

Box Lewis

MFG research notes and interim updates

GOALS

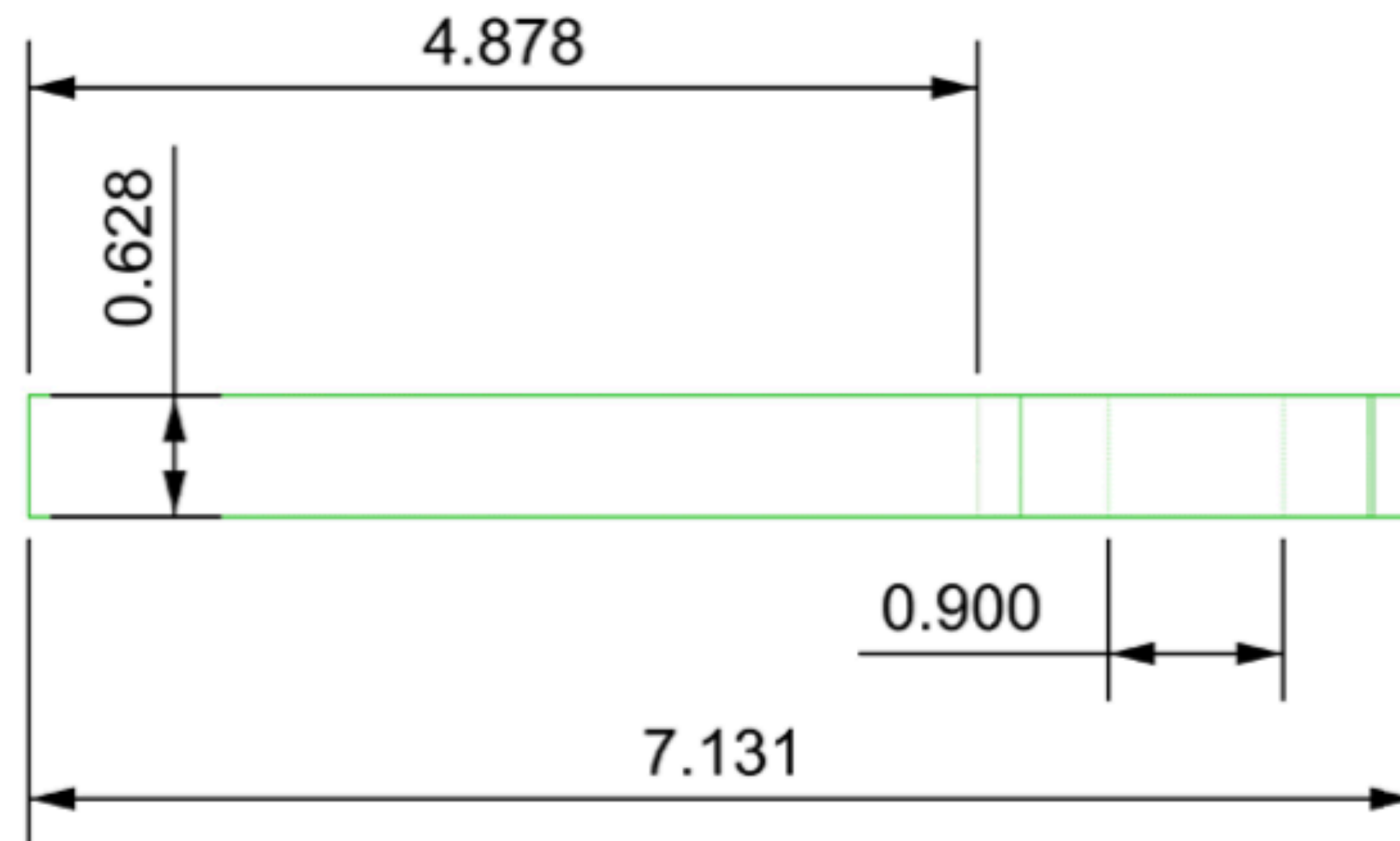
Manufacturing

- Identify the best manufacturing method for making a Box Lewis assembly.
 - Dimension based on the sample assembly
- Assembly must be functional
- Assembly must look as close to the original as possible
- Optimize cost as much as possible

QUOTING REPRESENTATIVE PART

“Make” Parts representative only

- Selected “inside large” (see figure below) to get estimates.
- “Inside large” is a good representation of the rest of the parts that need to be manufactured. Not including the Clevis Assembly



XOMETRY

3D Printed Quote - Aluminum

\$643.87

Material: AlSiMg
Direct Metal Laser Sintering

Pending: Need to research material properties.
Notes: Continue if water jet or laser/plasma do not work

Quote Q88-8443-9747 / Configure Part

InsideBig.stl

V0

Revise CAD

Upload Drawings

Configure

Analyze

Standard | Made in USA

\$643.87

\$643.87 ea.

