Bilateral Cooperation
with
Industrialised Countries

# Project AV-EDEN

# WP1

## Pilot training systems analyses

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# List of abbreviations

| | |
|---|---|
| AQP | Advanced Qualification Program |
| ATPL | Airline transport pilot licence |
| ATQP | Alternative Training and Qualification Programme |
| CAA | Civil Aviation Authority |
| CBT | Competence based training |
| CPL | Commercial pilot licence |
| CPL(A) | Commercial pilot licence (Airplane) |
| CPL/IR | Commercial pilot licence/Instrument rating |
| EASA | European Aviation Safety Agency |
| EBT | Evidence Based Training |
| FAA | Federal Aviation Administration |
| FAR | Federal Aviation Regulation |
| FCLTP | Flight Crew Licensing and Training Panel |
| FFS | Full Flight Simulator |
| FI | Flight Instructor |
| FI(A) | Flight Instructor (Airplane) |
| FNPT | Flight and Navigation Procedures Trainer |
| FSTD | Flight Simulation Training Device |
| FTO | Flight Training Organisation |
| ICAO | International Civil Aviation Organisation |
| IFR | Instrument Flight Rules |
| IR | Instrument Rating |
| JAA | Joint Aviation Authorities |
| JAR | Joint Aviation Regulations |
| ME | Multi Engine |
| MEP(L) | Multi-Engine Piston (Land) |
| MPL(A) | Multi-Pilot Licence (Airplane) |
| PPL | Private Pilot Licence |
| RF | Registered Facility |
| SARPs | Standards And Recommended Practices |
| SIC | Second In Command |
| SOPs | Standard Operating Procedures |
| TEM | Threat and Error Management |
| TRTO | Type Rating Training Organisation |
| VFR | Visual Flight Rules |

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# 1 Regulations

## 1.1 ICAO

Following the historical evolution, currently there are numerous regulations regarding pilot training. The first and foremost was Annex 1 to the Convention on International Civil Aviation: Personnel Licensing (ICAO Annex 1), which laid basis for every other post-war personnel licensing system. Annex 1 was created in 1948. The main principle is, that Annex 1 isn't used directly (it´s text isn't obligatory). It is usually transformed into national regulations. However, all deviations from standards in comparison to Annex 1 must be announced to ICAO.

ICAO Annex 1 was not always the same as it is now. It went through many small and several more substantial changes. Currently we have Annex 1 10$^{th}$ edition. Historically, the biggest changes occurred in 8$^{th}$ and 9$^{th}$ edition.

The 8$^{th}$ edition of ICAO Annex 1 brought amendment of SARPs dealing with the licensing of flight crew members such as deletion of the senior commercial pilot licence - aeroplane, the controlled VFR rating, the flight radio operator licence and the flight instructor rating for gliders and free balloons. The dividing line of 5 700 kg maximum take-off mass was replaced by a dividing line based on the crew complement required by certification. Also the requirements for issue of a type rating for aircraft certificated for multi-pilot operations were strengthened and the provisions for the issue of each licence and rating were updated. Next they came to establishment of flight instruction requirements for the private, commercial, glider and free balloon pilot licences and for the instrument and flight instructor ratings.

The 9th edition brought human factors knowledge requirements, amendment of definitions and new provisions requiring language proficiency for aeroplane and helicopter pilots, navigators using radiotelephony, air traffic controllers and aeronautical station operators.

## 1.2 EASA

Most countries in Europe, basically JAA members, use JAR-FCL 1 for airplane licenses and JAR-FCL 2 for helicopter licenses. These are used directly, without deviations, but there are translations to the official language of the state. The other countries use Annex 1 and national regulations. As stated in previous articles, Annex 1 isn't used directly. It is transformed into national regulation and all deviations from original statutory text must be announced to ICAO. The JAA members also use national regulations for types of licenses, which aren't treated by JAR FCL, for example glider pilot licenses.

