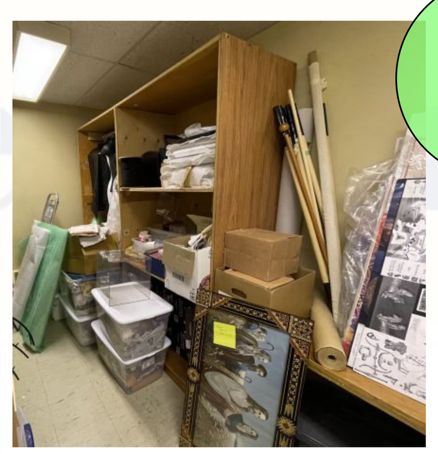
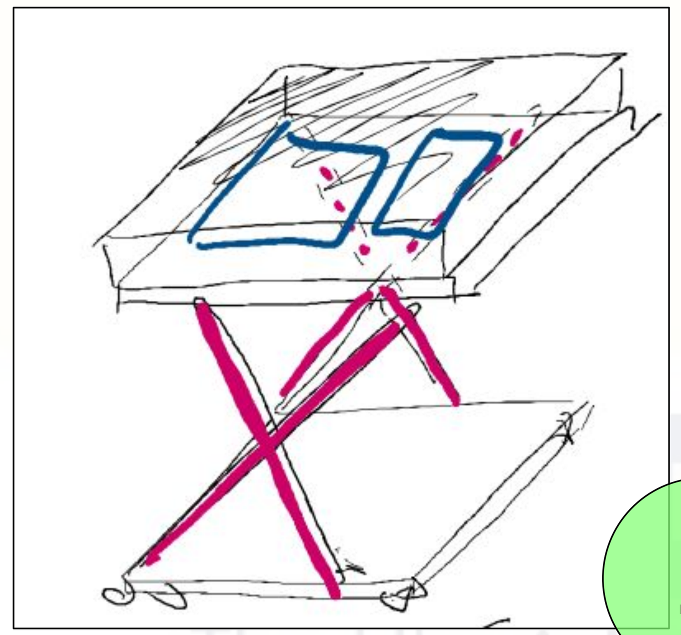
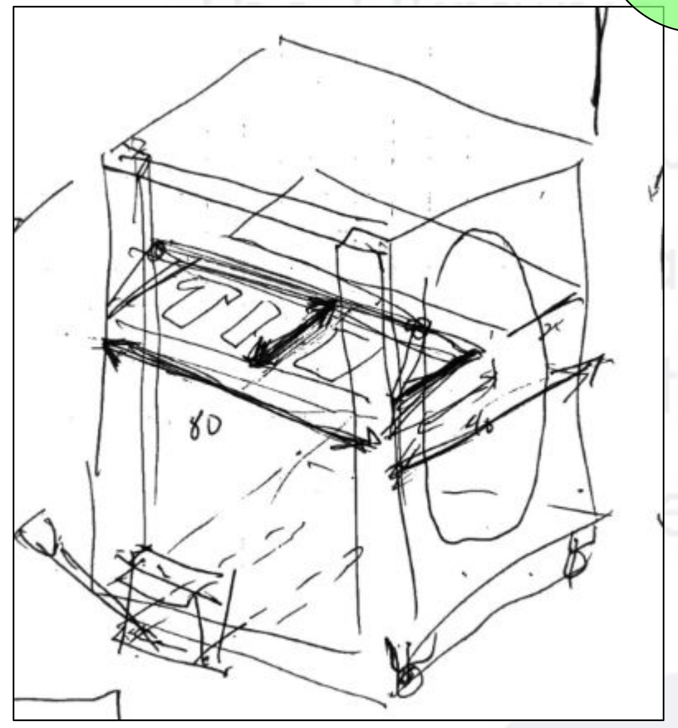
1



The RFP that was assigned to my Praxis II team to work on is concerned with the Ukrainian Museum of Canada (UMC) and their overflowing storage system for a collection of over 6 000 artifacts and textiles. Their only viable option to improve their storage situation is to make use of the gallery space as a storage space.

