

# Makerspace

## ANNUAL REPORT

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## Langara College Makerspace

### 2019-2020

#### Summary

Over the last three years the Makerspace has built a centre with a broadly-based constituency from across Langara's creative division and allied disciplines. We have marshalled a space that can address a wide range of technical, social, and conceptual questions, and a space that is open and welcoming to cross disciplinary collaboration and partnership. Overall there have been three ongoing areas of focus: (1) curricular integration of Makerspace capacity within existing and newly developed courses; (2) the ongoing development of technical competencies across the Langara community of staff, faculty and students; and (3) the fostering of innovative research/partnership/work integrated learning opportunities built upon the ethos and opportunities of the Makerspace. For 2019-2020, the makerspace will continue to pursue the development of these community engagements, both within, and external to, the institution.

### 2020-2021

#### Planning

COVID 19 has presented many challenges to the Langara community. As Langara began restricting physical access in mid-March of 2020, and was officially closed to access on March 27<sup>th</sup> 2020, the Makerspace pivoted to support the needs of the Langara community through optimizing access to our digital resource. As digital research space, Makerspace technologies played a key role in the ability to adapt to these fluid circumstances. For example, to support curricular needs, consultation with faculty and students led to the development of multiple online resources including an [online submission system](#) allowing students and faculty to continue producing 3-dimensional content without the requirement to be physically present on campus.

Concurrently during this time, the Makerspace was institutionally repositioned from its initial pilot within Creative Arts to a department within the AVP Portfolio. This transition initiated the reframing of the Makerspace steering committee with representation from the Provost and Vice-President Academic, The National Research Council, Langara's Applied Research Center, The Langara Foundation, The Dean of Creative Arts and CityStudio liaison, The Career Development Centre, and Faculty from Geography and Engineering. This committee will help guide the funding opportunities and external partnerships under investigation.

During this time of change the Makerspace will continue to adapt and provide new and innovative resources to faculty, staff, and students through curricular opportunities, self-directed inquiry and research. While continuing to support curricular access and broad institutional inclusion the Makerspace will additionally explore the co-building of opportunities for external partnerships, Tri-council funding, and greater access to cross disciplinary and cross curricular collaboration.

## Langara College Makerspace

### Participation

In 2020, the Makerspace online presence saw considerable expansion due to the inability of students and faculty to physically access Langara's campus. The Makerspace iWeb site grew substantially providing the community with greatly expanded and revised technical information, how to guides and videos, and access to online submission forms (see workshops below).

During this time, the Makerspace saw sustained access from across the Langara community.

DEPARTMENT	ACTIVITY	# OF FILES OUTPUTS
• Design Formation	classes	<b>319</b>
• Studio 58	classes	<b>35</b>
• Fine Art (Sculpture, Media, Design)	classes/research	<b>512</b>
• Anthropology	classes	<b>40</b>
• History	classes	<b>6</b>
• Engineering	classes	<b>5</b>
• Communications and Marketing	outreach	<b>1</b>
• Langara College Foundation	outreach	<b>260</b>
• Continuing Studies	research	
• Personal output	research	<b>71</b>
• Applied Research Centre	research	

January-March 2020	<b>203</b> individual outputs by students
March-September 2020	COVID structural transition, no campus access
September 2020-May 2021	<b>1006</b> individual outputs (file submission only, no physical access)

### Workshops (Online Videos and How-To's)

All Makerspace in-person workshops, and on site curricular instruction was cancelled after March 20 2020 due to COVID restrictions. As a result, the Makerspace [knowledge base shifted online](#) with the production of multiple how-to guides and videos including:

Vcarve For CNC	how-to
Mach 3 for CNC	how-to
.stl file preparation for Tinkering +Ultimaker printers	video
3D Printing for Formlab printers	how-to
Illustrator file preparation for the Laser cutter	how-to
Trotec laser file preparation	how-to
Vinyl Cutter file preparation	how-to, video
Preparing 3D files for 5 axis CNC	how-to, video