The European regulations for the purpose of this work are narrowed to regulations in regard to pilot training for aeroplane licences, namely JAR-FCL 1 - Flight Crew Licensing (Aeroplane) and marginally JAR-FCL 3 – Flight Crew Licences (Medical). JAR-FCL 1 sets requirements for training and applications for the issue of licenses, ratings, authorizations, approvals or certificates. JAR-FCL 3 sets requirements for the issue of medical certificates of class 1 and 2 for pilots of aeroplanes and helicopters. The medical class required for particular purpose or licence is stated in JAR-FCL 1. There are also national regulations for types of licenses, which aren't treated by JAR FCL, for example glider, balloon or airship pilot license.

## 1.3 FAA

The most common regulations dealing with flight crew training in the USA are FAA part 61: Certification: pilots, flight instructors and ground instructors, and FAA part 141: Pilot schools. Any type of license can be obtained by following requirements of either of these two regulations.

The main regulation concerning matters of this work is FAR part 61, which contains the requirements for issuing pilot, flight instructor, and ground instructor certificates, authorizations and ratings, and the conditions under which those certificates and ratings are necessary. It also handles the privileges and limitations of those certificates and ratings. Another important regulation in this field is FAR part 141, which prescribes the requirements for issuing pilot school certificates, provisional pilot school certificates, and associated ratings. It also contains general operating rules applicable to a holder of a certificate or rating issued under this part. Some information regarding qualifications required for specified purposes are included in FAR Part 121 – Operating requirements: Domestic, flag and supplemental operations, FAR Part 125 – Certification and operations: Airplanes having a seating capacity of 20 or more passengers or a maximum payload capacity of 6000 pounds or more; and rules governing persons on board of such aircraft, FAR part 135 – Operating requirements: Commuter and on demand operations and rules governing persons on board of such aircraft and FAR Part 137 – Agricultural aircraft operations. In FAR Part 142 – Training centres, there are requirements governing the certification and operation of aviation training centres.

## 1.4 Applicability of regulations

### 1.4.1 Applicability of Part 61

This FAA regulation contains the requirements for issuing pilot, flight instructor, and ground instructor certificates, authorizations and ratings, and the conditions under which those certificates and ratings are necessary. It also handles the privileges and limitations of those certificates and ratings.

### 1.4.2 Applicability of Part 141

This part prescribes the requirements for issuing pilot school certificates, provisional pilot school certificates, and associated ratings. It also contains general operating rules applicable to a holder of a certificate or rating issued under this part.

### 1.4.3 Applicability of JAR-FCL

JAR-FCL sets requirements for training and applications for the issue of licenses, ratings, authorizations, approvals or certificates received by the Authority from July 1, 1999.

Unlike in the USA, the JAR-FCL is divided into several parts, from which FCL 1 and FCL 2 deal with flight training. JAR-FCL 1 sets requirements regarding flight crew training for airplane licenses and JAR-FCL 2 sets requirements regarding flight crew training for helicopter licenses.

# 2 Basic differences between pilot training systems

In the USA there are two possibilities of conducting pilot training. It can be done by following FAR part 61 or 141. According to part 61 any instructor carrying the appropriate license can train his students for any rating from PPL to ATPL, IR, and Multi-Engine. Instructors are responsible for everything and work on their own. Students must pass flight and ground exams. These exams must be conducted by an examiner authorized by administrator i.e. FAA.

The other possibility is to conduct the training according to FAR part 141. Under this regulation the instructors must be organized under a flight school certified under FAR part 141. This school must have required personnel, aircraft and facilities. There shall be an approved course for each type of license trained for. There can be courses for a single license/rating, such as MEP(L), or there can be courses similar to integrated courses in Europe (see later in this paragraph), where multiple licenses/ratings are connected into one course.

The European system is slightly different. All pilot license candidates must be registered by a flight school. There are two types of schools. RF (Registered Facility) is a school, which can train their students only up to the PPL license. The other type of school, FTO (Flight Training Organization) can train their students for issue of any license up to the CPL/IR(ME) with frozen ATPL. These schools must also have required personnel, aircraft and facilities similar to FAR part 141.

