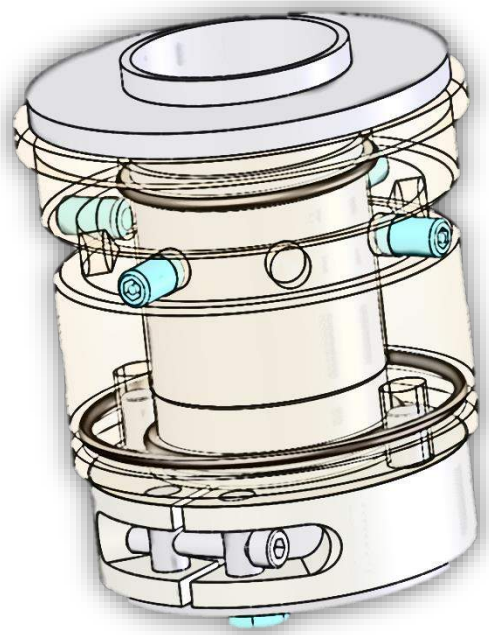
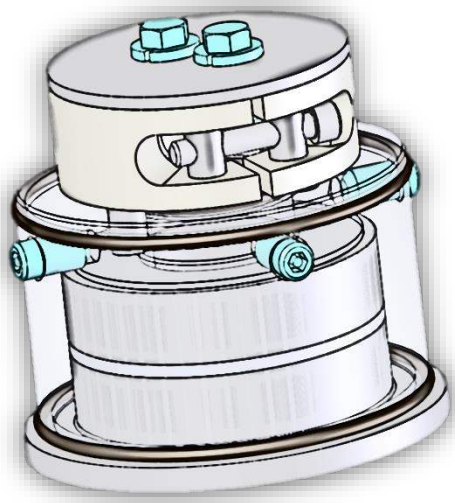
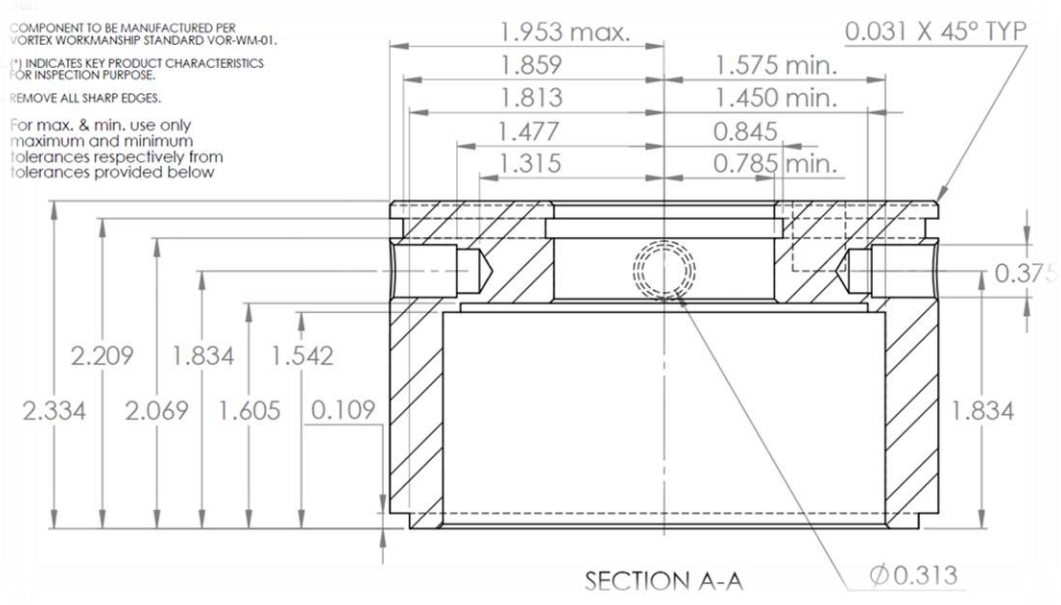
9/10/2015





PORTFOLIO & PROFILE



Mechanical Engineering | Vitalijs Arkulinskis

Vitalijs Arkulinskis Portfolio & Profile

Profile

- Mechanical Engineering (Exp. Dec 2015) and over 70 PDUs in Project Management training.
- Cumulative 3.5 years of work experience in the field of engineering and project management.
- Previous Internships: Dassault Systemes, Bombardier Aerospace, McGill University Robotics.
- Strong software knowledge of CAD, management, sales and programming applications.

Details

Engineering Design and Analysis Skills:

CATIA FEA and Excel fatigue analysis for gears, shafts, and screws.
VBA / C++ / Python for engineering analysis tool programming.
SolidWorks, Pro/Engineer, and AutoCAD design experience.
Mastercam and Boxford CNC manufacture (CAD to CAM).
Robotic actuation and computer vision with OpenCV + ROS.

Project Management Skills:

Multidisciplinary project management (PMP trained / MS Project).
Product development in waterfall / agile / iterative project structures.
Management optimization tool programming (6 Sigma / 5S / KAIZEN).
Financial analysis with Excel / VBA / SAP and proprietary systems.

Disclaimer

This portfolio contains images and descriptions of past projects where my role was design and design analysis. This document serves to demonstrate my CAD proficiency as well as ability to work with ingenuity. Software used includes primarily SolidWorks and Pro/Engineer. These projects range between conceptual and manufactured as well as simple and complex design structures. I sincerely hope you enjoy the examples provided and if you wish to contact me feel free to email or call the number provided below. Thank you!

Useful information

Spoken languages: English, French, Latvian, Russian
Accessibility: Canadian Citizen, Driver's License, EU Citizen (Available for business travel)

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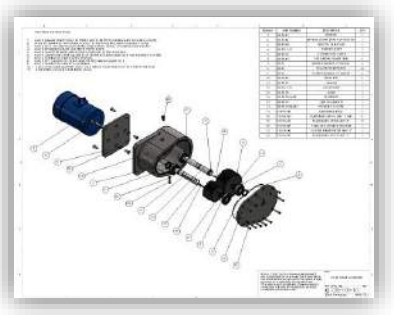
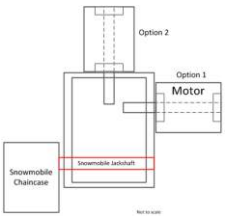
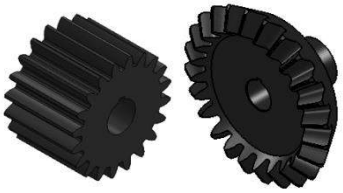
Vitalijs Arkulinskis Portfolio & Profile

Snowmobile gearbox design with parallel and bevel design options

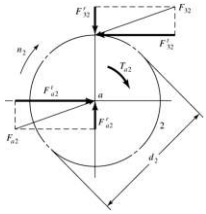
This project was undertaken as part of a class on material performance under stress. Concepts of AGMA analysis were used, as well as standard stress equations and Von Misses stresses. The design was made to sustain cold temperatures and be rated with a minimal safety factor of 1.5. I coded a calculator on Excel and we iterated configurations for an optimal design.

