

# Why did I want to be a Mechanical Engineer?

Paul Walshe  
ME (Mech) Student



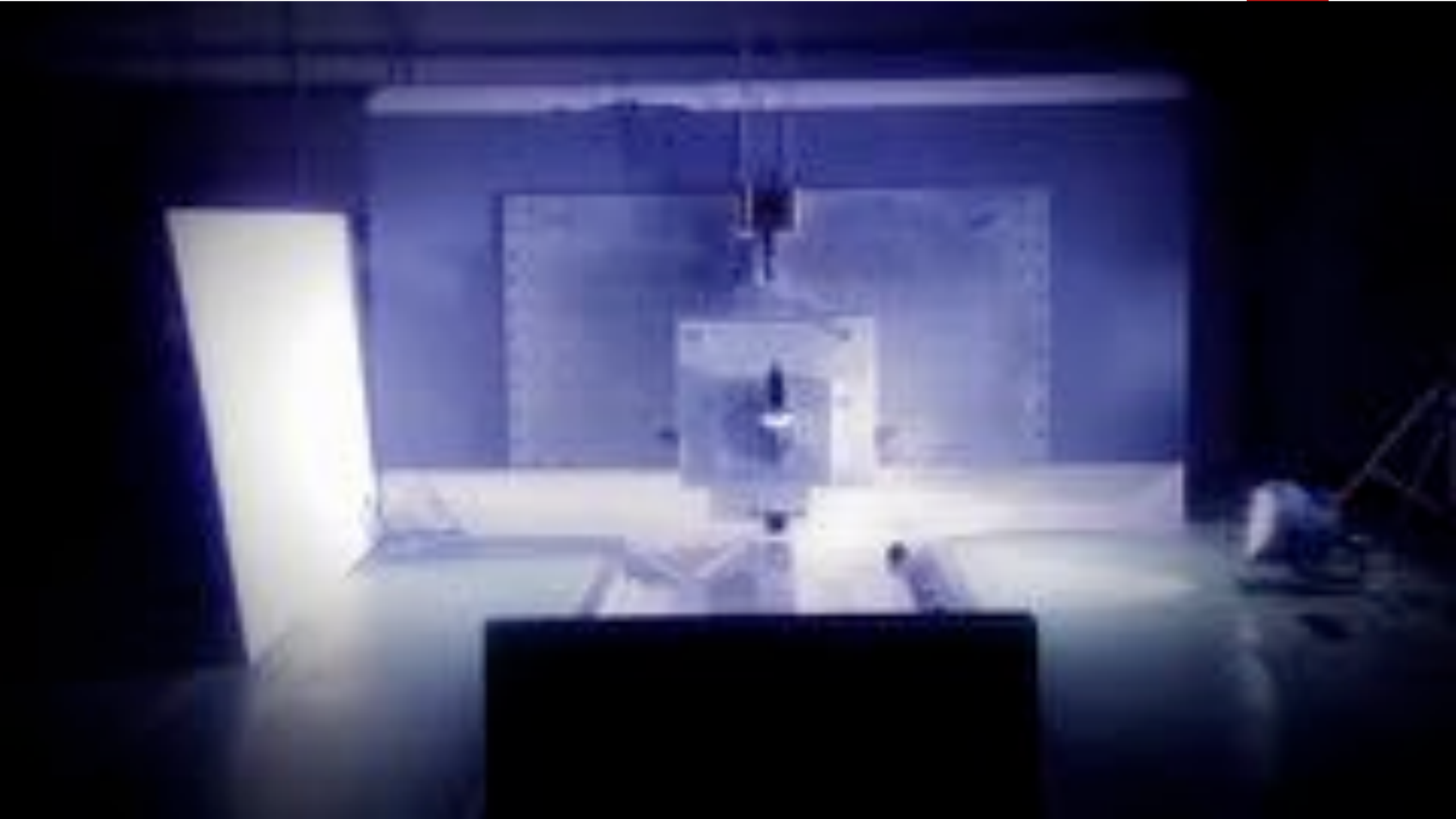




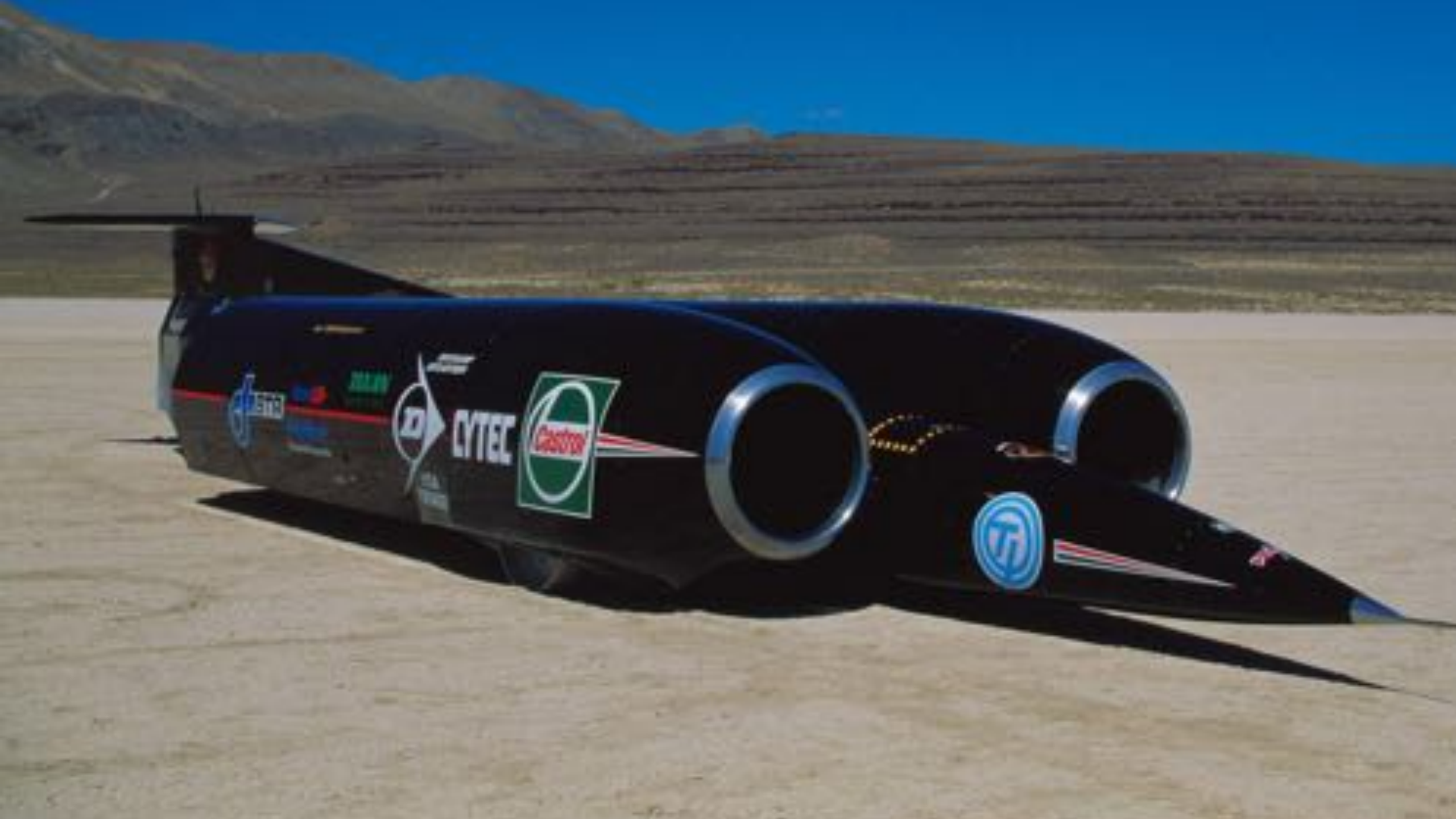
Sauber F1 Team

Claro TELCEL NEC cerlikon México











MISSION  
CONTROL

EPSRC serco



Castrol



# My Experience





Shell

Eco-marathon

17



SEMI

CAJAL



MERCURY

OAKEN

MOTOROLA

CARTON



M







# Nanjing Tech University



PROMUS  
**PREMIER™**  
Everolimus-Eluting Platinum Chromium Coronary Stent System



