



ADVANCED MANUFACTURING PROCESSES FOR AERONAUTICAL STRUCTURES

ADVANCED MASTER

WITH



ONE YEAR FULL TIME

- 6 months of courses
- 6 months of professional thesis or internship

TEACHING LANGUAGE

- English

START OF CLASSES

- September

LOCATION

- IMT Mines Albi-Carmaux, Campus Jarlard, France (70%)
- ISAE-SUPAERO, Toulouse, France (30%)

KEY POINTS

- Strong links with the industrial on-demand skills such as lean management, supply chain optimization, forming and machining processes.
- Good balance between academic courses and practice.

HEADS OF PROGRAM

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OBJECTIVES

The Aeronautical industry market is facing a rapid and continuous increase worldwide. Estimations are that the number of large commercial aircraft will double by 2030. Nearly sixty percent of the turnover is sub-contracted out all over the world and concerns mostly production and manufacturing activities. As a consequence, most aeronautical subcontracting companies will have to increase their production rates but also to keep in step with technological changes; moving from metal-based processes toward composite materials processes. Moreover aircraft manufacturers have changed their supply chain structures in recent years, and subcontractors are now required to manage more complex parts and to take over, on their own, the qualification processes.

The Advanced Master course AMPAS, is designed by IMT Mines Albi and ISAE-SUPAERO with the support of aeronautical industry partners. It will give a specialization to master level students allowing them to take over high level responsibilities in airframe structure manufacturing plants. It is especially well suited to students who have followed general studies in mechanical engineering, material science or equivalent and who would like to gain a major chance to be recruited in the aeronautical industry.

LEARNING APPROACH

1st semester: Academic session provided by tenured professors of IMT Mines Albi and ISAE-SUPAERO and expert practitioners from the aerospace industry to bring current knowledge and experience. The teaching, balancing academic lessons with more applied practice, includes:

- lectures and exercises
- process simulation sessions
- laboratory sessions
- practical sessions
- industrial conferences
- industrial and workshop visits
- multidisciplinary 100-hour project
- written report and oral presentation

2nd semester: Students are required to conduct a 4 to 6 months professional thesis or internship:

- in an industry or in a laboratory,
- in France or abroad,

supervised by a tutor from the host organization and from IMT Mines Albi or ISAE-SUPAERO.

The thesis concludes with the submission of a report and an oral dissertation in front of a jury.

CAREER OPPORTUNITIES

The Master course offers challenging career opportunities for those who require a postgraduate program to enhance and/or sharpen their technical and management skills in the aeronautical industry.

Career opportunities are numerous and growing all over the world, in subcontracting companies, as well as in aircraft manufacturers, aeronautical maintenance companies. AMPAS graduates can students can find employment as process, industrialization, production, quality, research and innovation engineers, product, project and production managers...

Companies recruiting our students

AIRBUS GROUP EFW (Dresde), AIRBUS OPERATIONS SAS, ALTEN, AKKA Engineering Process, ARMINES, AVIC COMAC, Fabrica Argentina de Aviones, FORMTECH (Breme), SAFRAN Power Unit, SAFRAN Helicopter Engines, VENG SA (Argentina), P3 GROUP, SAFRAN Aircraft Engineering, SAFRAN Electronics and Defense, SAFRAN Nacelles, DUQUEINE Atlantique...

More information





SYLLABUS

The academic course consists of modules aiming to provide a deep knowledge of the three main material families used in airframe structures (i.e. aluminum, titanium and long fiber reinforced polymer composites) and their related forming routes in aeronautical industries. It also provides knowledge in aircraft architecture, aeronautical supply chain specificities, lean manufacturing, quality management and certification requested to take on technical and organisational responsibilities in industry.

A team project (100 hours) will demonstrate the ability to address an aeronautical part processing following the theoretical and professional skills.



Part 1: Aircraft, material and process basic scientific knowledge

- Flight Dynamics AMPAS
- Aircraft and airframe architecture AMPAS
- Computer Aided Design (CATIA)
- Aluminium and titanium alloys
- Epoxy and thermoplastic composites
- Assembly processes
- Material and processes qualification
- NDT for metallic and composite materials
- Optical techniques for assembly aid

Part 2: Composite structure forming and machining processes

- Physical phenomena description and modelling related to thermoset based manufacturing
- Raw material and composite quality control
- LCM/RTM processes
- Autoclave Vacuum Bagging (monolithic - sandwich) processes
- Composite material trimming, drilling and assembly
- RTM/Infusion Simulation

Part 3: Metallic structure forming and machining processes

- Material behaviour and mechanical models
- Cold and hot sheet forming processes
- Surface treatments
- Subtractive and additive manufacturing
- Sheet forming simulation

Part 4: Industrial Organisation and management

- Supply chain structure and Organisation
- Materials management and Lean manufacturing
- Supply chain improvement and collaborative processes
- Quality requirement, management and tools

Part 5: Integrated Team Project

CAREER OUTCOMES

- process engineer
- industrialization engineer
- production engineer
- quality engineer
- research and innovation engineer
- product manager
- project manager
- production manager
- manufacturing engineer
- supply chain engineer
- method & process engineer
- sales and operations planning manager

TESTIMONIES

MATHIS MUNCK
Class of 2021-2022

I chose ISAE-Supaero for its ranking. The training is a great boost for my career. I wanted to learn more about aeronautic structures (theoretically and practically). Pure Sciences, aeronautic science focus and practical courses are equally taught. **This training is a great opportunity to meet and learn from highly skilled teachers from the biggest aerospace manufacturers.**

One of the strongest assets the teachers and their teaching skills. **Learning from real cases and from teachers' own experience is very pleasant.** The end of master group project is really intensive. **It is a real opportunity to train yourself in metal forming or composite manufacturing processes.** Then really interesting visits to the main aerospace companies of the region are performed during the year.

CHARLY DESPREZ
Class of 2021-2022

ISAE -SUPAERO is a famous engineering school in the space sector. Entering this school gave me a chance to learn aerospace engineering from very talented engineers and professors. Technical courses will offer me a lot of professional opportunities. My main objective was to learn additional skills in the aerospace sector and become more efficient in my future job. My second objective was to **specialize in the manufacturing process to work on the finished product and to evolve in a technical field.**

It gave me additional skills and deepened my initial training. Thanks to that **I was operational as soon as I arrived in the professional world.** All the courses taught during the advanced master were in line with the needs of the industry and I am using this knowledge on a daily basis.