

Projets majeurs de conception dans le cadre de la formation d'ingénieur: des bénéfices pour les étudiants et la société

Pr. David Rancourt

david.rancourt2@usherbrooke.ca

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CREATEK



UNIVERSITÉ DE
SHERBROOKE

A unique approach to mechanical engineering at UdeS

- Global approach: **from idea to product**
- Major 2-year capstone design projects



2009



2011



2010



IDEAS & PROJECTS



2012



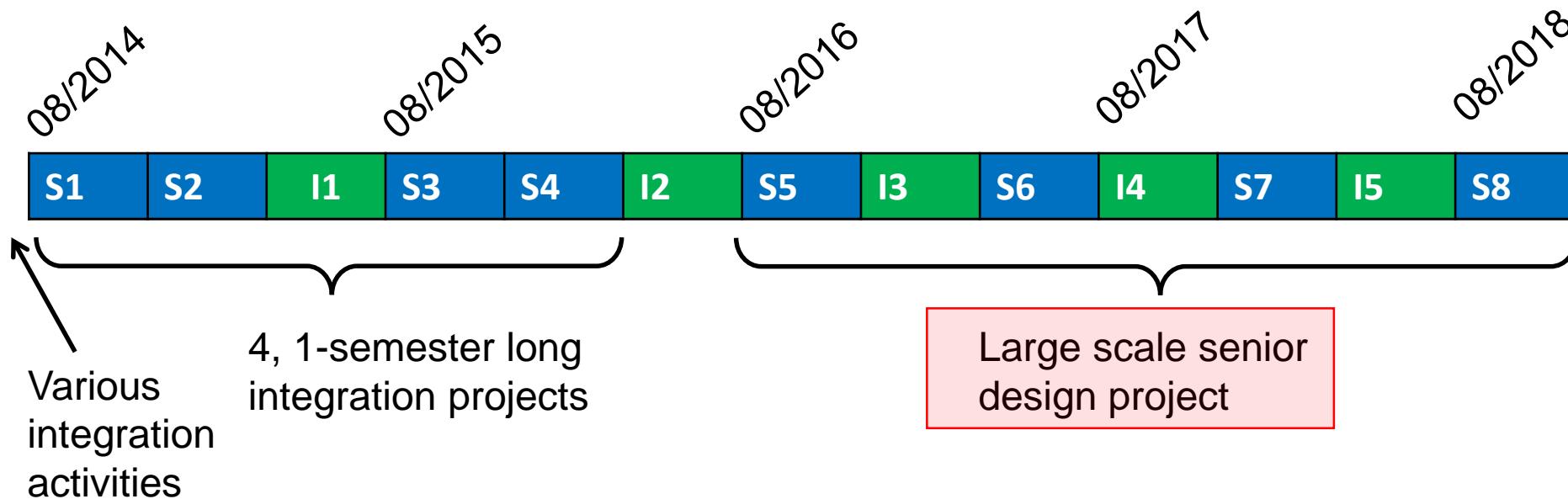
2013



McMasters's List of Desired Attributes

- A good understanding of the engineering sciences
 - Mathematics
 - Physical and life sciences
 - Information technology
- A good understanding of design and manufacturing processes
- A multi-disciplinary, systems perspective
- A basic understanding of the context in which engineering is practiced
 - Economics
 - History
 - Environment
 - Customer and societal needs
- Good communication skills
- Highly ethical standards
- An ability to think both critically and creatively – independently and cooperatively
- Flexibility
- Curiosity
- A profound understanding of the importance of teamwork
- Global awareness (aided by the knowledge of at least one language other than English)

