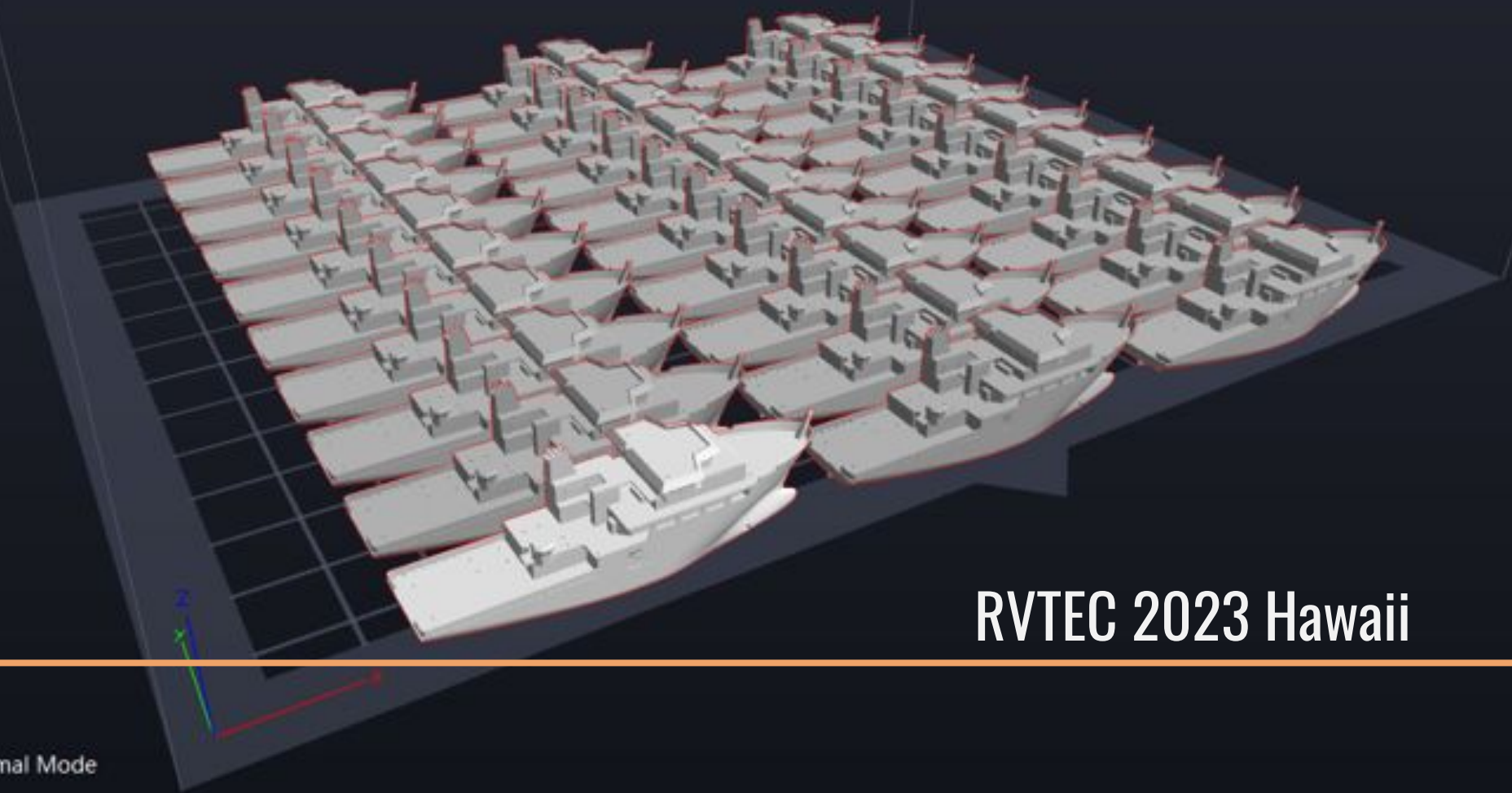




# 3D PRINTING ON RESEARCH