

Educating Tomorrow's Aerospace Engineers Ready to engineer in an international world

Ir. Aldert Kamp Director of Education 8-9 April 2013



Challenge the future



Global Engineering Education Exchange





Great challenges in aeronautics



Exponential growth in air transportation





Depletion of metals



Environmental impact



Noise pollution



Safety 2-5x



Skills needed to impact today's challenges



Creativity Up-to-date knowledge Practical experience Knowledge of fundamentals (e.g., calculus) Ability to take risks Knowledge of theory Knowledge of multiple engineering disciplines Technical prowess Understanding of non engineering disciplines Ability to work in a team Technical intuition Responsibility and ethics Effective communicator Ability to apply digital technologies Multi-cultural sensibility

[Source: US National Academy of Engineering - Grand Challenges]



Our context of education for Aerospace professionals



Profile of our graduate

Ability to apply knowledge across situations





Profile of an engineering student How does he learn?

- Tactile:
 - Touch, take apart, put together = <u>Engineers</u>





- Analytical:
 - Math, equations, theory, analysis =
 <u>Researchers</u>, physicists, mathematicians



Facilities in our education

- Advanced flight simulator
 - Flying classroom research facility
 - Cessna Citation II
- - Aerospace materials and structures laboratory
 - Satellite clean room
 - Wind tunnels







International profile

- <u>Largest</u> aerospace faculty in <u>Western Europe</u>
- Covering almost <u>all areas</u> of aerospace engineering
- <u>International</u>
 All teaching in English
 30% international students
 - International orientation in studies
- International visitation
- <u>CDIO</u> Initiative, PEGASUS network, IDEA League
- 2500 students = 1750 BSc + 750 MSc









The framework of the BSc Aerospace Engineering



Profile of our bachelor and master





A curriculum with a story

- How one engineers aircraft and spacecraft
- Focus on:



- the aircraft and spacecraft engineering and technology
- the professional roles and activities of aerospace engineers
- Enjoy the thrill of the profession of an aerospace engineer



Mainstreams and connections



Six engineering design projects in a row



Design project objectives

- Practice and apply theory and acquire new theory as needed
- Provide an environment for contextual learning
- Provide a learning and practicing of academic and engineering skills
- Accommodate a learning-by-doing-together
- Be a mental organiser for the students



Experiential learning in 1st-year design projects Hands-on design, build - test experiences







Minor programme in Bachelor International orientation

- 1 semester in 3rd year
- Broadening in aerospace, experiencing diversity
 - propulsion, robotics, spaceflight, manufacturing engineering, mechatronics, astronomy; cultural dimension
- Increasing interest in studying abroad
 - 15-20% goes abroad
- Favourite destinations
 - USA: Univ. of Texas, State Univ. IOWA
 - Nanyang Singapore
 - ENAC Toulouse (France), ETH Switzerland, DTU Denmark



The framework of the MSc Aerospace Engineering



The master programme Zoom in to Aerospace Engineering discipline





Fields of expertise Delft Aerospace





Internship

 12 weeks full time in aerospace industry or research institute

'Learn and explore'

- different skills than those taught at university
- cultural shock of the real work environment
- 80% abroad =
 45% EU + 35% non-EU
- More than 500 companies





Honours Programme Master International orientation

- Challenging excellent master students (Top-10%)
- Strengthening personal and professional development
- Package of courses and project about a central theme/subject
- 25 European Credit points (ECTS) \approx 1 semester
- Strong interest in 1/2 year study abroad
 - Courses, research or expert design projects
 - University, labs, institutes or industry
 - USA, Australia, Asia, Europe



Conclusions

• Educating T-shaped professionals in aerospace

- Design and engineering in bachelor
- Expertise and research in master
- At graduation our students are ready to engineer aircraft and spacecraft
- Undergraduate and graduate programmes fully taught in English
- Interesting exchange opportunities for foreign students
- Growing interest of our students to study one semester abroad
 - Top students only
 - Minor programme in bachelor
 - Honours programme in master



A curriculum where students experience the thrill of the profession of an aerospace engineer