The courses to obtain a license in an FTO are divide into two distinct groups: modular and integrated courses. When following modular courses, students first get their PPL, then any other rating or license, like IR, MEP or CPL. The order of licenses/ratings obtained is not given as a rule. It only depends on the needs and preferences of students. There is a separate training course for any rating/license. This is similar to training under FAR part 61, except it is performed by a certified school.

The integrated courses, on the other hand, are approved courses, which are performed during limited period of time and provide training from zero flight time up to a specified license, for example integrated ATP course. The flight time requirements of these courses are normally lower than in modular courses, but the maximum amount of time for training must be met. For example the maximum time for conducting integrated CPL(A) course is 24 months and the minimum flight time is 150 hours, compared to 200 hours in modular course. All flying must be performed according to the

approved Operations Manual and Training Manuals containing standard operating procedures (SOPs) among others. The students must pass final skill test conducted by an examiner authorized by administrator, which is national CAA (Civil Aviation Authority).

Except these basic differences there are also disagreements in various requirements and in regulation structure. The most significant difference between JAR FCL 1 and Part 61/141 is that the European regulation doesn't cover all types of licenses. For example you wouldn't find a glider, balloon, powered parachute, weight-shift-control aircraft or airship license in there.

Basic differences between American and European pilot training systems are outlined in Figure 2-1.

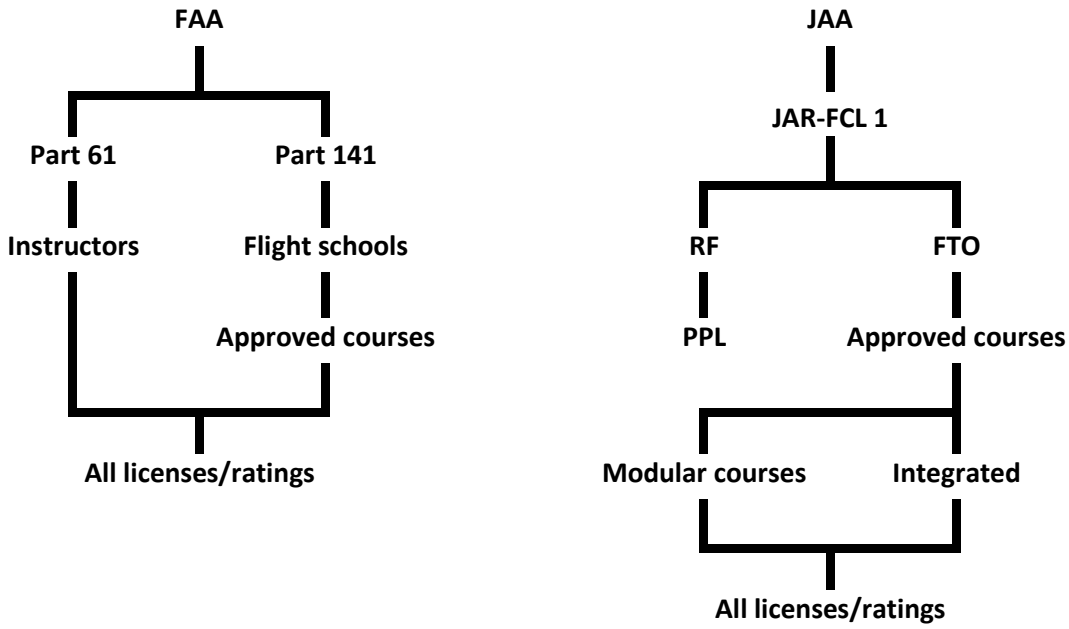



**Figure 2-1: Pilot training systems outline**

# 3 Differences in first officer requirements

Type rating training is for young pilots often the next step towards becoming an airline pilot after obtaining their CPL/IR. However, there are some dissimilarities between requirements for newly hired co-pilots between USA and Europe.