VESSELS

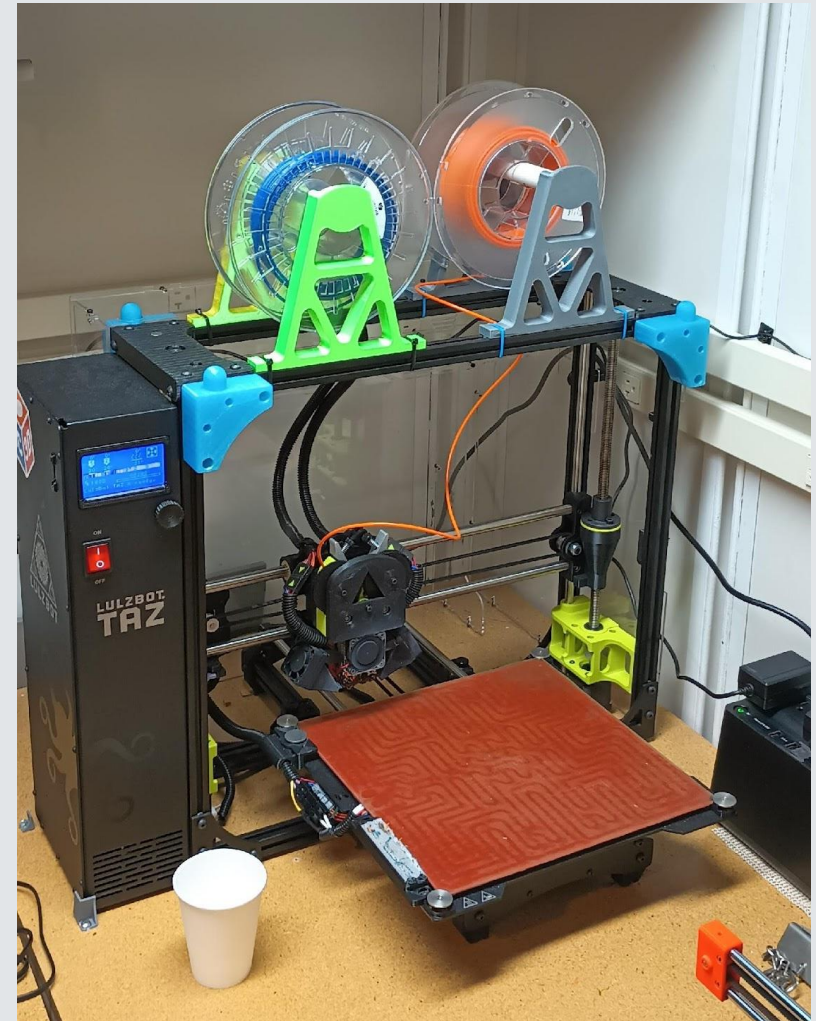
Start Slicing

