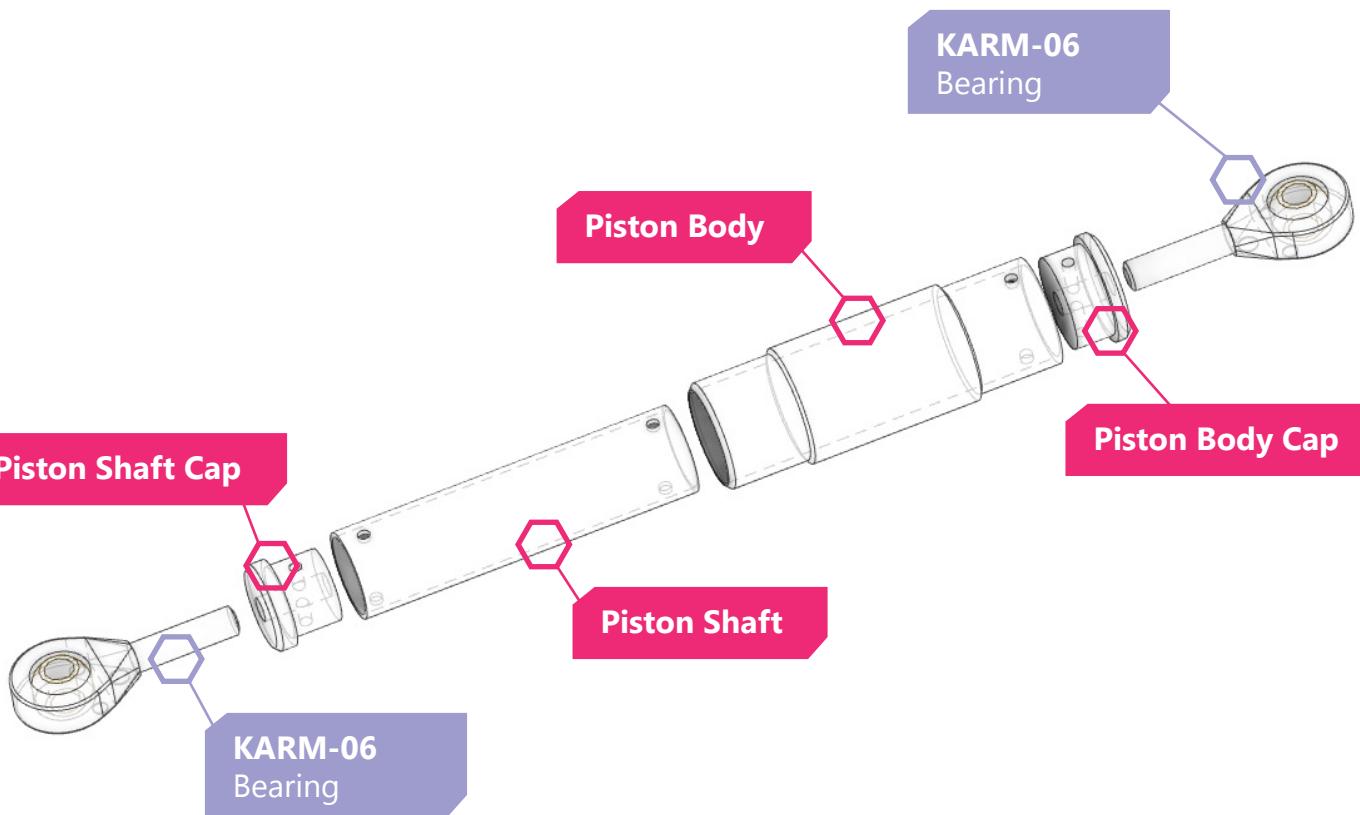


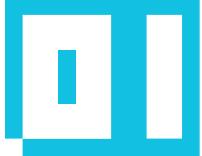


Elysium Max Exoskeleton Assembly Instructions

Piston

Click on the label or the hex shape to view the corresponding STL file on [GitHub](#).





Elysium Max Exoskeleton Assembly Instructions

Piston Placement

Piston assemblies can be found in [print/pistons](#) folder on GitHub, however they may be easier to re-create using something other than 3D printing such as approximating with plastic pipe or machining metal pipe and bar.