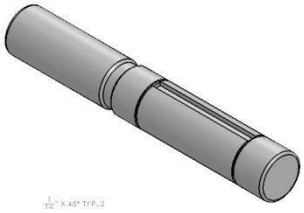






$$\sigma_c = \begin{cases} C_p\sqrt{W^t K_o K_v K_s \dfrac{K_m}{d_P F}\dfrac{C_f}{I}} \\ Z_E\sqrt{W^t K_o K_v K_s \dfrac{K_H}{d_{w1} b}\dfrac{Z_R}{Z_I}} \end{cases}$$

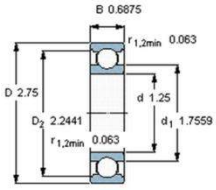


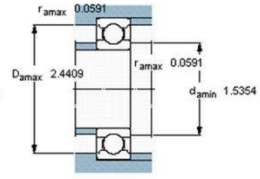


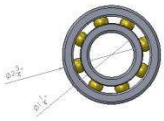
$$\sigma'_a = \left[\left(\frac{32k_f M_a}{\pi d^3}\right)^2 + 3\left(\frac{16k_{fs}T_a}{\pi d^3}\right)^2\right]^{1/2}$$

$$\sigma'_m = \left[\left(\frac{32k_f M_m}{\pi d^3}\right)^2 + 3\left(\frac{16k_{fs}T_m}{\pi d^3}\right)^2\right]^{1/2}$$

$$\sigma'_{max} = \sigma'_a + \sigma'_m$$

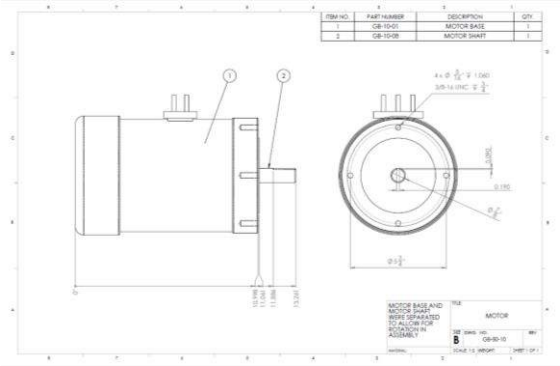


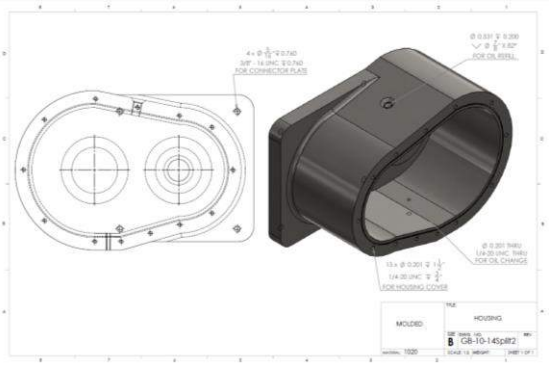




$$\sigma = W_t K_o K_v K_s \frac{P_d}{F}\frac{K_m K_B}{J}$$

$$S_e = k_a k_b k_c k_d k_e k_f S'_e$$





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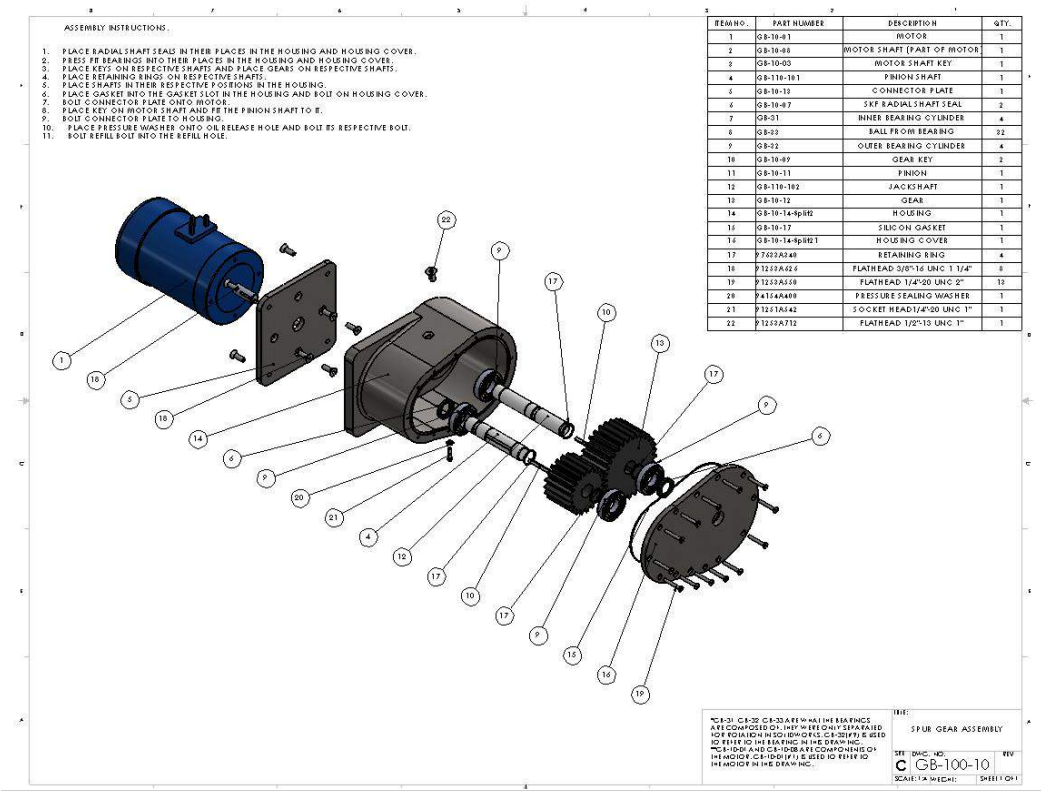
Vitalijs Arkulinskis Portfolio & Profile



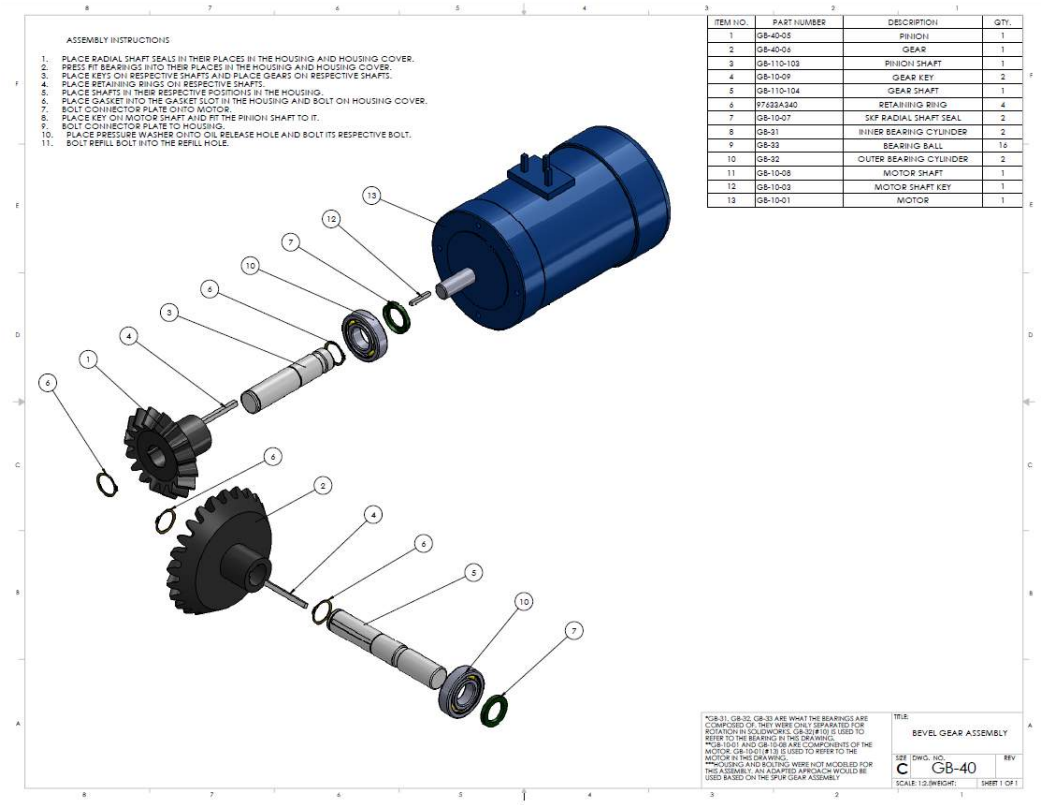
ASSEMBLY INSTRUCTIONS.