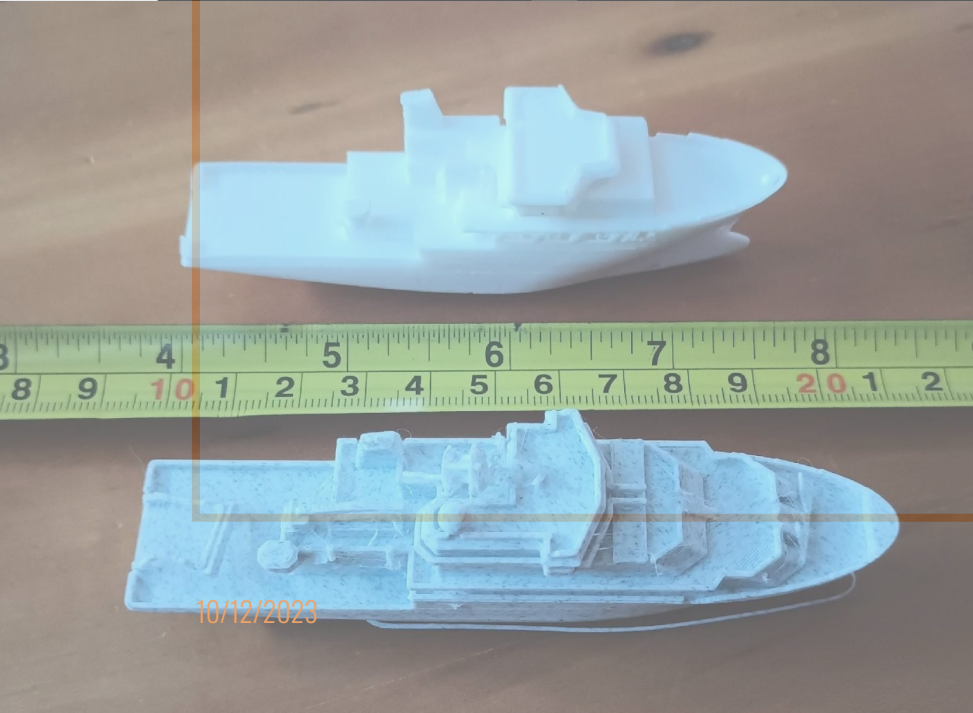
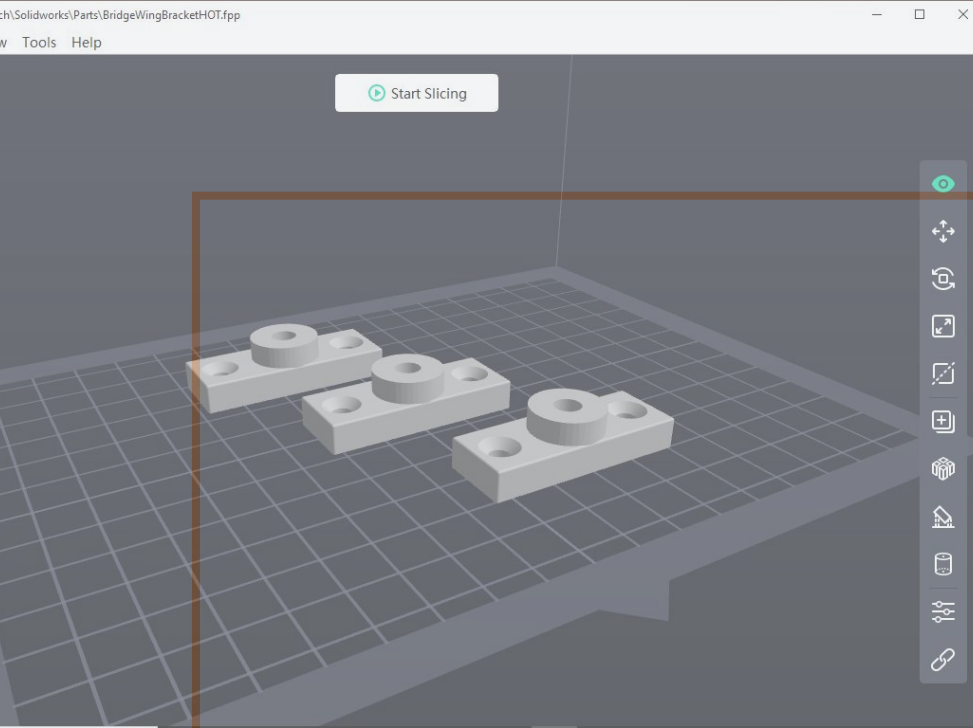


