DESIGN FOR ADDITIVE MANUFACTURING FOR PROTOTYPE MANUFACTURING

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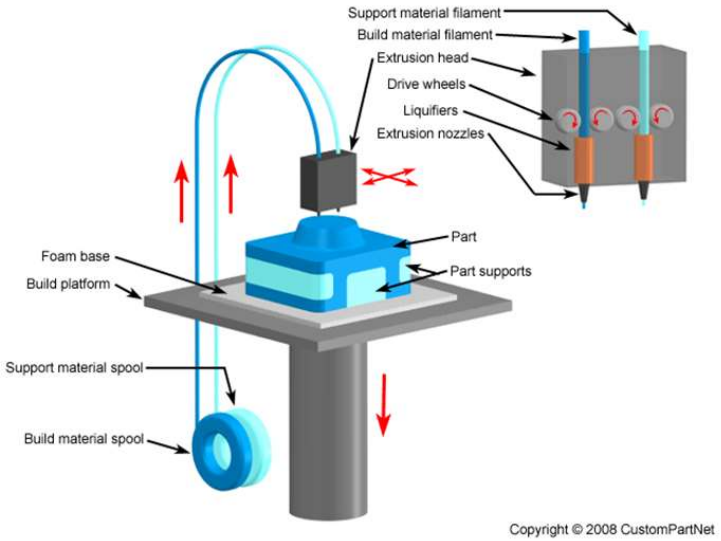
WHY ADDITIVE

- Cost
- Lead time
- Competitive advantage
- Part of the design process
- Design freedom
- Use of materials
- Reduction of waste

FUSED DEPOSITION MODELING



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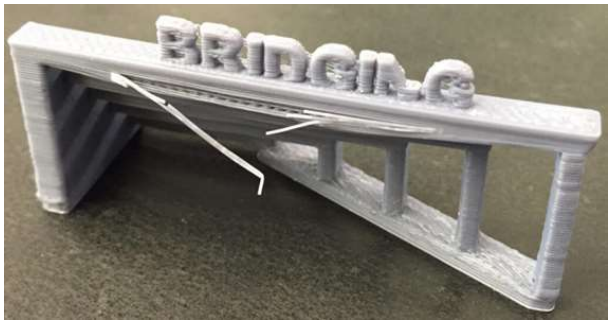
- Innovation Center
- Curriculum
- Design Process

MULTIPLE PARTS??????

- Use of support material. If splitting the part reduces or eliminates support material look to this
- Part has an extensive bridge
- Part has an overhang greater than 45º
- Part is larger than the build platform
- Protect fragile sections of the part

SUPPORTS

- Bridging
- Overhangs
- Holes
- Adds cost material and labor



INSERTS

- Add threads for an attachment point that demands strength
- Add an electrically conductive contact
- Add weight to a part for “feel”
- Add a RFID tag for later identification

POST PROCESSING

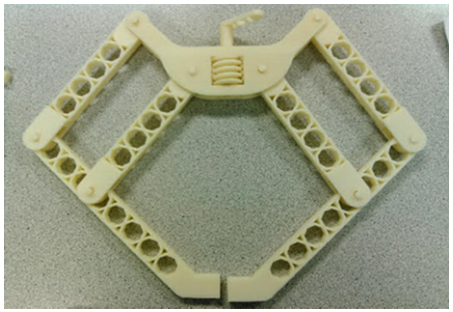
- Support material – Takes time to remove. This also can affect the aesthetics of the part. This can be done mechanically or with the use of a dissolvable support material. Using the base material for support can reduce the initial cost of the material but still will need to be removed.
- Sanding – This can improve the surface finish of the part. It adds cost due to labor and can damage the part of not done properly
- Cold welding – This allows multiple parts to be joined with the use of an adhesive. It allows the part to be optimized for orientation. This requires extra labor and some degree of skill. Parts may not be as strong as a single unit.
- Sealing – Parts can be sealed with the use of an epoxy. This makes the part stronger and possibly waterproof. This requires extra cycle time and the cost of the epoxy. But may be a product requirement.