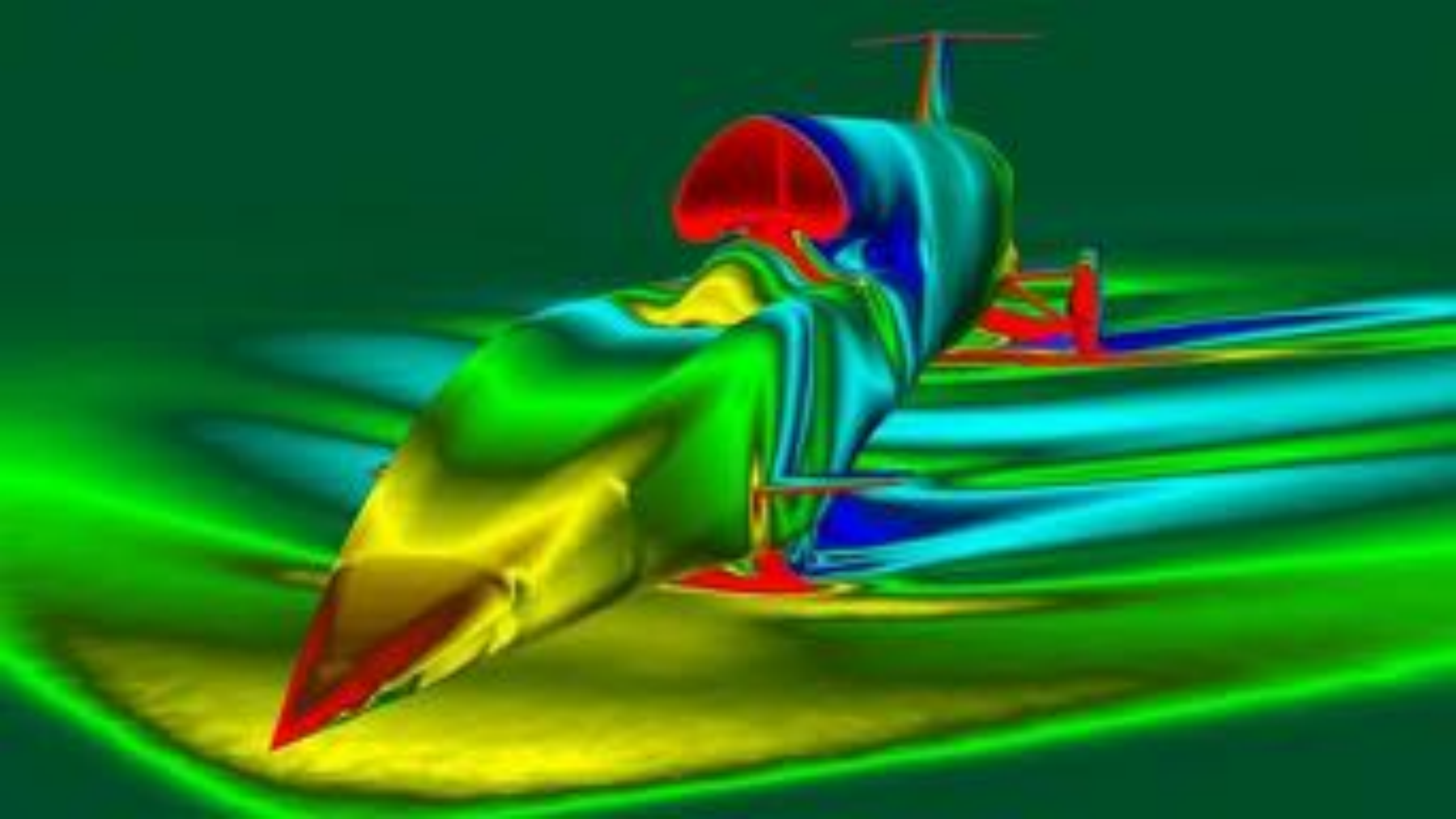
**PREMIER** Architecture.  
**PREMIER** Outcomes.





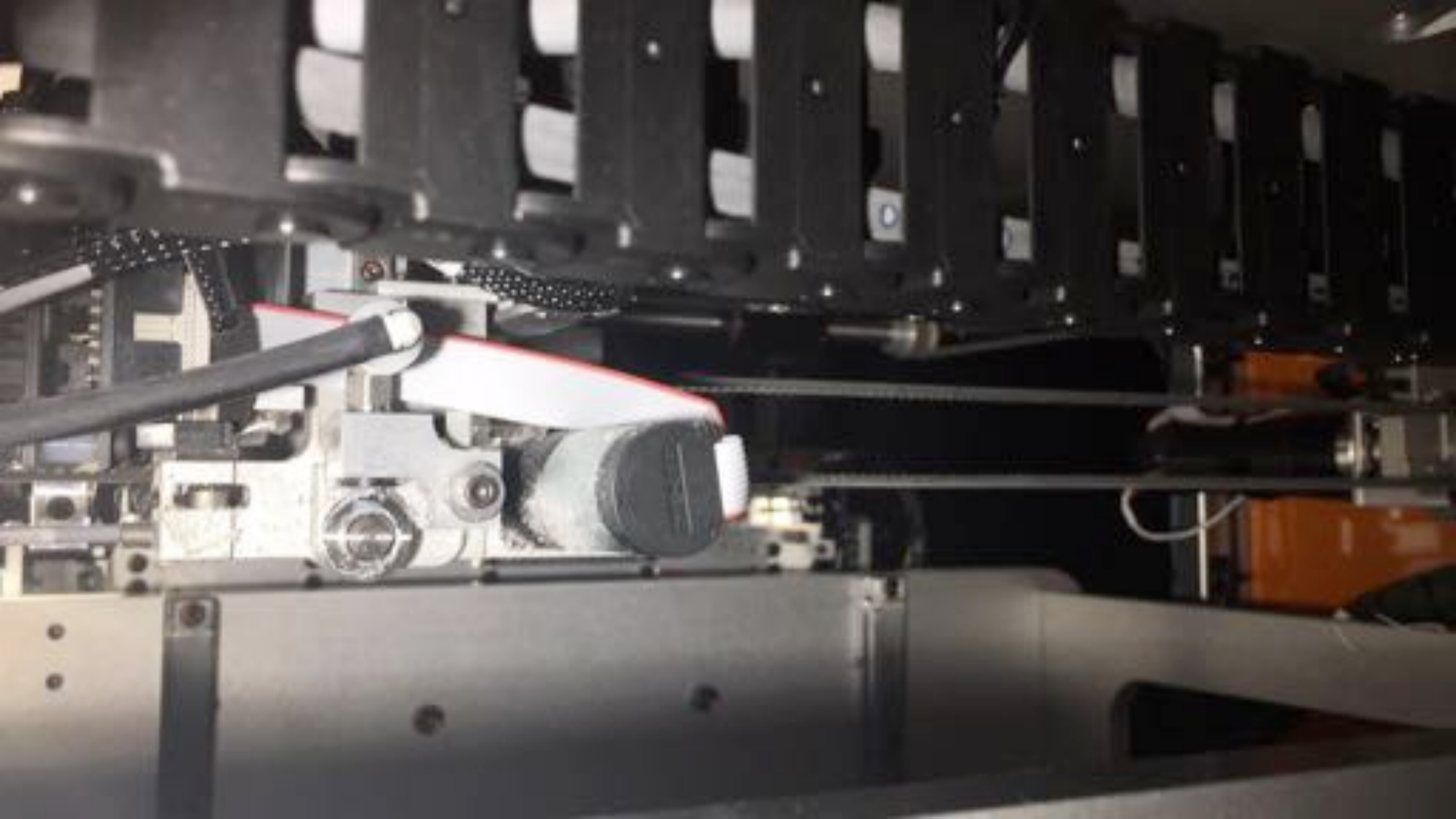


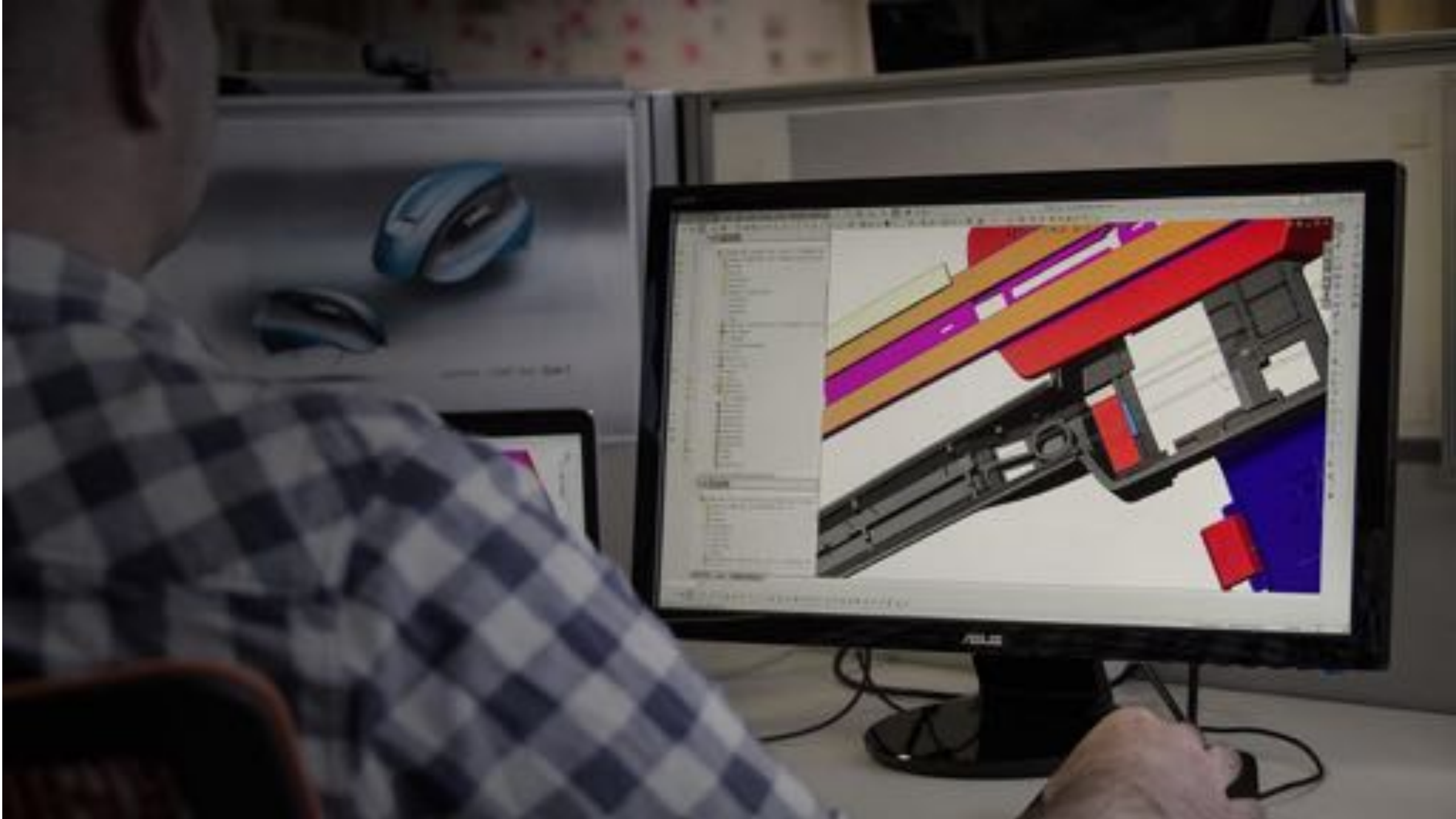
Ok, fine. How does that  
relate to classes though?