#### YOUTUBE Views:

June 4-14	<b>250</b> views in last 10 days
2021 to date	<b>1,253</b> views
2020	<b>418</b> views

#### Website Analytics:

2021 to date	<b>469</b> users, <b>442</b> new users, <b>762</b> sessions, <b>5,618</b> page views
2020	<b>1277</b> users, <b>1276</b> new users, <b>1997</b> sessions, <b>16,691</b> page views

## Langara College Makerspace

Additionally, links to free downloadable [software for file creation](#) (Rhino, Solidworks, Fusion 360, Vectorworks) used in curriculum, G-code creation software for the Makerspace 3D printers (Tinkering, Formlabs, Ultimaker, Makerbot) and a range of supplemental links to equipment technical details and material characteristics are now readily available.

## Faculty Research Projects

Through the ongoing relationships between the Makerspace, The Applied Research Centre, and The Career Development Centre we are co-building a number of funded research projects.

- |  |  |
|--|--|
| • RSAF 1 (Phase 2) plastic injector completion               | \$3000 (Spring 2021)                                 |
| • RSAF1 – Vespa (conversion to electric)                     | \$3000 (Fall 2021)                                   |
| • NSERC Engage – Trailrider (conversion to electric)         | \$25,000 (Fall 2021)                                 |
| • COV Grant – Heat Islands                                   | \$20,000 (completion phase, Fall 2021)               |
| • WIL – Makerspace/AV/Studio 58 (sign-out system)            | \$25,000 est. (in development)                       |
| • NSERC – CCSIF College and Community Social Innovation Fund | up to \$120K (per year for 3 years) (in development) |
| • SSHRC – Canada’s Future Ideas Lab                          | up to \$250K (for two years) (in development)        |

## Students Hired

Covid 19 placed severe restrictions on the hiring of students for on campus work. A limited number of Student Aides were hired to complete existing research projects.

Student Aides	
Fine Arts (Design)	5

## Outreach

The Makerspace participated in a reduced number of Langara-based outreach activities this year, primarily focused on internal publications and online conferences.

- |   |                        |
|---|------------------------|
| • Langara Post                                    | ongoing                |
| • CAIDV Open House                                | ongoing                |
| • Makerspace iWeb site                            | ongoing                |
| • Innovation Day                                  | cancelled due to COVID |
| • Applied Research Day                            | ongoing                |
| • Research Innovation and Partnership Expo (RIPE) | 2021                   |

## New Technology

In 2021, the Makerspace has made 3 strategic purchases of new of technology and is partnering with Engineering on the acquisition of 2 others. This cluster of technologies has multiple applicability’s across curriculum and applied research and greatly broaden the scope of capabilities of the Makerspace. These new resources will now allow us to generate high quality digital content quickly and easily and to pursue ideas through the prototype stage to working prototype/finished objects.

## Langara College Makerspace

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CNC plasma table There has been an ongoing desire from curriculum (Fine Arts, Engineering, Design Formations, Studio 58) to move beyond wood or plastic production and directly realize metal components. This digital technology will allow us to accurately and repeatably produce 2D metal components of moderate size.

Tormach 3axis CNC milling machine

This digital technology will allow for the accurate and repeatable cutting of complex 3D metal and plastic components of moderate size, working as an expansion of the CNC plasma cutter's 2D capabilities

3D potter ceramic printer

We can now print digital objects directly in ceramic material. This has direct applicability to curriculum in ceramic, sculpture, and design but also expands our overall printable capabilities beyond plastic filaments and resins only. Additionally, this technology allows for the experimental printing of viscous materials (silicones, cements, adobe and other bio materials), expanding 3D printing's applicability to research and a wider range of curricula/partners.

Artec Leo 3D scanner

There is a steep learning curve associated with the creation of 3D objects via 3D modelling software. This is a considerable barrier to participation. The Artec Leo is an industry standard, handheld, untethered, portable scanning hardware which will allow for the simple, high resolution scanning of objects from the size of a person up to the size of a vehicle. This technology was acquired in partnership with Engineering.