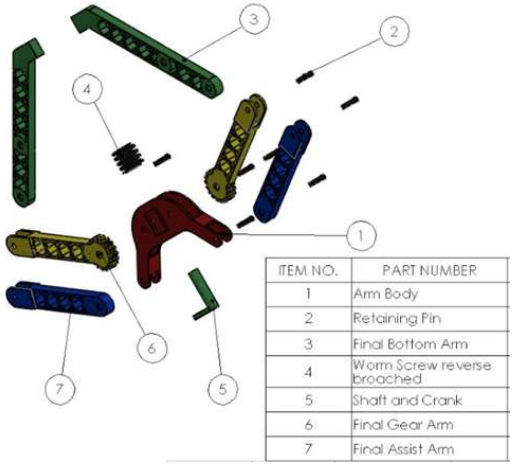
COST FACTORS

- Part size
- Support material
- Labor to remove support material
- Insert costs
- Labor to place inserts
- Cycle time multiplied by machine cost

DRONE MOTORIZED ARM ATTACHMENT
SOURCE: UNIVERSITY OF DAYTON INTRO TO DESIGN COURSE

- **Application:** A motorized arm that attaches to a drone. The arm would use a single motor to drive a worm screw, however, the prototype was created with a hand crank to simulate the motor.





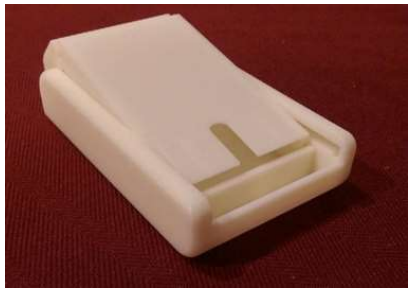
ITEM NO.	PART NUMBER
1	Arm Body
2	Retaining Pin
3	Final Bottom Arm
4	Worm Screw reverse broached
5	Shaft and Crank
6	Final Gear Arm
7	Final Assist Arm

FLAT PACK BLUETOOTH MOUSE

SOURCE: UNIVERSITY OF DAYTON INTRO TO DESIGN COURSE

- **Application:** A travel friendly wireless mouse that can collapse and pack flat.

The electronic components used in the prototype were borrowed from a low cost existing blue tooth mouse.



MULTI-FUNCTION CAMPING TOOLS

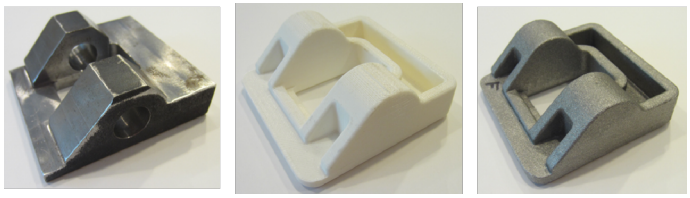
SOURCE: UNIVERSITY OF DAYTON INTRO TO DESIGN COURSE

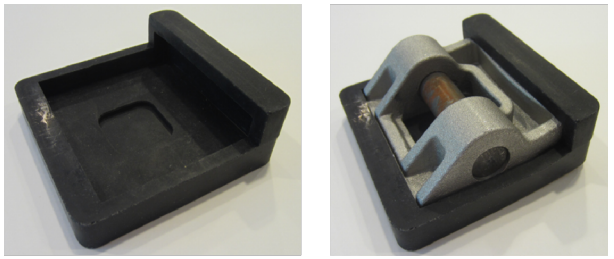
- **Application:** A multipurpose tool that can fit into a normal pocket and pick-up basic foods. The tools could be printed on demand and easily changed out for any other camping needs.

CLEVIS BLOCK

SOURCE: AN GLOBAL MEDICAL EQUIPMENT MANUFACTURER

- **Application:** A vibration isolation mount for an actuator used in a medical procedure chair. The clevis block was initially prototyped as a machined component. A prototype was then printed out of ABS plastic and used as the master pattern for multiple Aluminum sand cast prototypes.





THANK YOU

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