IMPETUS AFEA | **SOLVER**  
<http://www.impetus-afea.com>







Questions?



# Mechanical Engineering is Best Engineering

FIRST YEAR INFORMATION TALK –  
CATHAL MCCLEAN

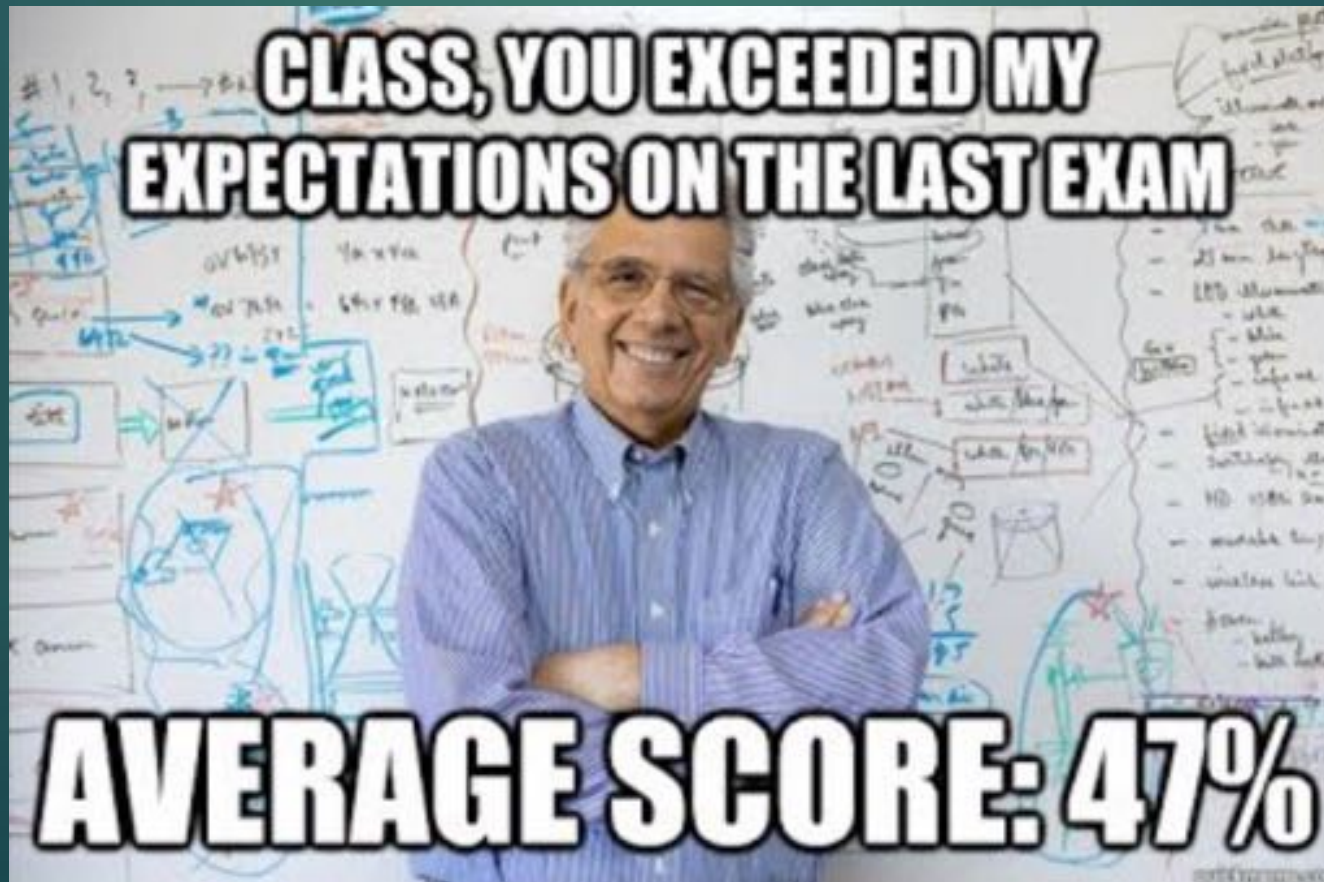
WHO AM I?

A person with long dark hair is seen from behind, looking out over a vast landscape. The foreground is filled with green trees, and the middle ground shows a large body of water. The background is a hazy, grey sky. The text "WHO AM I?" is overlaid in white, sans-serif font across the center of the image.



# Preliminary advice

- ▶ Don't choose a stream based on the "difficulty" of modules.



# My experiences – Second Year

- ▶ Dynamics
- ▶ Electronics
- ▶ Design
- ▶ Heat Transfer
- ▶ Statistics
- ▶ Mechanics of Fluids I

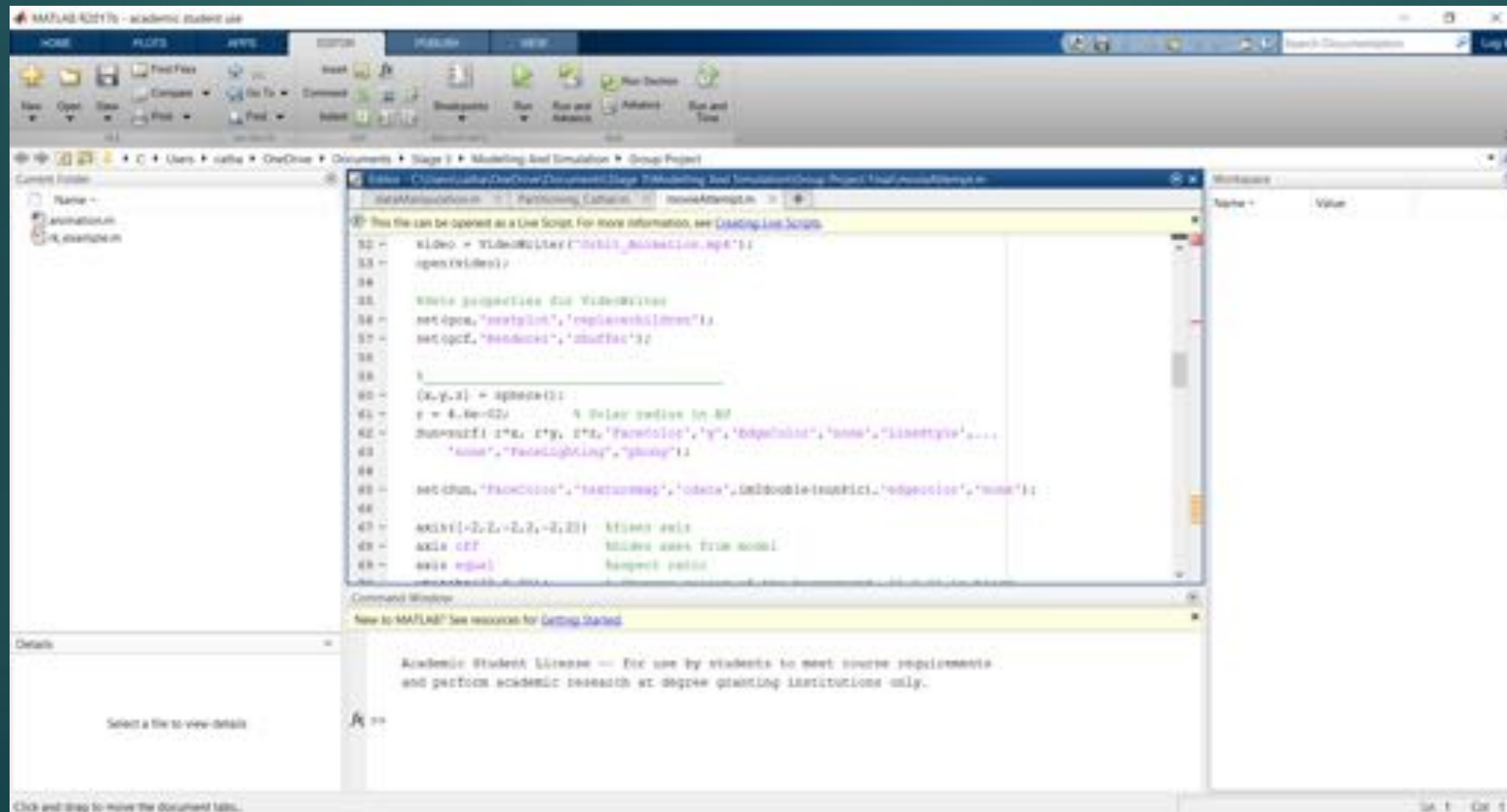
Incredibly broad curriculum is a characteristic of the Mechanical Engineering Programme

# My experiences – Second Year

- ▶ First time taking Materials Science & Mechanics of Solids
  - ▶ *“Structures are made from materials and we shall talk about structures and also about materials; but in fact there is no clear-cut dividing line between a material and a structure.*
  - ▶ *Steel is undoubtedly a material and the Forth bridge is undoubtedly a structure, but reinforced concrete and wood and human flesh - all of which have a rather complicated constitution - may be considered as either structures or materials.*
  - ▶ *When we talk about structures we shall have to ask... How have worms come to be the shape they are? Why can a bat fly into a rose-bush without tearing its wings? How do our tendons work? How were pterodactyls able to weigh so little? Why do birds have feathers? Why are sailing ships rigged the way they are?...”*

# My experiences – Third Year

## ► Modelling and Simulation





Moon Phase: 1st Quarter



# My experiences – Fourth year

- ▶ Continuum Mechanics
  - ▶ Feeds into solid mechanics, fluid mechanics, and thermodynamics.
- ▶ Thermodynamics III
  - ▶ Psychrometrics (gas/vapour mixtures), combustion reactions/stoichiometry
- ▶ Mechanics of Fluids II
  - ▶ Wind tunnel experiments (comparing a cylinder to aerofoil)

# Internship – Atlantic Aviation Group

- ▶ Aircraft maintenance and technical services.
  - ▶ I don't have time to unpack exactly what this means.
- ▶ Built upon previous summer internship experiences.

