

Faculty / Department name

# THE MINOR PACKAGE AERONAUTICAL ENGINEERING & MANAGEMENT

**DR. DENNIS PRAK**  
**DR. MATTHIEU VAN DER HEIJDEN**  
**DR. ENGIN TOPAN**  
**DR. ANNEMIEKE MEGHOE**

**DR. HUSEYIN OZDEMIR**  
**DR. WOUTER GROUVE**  
**DR. MARIJN SANDERS**

# AERONAUTICAL ENGINEERING & MANAGEMENT

- This minor package consists of two (separate) 15 EC modules:
  - Aerospace Management & Operations (ASMO)
  - Aircraft Engineering (AE)

# THE AEROSPACE INDUSTRY

- Source of innovation, economic wealth and political power
- Changed the world like in recent times only the telephone or internet did
- Razor-thin profit margins
- Highly vulnerable to unforeseen events (see recent news)

# IN THIS MINOR PACKAGE

- Merging of Man and Technology (aka HTHT)
- The aircraft takes center stage



# AERONAUTICAL ENGINEERING & MANAGEMENT

AEROSPACE MANAGEMENT &  
OPERATIONS





# FINAL OBJECTIVES



Managing  
a virtual airline

Analyzing the competitive position of your  
favorite, real airport

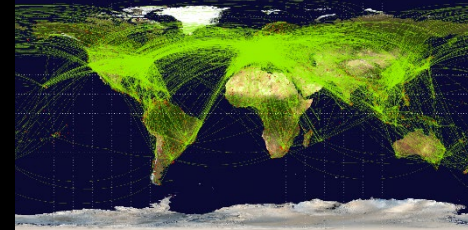
# SUBJECTS

- Aerospace industry
  - Historical & political development
  - Supply & demand
  - Route structures



# SUBJECTS

- Airline management
  - Business models
  - Route and fleet scheduling
  - Economics & finance
- Aircraft maintenance
- Revenue management





# SUBJECTS

- Airport management & operations
  - Structure of airport industry
  - Airport economics
  - Airport operations
  - Interplay between airports and airlines
  - Impact on economy, society, and environment



# HOW DO WE WORK?

- Lectures
- Guest lectures
- Group discussion assignments
- Assignments
  - Maintenance assignment
  - Revenue management assignment
  - Competitive analysis of an airport
- Airline simulation management game
- 2 written exams

