

UNIVERSITY OF LOUISIANA AT LAFAYETTE

STEP Committee

Technology Fee Application

3D Printers and Laser Cutter
Title

Adam Feld and Daniel DiCaprio
Name of Submitter
<i>(Faculty or Staff Only)</i>

College of the Arts			
Organization			
Title:	3D Printers and Laser Cutter	Date:	7/16/2018
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Department/College/Org:	School of Architecture and Design/ College of the Arts		

ABSTRACT (250 words or less):

Many of the departments, within the College of the Arts (C.O.A.), work in 2 and 3 dimensions in the development of objects for their assignments. The act of making prototypes and models is vital. Typically, students first learn the

importance of traditional hand-craftsmanship but once a student understands that process, they can progress to digital fabrication allowing for greater accuracy and quicker development of ideas. The new equipment allows students to incorporate computer-based processes into the production of their 2 and 3 dimensional work. This will combine traditional hand-craftsmanship and digital fabrication as well as prepare students for the professional world. These new machines can seamlessly be incorporated into the curriculum and work with our current equipment. In the past academic year, the College of the Arts has worked to create a Digital Fabrication Lab, housed on the first floor of Fletcher Hall. This lab, as a C.O.A. resource, will service roughly 800 students in the School of Architecture and Design, Visual Arts, and Music and Performing Arts.

a. Purpose of Grant and Impact to Student Body as a Whole

The purpose of this request is to combine new machines with current machines to allow students from the entire college to broaden their scope of work, as well as classroom experience, by creating a robust digital fabrication lab within the College of the Arts. The use of these machines has an impact in the professional production of objects. Historically these machines were cost prohibitive and difficult to utilize due to the specialized nature of software and hardware. The recent innovations and mass marketing has allowed for affordable, reliable, and professional quality machines.

This equipment will allow students, utilizing skills learned in other digitally based art media, to experiment, problem solve, and express themselves in a new way with current technology. Digital processes are currently being utilized and incorporated throughout the entire College of the Arts curriculums. The implementation of this equipment has the potential to bring students from all C.O.A. majors to the same area (the lab itself), potentially allowing for more education as to different majors as well as more collaborative projects.

The introduction of this equipment will help UL Lafayette and the College of the Arts maintains its standards of excellence by providing students and faculty with current and viable technologies. The spirit of experimentation and expression, that the infusion of this equipment brings, will keep our programs cutting edge and attractive to potential students. The ability for faculty to teach traditional approaches while integrating evolving concepts and technologies falls in line with the spirit and letter of the university and College of the Arts mission statements.

b. Projected Lifetime of Enhancement

- i. The laser cutter can be projected to last for 5,000 hours of use (3–5 years) without a recharge of the laser tube. The focusing lens is sealed to lengthen the need for replacement.
- ii. The 3D printer can be projected to last as long as the print-head, which can be replaced as needed.
- iii. For each machine, additional parts can be purchased to replace failing parts. The budget will be drawn from the proceeds of the technical manual and expected lab fees. Replacement of failing parts will extend the lifetime of the machines.

- iv. All machines will have faculty and student workers who will oversee the use and maintenance for these machines.

Expected Service Life

- Boss LS-1630: Laser Tube is rated for 5,000 hours but the machine will outlast the tube, which can be replaced as needed.
- Ultimaker S5: 5+ years.

c. Person(s) responsible for

i. Implementation

1. Currently, Prof. Adam Feld in Industrial Design uses the machines in INDN 301, INDN 302, INDN 307, and INDN 308 classes.
2. Prof. Daniel DiCaprio (Visual Arts) VIAR 376, VIAR 470, VIAR 409, VIAR 410

ii. Installation

1. Prof. Adam Feld will install both 3D printers and the Laser Cutter in JLF 125 (the Digital Fabrication Lab), a locked shared use room for the College of the Arts. This room also houses the Visual Art Department's slide library, is adjacent to New Media's green screen room, and adjacent to the proposed Animation's Stop-Motion Lab, further assisting an interdisciplinary use of the machines.