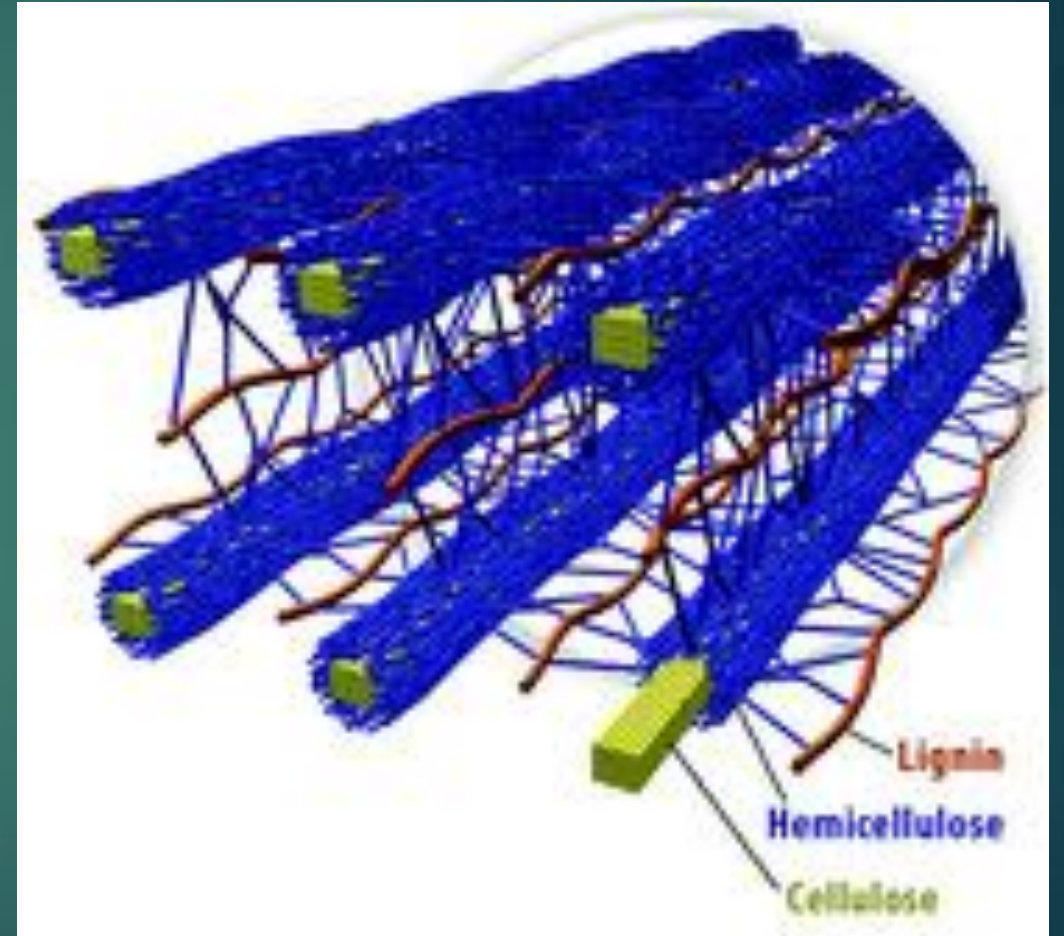








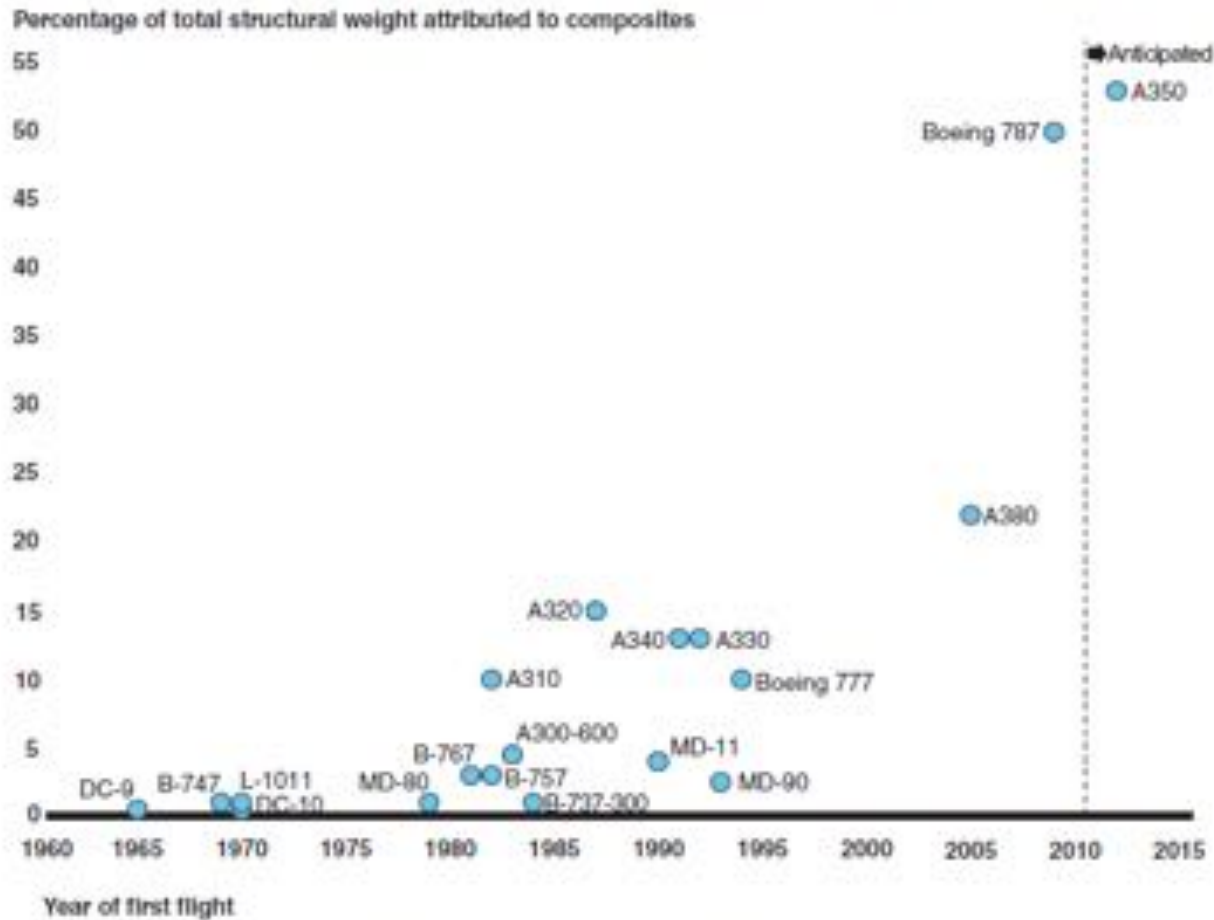
# Fifth Year - Thesis



# Fifth Year - Thesis

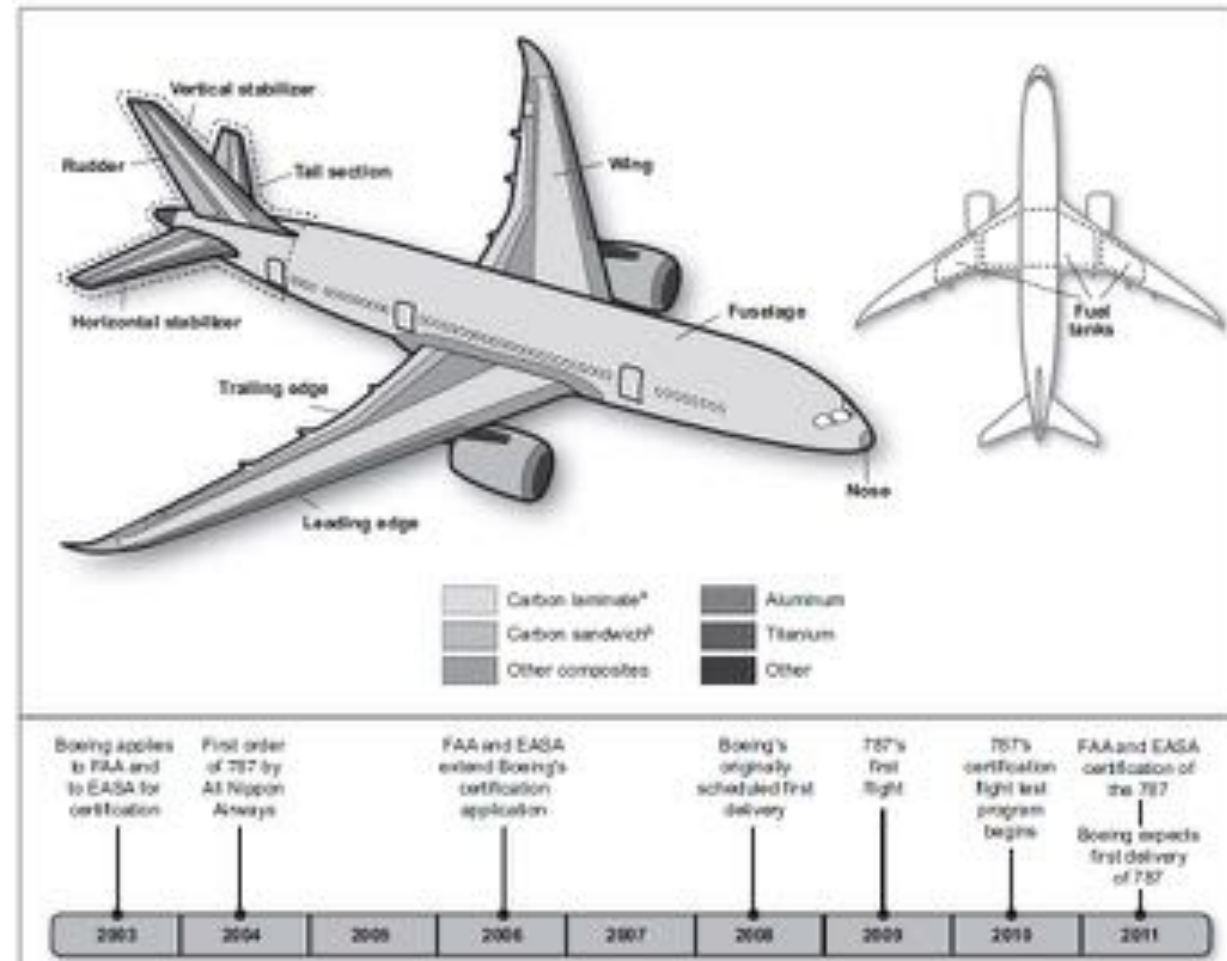


**Figure 1: Commercial Airplane Models over Time by Percentage of Composites**



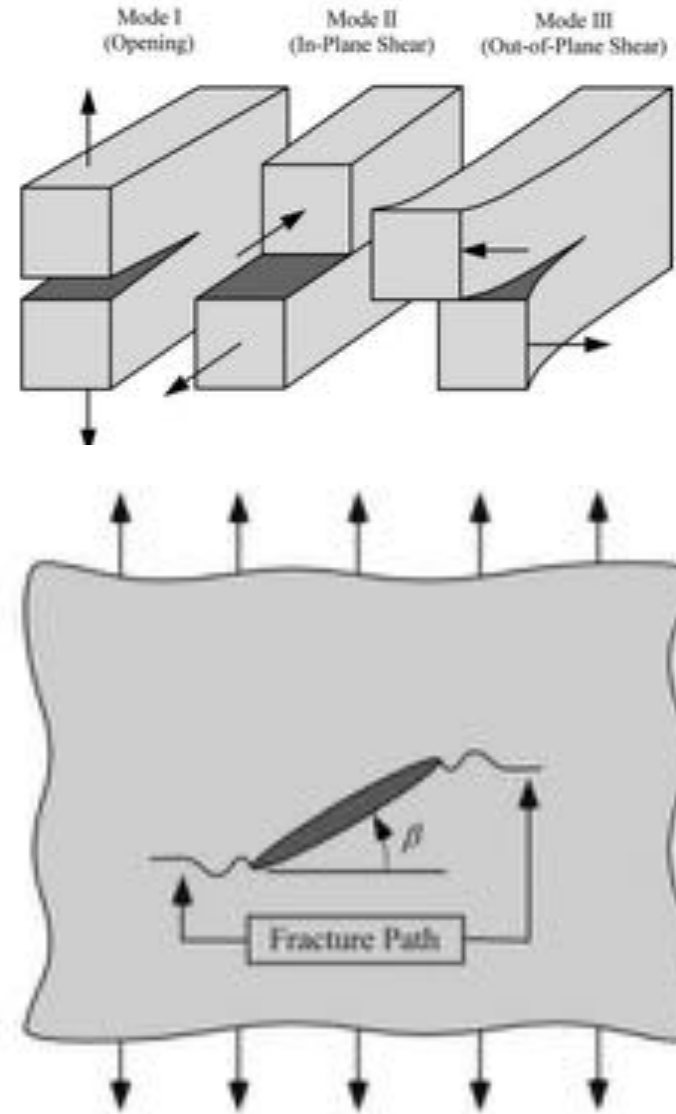
Sources: GAO analysis of information from FAA, NASA, Boeing Company, Jane's All the World's Aircraft, and Jane's Aircraft Upgrades.

Note: Percentages are approximate.