1. PLACE RADIAL SHAFT SEALS IN THEIR PLACES IN THE HOUSING AND HOUSING COVER.
2. PRESS FIT BEARINGS INTO THEIR PLACES IN THE HOUSING AND HOUSING COVER.
3. PLACE KEYS ON RESPECTIVE SHAFTS AND PLACE GEARS ON RESPECTIVE SHAFTS.
4. PLACE RETAINING RINGS ON RESPECTIVE SHAFTS.
5. PLACE SHAFTS IN THEIR RESPECTIVE POSITIONS IN THE HOUSING.
6. PLACE GASKET INTO THE GASKET SLOT IN THE HOUSING AND BOLT ON HOUSING COVER.
7. BOLT CONNECTOR PLATE ONTO MOTOR.
8. PLACE KEY ON MOTOR SHAFT AND FIT THE PINION SHAFT TO IT.
9. BOLT CONNECTOR PLATE TO HOUSING.
10. PLACE PRESSURE WASHER ONTO OIL RELEASE HOLE AND BOLT ITS RESPECTIVE BOLT.
11. BOLT REFILL BOLT INTO THE REFILL HOLE.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GB-10-01	MOTOR	1
2	GB-10-08	MOTOR SHAFT (PART OF MOTOR)	1
3	GB-10-03	MOTOR SHAFT KEY	1
4	GB-110-101	PINION SHAFT	1
5	GB-10-10	CONNECTOR PLATE	1
6	GB-10-07	SKF RADIALS SHAFT SEAL	2
7	GB-31	INNER BEARING CYLINDER	4
8	GB-33	BALL FROM BEARING	32
9	GB-32	OUTER BEARING CYLINDER	4
10	GB-10-09	GEAR KEY	2
11	GB-10-11	PINION	1
12	GB-110-102	JACKSHAFT	1
13	GB-10-12	GEAR	1
14	GB-10-14-Split2	HOUSING	1
15	GB-10-17	SILICON GASKET	1
16	GB-10-14-Split2.1	HOUSING COVER	1
17	97633A240	RETAINING RING	4
18	91253A626	FLATHEAD 3/8"-16 UNC 1 1/4"	8
19	91253A550	FLATHEAD 1/4"-20 UNC 2"	13
20	94164A400	PRESSURE SEALING WASHER	1
21	91251A542	SOCKET HEAD1/4"-20 UNC 1"	1
22	91253A712	FLATHEAD 1/2"-13 UNC 1"	1

*GB-31, GB-32, GB-33 ARE WHAT THE BEARINGS ARE COMPOSED OF. THEY WERE ONLY SEPARATED FOR ROTATION IN SOLIDWORKS. GB-31(#10) IS USED TO REFER TO THE BEARING IN THE DRAWING.
**GB-10-01 AND GB-10-08 ARE COMPONENTS OF THE MOTOR. GB-10-01(#13) IS USED TO REFER TO THE MOTOR IN THIS DRAWING.

TITLE: SPUR GEAR ASSEMBLY
SIZE C | DWG. NO. GB-100-10 | REV
SCALE: 1:4 WEIGHT: | SHEET 1 OF 1



ASSEMBLY INSTRUCTIONS

1. PLACE RADIAL SHAFT SEALS IN THEIR PLACES IN THE HOUSING AND HOUSING COVER.
2. PRESS FIT BEARINGS INTO THEIR PLACES IN THE HOUSING AND HOUSING COVER.
3. PLACE KEYS ON RESPECTIVE SHAFTS AND PLACE GEARS ON RESPECTIVE SHAFTS.
4. PLACE RETAINING RINGS ON RESPECTIVE SHAFTS.
5. PLACE SHAFTS IN THEIR RESPECTIVE POSITIONS IN THE HOUSING.
6. PLACE GASKET INTO THE GASKET SLOT IN THE HOUSING AND BOLT ON HOUSING COVER.
7. BOLT CONNECTOR PLATE ONTO MOTOR.
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9. BOLT CONNECTOR PLATE TO HOUSING.
10. PLACE PRESSURE WASHER ONTO OIL RELEASE HOLE AND BOLT ITS RESPECTIVE BOLT.
11. BOLT REFILL BOLT INTO THE REFILL HOLE.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GB-40-05	PINION	1
2	GB-40-06	GEAR	1
3	GB-110-103	PINION SHAFT	1
4	GB-10-09	GEAR KEY	2
5	GB-110-104	GEAR SHAFT	1
6	97633A240	RETAINING RING	4
7	GB-10-07	SKF RADIAL SHAFT SEAL	2
8	GB-31	INNER BEARING CYLINDER	2
9	GB-33	BEARING BALL	16
10	GB-32	OUTER BEARING CYLINDER	2
11	GB-10-08	MOTOR SHAFT	1
12	GB-10-03	MOTOR SHAFT KEY	1
13	GB-10-01	MOTOR	1

*GB-31, GB-32, GB-33 ARE WHAT THE BEARINGS ARE COMPOSED OF. THEY WERE ONLY SEPARATED FOR ROTATION IN SOLIDWORKS. GB-31(#10) IS USED TO REFER TO THE BEARING IN THIS DRAWING.
**GB-10-01 AND GB-10-08 ARE COMPONENTS OF THE MOTOR. GB-10-01(#13) IS USED TO REFER TO THE MOTOR IN THIS DRAWING.
***HOUSING AND BOLTING WERE NOT MODELED FOR THIS ASSEMBLY. AN ADAPTED APPROACH WOULD BE USED BASED ON THE SPUR GEAR ASSEMBLY