The Federal aviation regulations are less strict than European regulations concerning certification requirements for pilots who may be hired as commercial airline pilots. The United states regulations require minimal academic achievement and only 250 hours of total flight time, with none of it required in the type of aircraft or operating environment that today's pilots will experience. Although the practical experience at actual carriers may be different, it is still not a regulatory requirement.

On the other hand EASA requires flight officers to have, in addition to Multi-crew cooperation course, also a type rating. And what is more, the type rating training and requirements for student pilot skills and abilities shall not differ in dependence on his function as pilot in command or co-pilot. However any type rating can be limited as "co-pilot only". This forms a rather big discrepancy between flight officer requirements in the USA and Europe.

To specify the requirements: U.S. FAR 121.437(b) requires pilots acting as second-in-command of aircraft to be holders of at least a commercial pilot certificate, an instrument rating, and an appropriate class rating such as a multiengine class rating but not a type rating. Until recently, this applied to both domestic and international operations. "However, International Civil Aviation Organization (ICAO) Annex I, Chapter 2, paragraph 2.1.3.2, establishes an aircraft type-rating standard for both the PIC (pilot-in-command) and SIC." (1) FAA didn't follow this requirement at all and FAR 121.437 required a type rating only for PIC.

In order to bring the U.S. Federal Aviation Regulations into compliance with international standards on pilot certificates the FAA released a final rule on the new second-in-command (SIC) pilot type rating on August 4, 2005. Subsequently, on September 9, 2005, FAA reissued the final rule to correct the compliance date and on October 27, 2005, released an amendment to the final rule to correct errors in the final rules published on August 4.

"The final rule requires pilots who plan to fly outside U.S. airspace and land in foreign countries, and who are acting as second-in-command of an aircraft certificated for operations with a minimum flight

crew of at least two pilots, to obtain an SIC pilot type rating. Pilots shall have the second in command pilot type rating when flying into airspace controlled by a foreign civil aviation authority that requires it. This would include not only flights to foreign destinations, but also flights where there is a potential to land in a foreign country (for example, a flight from Newark, NJ to Anchorage, AK that crosses Canadian airspace and could result in an emergency landing in Canada).” (2)

FAA doesn´t require pilots flying domestically to have this second-in-command type rating. Moreover, even for the issue of a type rating there is no need of a skill test. From FAR 61.55:

“(d) A person may receive a second-in-command pilot type rating for an aircraft after satisfactorily completing the second-in-command familiarization training requirements under paragraph (b) of this section in that type of aircraft. The person must comply with the following application and pilot certification procedures:

(1) The person who provided the training must sign the applicant's logbook or training record after each lesson in accordance with Sec. 61.51(h)(2) of this part. In lieu of the trainer, it is permissible for a qualified management official within the organization to sign the applicant's training records or logbook and make the required endorsement. The qualified management official must hold the position of Chief Pilot, Director of Training, Director of Operations, or another comparable management position within the organization that provided the training and must be in a position to verify the applicant's training records and that the training was given.

(2) The trainer or qualified management official must make an endorsement in the applicant's logbook that states "[Applicant's Name and Pilot Certificate Number] has demonstrated the skill and knowledge required for the safe operation of the [Type of Aircraft], relevant to the duties and responsibilities of a second in command."

(3) If the applicant's flight experience and/or training records are in an electronic form, the applicant must present a paper copy of those records containing the signature of the trainer or qualified management official to an FAA Flight Standards District Office or Examiner.

(7) There is no practical test required for the issuance of "SIC Privileges Only" pilot type rating.” (3)

The main question is, whether this second in command type rating is sufficient to assure equivalent level of safety to the European type rating. As for obtaining the SIC type rating, only second-in-command familiarization training is needed, clearly the level of knowledge and skills required for such type rating is lower than those for pilot in command type rating. Performance of a newly hired

co-pilot with only 250 hours of flight in the logbook can be questionable, more so, if we imagine such a critical emergency situation as pilot in command incapacitation.