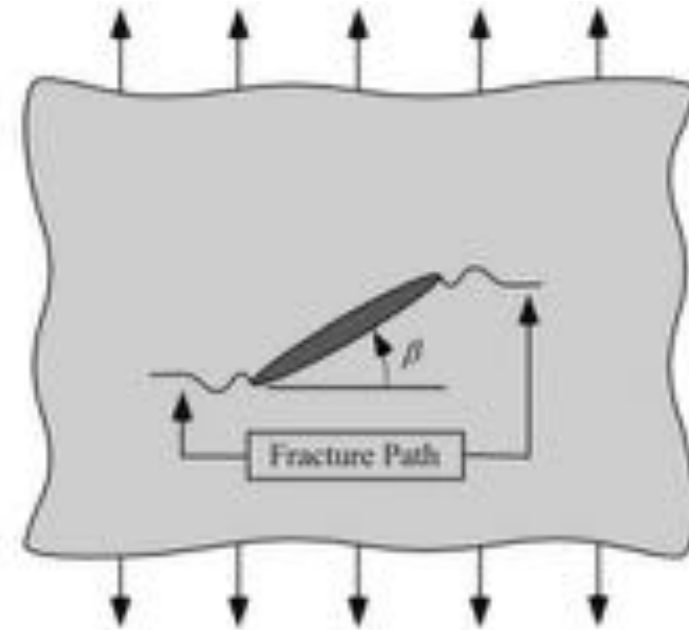
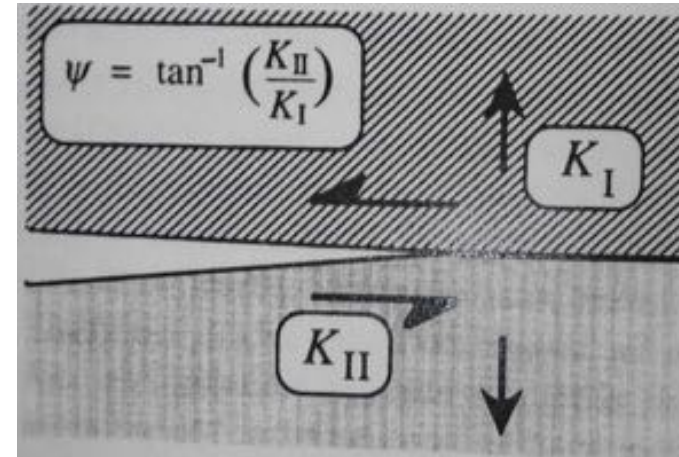
# Fifth Year - Thesis

- ▶ Composites are not this simple!

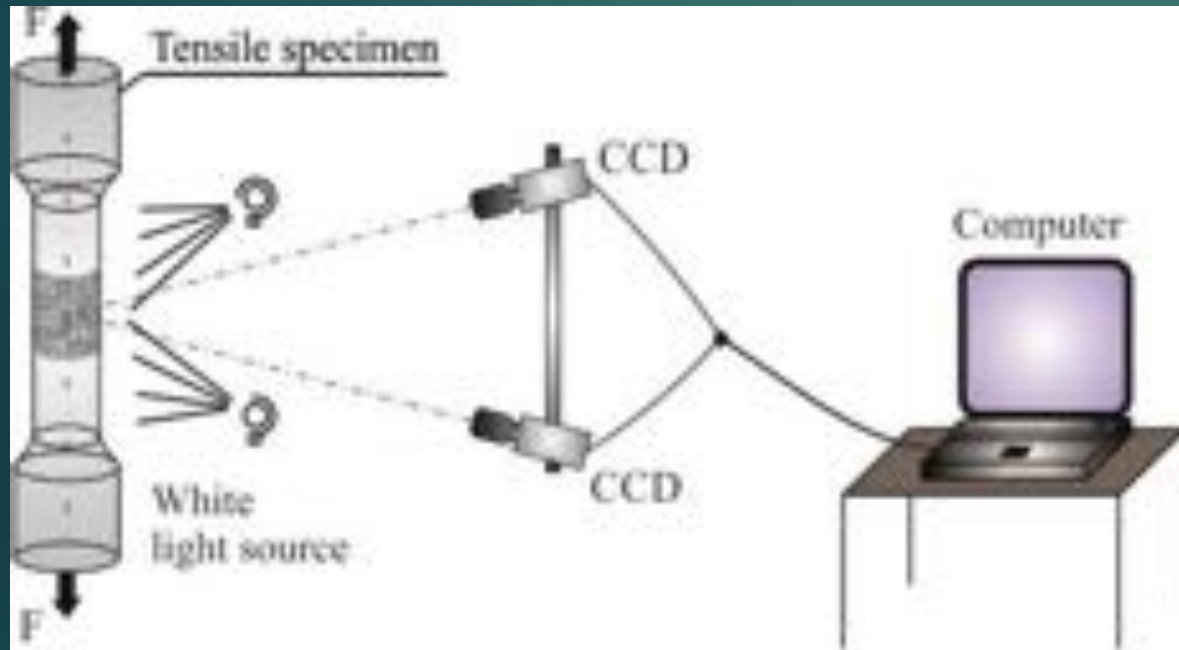


# Fifth Year - Thesis

- ▶ And that's not all!
- ▶ People used to think that it took the least amount of effort to open a crack in Mode I.
- ▶ THIS IS NOT TRUE FOR COMPOSITES!
- ▶ This has opened the door to some very cool research in "mixed mode fracture mechanics".