TITLE: BEVEL GEAR ASSEMBLY
SIZE C | DWG. NO. GB-40 | REV
SCALE: 1:2.5 WEIGHT: | SHEET 1 OF 1

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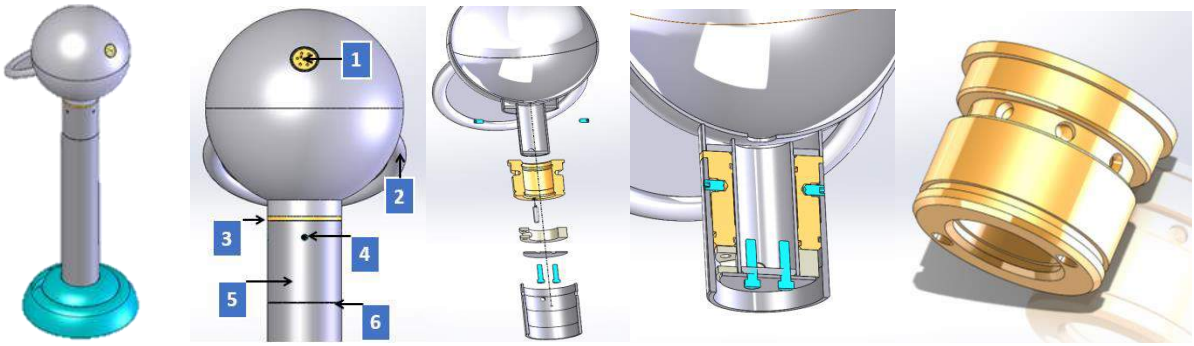
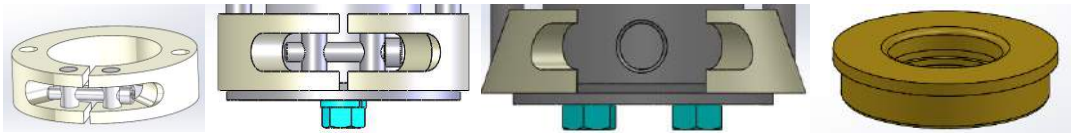
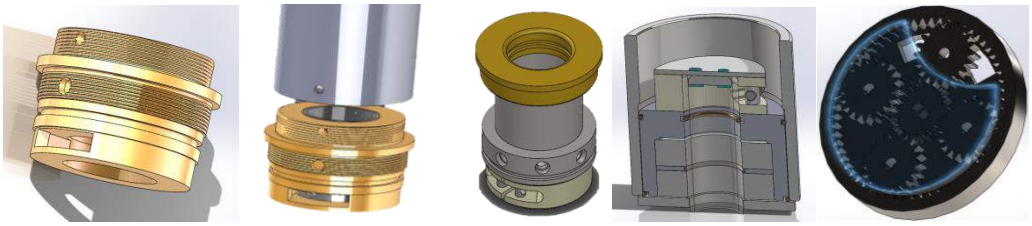
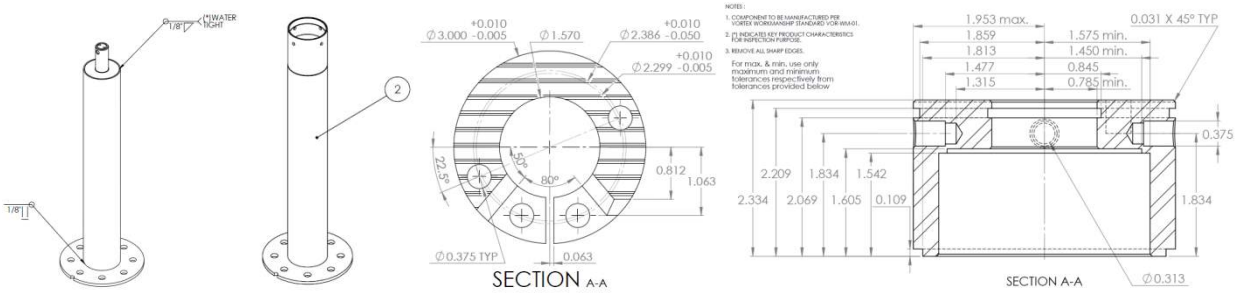
Aquatic joint redesign for water playground equipment

The main challenge in this project was keeping the design waterproof while providing a more pleasant user experience. Focused on safety this design is tamper proof and should last extended periods of time without maintenance.
Below you can see the creative process behind the project with details on the following page.









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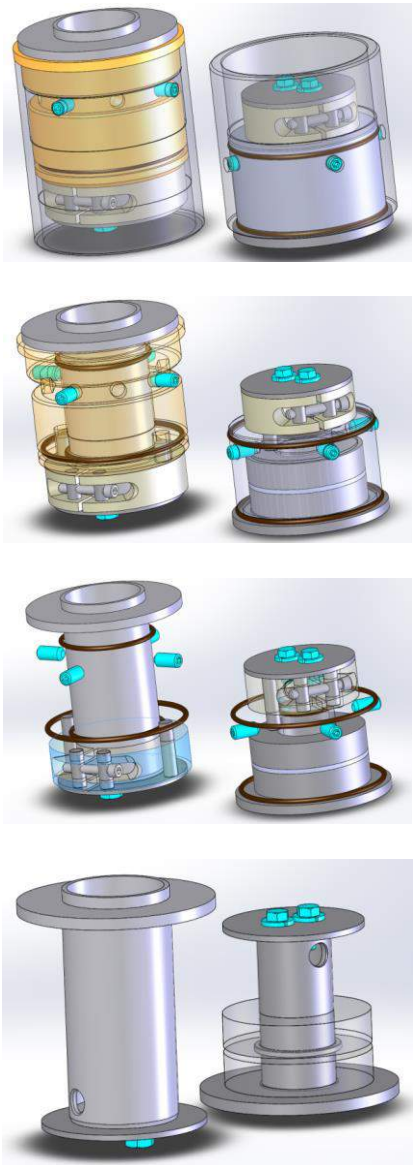
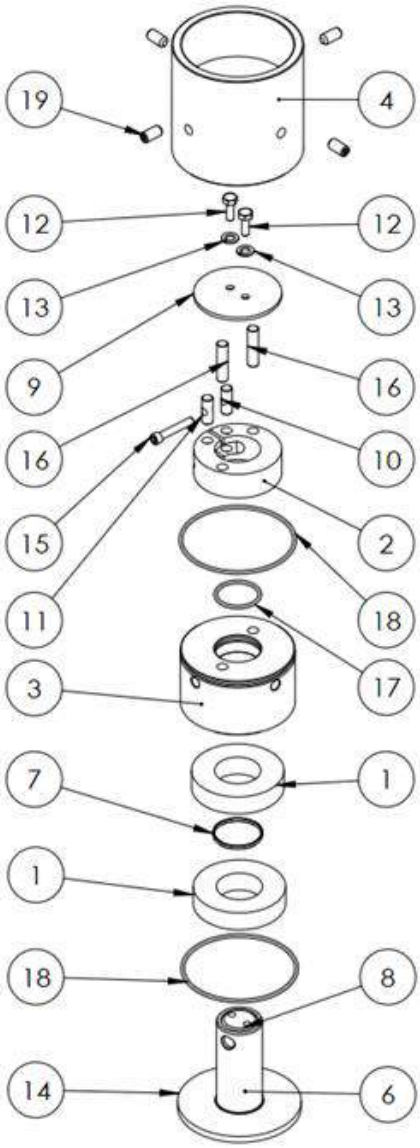
The following is a side by side comparisson of the two joints (redesigned on the right). As you can see the footprint of the design is much smaller while the friction is dealth with by introducing bearings. Bearing quality is important, however this design allows us to avoid any contact with water for the internal sensitive components. The design is essentially flipped upside down making the assembly easier. The new design uses less material and stainless steel instead of brass, further reducing cost.