RVTEC 2023 Hawaii

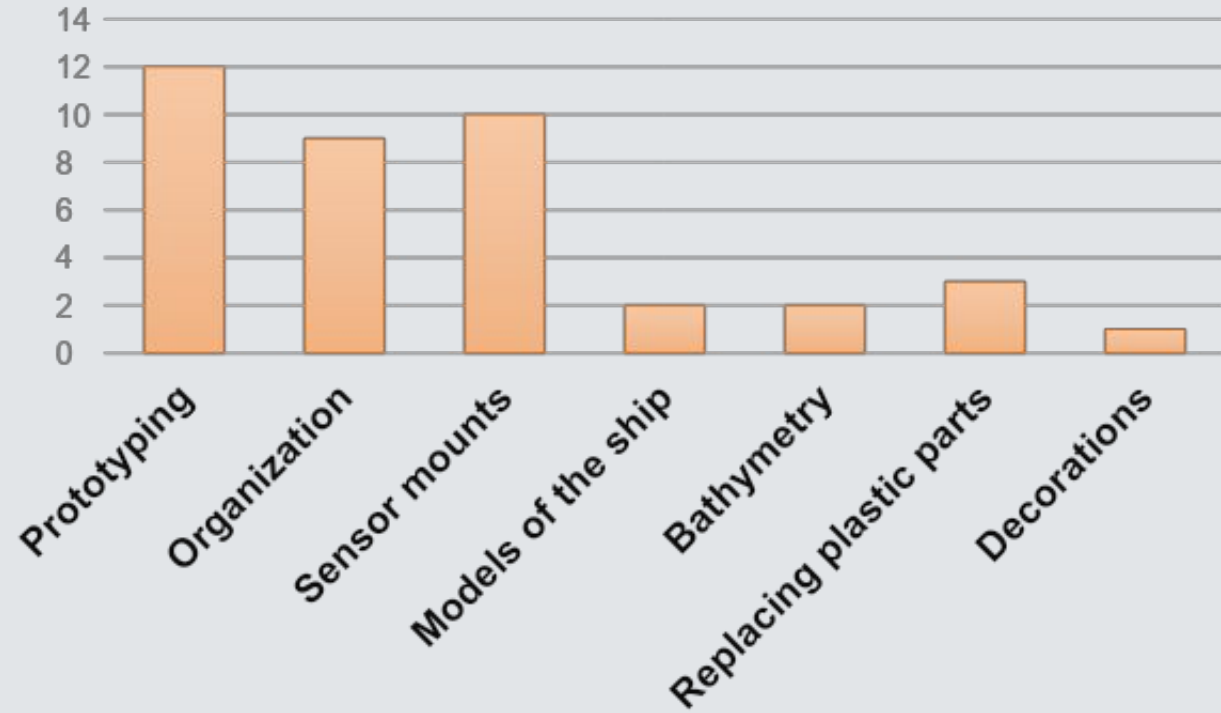


- Machines
- Materials
- Modelling
- Models
- Moving forward





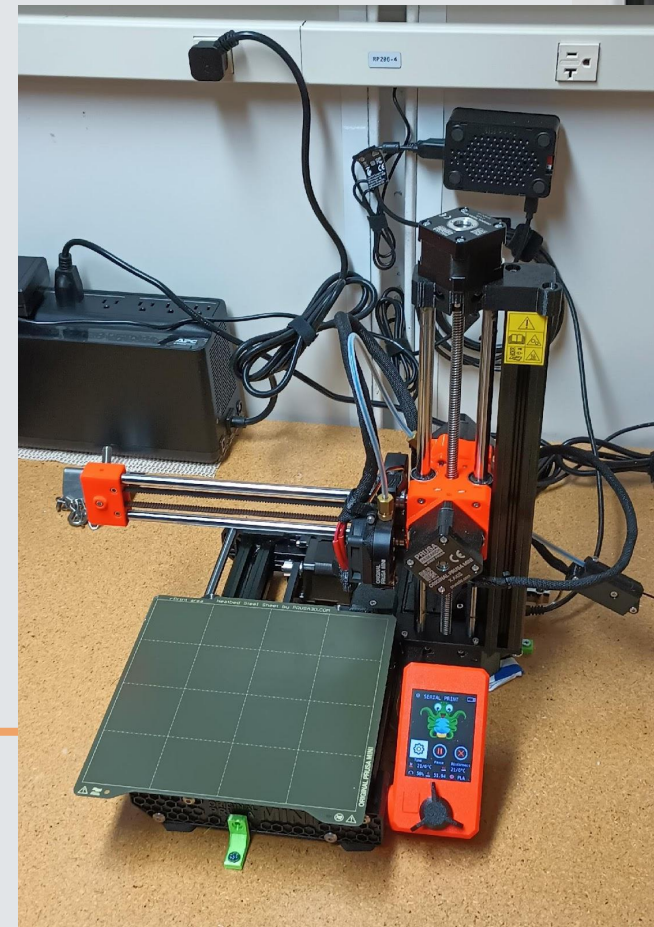
## "What do you use 3D printing for?"

