



Mastère Spécialisé® / Advanced Master

Advanced Manufacturing Processes for Aeronautical Structures

WITH IMT MINES ALBI-CARMAUX



■ Objectives

The Aeronautical industry market is facing a rapid and continuous increase worldwide as shown by the record breaking contracts recently signed by both Airbus and Boeing. These two industry leaders forecast an increase of close to 5% in activity over the next years. Estimations indicate that the annual increase of large commercial airplanes will induce a doubling of the number of aircrafts by 2030. Nearly sixty percent of the turnover is subcontracted 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 up to date with technological changes; moving from metallic processes toward composite materials processes. Moreover the aircraft manufacturers have changed their supply chain structure in the last 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 by aeronautical industry.

■ Organization

Heads of program MINES-ALBI

- Prof. Jean-José ORTEU
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Heads of program ISAE-SUPAERO

- Prof Anis HOR
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Course duration

One year full time: 6 months of courses and 6 months of professional thesis or internship

Course start date

September

Location

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

Teaching language

English

■ Learning approach

First semester:

Academic term of 520h, provided by permanent professors of IMT Mines Albi and ISAE-SUPAERO and expert practitioners from 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 project of 100h
- written report and oral presentation

Second semester:

Students have to conduct a professional thesis or make an 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 is concluded by the preparation of a report and an oral dissertation in front of a jury.

■ 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 is also devoted to gain knowledge in aircraft architecture, on aeronautical supply chain specificities, lean manufacturing, quality management and certification requested to be able to take over 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 - 130 h

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 - 100 h

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 - 106 h

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 - 84 h

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 - 100 h



■ Career opportunities

The Advanced Manufacturing Processes for Aeronautical Structures Master course offers challenging career opportunities for young engineers or more experienced engineers, who require a postgraduate program to enhance and/or focus their technical and management skills towards aeronautical industry sector.

Career opportunities are numerous and growing over the world, in tier 1 and tier 2 subcontracting companies, as well as in aircraft manufacturers, aeronautical maintenance companies. Graduated AMPAS students can find employments as process, industrialization, production, quality, research and innovation engineer, product, project and production manager...

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...



Testimonies

Why did you choose this Advanced Master?

ABDUL KHADER MOHAMMED

Cohort 2020/2021

Intern in Additive Manufacturing at ICA | ISAE-SUPAERO

👂 I chose ISAE-SUPAERO because of its deep understanding and expertise in Aerospace/Aeronautics, its strong academic pedigree, global reputation, industrial collaboration, international outlook and networking. I was always fascinated by materials and their transformation through manufacturing. I understood the importance of aerospace manufacturing through my undergraduate academics and work experience. Furthermore, I wanted to pursue my career in Aerospace with expertise in manufacturing, quality and project management. This led me to ISAE-SUPAERO and particularly the AMPAS advanced master. ISAE-SUPAERO is the place where I wanted to pursue my master's degree, and I applied only to ISAE. AMPAS provided holistic background in various domains of Aerospace with industrial collaboration in a multi-cultural environment. I wanted to gain further knowledge and experience in the various domains of Aerospace in an international environment.

EDGAR SILVA

Cohort 2020/2021

Intern as system engineer | Safran Seats

👂 I chose this master because it fits my skills, I know that ISAE-SUPAERO is a recognized school in the aeronautical sector, my clear objective has been to use this master as a springboard and find a job in the aeronautical sector where I can develop my professional career.

According to your experience, which are the strong assets of the Master?

The strong assets are **the faculty (academic and industrial), its infrastructure and equipment, pedagogies, teaching modules/subjects, the collaboration of IMT Mines Albi and ISAE-SUPAERO with the industry, industrial visits, the Integrated Team Project and travelling between Albi and Toulouse.**

In my opinion, the practical assignments that are imported during the course are of great importance because you can put into practice everything you have learned during the course.

What are your career plans?

Currently, I am doing my internship in the subject of Additive Manufacturing. By building on my Master's degree and work experience, I want to continue my career in Aerospace field in Europe.

I would like to continue working in the aeronautical sector, probably continuing with the work I have done during my internship.



Admission procedures

■ ADVANCED MASTERS

Academic requirements

A master's degree, or an equivalent degree in science or engineering (or in management for advanced masters in management), or bachelor degree completed by 3 years of professional experience

LANGUAGE REQUIREMENTS FOR ALL MASTERS



(including for Masters taught in French)

TOEFL (IBT)	or	TOEIC	or	IELTS
				
88 points <small>(Inst. code: 9820)</small>		785 points		6.5 points
or				
		CAE/FCE	or	Linguaskill
				
		170 points		170 points

NOTA BENE : Volume of teaching hours and contents of the programs are provided for information only and are subject to change.

LANGUAGE REQUIREMENTS FOR MASTERS IN FRENCH



Language qualification requested

Score B2-Common - European Framework of Reference for Languages

■ SELECTION AND ADMISSION

Selection and admission are made by an admission committee :
Possible interviews can be organized if necessary

Deadlines for application:

Applications open in October 2021

for a start of classes in September 2022.

Several admission committees are scheduled from January to July, see schedule on our website

Application website :

<http://admissionsmasters.isae-superaero.fr>

Funding

Information on tuitions fees and funding on our website



Your contacts

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