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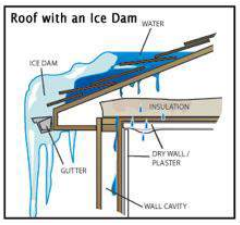
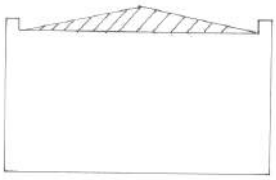
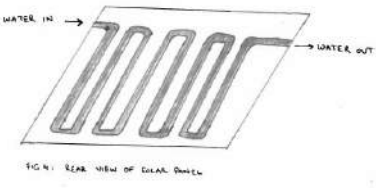
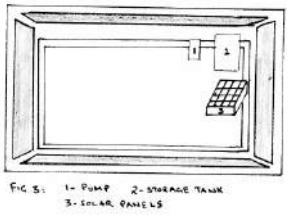
University level projects on literature research and coding

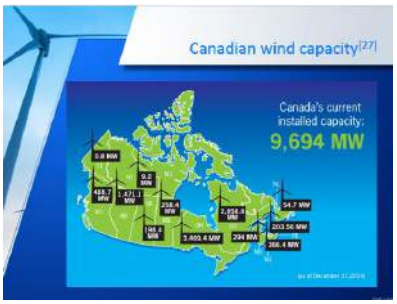
The first line refers to the roof de-icing solution presented to improve safety of the Trottier building on McGill campus. A residual heat incline is used alongside a solar heater.
The second line is an extract from the inquest into the state of wind power generation technology. Design potentials and reasoning behind current solutions were discussed in detail, backed by the electro-mechanics studied in class.
The last set of graphs is a representation of numerical convergence on a pair solution to a system of DEs, using numerical methods: Newton and FxPt (Jacobian, Identity).

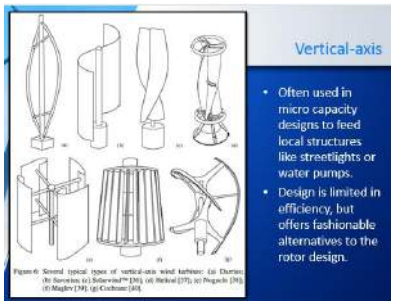


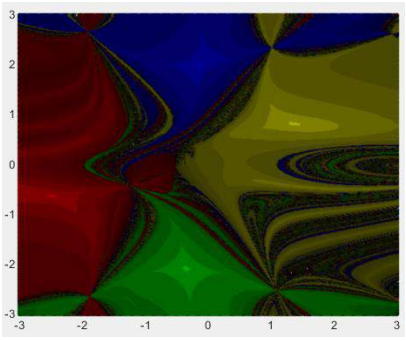


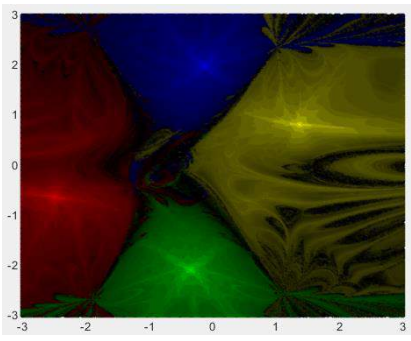


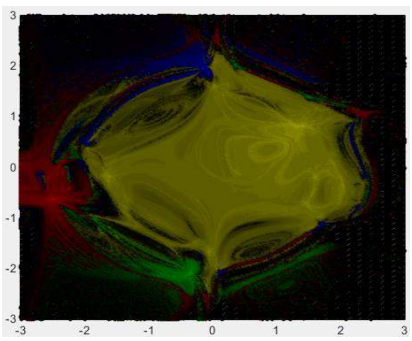












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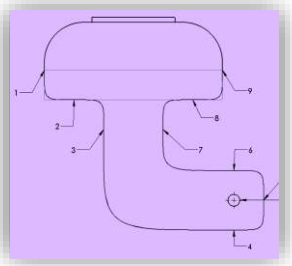
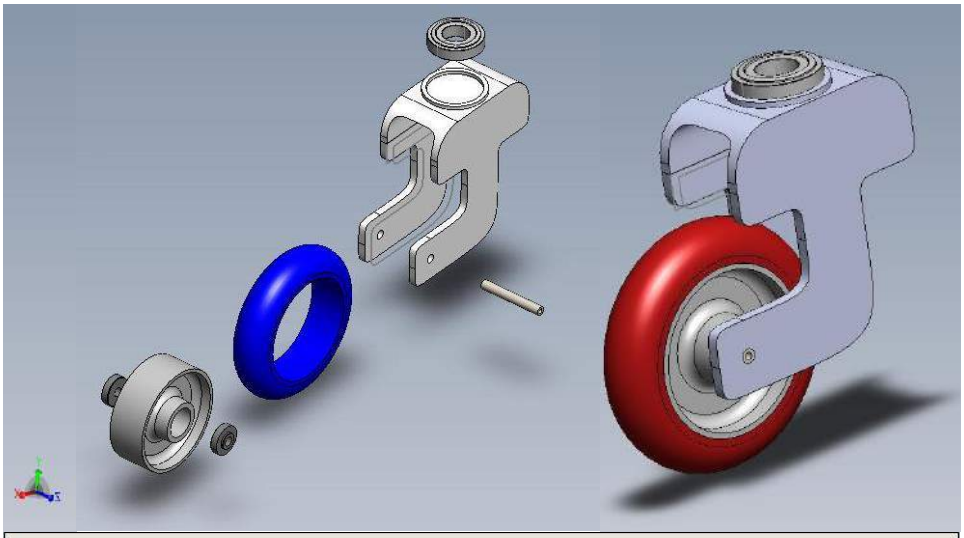
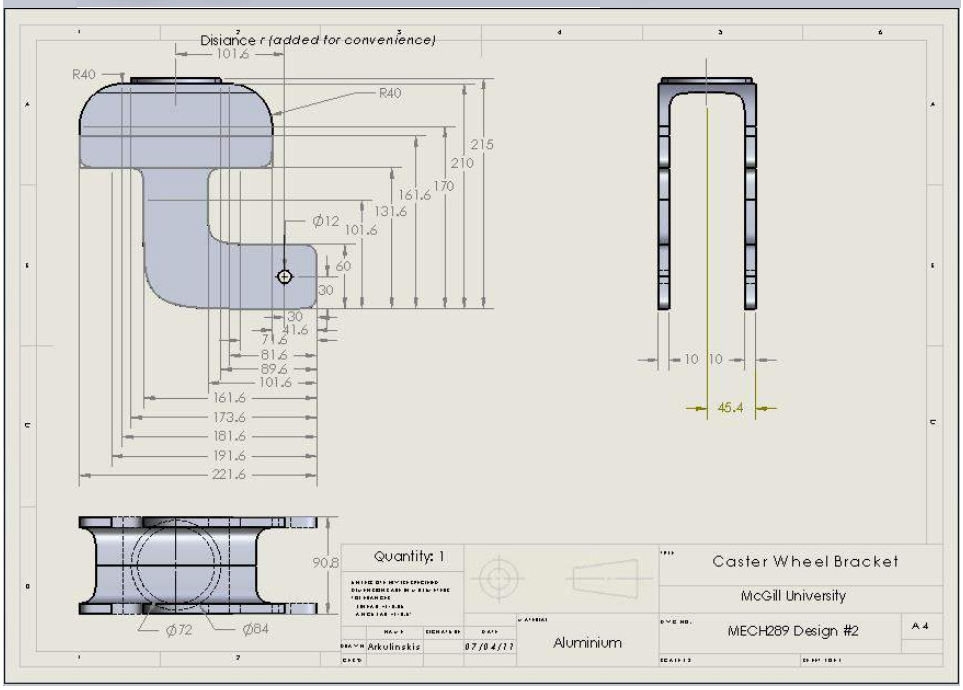
Robotic caster wheel design for obstacle avoidance using available parts

This design involves using load redistribution curves based on the dynamics of G^2 continuities. The design offers superior directional control and can be easily manufactured.