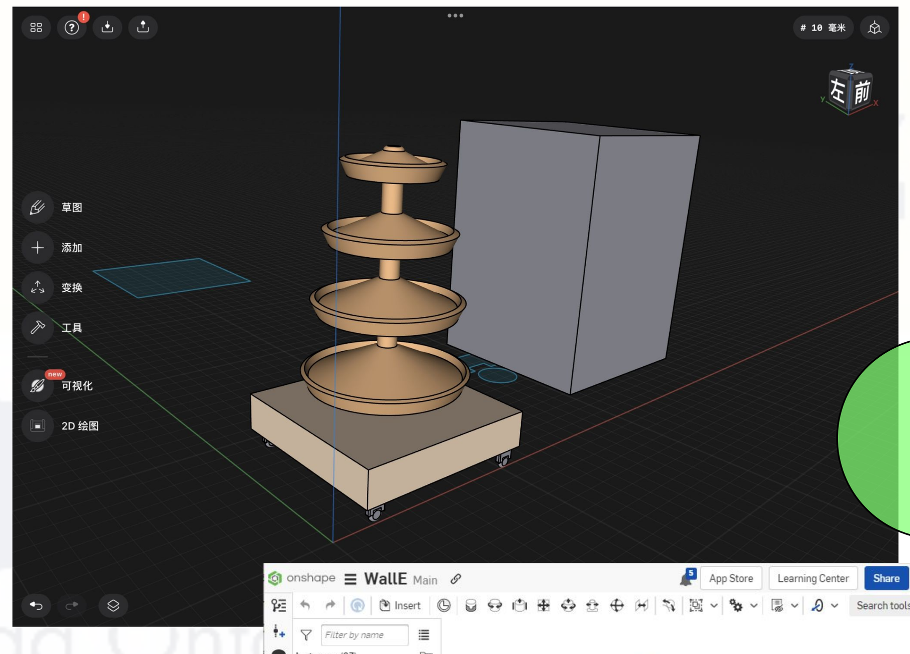
2

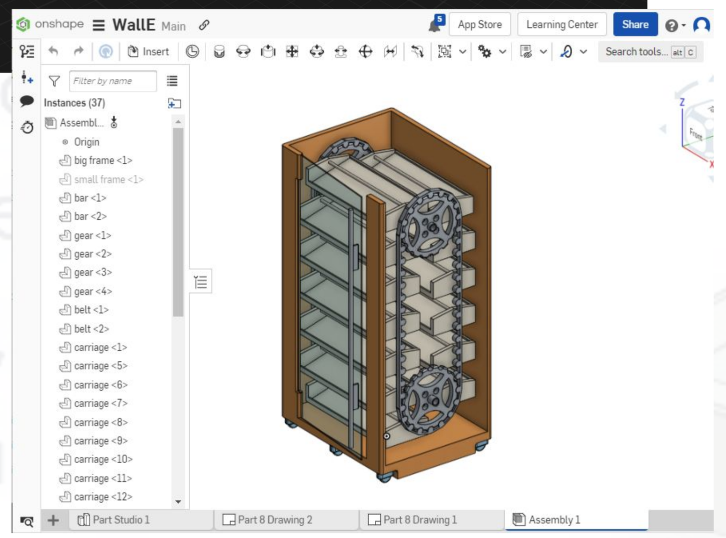




Some concept designs created right after Beta. They either served as improvements to prototypes that were brought into Beta or ones that didn't make it through Beta.

3





The beginning of the prototyping phase. A group member already created a CAD model of the "Tree" idea. I created the other two in a short amount of time. It was challenging to learn how assemblies worked in Onshape (CAD software).

I aimed to create as accurate as possible 3D models that would be implementable into the UMC Gallery Space

4

Respond

Response to the detection of incorrect RH has several forms. Active mach
humidifiers and dehumidifiers – respond minute by minute via their hum
Engineering consultants and technical information are abundant for buil
systems, e.g. ASHRAE (2007). Special museum systems, such as humidist
heating, are available (Consult Vignette 3). Portable domestic humidifiers
dehumidifiers are widely understood, and cost-effective for small museu
must take care not to create a water risk with these devices.

