# Aviation

Fields of education: Engineering and Information Technologies

## 1. Professional qualification

### Professional career outline

The aviation industry is also affected by the increased demands for global mobility and the introduction of new technologies. By the year 2035 it is expected that the number of passengers travelling by air will double compared to what it is today. As a result, more transport capacity is required and with that the necessary infrastructure on the ground and in the air need to be expanded too. Also, the enlarged airliner fleets will need to be maintained. To this end, the life cycle costs will have to be optimised further.

In order to be able to meet the future challenges in aviation, the industry and authorities will need to rely on aviation experts familiar with advanced methods in Systems and Process Engineering and a profound understanding of this highly complex environment. Digital technologies require extensive know-how in development and implementation – in particular with regard to operational processes and the planning and management of limited resources. In aviation there are also safety and security considerations that need to be made, which have a high priority. To this end, today's Safety Management System must be applied at all levels and needs to be developed further.

Increased digitalisation and automatisation are the breeding ground for the development of new solutions in planning and operation at airlines and larger airports, which may result in a complete redesign of processes and thus increase capacity without the need for costly expansions of the infrastructure.

The rising number of drones exemplifies that there are constantly new players entering the aviation market. In order to be able to integrate them into the aviation system as a whole – and thus to provide commercially a plethora of services such as inspections, surveillance, transportation of goods and persons, etc. – new procedures are indispensable.

The tasks mentioned above could be addressed by graduates in the MSE aviation profile, particularly in aircraft maintenance, production support and components, as well as in dynamic planning and process design at airlines and with air traffic control and authorities. The competencies described above allow graduates in the aviation profile to also work in non-aviation related professions related to transport (rail, road, logistics,...).

### Professional skills

Graduates in the MSE profile aviation acquire the following competencies and methods:

- They are able to manage and implement large and complex aviation projects with multiple stakeholders.
- Using Advanced Systems Engineering, they are able to model the entire Lift Cycle Process and to apply these skills in aviation projects. This can be in the field of aviation infrastructure (airports, air traffic control, logistics, transport), in the maintenance of aircraft and systems or in future applications for drones.
- They are able to handle complex maters in the field of maintenance and repair engineering and have a good understanding of Part M and Part 145 regulations.
- Modern technologies such as increased automatisation, big data and 3D production can be evaluated and applied competently in the aviation industry.
- The graduates must be able to evaluate and complex systems and integrate them into the existing infrastructure. To this end, they require important competencies in method-based Systems Engineering.

- Operational processes are planned, introduced and implemented in the short- and long-term planning of airlines and airports with a view to the anticipated digitalisation, etc.

With a few years of professional experience, dispatchers at airports, in aircraft handling, with airlines and in maintenance facilities have a good skill set which could be further developed through the MSE profile aviation – thus enhancing their professional development and potential.

### Entry skills

Specific skills are required to enrol in this profile. Students holding one of the following Bachelor degrees generally fulfil these entry requirements.

- BSc in Aviation
- BSc in Transport Systems

The assessment of the entry skills is part of the enrolment process of the respective school. Students who do not hold one of the above mentioned Bachelor degrees will be individually assessed for their suitability by the respective University of Applied Sciences.

### Differentiation to bachelor level

In contrast to graduates in the BSc in Aviation, master graduates are able to deal with more challenging and complex projects with many stakeholders and planning tasks. In the field of maintenance and overhaul, structural repair manuals can be applied directly to the daily business. It is possible to develop new solutions for the inspection and repair of new aluminium alloys and composites. The requirements for destruction-free inspections of aircraft structures can be defined for the damage tolerance to be detected, so that level 3 inspectors can compile inspection directives accordingly.

With increased automatisation/digitalisation, which have assumed a more prominent role in aviation through the introduction of new drone systems, methods and competencies are acquired that can be introduced in practice while maintaining safety standards in aviation. Using new digital technologies, graduates must be able to further develop the current Safety Management Systems as they are used by airlines, maintenance facilities, airports and development- and production facilities.

## 2. Profile contents

The profile covers the following content:

The field “Maintenance, Repair and Overhaul” focuses on the knowledge of the rules and regulation for aircraft maintenance (with an emphasis on Part M and Part 145), which are elaborated to the level of the individual process steps that are to be applied. Students learn about the full complexity of maintenance logistics. This includes the use of big data in preventive maintenance and the use of new repair solutions using 3D printing. Using handbook methods, repair solutions for aircraft structures are configured, which are ready for immediate implementation. The method of destruction-free inspection is expanded upon, with a focus on the inspection of alloys and composites.

The area “Aviation Infrastructure Operations” is built on operating an airport with increased demand for capacity on the ground and in the air, which requires modern method-based Systems Engineering. Also, the implementation of autonomous systems at airports should be achieved. Currently, many tasks revolving around the aircraft and in operational planning (gate assignment, slot coordination, etc.) are done manually and are therefore highly labour intensive. In order to extend capacity in the airspace, new concepts are required, which apply the latest in satellite and mobile telecommunication. Furthermore, in this field of study passenger movements within the airport infrastructure and around it are optimised.

The field “Towards Unmanned Aviation” is about drones with their autonomous systems technology and the miniaturisation of sensors that have made it necessary to integrate a new player in the existing aviation system. This needs to be done in a way that will ensure that a high safety standard is maintained. To this end, aviation regulations and their standards need to be taught, together with the

opportunities how new services could be made available with drones using a risk performance approach. In addition, it should also be taught what the challenges of higher automation with artificial intelligence in manned aviation are. This includes the issue of data protection. The relevant factors and framework for the introduction of new technologies need to be explored further and monitored, such as the role of the human being in a complex system.