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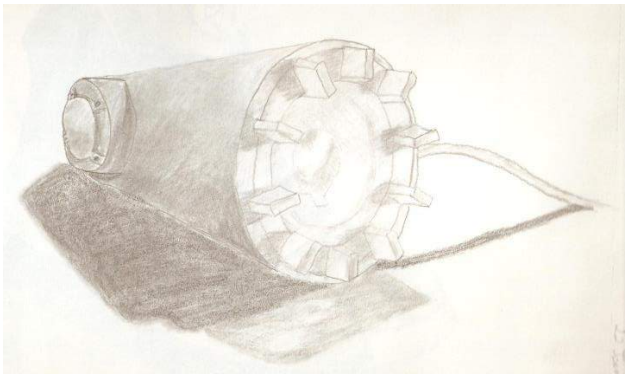
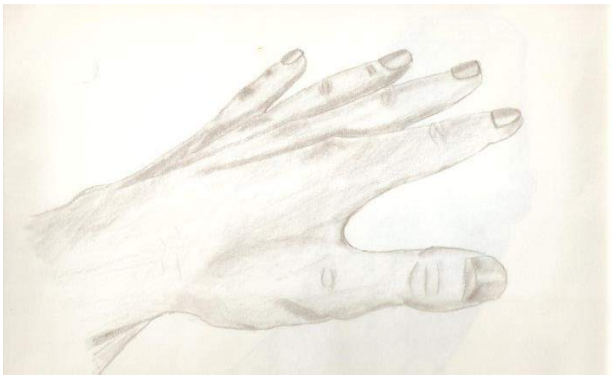
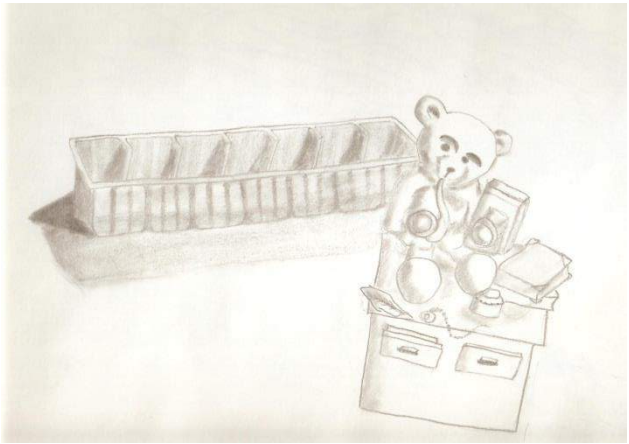
Free hand drawing examples focused on object capture and shading

Design courses at McGill focus on communicating ideas using a visual medium like CAD, and in this case free hand drawing. The course has allowed me to increase the speed of sketching dramatically and I am now able to present my ideas in a clear and efficient manner when communicating designs. Below are examples of some objects we were asked to draw.







Above you can see in reading progression a speaker on it's side, a hand, shoes, plastic packaging, and a toy statuette of a bear.

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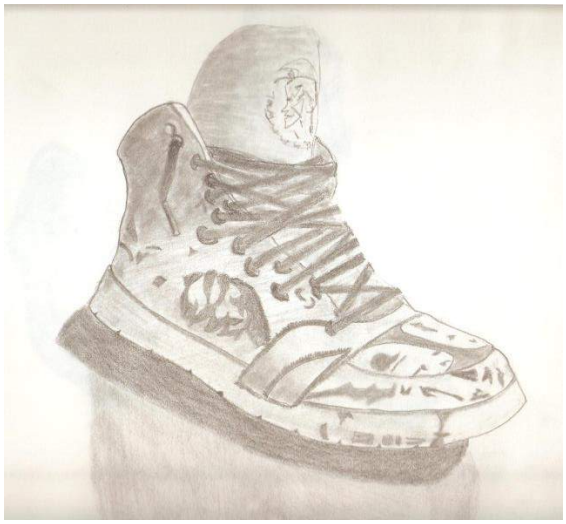
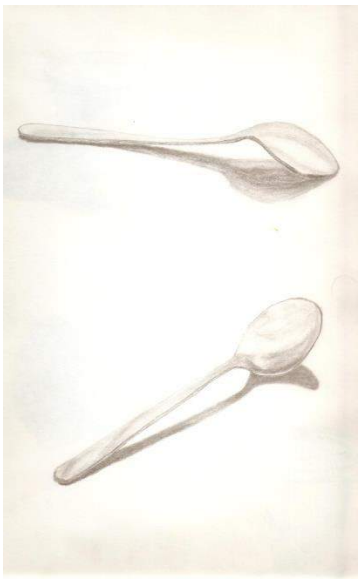
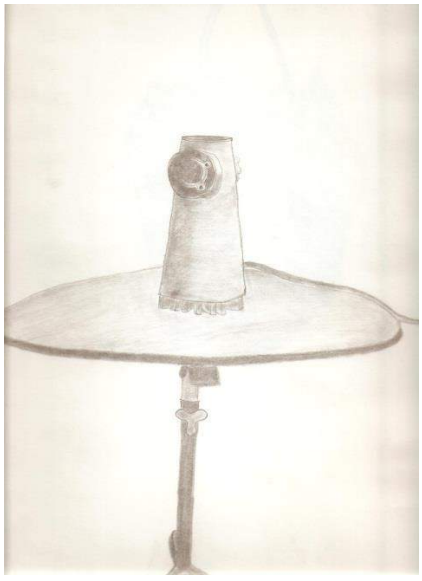
Below you can see in reading progression a hand holding a cup,
a Diesel shoe, spoons, toilet paper rolls, and a speaker on an IKEA side table.



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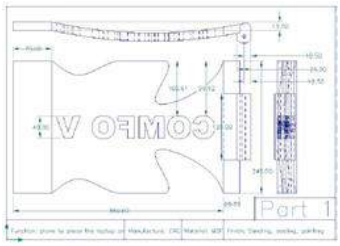
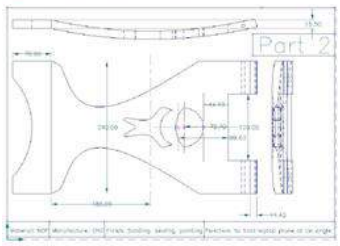
Laptop comfort station for heat dissipation during bed use

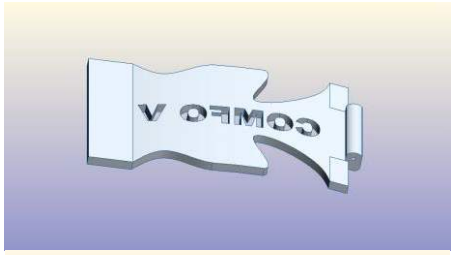
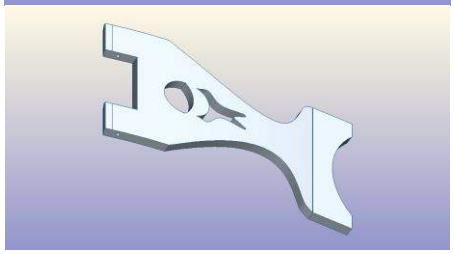
Careful analysis of posture control and available solutions on the market, was quickly followed by a prototyping phase and supporting CAD. After multiple iterations of the design it was optimized for CAM and then fed to a CNC machining system.