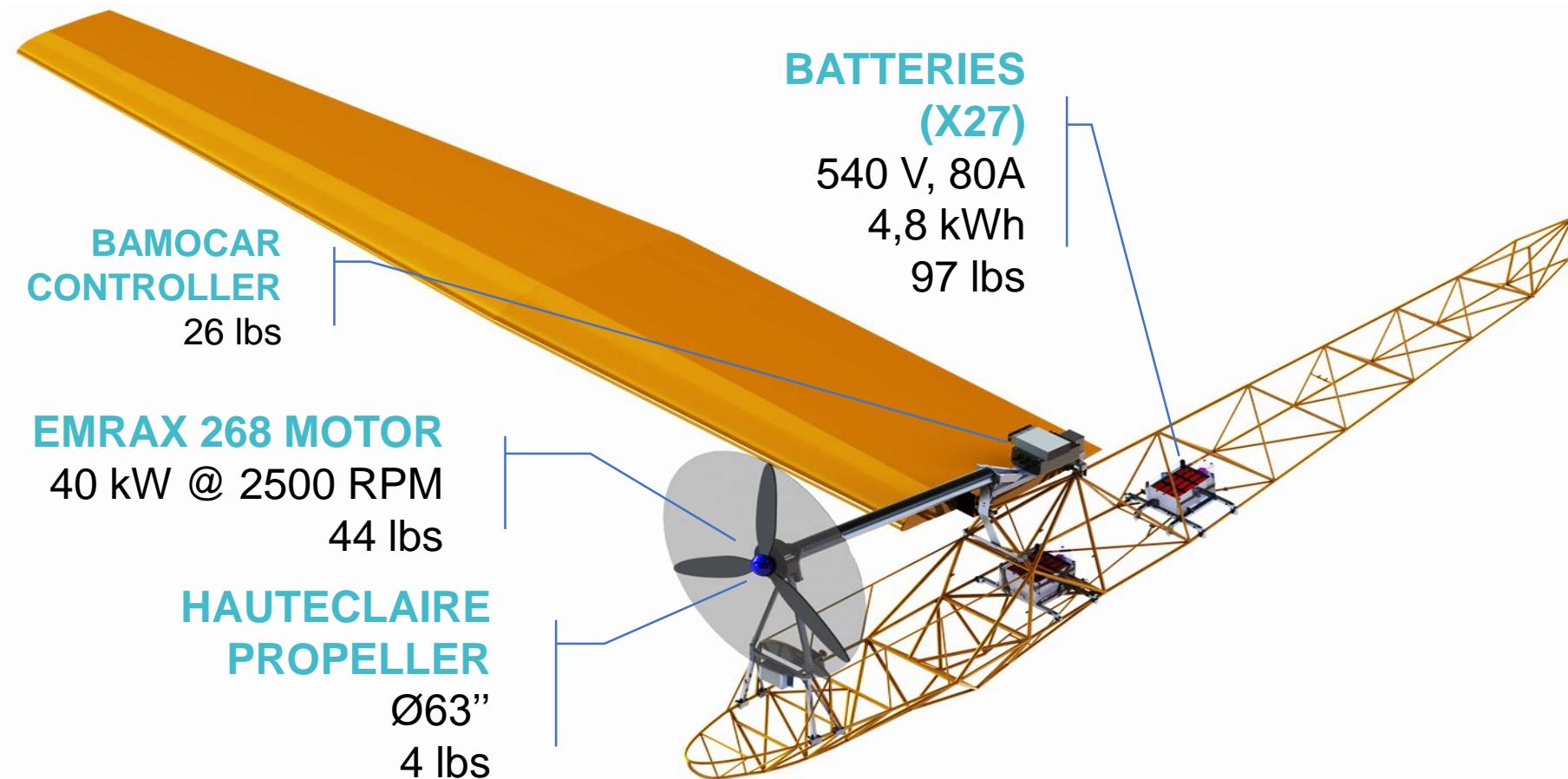
Outline of Sherbrooke's Mechanical Engineering Program



- No major in AE – only a minor
- No core curriculum: students start to learn the basics of ME as early as the first week
- Significant emphasis on *design and hands-on experience*.
 - i.e. Students learn to machine parts during their first semester

Exemples de projets avec
contribution directe à la société

Projet Zephyr (2015-2017)





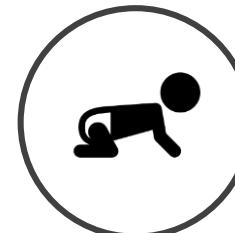
CIGOGNE



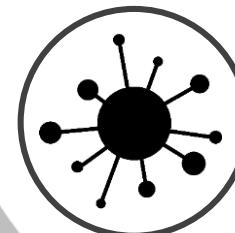
Selon l'OMS



La non vaccination cause
2-3 millions de **morts** / an



10 millions de nourrissons
non vaccinés dans 64 pays



Perte de 84% des vaccins contre
la tuberculose dû au **transport**

Route après de fortes pluies Île de Pentecôte, Vanuatu



Notre produit

Compartiment activement réfrigéré se fixant sur un drone



Chargement
Jusqu'à 2 kg
1400 doses

Portée
70 km

Température contrôlée
Régulation continue
entre 2 et 8 °C

Région désertique

Tulugulid District, Éthiopie



Futur **prometteur** du projet grâce à des démarches entreprises auprès de :

