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 and estimations indicate that the annual increase of large commercial airplanes will induce a doubling of the number of aircraft 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 Mines Albi and ISAE 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.

To reach this goal, AMPAS master students will develop:

- general knowledge of flight dynamics constrains and airframe design
- knowledge and understanding of the airframe materials and processes and their qualification constrains
- knowledge, understanding and practice of the prevalent processes for structural applications with either metallic or fiber reinforced thermoset composites materials
- ability to use state of the art simulation tools for definition and optimization of metallic sheet forming and RTM/infusion process
- knowledge of the aeronautical supply chain structure and its communication rules
- understanding of the aeronautic dedicated quality and management requirements
- knowledge and practice of lean manufacturing tools
- ability to undertake manufacturing projects in an international team environment
- ability to communicate with written reports and by oral presentation.

Organisation

Heads of Program:
- Fabrice SCHMIDT
  E-mail: fabrice.schmidt@mines-albi.fr
- Prof Catherine MABRU
  E-mail: catherine.mabru@isae.fr

Duration of studies: One year full time

Beginning of classes: September

Location: Mines Albi, Campus Jarlard, Albi (70% of courses)
ISAE, Toulouse (30% of courses)

Teaching language: English

Learning approach

First semester: academic term of 450h and 45 credits, provided by permanent professors of Mines Albi and ISAE 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 80h
- written report and oral presentation

Second semester: Professional thesis in the aeronautical industry or in an academic research lab in collaboration with aeronautical industrial partners, in France or abroad. The duration is from 5 to 6 months and corresponds to 30 credits. Students are supervised by a tutor from the host Organisation and from Mines Albi or ISAE. Thesis is concluded by the preparation of a final 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 and quality management requested to be able to take over technical and organisational responsibilities in industry.

A team project (80 hours) will demonstrate the ability to address 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) - Aluminum 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 - 110 h**
Physical phenomena description and modeling 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 - 109 h**
Material behaviour and mechanical models - Cold and hot sheet forming processes - Surface treatments - Machining additive manufacturing - Sheet forming simulation

**Part 4 - Industrial Organisation and management - 70 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 - 80 h**

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**Career opportunities**

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, ALTEN, Safran, CDI P3-Group, EFW, FORMTECH,

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**TESTIMONY**

Michael TANIS, France, Project manager A320 NEO, graduated in 2015

*Why did you choose ISAE and apply for our master ? What were your objectives ?*

After five years of working experience in the chemical industry, I integrated the Advanced Master AMPAS in order to enter the aeronautical industry and work on projects I have always been interested in: airplane production and assembly. I chose the ISAE for its international renown, the industrial pertinence of its courses, and its top notch teachers. I also chose it for the strong links the school has with the key players in this industry. Participating in the AMPAS program is a great opportunity to gain expertise in specific aeronautical technologies and processes and to acquire knowledge about global industrial Organisation and optimization tools.

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

One strong asset of this Advanced Master's program is to provide the possibility of acquiring industrial skills focused on specific aeronautical technologies such as the forming of composite and metal materials. Another is that the theoretical classes are associated with laboratory sessions and visits to the companies. This Organisation allows the students to have an overview of the classroom vision of the technology and its on-the-job use in an industrial environment. Not to be overlooked, the master’s program is conducted in English, providing the students with the opportunity to be prepared to work in an international environment.

*Which are your career plans ?*

The six-month internship, which brings the Master's program to a close, puts classroom theory into practice. I worked on the restructuration project of the A380 Final Assembly Line. Thanks to this opportunity, after graduation I was able to integrate the A320 Final Assembly Line as a project manager for the NEO (New Engine Option) program. I am responsible for the coordination of the industrial ramp up activities. My other responsibilities include the coordination of projects deployed to mitigate the industrial disruptions inherent in the introduction of a new program. My next challenge would be to lead a team in a long-term industrial project, managing a group of people towards achieving the project’s goals.
Common ISAE’s admission procedures

Advanced Masters
Academic requirements
Applicants must have a Master degree, or an equivalent degree in science or engineering, or a bachelor degree with 3 years of professional experience at least.

Tuition fees 2017:

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<th>EU</th>
<th>Out of EU</th>
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<tbody>
<tr>
<td></td>
<td>reduced tuition fees¹</td>
<td>tuition fees</td>
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<tr>
<td>AMPAS</td>
<td>7 500 €</td>
<td>12 500 €</td>
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</table>

¹ for students graduated in the year of enrollment or the year before and with no professional experience
² for individual applicants
³ fees for public agencies and private companies available upon request from Philippe Galaup at: philippe.galaup@isae.fr, Head of recruitment and Contractual Relations

Possibility of studies funding by the Midi-Pyrénées Regional Council for French and UE unemployed applicants.

Selection and admission

Admission to ISAE’s master at:


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

Deadlines for application:
> several admission committees scheduled from February to July 2017, see schedule on our website: www.isae-supaero.fr

Application fees:
> 70 € (non-refundable)

Language requirements

Language qualification requested:
> TOEFL (IBT): 79 points (Inst. code: 9820)
> or TOEIC: 785 points
> or IELTS: 6.5 points
> or CAE.

Your contacts at ISAE

Philippe GALAUP, Head of recruitment and Contractual Relations - Phone: +33 (5) 61 33 80 27
Laurence BALLARIN, Senior Admission Advisor - Phone: +33 (5) 61 33 80 22
Marie GUIBBAL, Senior Admission Advisor - Phone: +33 (5) 61 33 80 28
Mikael LE ROUX, Senior Admission Advisor - Phone: +33 (5) 61 33 80 13

info-masters@isae-supero.fr
ISAE in few words

ISAE-SUPAERO is a world-class higher institute for aerospace engineering education and research. Nowadays with a student corpus of over 1600, ISAE-SUPAERO is one of Europe's largest Aerospace Institute offering graduate and postgraduate programs. Yearly, ISAE-SUPAERO awards around 20% of master’s degrees in Europe in aeronautics and space field. ISAE-SUPAERO develops its worldwide reputation on the prestige of its master’s programs, the fame of its teaching staff, or the excellence of its research but also on the high-value of its graduates, their skills in engineering or management, as well, their capacity to evolve within a very high-technology environment, their enterprising mind and international opening..

Identity card

Name: Institut Supérieur de l’Aéronautique et de l’Espace (ISAE).
Legal Status: Public Institution of higher education and research.
Faculty: 100 professors and researchers.
Employees: 400.

A campus fully renovated in 2015

ISAE-SUPAERO campus is located in Toulouse, along the Canal du Midi (UNESCO world heritage).
It is composed of:
» wide range of sports facilities including swimming pool, tennis and squash courts, sports hall, football and rugby fields, climbing wall and fitness room,
» 6 students halls of residence : 1000 rooms and studios apartments, all connected to high-speed network,
» a restaurant.
The campus is located in the Rangueil scientific complex, close to:
» ONERA French aerospace research centre
» CNES - French space agency
» 2 CNRS (National Center for Scientific Research) laboratories
» University and engineering schools.

Key figures

1 «diplôme d’ingénieur» ISAE-SUPAERO in French
1 Master of Science ISAE-SUPAERO in English
1 «diplôme d’ingénieur par apprentissage»
CNAM-ISAE (co-op master program)
15 Advanced Masters including 10 in English
5 Masters in French
6 PhD Programs
More than 1600 students including 1400 masters and more than 220 PhDs
81 international cooperation agreements

a set to facilitate settlement of new students in Toulouse city.
Including: bank account opening, housing insurance, accommodation booking, immigration formalities, public transportation card, SIM card, Guided tour of Toulouse city