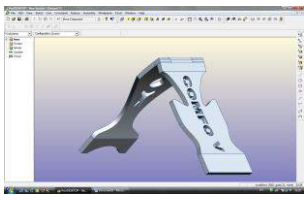
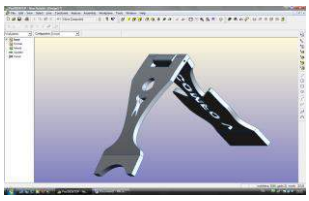
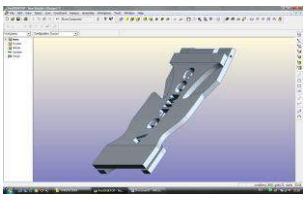
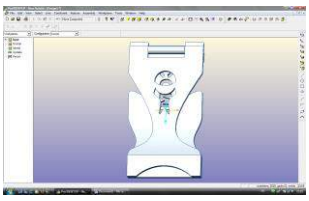


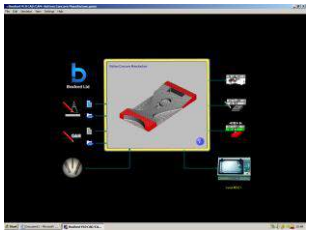
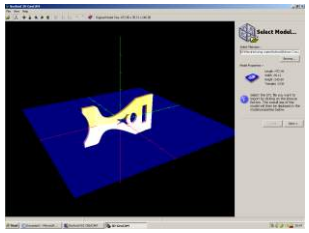
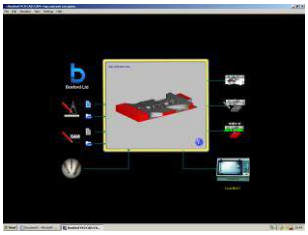
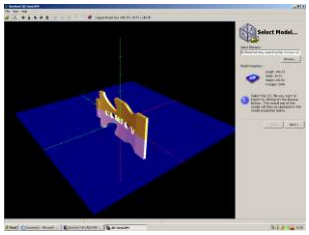




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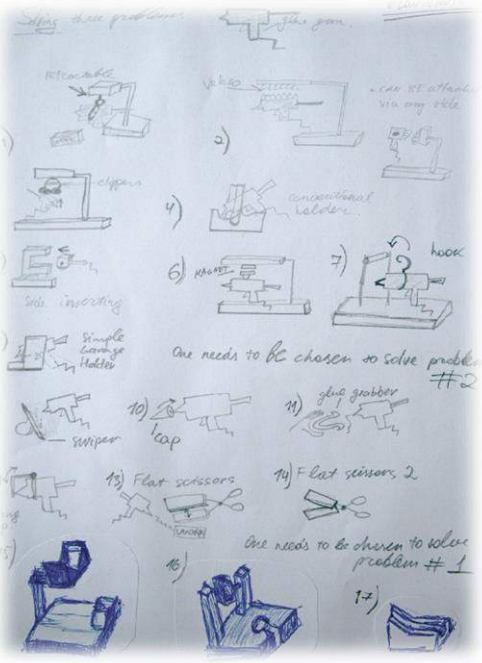
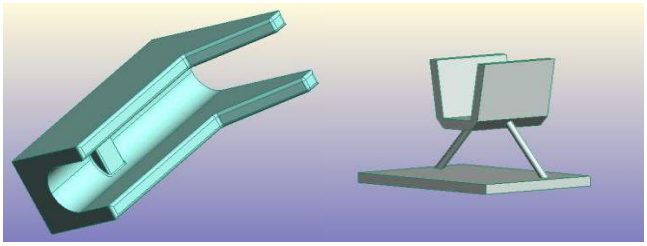
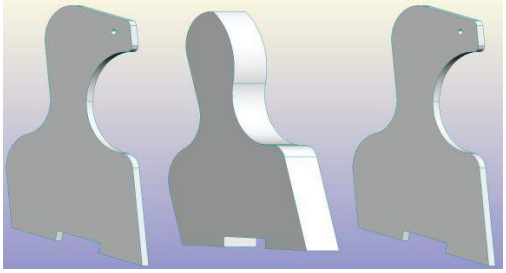
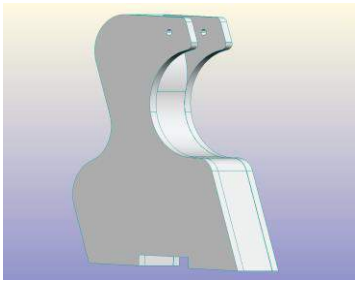
Workstation glue gun safety stand design for workflow optimization

Design brainstorming phase produced over twenty alternative design paths. The final product was fully developed and manufactured. Hot red colors and polished transparent acrylic added to the aesthetics of the highly robust design.









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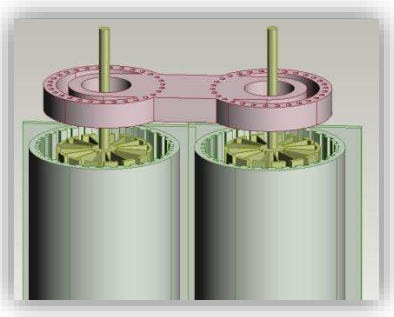
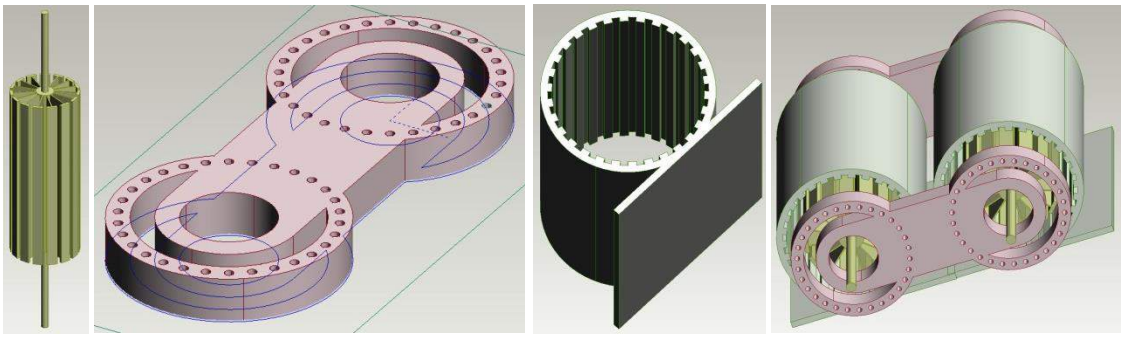
Other exciting projects high school and university level

While at school and university I was curious to pursue other projects. I experimented with materials in my school's manufacturing facilities and did electricity generation experiments. I was also able to design a slide phone exterior and gained valuable experience in what not to do, and which practices work best in wood, plastic and Styrofoam machining.