iii. Maintenance

1. Boss LS-1630
 - i. Laser Maintenance requires the replacement of CO₂ tubes approximately every 5,000-use hours. The 65W CO₂ Laser Tubes (SKU: 65WCO2X) are custom made and will cost \$597.00.
 - ii. Other maintenance will be supplied by mandatory training and the purchase of the required technical manual.
2. Ultimaker S5
 - i. There is a monthly (cleaning and lubing), 3-monthly (mechanical play, residue cleaning, and large axel lubing), and yearly maintenance (cleaning and replace Bowden Tubes), based on a 1,500-hour, 24 hour a day, use. Since the C.O.A. has roughly 800 students that could use these machines, the maintenance will be overseen by faculty and student workers.

iv. Operation

Because this is a C.O.A. Lab, it will be run by: Prof. Adam Feld (Industrial Design), Prof. Dan DiCaprio (Metals and Jewelry), Prof. Thomas Cline (Industrial Design), Prof. Bosheng Liu (Architecture) and Chad Aldridge (Shop Director). Prof. Bosheng Liu is a new hire in the School of Architecture and Design who will have, as part of his workload, the day-to-day oversight of the lab beginning in Fall 2018.

v. Training (with qualifications)

There is a current training program for the current laser cutter and 3D printers. Prof. Adam Feld currently conducts all training. This training program is in the process of being updated to work with the new Lab facility as well as incorporate processes from different departments within the C.O.A..

1. The current training procedure is as follows.
 - a) Students are given a lecture on the use of the machine. Accompanying the lecture is a manual (purchased at the bookstore) on the use of the specific software as well as use of the machine.
 - b) Students are given an in person demonstration.
 - c) Students take a certification test conducted by the professor.
 - d) Students are required to run the machine with a partner until the process is mastered, usually less than 5 times.
 - e) After several operations of the machine, the student is considered fully certified and will receive a card, which allows them to use the machine during regular hours offered each week.

d. The narrative of each proposal must include the purpose and justification for each of the items listed in the Budget Proposal.

- i. **2 Ultimaker S5**, 3D Printers- These will be the 4th and 5th Ultimaker 3D printers. The reason for continually working with Ultimaker is that all of the machines work with the same software and are very easy to use and have not arduous maintenance schedules. These two printers have dual print cores. One core prints the main material and the core can print support structure that can easily break off or a second material. These will allow students and faculty to 3D print with more accuracy on positive and negative draft as well as for designs that have delicate parts that do not touch the print bed.
- ii. **Boss LS-1630**, This will be a second Boss Laser Cutter. The reason is for commonality of machines and for high-use times. In addition, since this will be the second machine, the manual will apply to this machine, thus making it easier for students to become confident on its use.
- iii. **Nylon Filament**, This filament will allow students the ability to print for the Ultimaker S5 with a material that is rigid and easily to work with for secondary operations such as sanding, priming, and painting.
- iv. **0.4 mm Print Core AA**, the AA print core will work with all materials and will serve as the main print core for the Ultimaker S5 but with standard use, can get clogged and the additional cores will allow the machines to be continually used instead of being shut down for maintenance.
- v. **0.4 mm Print Core BB**, the BB print core will work with all materials and will serve as the secondary print core for the Ultimaker S5. This print core's main use is for support structure in printing. With standard use, this print core can get clogged and the additional cores will allow the machines to be continually used instead of being shut down for maintenance.

- vi. **Replacement Bowden Tubes**, These tubes guide the filament from the spool to the Print Cores. After much use, they have the possibility to get clogged and affect the print cores as well as the 3D print itself.

Budget Proposal

1. Equipment	\$ 5,995.00	Ultimaker S5, 3D Printer (2)
	\$ 6,997.00	Boss LS-1630, sku: LS-1630X (1)
2. Software	\$ 0	
3. Supplies	\$ 550.00	Nylon Filament – 3.00mm (10 spools)
4.	\$ 229.90	0.4 mm print core AA (2)
	\$ 229.90	0.4 mm print core BB (2)
5. Maintenance	\$ 1,194.00	Replacement Bowden Tubes (2)
6. Personnel	\$ 0.00	
7. <u>Other</u>	\$ 0.00	
TOTAL:	\$ 21,190.80	

1. Include any additional information relevant to your application.
2. Discuss all previous funded STEP projects (if any).
There have been no previous awards by the applicants.

ONE ELECTRONIC COPY (Microsoft Word or Adobe PDF) OF PROPOSAL SHOULD BE EMAILED TO stepproposal@louisiana.edu BY DEADLINE DATE.

For additional submission instructions and deadlines, please visit <http://cio.louisiana.edu/step-process>

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WILL BE ACCEPTED!