\$799.02

(Save \$155.15)


Free Shipping

Show Other Price Tier Options

Click to move model

+

-



181.334 mm x 50.800 mm x 15.939 mm | 7.139 in x 2.000 in x 0.628 in | 3.498 in³

Process

Metal 3D Printing

Technology

Direct Metal Laser Sintering (DMLS)

Material

Learn about our materials

Aluminum AlSiMg

Spec Sheet

Finish

Learn about our finishes

 or

see our surface finish photo gallery

Standard

Add

Threads and Tapped Holes

Threads and Tapped Holes

Inserts

Cancel

Save Properties

Search

Search the menu for process, materials, ai

Q

XOMETRY

3D Printed Quote - Steel 17-4

\$1,345.00

Material: Steel 17-4
Direct Metal Laser Sintering

Pending: Need to research material properties.
Notes: Continue if water jet or laser/plasma do not work

Configure

Analyze

Quote Q88-8443-9747 / Configure Part

InsideBig.stl

V0

Revise CAD

Upload Drawings

Inside Big - 17-4 Steel (DMSL)

Cancel

Save Properties

Standard | Made in USA

\$1,345.00

\$1,345.00 ea.

\$1,669.10

(Save \$324.10)

Free Shipping

Show Other Price Tier Options

Click to move model

Home

+

-

181.334 mm x 50.800 mm x 15.939 mm | 7.139 in x 2.000 in x 0.628 in | 3.498 in³

Process

Metal 3D Printing

Technology

Direct Metal Laser Sintering (DMLS)

Material

[Learn about our materials](#)

Stainless 17-4

[Spec Sheet](#)

Finish

[Learn about our finishes](#)

 or [see our surface finish photo gallery](#)

Standard

Add

Threads and Tapped Holes

☐

Threads and Tapped Holes

i

Inserts

Search

Search the menu for process, materials, ai

Q

X

XOMETRY

3D Printed Quote - Steel 316L

\$1,345.00

Material: Steel 316L
Direct Metal Laser Sintering

Pending: Need to research material properties.
Notes: Continue if water jet or laser/plasma do not work

Configure

Analyze

Quote Q88-8443-9747 / Configure Part

InsideBig.stl

V0

Revise CAD

Upload Drawings

Cancel

Save Properties

Standard | Made in USA

\$1,345.00

\$1,345.00 ea.

~~\$1,669.10~~ (Save \$324.10)

Free Shipping

Show Other Price Tier Options

Click to move model

Home

+

-

181.334 mm x 50.800 mm x 15.939 mm | 7.139 in x 2.000 in x 0.628 in | 3.498 in³

Process

Metal 3D Printing

Technology

Direct Metal Laser Sintering (DMLS)

Material

Learn about our materials

Stainless Steel 316L

Spec Sheet

Finish

Learn about our finishes

 or

see our surface finish photo gallery

Standard

Add

Threads and Tapped Holes

Threads and Tapped Holes

Search

Search the menu for process, materials, ai

Chat icon

PROTOLABS

3D Printed Quote - Multiple Metals

AlSiMg	\$1,037.66
Cobalt Chrome	\$1,866.02
Inconel 718	\$2,006.53
Steel 17-4	\$1,401.13
Titanium	\$2,053.03

Material: see list
Direct Metal Laser Sintering


Pending: Need to research material properties.
Notes: Continue if water jet or laser/plasma do not work


PROTOLABS

 Santiago T. ▾


 Projects

 Parts

 Order History

 Design Guides

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Protolabs Companies

Hubs | myRapid

⏪

RCrough (Quote 1258-396)

⏩

inside_big

Materials and Resolutions

Direct Metal Laser Sintering (DMLS)

Aluminum AlSi10Mg

Cobalt Chrome

Inconel 718

Stainless Steel 17-4PH

Stainless Steel 316L

Titanium Ti-6Al-4V

Inconel 718 (X Line)

Aluminum AlSi10Mg (X Line)

High Res

Micro Res

Normal Res

Request

Request

Request

Request

Request

Request

N/A

N/A

\$1,037.66

\$1,866.02

\$2,006.53

\$1,401.13

\$1,428.47

\$2,053.03

SHAPEWAYS

3D Printed Quote - Aluminum

\$694.36

Material: AlSiMg
L-PBF

Pending: Need to research material properties.
Notes: Continue if water jet or laser/plasma do not work