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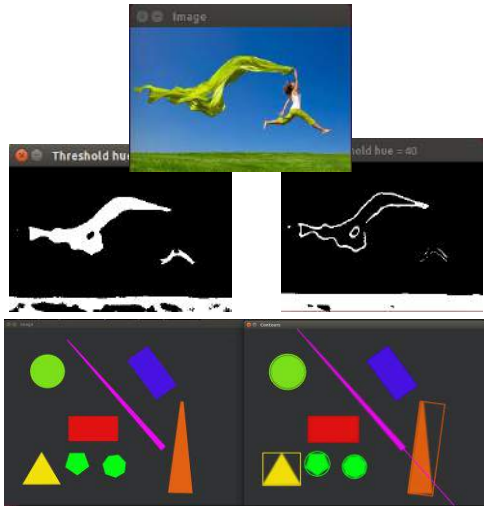
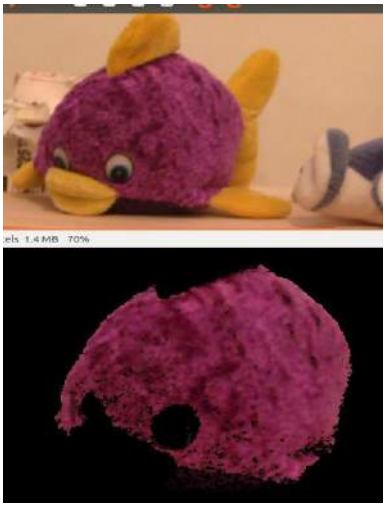
Computer vision and object recognition for an underwater autonomous vehicle

Joining one of the most inventive groups at McGill I was able to improve my understanding of computer vision systems and use OpenCV. I now have the knowledge of over thirty different object recognition styles and I continue to explore the topic as a hobby. Coding is an exciting pass time and one of the strong suits I have when embarking on any new project.

McGill ROBOTICS





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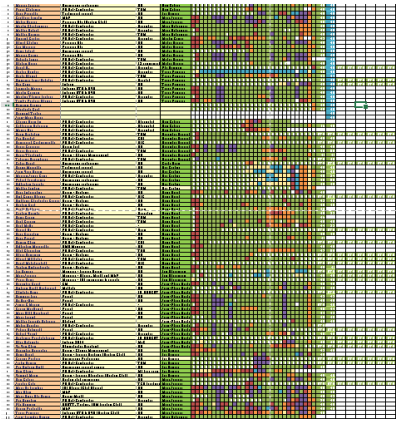
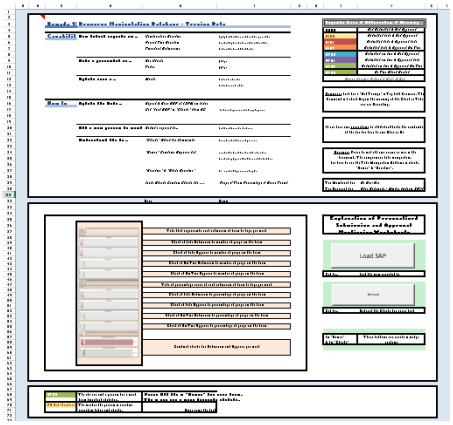
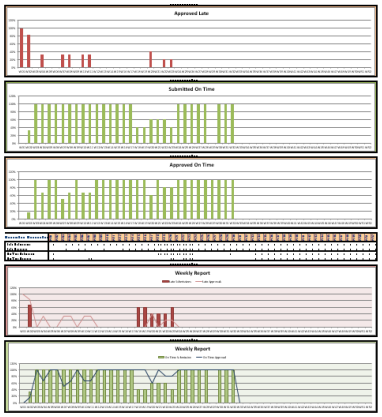
Overview of industry experience including Excel and CATIA examples

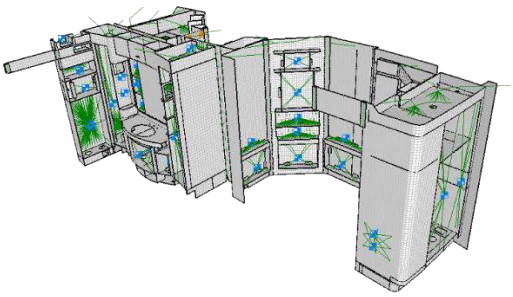
The following are reconstructed snapshots of my past work that serve to show the level of complexity of tasks undertaken. I am not able to show my work for FEA, due to non-disclosure, but I was able to find very similar analysis examples on Google to demonstrate the type of work I was involved in, and the type of reports on private jet interior stress analysis I had to write as part of my job at Dassault Systemes.

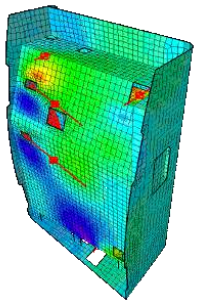
Achieving Excellence System

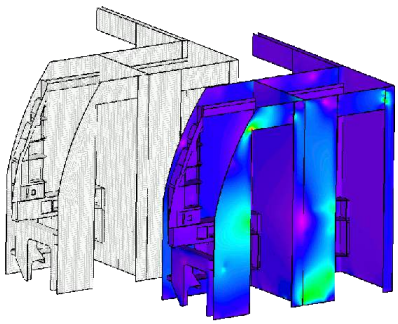


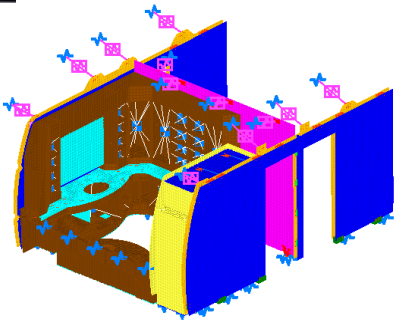


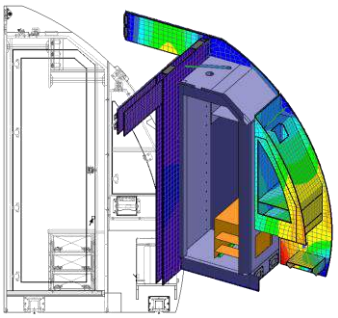












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Additional certifications

CERTIFICATE OF ACHIEVEMENT

This certificate is awarded to

VITALIJS ARKULINSKIS

for the Successful Completion of

THE MCGRAW-HILL 36-HOUR
SIX SIGMA COURSE

Cheryl Ringer — May 2014

Signature — Date

Professional

Career Academy .com

Certificate of Completion

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for successful completion of the

LOOKINGGLASS - CERTIFIED ASSOCIATE IN PROJECT MANAGEMENT (CAPM) EXAM PREP

Certification Training

CareerAcademy.com — AUGUST 18, 2015 — Date — Student

Career Academy Inc.

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Certification Training

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Certification Training

CareerAcademy.com	AUGUST 14, 2015 *Date*	*Student*

Career Academy Inc.

Thank you!

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