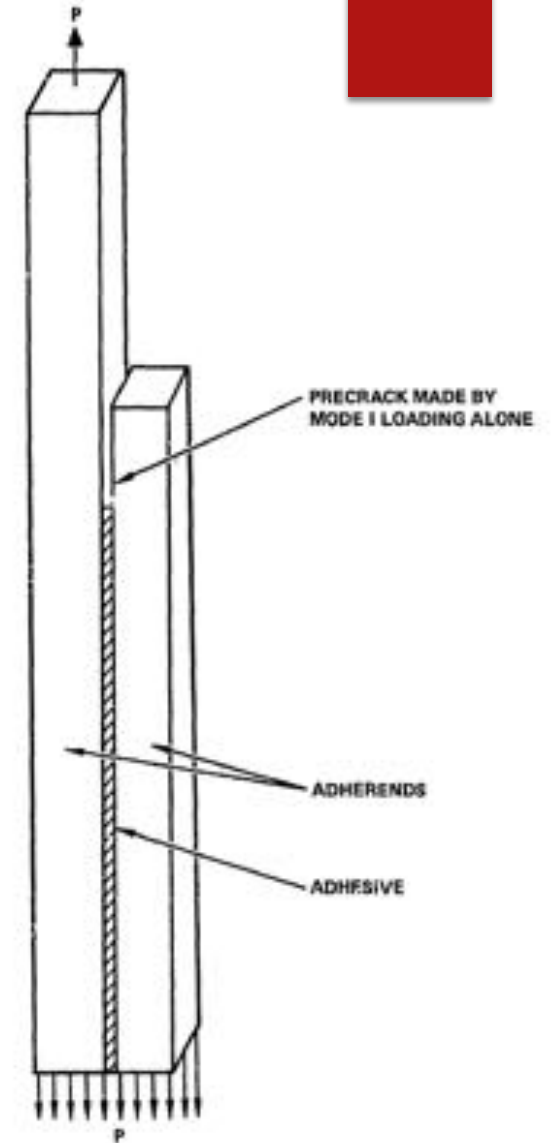


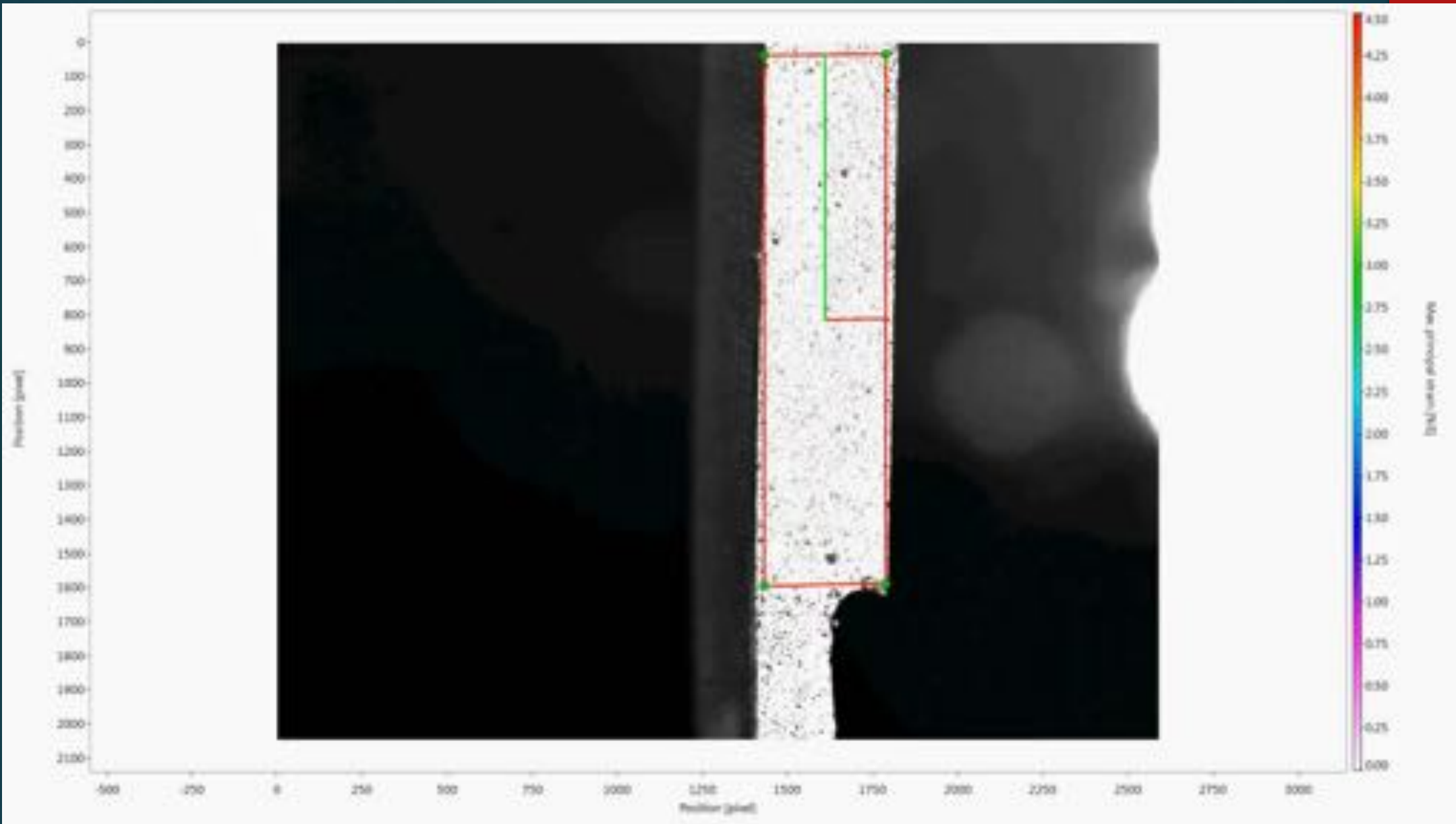
# Fifth Year - Thesis



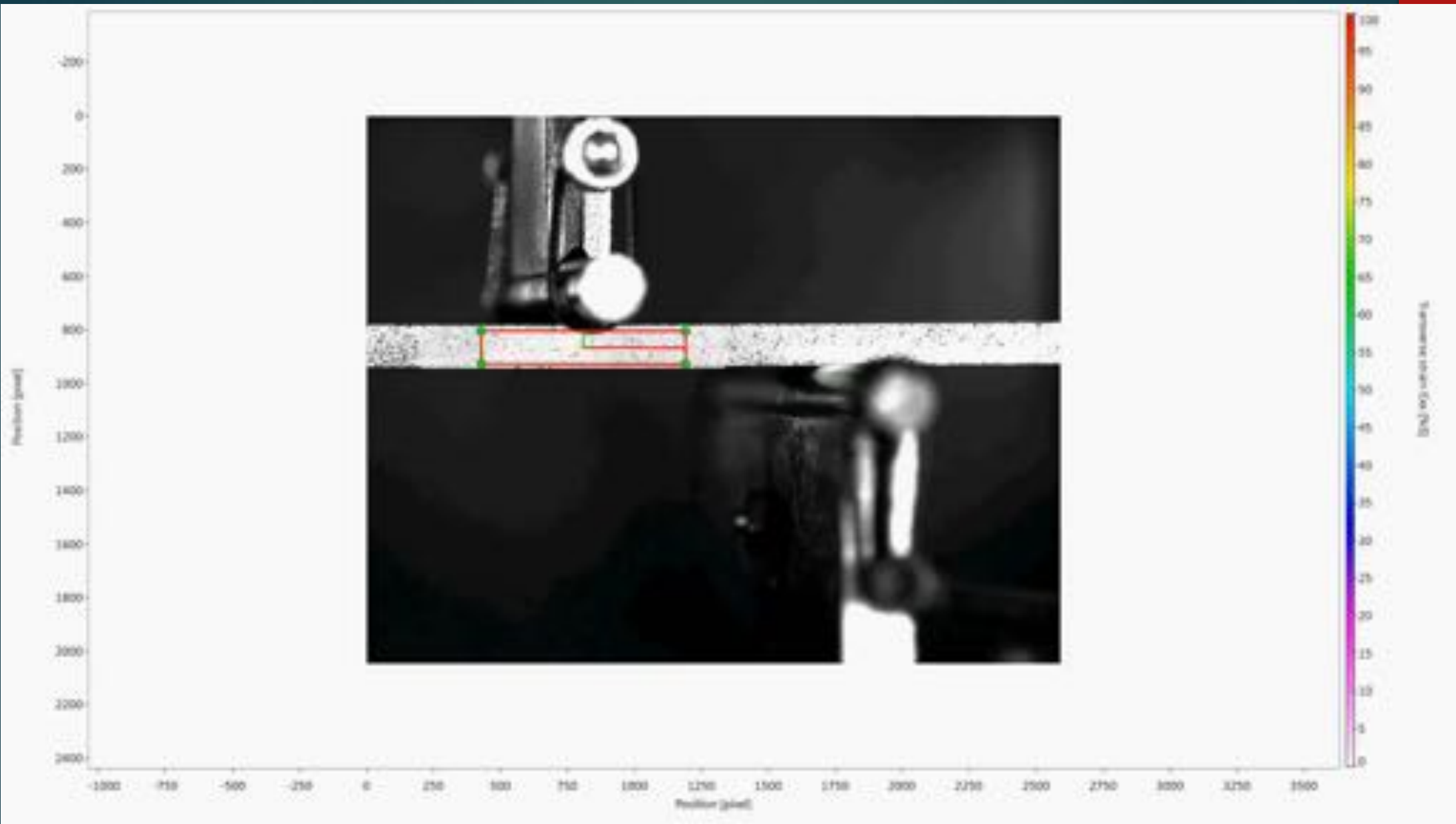
# Fifth Year - Thesis

- ▶ Using the “Crack Lap Shear” test.
- ▶ Introduced in 1977.
- ▶ Studied extensively in the 80s.
- ▶ Lots of conflicting reports and data in regards to mode mixity.
  - ▶ (How much “effort” it takes to open a crack in Mode I w.r.t Mode II).









# Should I do Mechanical Engineering?

- ▶ Broad curriculum with a wide variety of choice in modules.
- ▶ These choices are wide ranging (fluid mechanics of helicopter blades, satellite control systems, lab-on-a-chip micro/nanomanufacturing etc.)
- ▶ Better understand the physical world, its structures, materials, behaviour and machinery.
- ▶ ME Mechanical Engineering, ME Materials Science and Engineering, ME Energy Systems Engineering, ME Engineering with Business (Mechanical)

Questions?



[cathal.mc-clean@ucdconnect.ie](mailto:cathal.mc-clean@ucdconnect.ie)

# Mechanical Engineering at UCD

# About me:

- ✦ **Name:** Karen FitzGerald.
- ✦ **Studying:** PhD Student in School of Mechanical and Materials Engineering.
- ✦ **Past:** Started Engineering Degree 2009.