Although nowadays the only real difference between FAA and EASA in terms of SIC requirements is the absence of type rating requirement, this situation will change dramatically in 2013, as lately both the House of Representatives and Senate agreed on revising pilot training and certification standards as a response to issues related to Colgan Air Q400 crash outside Buffalo in February 2009. The most significant outcome of this agreement is that the legislation cleared by Congress will require all Part 121 pilots to hold an Airline Transport Pilot certificate, which means that a pilot must be at least 23 years old, pass a test demonstrating knowledge of the aircraft category and class he or she will be operating and have accumulated a minimum of 1,500 flight hours. The bill also demands that FAA issue rulemakings provision of stall, upset recognition, and recovery training by commercial air carriers. FAA has 36 months to comply and issue the appropriate rulemaking changes. (4)

# 4 Analyses of ICAO Annex 1, JAR-FCL 1, FAR part 61 and part 141

## 4.1 Method of rendering a licence valid

Concerning the ICAO Annex 1, validation of licence issued by another state is dealt with in chapter 1.2.2.1 and 1.2.2.2. In JAR-FCL 1 it is section 1.015 and its appendices and in FAR 61 it is subpart B, paragraph 61.73.

The methods of rendering a licence issued by another state valid are equal between ICAO Annex 1 and JAR-FCL 1 (limited to licences issued by JAA members). The ICAO Annex 1 doesn´t limit validation to any specific licence, so it is up to the state of issue. "JAR-FCL extends the acceptance without formality to professional licences for JAA Member States which are recommended for mutual recognition concerning JAR-FCL." (5) For pilots holding licences of non-JAA states there is a required experience, besides other requirements for validation, for every licence except PPL. This required experience is submitted in the following table:

| Licence held | Total flying hours experience | Validation conditions |
|---|---|---|
| **ATPL(A)** | >1 500 hours as PIC on multi-pilot aeroplanes | Commercial air transport in multi-pilot aeroplanes as PIC |
| **ATPL(A) or CPL(A)/IR*** | >1 500 hours as PIC or co-pilot on multi-pilot aeroplanes according to operational requirements | Commercial air transport in multi-pilot aeroplanes as co-pilot |
| **CPL(A)/IR** | >1 000 hours as PIC in commercial air transport since gaining an IR | Commercial air transport in single-pilot aeroplanes as PIC |
| **CPL(A)/IR** | >1 000 hours as PIC or as co-pilot in single-pilot aeroplanes according to operational requirements | Commercial air transport in single-pilot aeroplanes as co-pilot according to JAR–OPS |
| **CPL(A)** | >700 hours in aeroplanes other than TMGs, including 200 hours in the activity role for which validation is sought, and 50 hours in that role in the last 12 months | Activities in aeroplanes other than commercial air transport |

Table 4-1: Non JAR-FCL license validation

*CPL(A)/IR holders on multi-pilot aeroplanes shall have demonstrated ICAO ATPL(A) level knowledge before validation

Also the acceptance of private pilot licence under FAR part 61 is in accordance with ICAO Annex 1. A person who holds an instrument rating on a foreign pilot license issued by a contracting State to the Convention on International Civil Aviation may be issued an instrument rating on a U.S. private pilot certificate provided that within 24 months preceding the month in which the person applies for the instrument rating, the person passes the appropriate knowledge test. There is no provision for validation of other than private pilot licences.

## 4.2 Approved training and approved training organization

Approved training is covered in ICAO Annex 1 chapter 1.2.8.1 and 1.2.8.2, referring to appendices 2 and 4. According to Annex 1: “Approved training shall provide a level of competency at least equal to that provided by the minimum experience requirements for personnel not receiving such approved training.” (6) According to appendix 2: “The training organization shall provide a training and procedures manual for the use and guidance of personnel concerned.” (6) All the requirements for such manual are listed in this appendix. The training manual must be subsequently amended as necessary to keep the information contained therein up to date. Guidance on the approval of training programmes can be also found in the Manual on the Approval of Flight Crew Training Organizations (Doc 9841). Appendix 4 covers safety management systems framework.