SHAPEWAYS



Bring your product to life

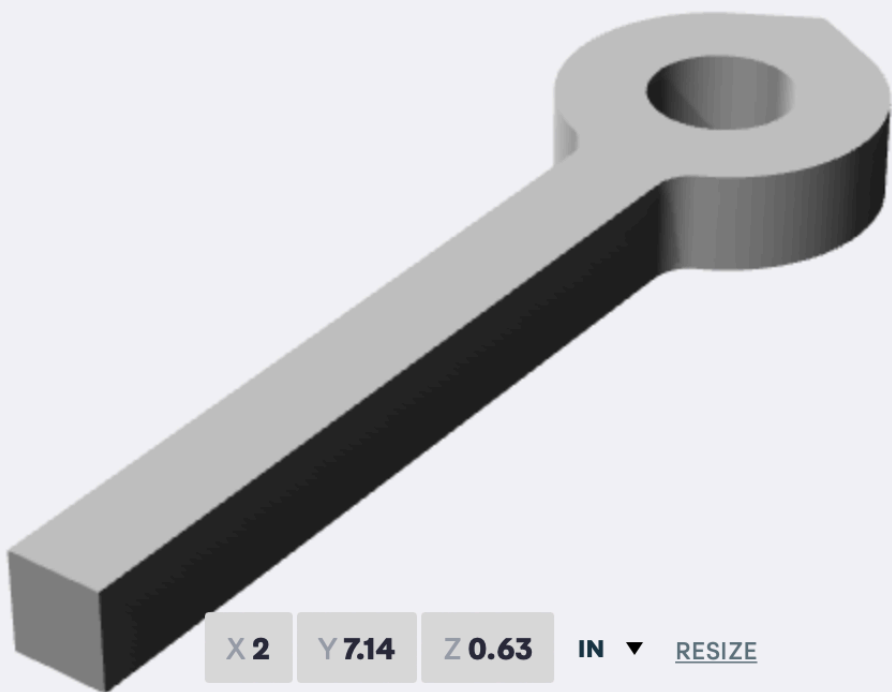
- InsideBig [TOOLS](#)
- Aluminum (L-PBF) [CHANGE](#)

Choose Options

MATERIALS / FINISHES

Standard

Matte with a subtle sparkle and a slightly textured surface.



Model Volume	3.5 inch ³
Machine Space	4.74 inch ³
Support Structure	0.67 inch ³
Parts Bounds Volume	8.96 inch ³
Part Count	1

ADD TO CART QTY 1 ▼ \$694.36

SHAPEWAYS

3D Printed Quote - Steel 420 / Bronze


\$373.13

Material: 420 Steel/Bronze
BJT

Pending: Need to research material properties.

Notes: Continue if water jet or laser/plasma do not work

SHAPEWAYS



X 2Y 7.14Z 0.63IN

RESIZE

Model Volume3.5 inch³

Machine Space4.74 inch³

Support Structure0.67 inch³

Parts Bounds Volume8.96 inch³

Part Count1

Bring your product to life

InsideBig

TOOLS

420i Steel/Bronze (BJT)[Steel]

CHANGE

Choose Options

COLOR

Black

Bronzed-Silver+\$0

Bronze+\$86.12

Nickel

Gold

MATERIALS / FINISHES

Matte

Polished & Bronzed+\$18.15

ADD TO CART

QTY 1

\$373.13

QUOTE SUMMARY

3D Printed Quote - Metal

	Xometry	Protolabs	Shapeways	Method	“Inside Large”	~ for X Parts
AlSiMg	643.87	1,037.66	694.36	3DP		
Steel 17-4	1,345.00	1,401.13		3DP		
Steel 316L	1,345.00			3DP		
Cobalt Chrome		1,866.02		3DP		
Inconel 718		2,006.53		3DP		
Titanium		2,053.03		3DP		
Steel 420 / bronze			373.13	3DP		

STATUS AND NEXT STEPS

5/9/2023

- Status:
 - Initial RFQs for 3D printed metal completed
 - Cost is high, ~ 1K per component.
 - Material properties need verification is used.
 - Unable to quote Waterjet or Laser cutting due to CAD file formats
 - STL files cannot be used for this mfg method.
- Next Steps:
 - Covert files into required formats for Waterjet or Laser cutting quotes
 - Continue research for COTS parts (clevis assembly)

✖ **Sheet Cutting is not available for mesh file formats.** Autoquoting Sheet Cutting (Laser/Waterjet) is not available for mesh file formats. To quote in Sheet Cutting (Laser/Waterjet), please provide a .step, .sldprt, .x_b, .x_t, .3dxml, .catpart, .prt, or .sat.

Revise CAD

Back up

REFERENCE DOCUMENTS

Documents in GitHub repo

- Shapeways All Materials-Guide-2021.pdf
- Shapeways-Aluminum_General_Info.pdf
- Shapeways-Steel_General_Info.pdf
- Protolabs Aluminum Datasheet - Material-Data-SheetAluminum.pdf
- Xometry - Stainless Steel 3D Printing | Material Properties and Applications.pdf