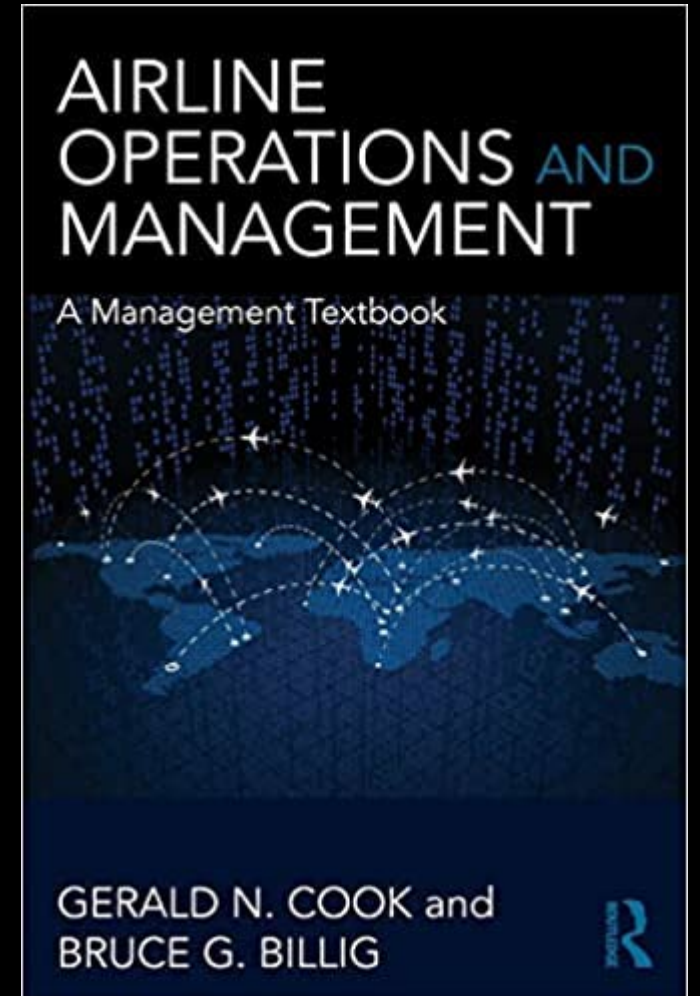
# PRIMARY LEARNING GOALS

- To get acquainted with the actors in and development of the aerospace industry
- To understand the relationship between aircraft characteristics and their value / suitability
- To be able to trade off technical and human factors in strategic and operational airline decisions
- To understand the role of airports, their operations, competition, and interaction with their environment



# LITERATURE

- Cook, G.N. & Billig, B.G.: Airline operations and management 1st ed., Routledge.
- Articles / hand-outs
- Materials you bring up for the discussion sessions



# PREREQUISITES

- 5 modules of B1 and B2 or 3 years of HBO completed (StuderenOpMaat)
- Recommended: B1 and B2 completed
- Genuine interest and motivation
- Basic knowledge of mathematics, probability, and statistics
  - sometimes extra study, materials on Canvas
- Maximum 50 students
  - (we have a reserve list, contact [minor@utwente.nl](mailto:minor@utwente.nl))



# REMARK

- ASMO is about the civil aviation industry
  - Focus on management and governance of airlines and airports
  - From strategic (e.g. business models) to tactical (e.g. fleet planning) to operational (e.g. revenue management)
  - There will be some mathematics and statistics (e.g. probability distributions, basic calculus)
- ASMO is not about aircraft design & technology (AE is)
  - Although we discuss some important innovations ...
  - ... And consider some aircraft characteristics in relation to their use (e.g. range, payload, operating costs)

# AEROSPACE MANAGEMENT & OPERATIONS

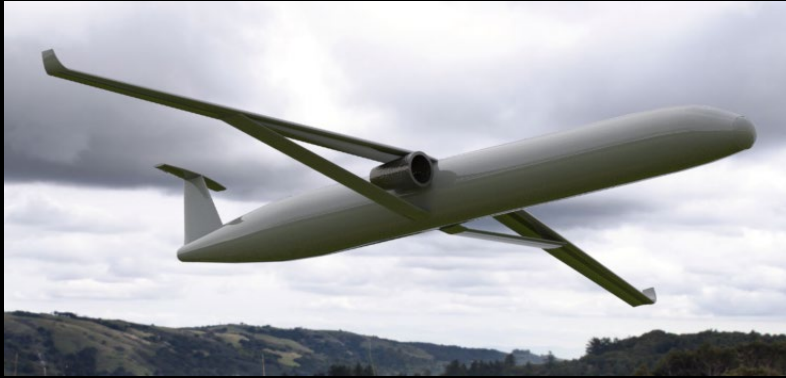
*Get ready for  
departure, and  
cleared for  
takeoff!*