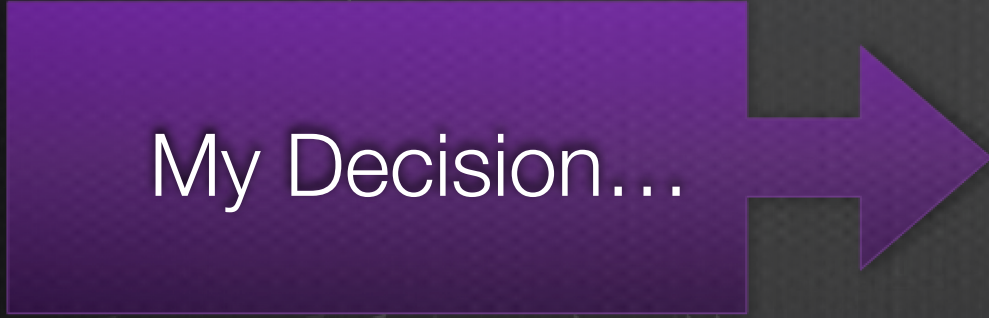
Hobbies

Secondary School Subjects

Practical

Tangible

Visualise



MECHANICAL ENGINEERING

Material Science

Dynamics

Fracture Mechanics

Manufacturing

Fluids

Solids

DESIGN

Continuum Mechanics

Thermodynamics

Heat Transfer

# Placement Jaguar Land Rover



# My Placement in Jaguar Land Rover.

*“Young Women in Engineering Scholarship Programme”*

- **Two Placements:**
- **3 Month Summer Placement.**
- **8 Month Industrial Work Placement.**

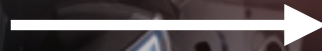




# JLR Product Development

## Departments:

**VEHICLE ENGINEERING**



**POWERTRAIN ENGINEERING**

**BODY ENGINEERING**

**ADVANCED ENGINEERING**

**ELECTRICAL ENGINEERING**

**CHASSIS ENGINEERING**

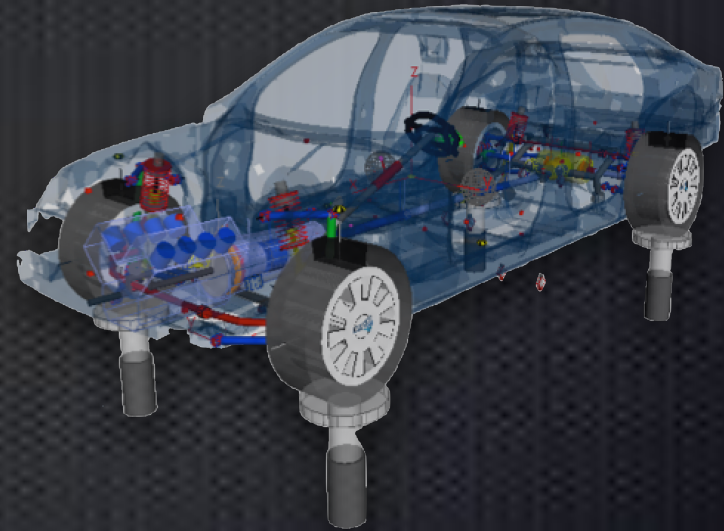
“This is the key technical department where we give our vehicles their unique characteristics. How they drive. How safe they are. Even how they sound.”

### **Vehicle Dynamics Department:**

- ✦ **Vehicle Suspension Systems**
- ✦ **Steering and Handling**
- ✦ **Ride Comfort**
- ✦ **Tyre Allocation**

# Computer Aided Engineering

- ✦ Make Vehicle Models
- ✦ Virtual Testing
- ✦ Optimisation
- ✦ Create Test Cases



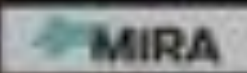


**HIGHLIGHTS**





Test: Wet Handling Surface: Asphalt Vehicle: Ford Focus



**P**

A circular speedometer with a needle pointing to approximately 100. The text "Speed (km/h)" is visible below the dial.

LAP TIME 00:00



**B**

A circular speedometer with a needle pointing to approximately 100. The text "Speed (km/h)" is visible below the dial.

LAP TIME 00:00





# Cruden Driving Simulator



# Virtual Innovation Centre

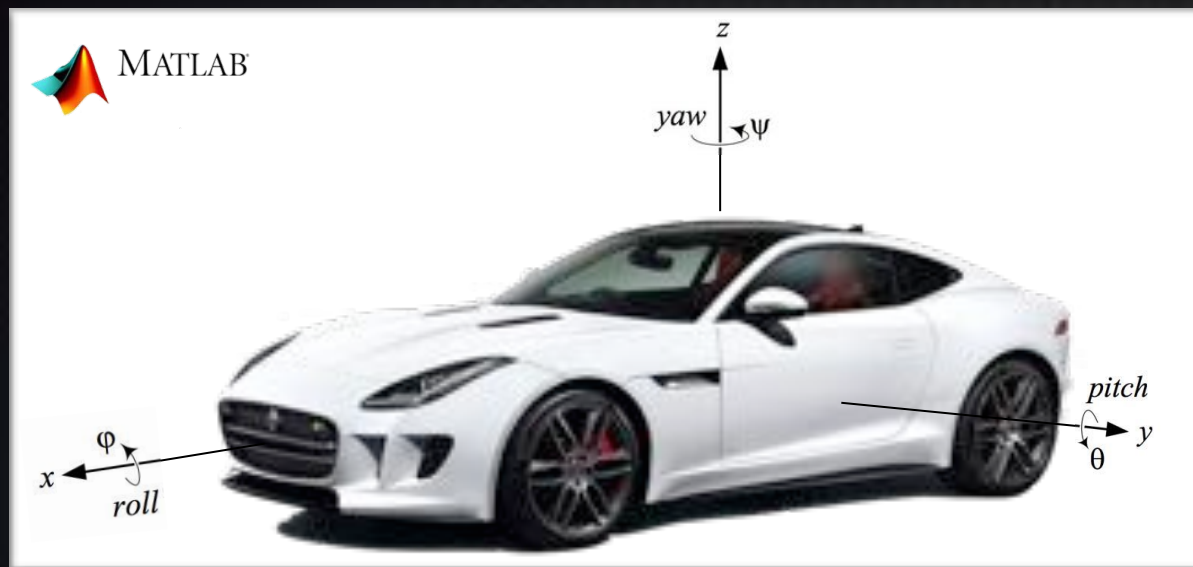




**HIGHLIGHTS**



# ME Thesis in conjunction with: Jaguar Land Rover



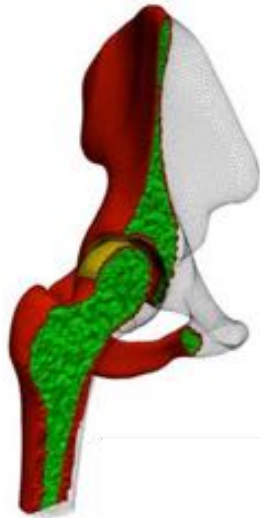


# Funded Ph.D in Mechanical Engineering

“OVERCOMING POST-OPERATIVE HIP INSTABILITY: A NUMERICAL MODEL APPROACH.”

## Finite Volume Model

(FV)