S. Michalski, "Agent of Deterioration: Incorrect Relative Humidity [Online]. Available: https://www.canada.ca/en/conservation-institute/services/agents ml.

Other factors affecting the obtained resistance to rolling are : the convergence of the system, and the resistance generated in wheel bearings. By reducing the influence of wheel alignment and by not taking into account the resistance generated by the bearings in the wheels, a general equation of the rolling resistance force on a flat surface can be determined, equation (4).

$$F_t = G \cdot f_t, \quad (4)$$

where:
G – gravity [N], where: $G = m \cdot g$
m – mass [kg],
g – acceleration of gravity $[\frac{m}{s^2}]$,
f_t – rolling resistance coefficient.

4 Analysis of results

The developed method and research stand allowed to determine the rolling resistance coefficient for the tested trolley equipped with four non-pneumatic wheels on a hard surface made of ceramic tiles at the level of approximately 0.035 ± 0.00016. The set load values (from about 100 kg to 200 kg) did not affect the value of the rolling resistance coefficient.

Ł. Warguła, B. Wieczorek, and M. Kukla, "The determination of the rolling resistance coefficient of objects equipped with the wheels and suspension system – results of preliminary tests," p. 254, 2019, doi: 1051/matecconf/201925401005.

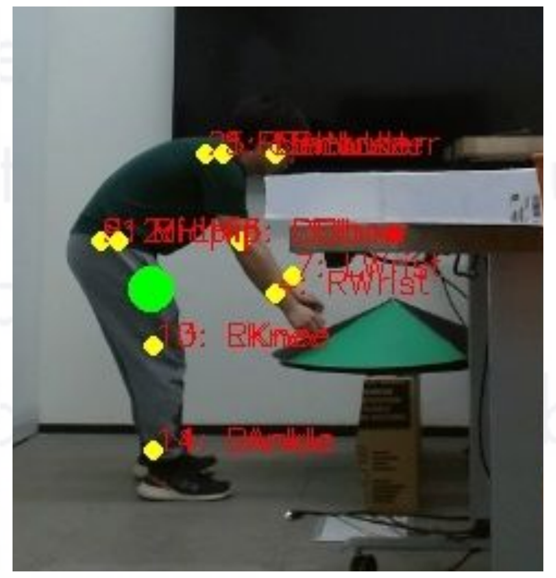
Suggested Materials	Unacceptable Materials
Plastics Only chemically inert plastics should be considered for textile storage, since many other plastics off gas harmful acids or peroxides, which can damage artifacts. [6]	
▪ Polyethylene (PE) (e.g. Bubble Wrap®, Plastazote®, Microfoam, etc) ▪ Polypropylene (PP) ▪ Polystyrene ▪ Acrylic ▪ PP and PE corrugated boards (e.g. Polyflute, Corplast®)	▪ Polyvinyl chloride (PVC) ▪ Polyvinylidene (PVDC) ▪ Polyvinyl Acetate (PVA), found in adhesives and paints ▪ Acidic polyesters ▪ Polyurethane foams ▪ Chloroprene (e.g. Neoprene®) ▪ Urea formaldehyde panels (such as Gator Foam®) ▪ Any plastics which contain chlorine or sulfur

Doing lots of research to justify requirements, define a proper scope, and define proper requirement constraints.

The research shown on the right puts restrictions on what our solution can be made of and how heavy it can be. That is, a viable solution should not violate constraints defined by research.

Our final concept: The Modular Walkway

5



(In my opinion) the coolest proxy test I performed throughout my engineering journey. This one required the team to build life-sized models of the shelving component of our textile storage solution, then attempt to use them.

The metric that we were interested in was the change in a user's center of gravity. This was done with an open-source, pretrained model that was easily integrable into Python.