- **Fournisseurs** : AxisProto
- **Partenaires** : Laflamme Aéro
- **Clients** : Croix-Rouge canadienne
Croix-Rouge internationale
UNICEF

Projet Pégase: Increasing Interest In STEM Through Design and Flight of a Human Powered Aircraft

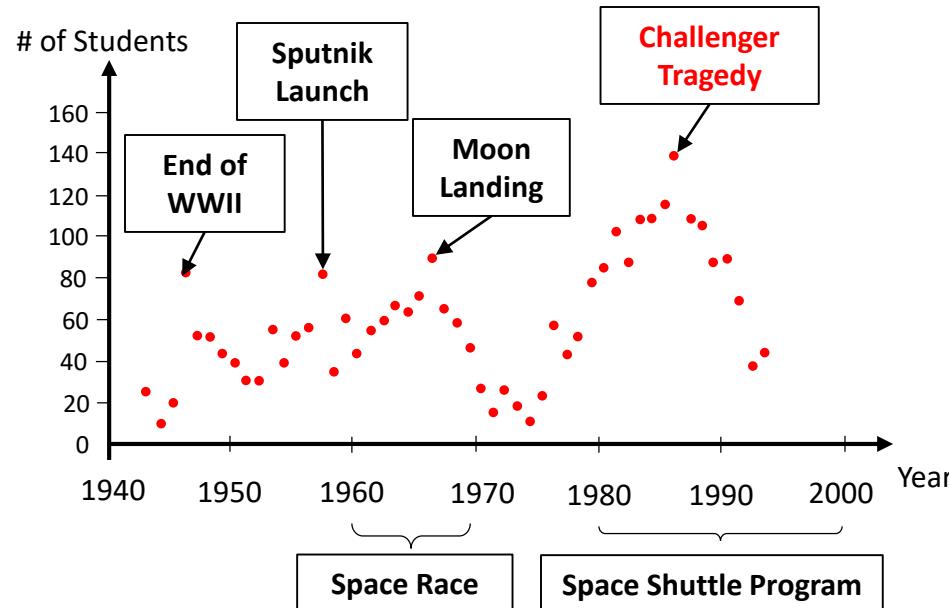


Enrollment in Engineering Programs

- Past has shown that enrollment in engineering programs was correlated with coverage of aerospace events
- A common misconception is that the aerospace industry is now going idle:
 - Concorde has retired in 2003
 - Space Shuttle program ended in 2011
- Students' career choices are influenced by readily available information [2]:
 - Advertising
 - News reports
 - Nowadays: Social media



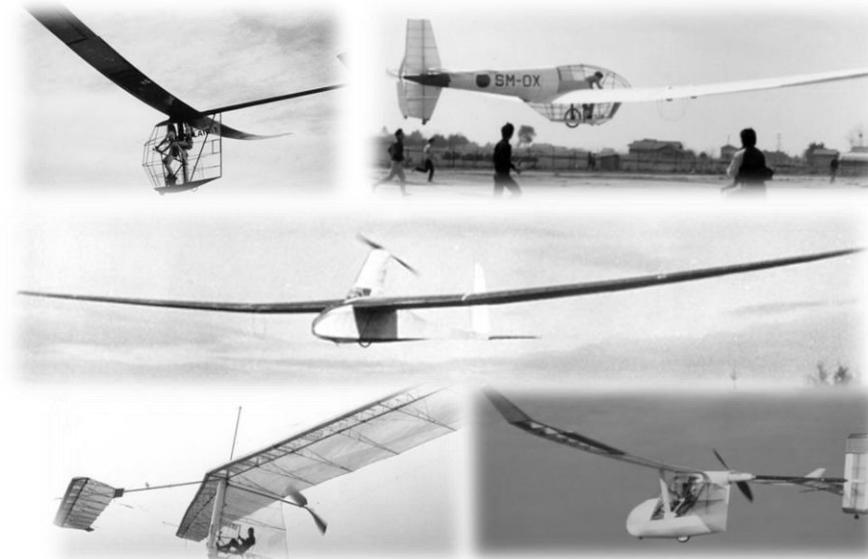
Fall term sophomore enrollement in the MIT Department of Aeronautics [1]



How can we reach out and encourage kids to choose engineering as a career?