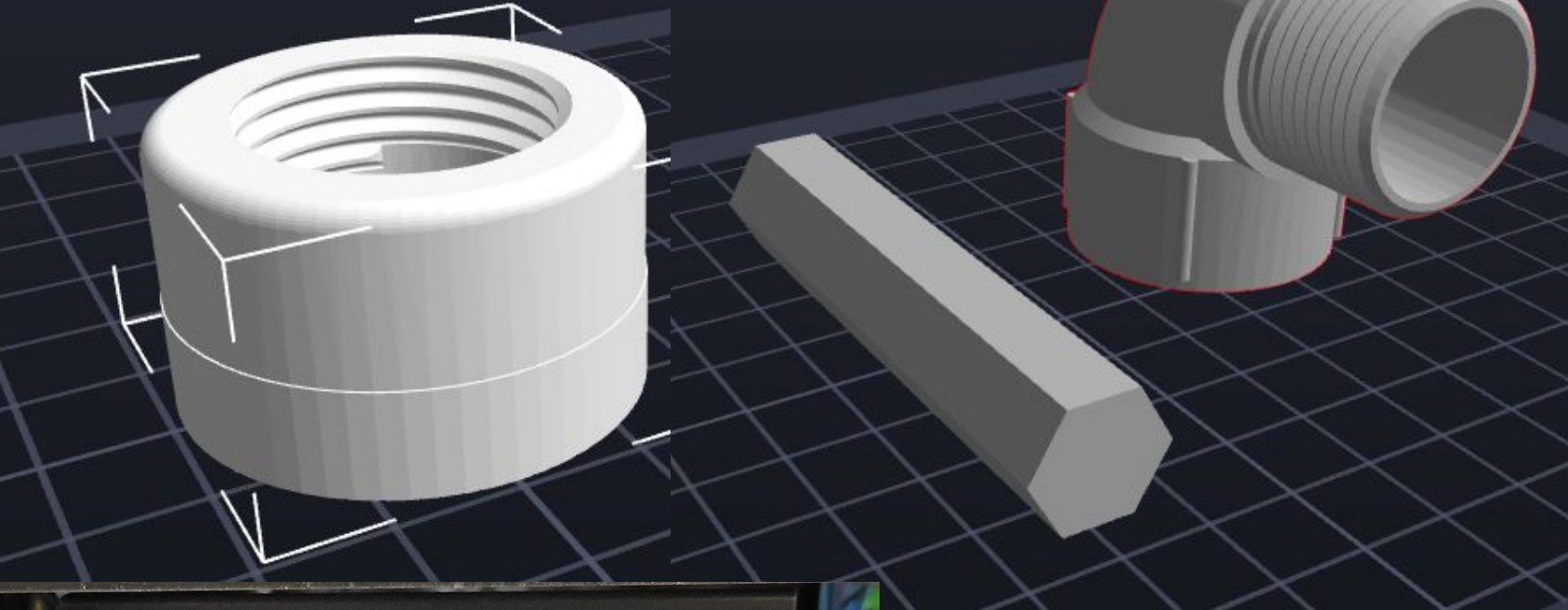


- What have you made?
- Did you put it in the ocean? Any problems?