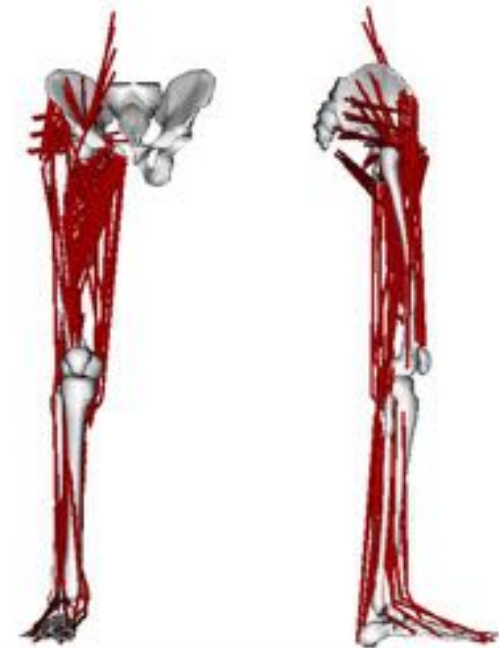
Precision

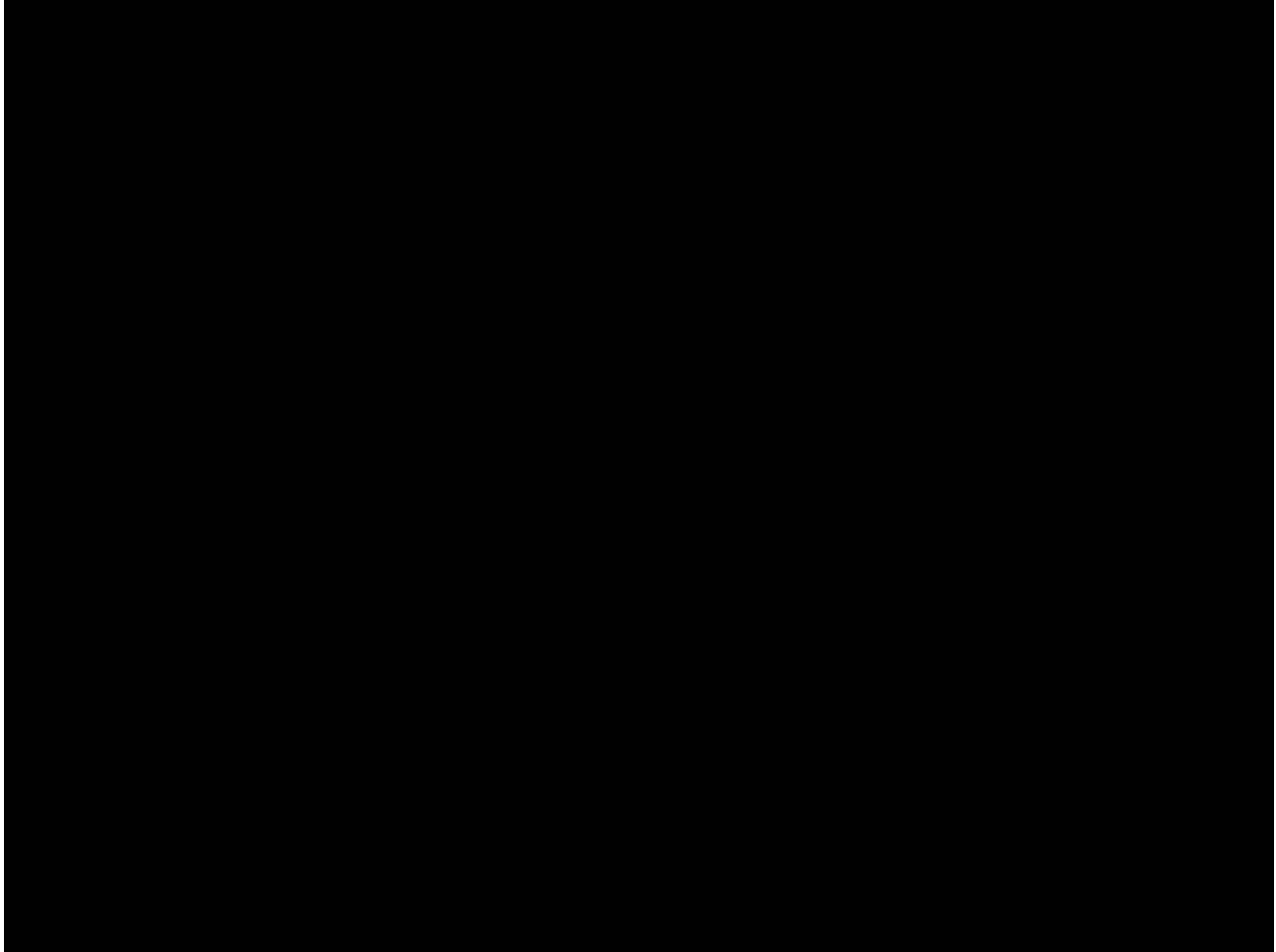
Speed

Joint Stability

## Multibody Dynamics Model

(MBD)



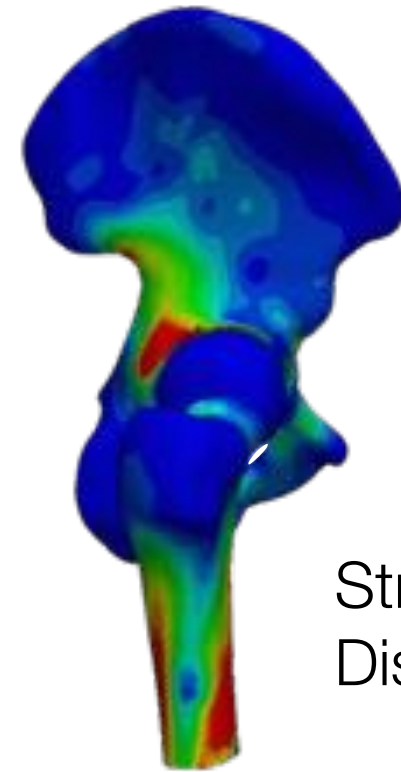




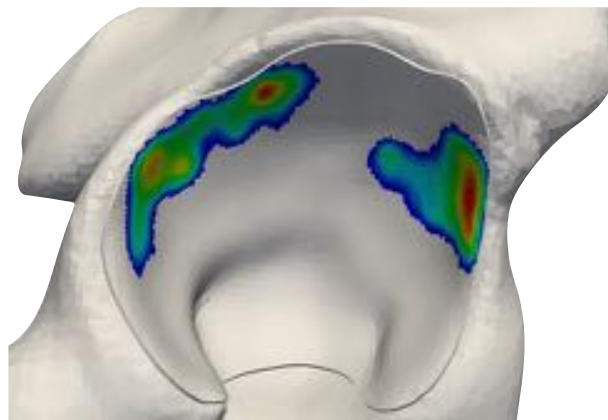
# Why is this useful?



a) Heel Strike    b) Mid-Stance    c) Toe-off  
Stages of Gait Cycle



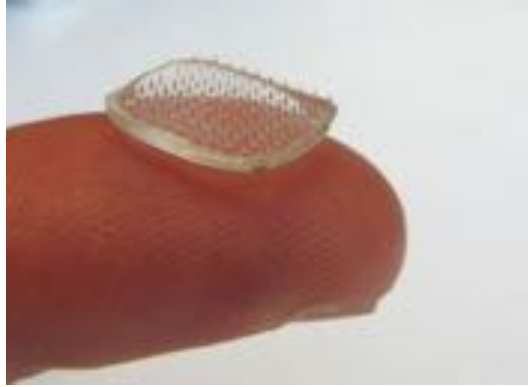
Stress  
Distributions



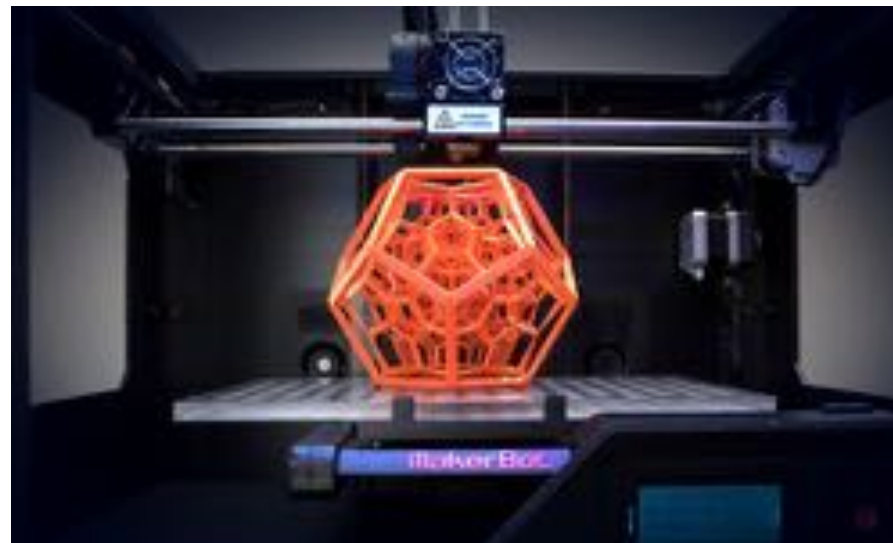
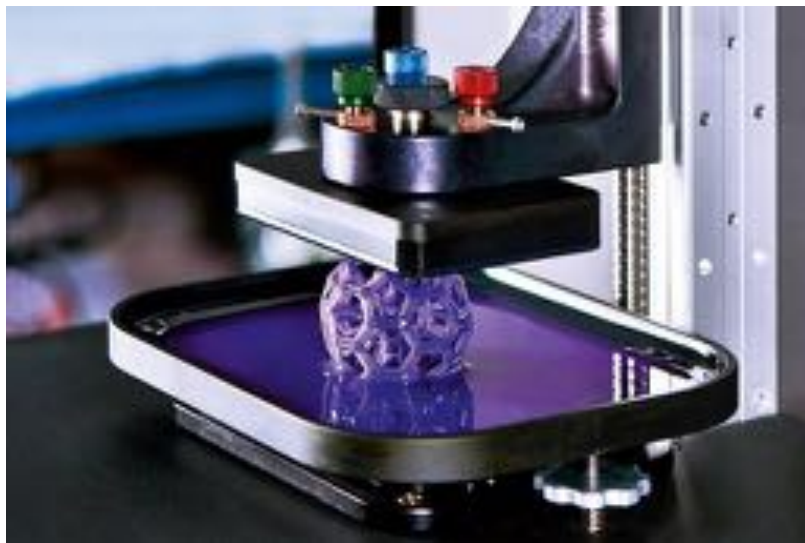
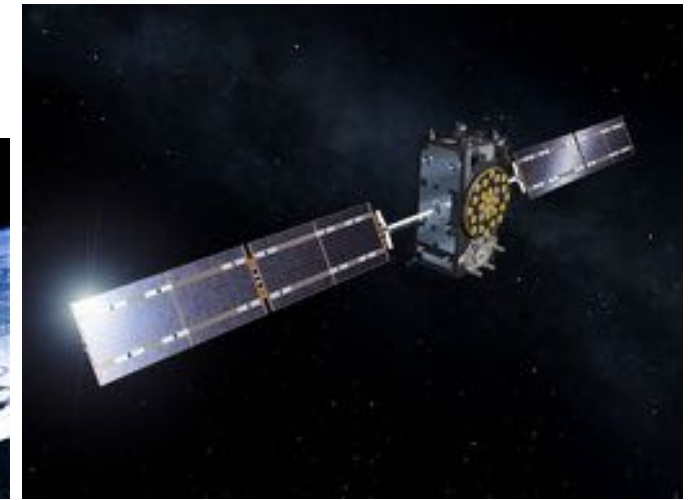
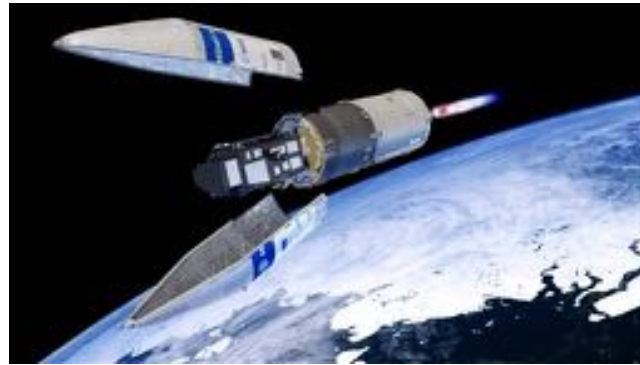
Hip Contact Pressures



Prosthesis



# UCD School of Mechanical & Materials Engineering



Thanks, any questions?