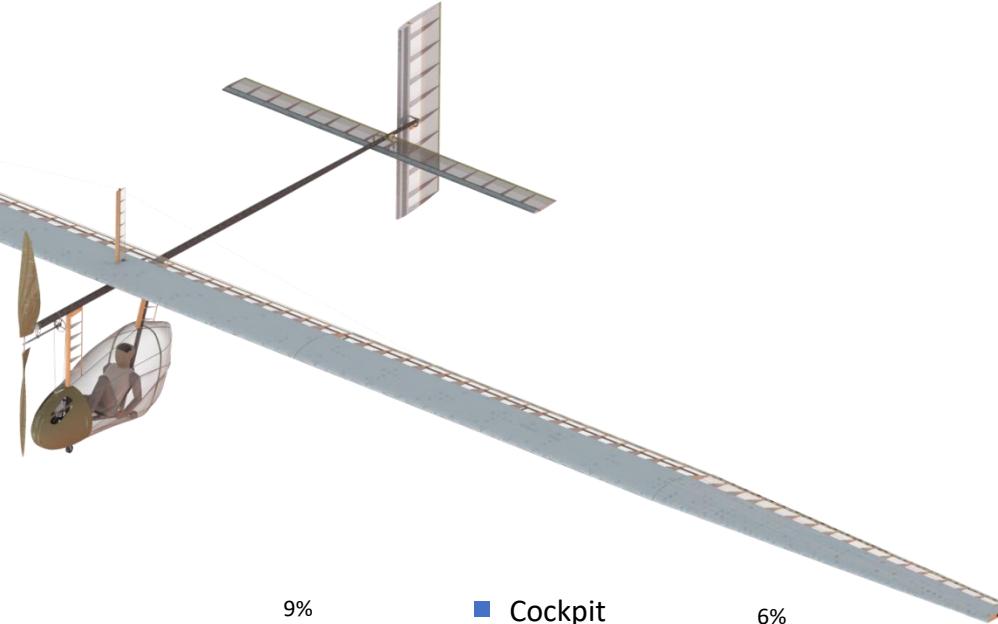
Projet Pégase – Human Powered Aircraft

- Seize the senior design project opportunity to realize something inspiring (and crazy) to promote STEM careers in our community
- Specific Objectives:
 1. Maintain flight under human power alone before the end of the project (300W)
 2. Make a prototype that is easy to assemble and transport
 3. Raise interest in STEM education fields



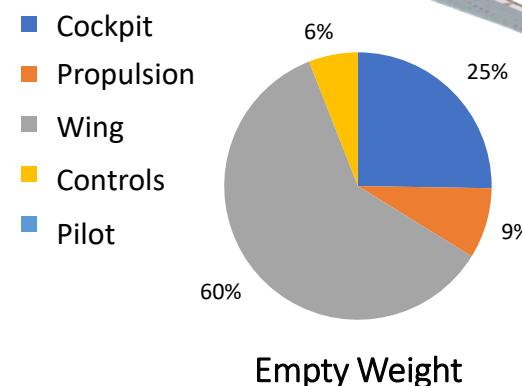
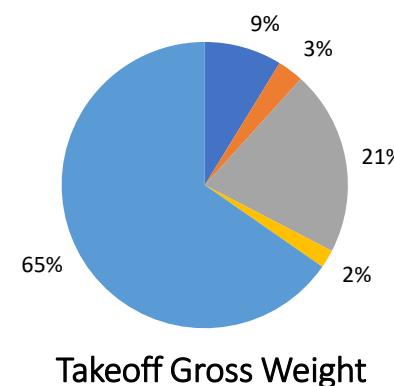
Projet Pégase – Human Powered Aircraft

- *Span = 27 m*
- *Wing area = 27,75 m²*
- *Cruise Speed = 26 km/h*
- *Empty weight = 40 kg*
- *Takeoff gross Weight = 110 kg*
- *Power required = 300 W*



Mass breakdown:

1. Cockpit = 10kg
2. Propulsion = 3.6kg
3. Wing = 24kg
4. Control System = 2.4kg
5. Pilot = 70kg



En résumé

- Projets majeurs de conception à l’UdeS
 - Durée de 2 ans
 - Projets très variés
 - Répond à des besoins concrets
 - Très appliqués, mise en pratique des connaissances
 - Environ 15 projets chaque année!
- Choix des projets
 - Selon le goût des étudiants (ce sont leurs projets!)
 - De plus en plus de projets à saveur entrepreneuriale et sociétale
 - Cigogne
 - Zephyr
 - Pegase
 - ...