Artec Space Spider 3D scanner

The Artec Space Spider is an industry standard, tethered, semi-portable scanning hardware will allow for the simple, high resolution scanning of objects from the size of a person down to the size of a coin. This technology was acquired in partnership with Engineering.



All of the above hardware has direct applicability to applied research and curricular expansion. The metal forming technology is already an important component of a successful NSERC Engage grant beginning this fall (see faculty research projects) and integrates well with Engineering (functional prototypes/finished objects), Fine Art (public art installations), Studio 58 (props and set components). The Scanners are desired within Engineering to enable the simple reverse engineering of complex componentry but also integrate well with Archeology (digital site models), Web and Mobile (VR/AR environments and objects), Theater (immersive VR), Nursing (reconstructive medicine), and to prospective industry partners who have interests in exploring this technology through applied research partnerships.

## Langara College Makerspace

### External Partners/Funders/Patrons

Currently the Makerspace, in conjunction with the Langara College Foundation, the Applied Research Centre, The Career Development Centre, and CityStudio are primarily pursuing partnership funding through Faculty Research Projects (above).

### 2020-2021

#### Summary

The Makerspace foundation of innovation, technical flexibility and the open-ended exploration of new digital tools has allowed our community to relatively seamlessly adapt to the rapidly changing and challenging circumstances of 2020/2021. As events continue to develop, and as the Institution transitions back to an on campus instructional model, we will: **(1)** maintain Makerspace broad, cross disciplinary access and inclusion, **(2)** continue to foster technical and conceptual competencies through hands-on exploration **(3)** help co-build new forms of opportunity through research, partnership, and work integrated learning, both within and external to, the institution.



Students and their CNC outputs

ASSEMBLY

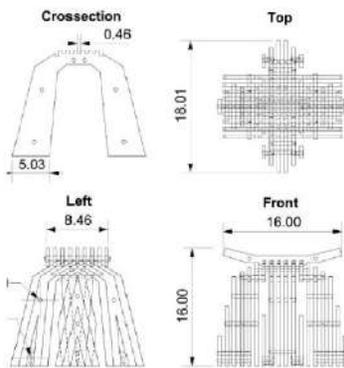


Process Development - Fine Art Design



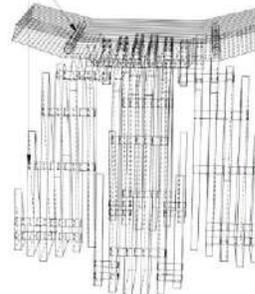
Applied Research - RSAFE Reports

Birchply Stool



Digital Technical Drawings - Fine Arts Design

Threaded rod 1/2"  
Spacers in between each piece bolts on either end



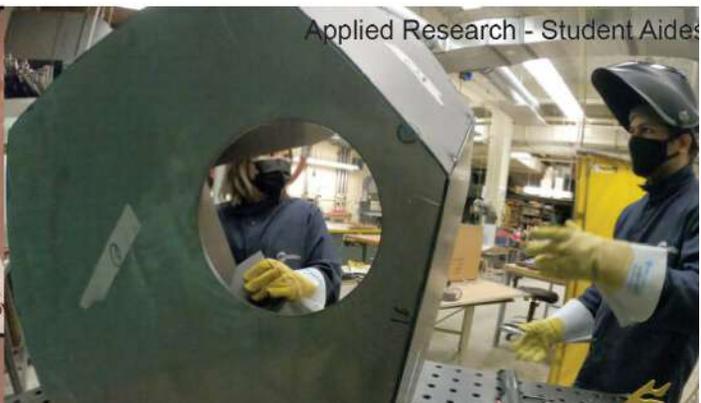
Outputting On 3D Printer - Archeology



Rendered Exploded View - Fine Arts



Lighting Design - Design Formations



Applied Research - Student Aides