# AERONAUTICAL ENGINEERING & MANAGEMENT

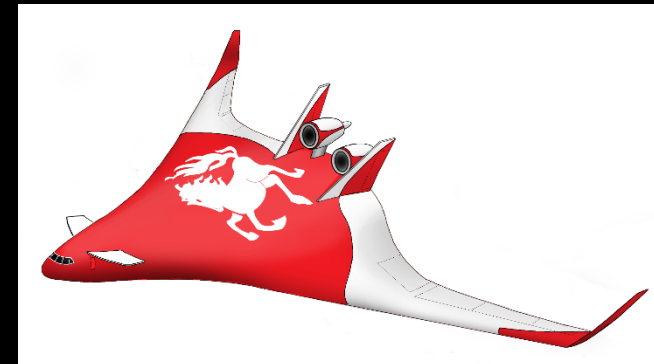
AIRCRAFT ENGINEERING



# THE MODULE AIRCRAFT ENGINEERING



**Final objective is to make a conceptual design of an aircraft**



# COURSES

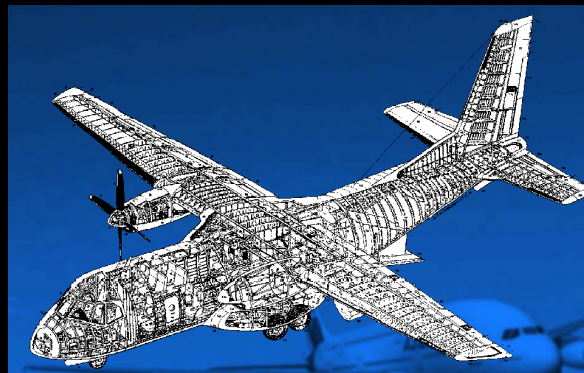
- Introduction to Aircraft Technology
  - Aircraft performance
  - History
  - The evolution of aircraft configurations,
  - The principles of flight,
  - Terminology / lift, drag, pitching moment, stall, stability, critical Mach number, drag-divergence





# COURSES

- Aircraft Structures
  - Structures / Mechanics
  - Flutter / Dynamics
  - Loads / Dynamics
  - Buckling
  - Materials / Aluminum, Composites, Glare
  - Gas turbines / Fatigue, Blades, Coatings



# COURSES

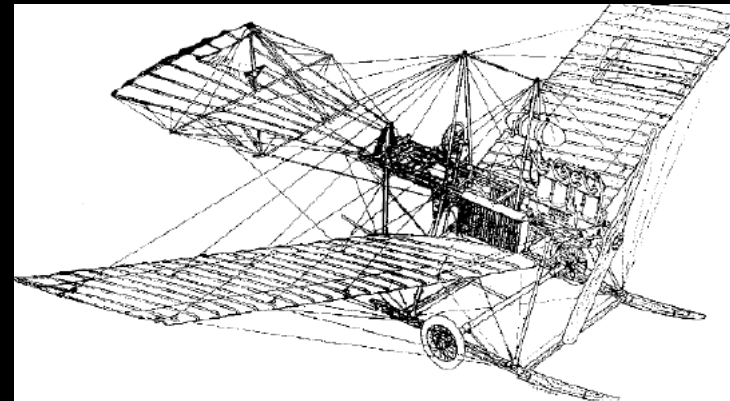


- Aerodynamics
  - numerical methods that are used in the conceptual design
  - aerodynamic characteristics of aircrafts (lift, drag, pitching moment) flying at subsonic, transonic or supersonic speed