Tracking changes in center of gravity was a way to quantify accessibility

6

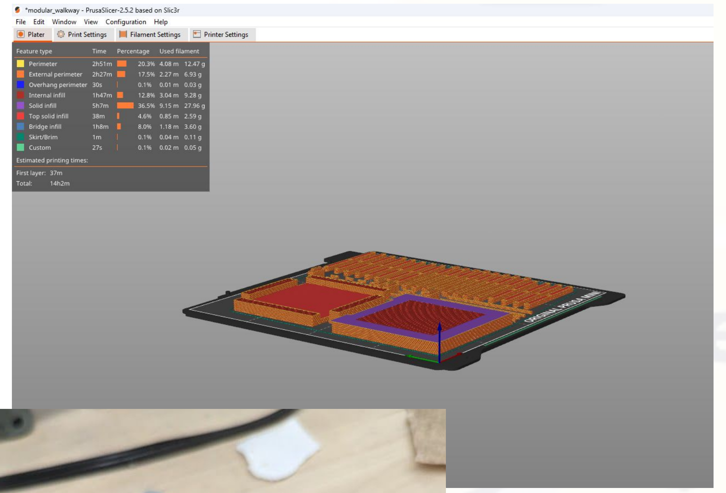
	Walle	Walkway	Tree
6.1.4 - Shall Use Only Safe Textile Materials			
6.1.5 - Shall be Stored Horizontally	15.5°	0°	20°
6.2.1 - Shall Store Textiles	619	360	129
6.2.2 - Shall Fit Within the Dimensions of the Gallery, where a solution with smaller dimensions is preferred	Yes 1.2m by 1m Guaranteed to fit in 1.2m square	Yes 0.75m by 0.75m Guaranteed to fit in 0.75m square	Yes 1m by 1m Guaranteed to fit in 1m square
6.3.1 - Shall not Impose Financial Hardship			
6.4.1.1 - Shall Limit Shifting of Volunteer's Centre of Gravity (x)	493px	184px	max(489, 335) = 489 1st col = top 2nd col = bottom
6.4.1.2 - Shall Limit Shifting of	85px	55px	max(83, 123) = 123

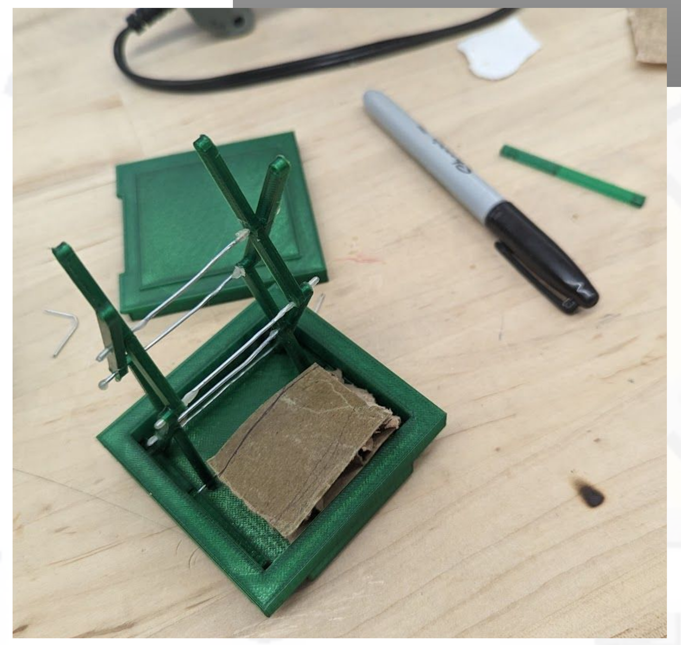
	Walle	Walkway	Tree
6.1.5	Better	Better	DATUM
6.2.1	Better	Better	
6.2.2	Worse	Better	
6.4.1.1	Worse	Better	
6.4.1.2	Better	Better	
6.4.3	Worse	Better	

A snapshot of our Praxis II converging process. Given that we had one less concept when compared to Praxis I, it wasn't too tedious to create three pugh charts to see how designs stacked against each other.

We didn't record measurements for some requirements because they were not as important to our stakeholders.

7





The third prototype that my Praxis II team needed to make - a 3D print showcasing the scissor lift mechanism. Visualizing the print on PrusaSlicer helped a great deal in getting the 3D print tolerances right and a smooth mechanism on the first try.

8

Showcase! All the hard work that my Praxis II team put into a 15 minute presentation and 15 minute Q/A session, with stakeholders visiting to see what we have created.

We are extremely proud of our work and make sure the structure of our presentation is sound and our responses to questions presented to us seamless.