# MACHINES

- Fused Deposition Modelling (FDM) printers
- Do you have a machine on board: YES 11. No 2.
- What models are in use in the fleet? Survey says:
  - Markforged mark2
  - Prusa Mk3s+, Prusa Mini
  - Ender 3 Pro
  - Ultimaker S7 pro
  - Flashforge creator pro 2
  - LulzBot Taz6
  - 2 responses of “Various”





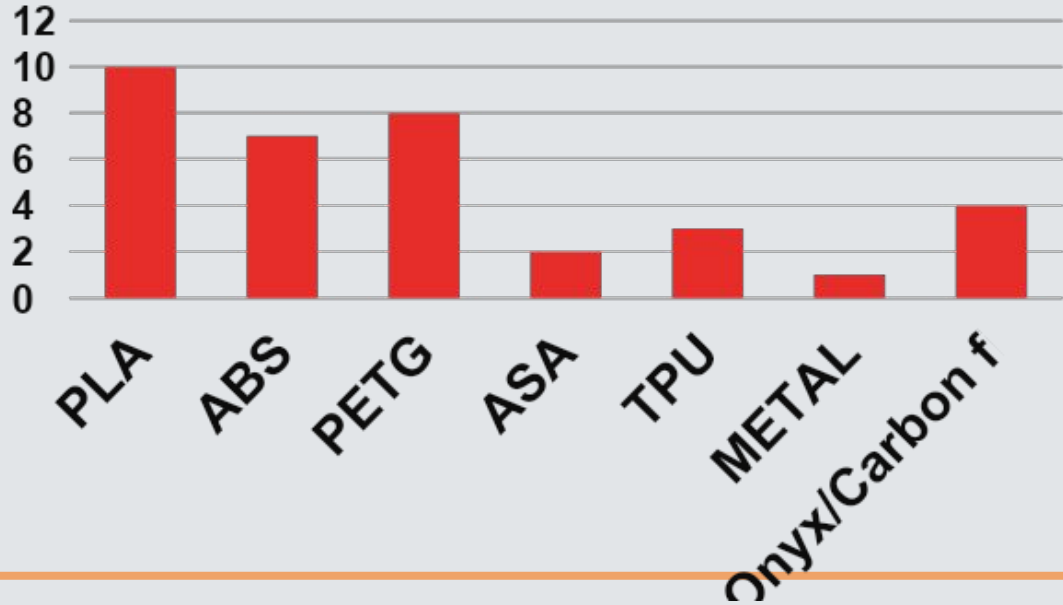
“How often do you use your 3D printer?” Poll results:

Daily: 4 votes  
Weekly: 4 votes  
Monthly: 3 votes



# MATERIALS

Number of respondents who use each type of material



# MODELLING

- Do you draw your own?
  - What software do you use?
  - Where did you learn?
- Download from Thingiverse/ others that people use.


10/12/2023

← ↻ 🏠 <https://www.thingiverse.com/search?q=rechargeable+battery+&page=1&type=things&sort=relevant>