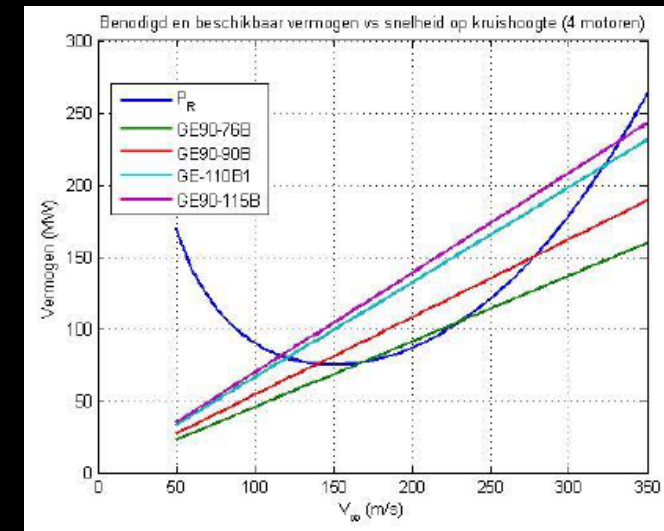
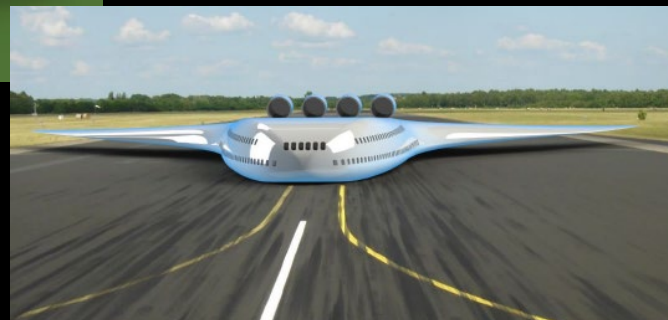
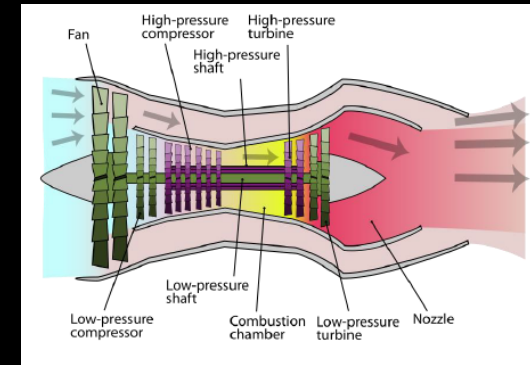
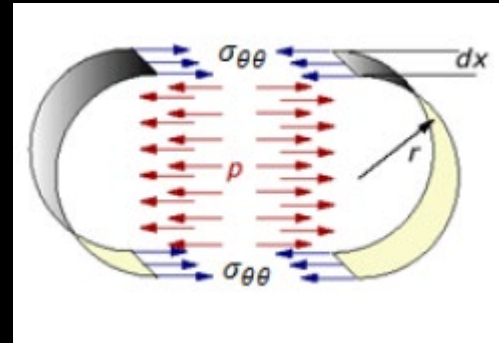
# ASSESSMENT

- Exercises and exams (written and oral extension/resit) about
  - aerodynamics,
  - aircraft performance and
  - aircraft structures
- Project: report and presentation of conceptual design of an aircraft.



# OVERALL LEARNING GOAL

- To get acquainted with
  - the technical knowledge (performance, aerodynamics, design and structures)
  - needed for making a simple conceptual design of an aircraft,
  - and to apply this knowledge in an aircraft design project.



Hyper Jumbo, project 2014



# DRONE FOR DISASTER RELIEF (2016)



Presenting a new **Multipurpose UAV**



# LITERATURE

- Anderson, John D. Jr.:
  - Fundamentals of Aerodynamics 6th ed., McGraw-Hill. ISBN 978-125-925134-4
- Anderson, John D. Jr.:
  - Introduction to Flight, 7th edition, McGraw-Hill. ISBN 978-007-108605-9
- Hand-outs

# PREREQUISITES

- Math: B1, B2, D1 and D2.
  - Especially Chapters 13-16 from 'Calculus, Early Transcendentals'
- Knowledge on Fluid & Solid Mechanics
- Genuine interest and motivation
  - Experience: just thinking aircraft are cool does not suffice
- Maximum 80 students (we have a reserve list)

# AIRCRAFT ENGINEERING

*Aircraft Engineering is  
a way to get acquainted  
with multidisciplinary  
design of large complex  
structures*

# AERONAUTICAL ENGINEERING & MANAGEMENT

- Most lecturers have experience in aerospace research and industry
- Last year students awarded the minor with an average grade 7+
- Last year 60 respectively 65 students (AM&O resp AE) from 10 different BSc programs followed the minor
- Challenging minor which requires high effort, motivation and interest in Aerospace

# 9 G TURN OF AN F-16. WHY IS THE AFTERBURNER NEEDED?