UltiMaker Thingiverse 🔍 rechargeable battery

Relevant ▾ All Things ▾

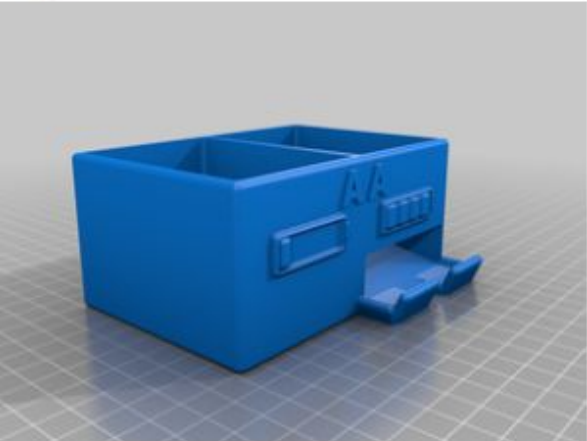
Makita Battery Mount



+ Collect Thing ❤️ 1870

📤 Share


Rechargeable Battery Dispenser




+ Collect Thing ❤️ 80

📤 Share

(Rechargeable) battery storage

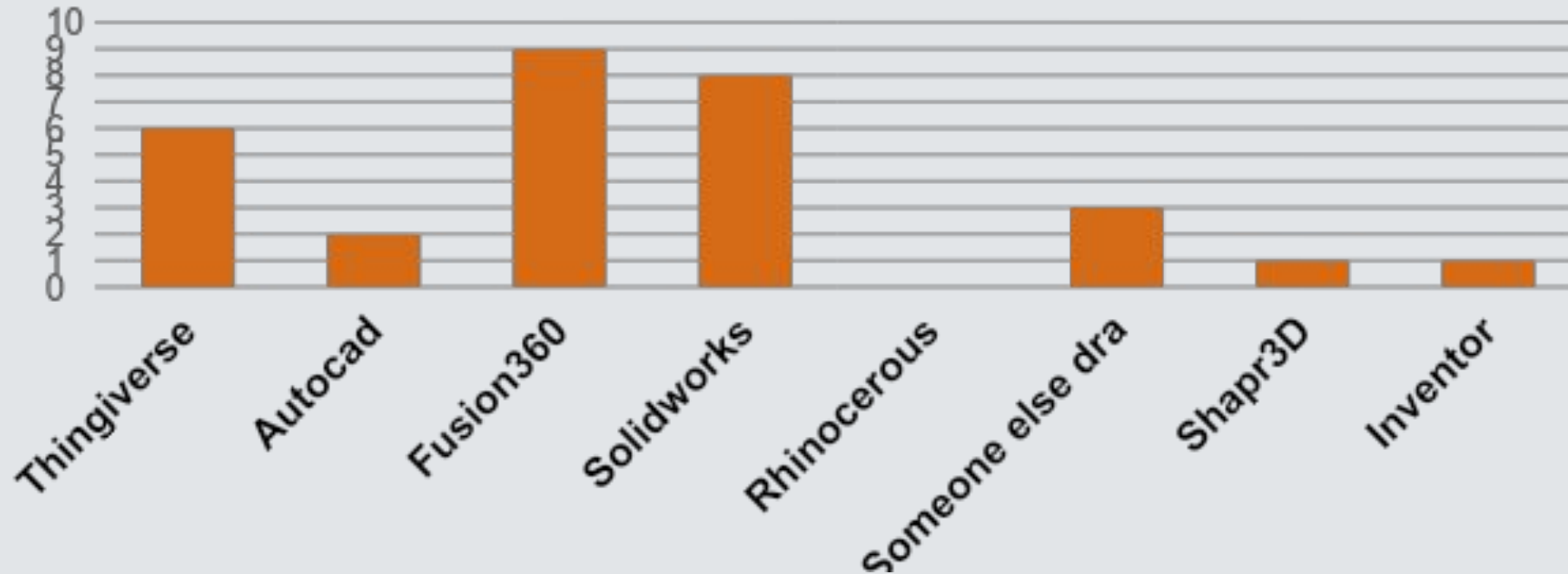


DSO138 Rechargeable Battery



9

# WHERE DO YOUR 3D MODELS COME FROM?





## **“WHERE DID YOU LEARN TO DRAW YOUR 3D MODELS?”**

- 5 responses: “High school/College/Trade school”
- **12 responses: “self taught or on the job”**
- Someone said “SIO machine shop” which I just lumped into “On the job”

## **MOVING FORWARD**

“Would you be interested in sharing your .STLs?” Unanimous “YES!”

- Thingiverse does allow “tagging” uploaded models. Some universal tag is needed, so we can find all the models ie “RVTEC”
- Specific repository to go look in, ie UNOLS web page?

# THANK YOU!

- To the UNOLS team and especially Brandi for all the heavy lifting required to make RVTEC happen
- University of Hawaii, especially Dani Hinshaw and Maximillian Cramer for supplying knowledge and the printer for our demonstration.
- NSF, ONR, and others for the funding to get us here.
- All the survey responses from the techs at OSU, STARC, NOAA incl Oscar Dyson, R/V Falkor (too), Point Sur, Savannah, Sikuliaq, Seawolf, Endeavor, Atlantic Explorer, Neil Armstrong, and the UNOLS Tech Pool!
- Thank you, for your attention!

## **THERE'S NO WAY WE HAVE EXTRA TIME.**

- 3D printing in metal! Anyone done it? Seen it? Thrown a piece in the ocean?
- Humidity at sea affecting filament? Storage solutions?
- Print size OK? "I wish I could go bigger"? Smaller is OK?
- Ventilation during prints for fumes? ABS?
- Questions?