This topic is also covered in JAR–FCL 1.055: Training organisations and registered facilities, Appendices 1a and 1b, 2 and 3 to JAR–FCL 1.055 and Appendix 2 to JAR–FCL 1.125. “Flying training organisations (FTOs) wishing to offer training for licences and associated ratings whose principal place of business and registered office is located in a JAA Member State, will be granted approval by that State when in compliance with JAR–FCL.” (7) Other requirements are offered in Appendix 1a to JAR–FCL 1.055. It is also possible to grant an approval to a FTO whose principal place of business and registered office is located outside of JAA member states, provided that an arrangement has been agreed between the JAA and the non-JAA Authority of the State in which the FTO has its principal place of business and registered office for the purpose of regulatory oversight and participation in the approval process. Other requirements must be also met, including requirements stated in Appendix 1c to JAR-FCL 1.055. Amongst the most important: “The skill test for the Instrument Rating shall be conducted in the JAA Member State of the approving authority. FTOs shall make arrangements for the approved course to include acclimatisation flying within the JAA Member State

of the approving Authority or any other JAA Member State at the discretion of the approving Authority prior to any student taking the instrument rating skill test with an examiner authorised by the approving Authority." (7) All other skill tests may be taken with a locally-based flight examiner (FE(A)) designated and authorised by the JAA approving authority, provided that the examiner is authorised in accordance with JAR-FCL and completely independent from the FTO except with the permission of the approving Authority.

There's an analogous situation concerning Type rating training organisations (TRTOs). Requirements for approval of TRTOs are given in Appendix 2 to JAR–FCL 1.055. As for MPL(A): "FTOs wishing to offer training for a MPL(A) shall demonstrate to the satisfaction of the Authority that the MPL(A) training course provides a level of competency in multi-crew operations at least equivalent to what is currently expected from graduates of the ATP(A) integrated course who have completed type rating training for a multi-pilot aeroplane. The Authority shall inform the JAA of any training course approved under this requirement." (7)

Under FAA this topic is covered in FAR part 141. According to § 141.7: "An applicant that meets the applicable requirements of subparts A, B, and C of this part, but does not meet the recent training activity requirements of §141.5(d) of this part, may be issued a provisional pilot school certificate with ratings." (8) In fact, a pilot school has to obtain a provisional pilot school certificate, and after two or more years, when it has met the criteria for issuance of a pilot school certificate (§141.5), can enrol for this certificate. In subpart C section 53 it is stated that an applicant for a pilot school certificate must obtain an administrator's approval of the outline of each training course. There´s also a provision for special courses of training for which a curriculum is not prescribed in the appendices of FAR part 141 provided that "the training course contains features that could achieve a level of pilot proficiency equivalent to that achieved by a training course prescribed in the appendixes of this part or the requirements of part 61of this chapter." (8) Such as in JAR-FCL, there are also requirements for issuing pilot school certificates, concerning for example personnel, instructor and chief instructor qualifications, airports, aircraft, flight simulators and flight training devices, briefing areas and ground training facilities. Provision is made to use satellite bases other than the main base of approved flight school under FAR part 141 if certain conditions stated in subpart E § 141.91 are met. At the end of the regulation in appendices there is a brief syllabus for each pilot certificate or rating.

The differences between regulations are minimal, except the JAR-FCL 1 is much less comprehensive than FAR part 141, which is directly dedicated to flight schools. The other more or less important distinction lies in FAR part 141 not providing any information regarding flight schools whose principal

place of business and registered office is located outside of the United States of America. As for ICAO Annex 1 comparison, these regulations are equivalent, except “JAR-FCL contains specific Appendices and Acceptable Means of Compliance regarding the approval process of training organisations.” (5)

## 4.3 Language proficiency

Chapter 1.2.9.6 of ICAO Annex 1 states: “As of 5 March 2008, the language proficiency of aeroplane, airship, helicopter and powered-lift pilots, air traffic controllers and aeronautical station operators who demonstrate proficiency below the Expert Level (Level 6) shall be formally evaluated at intervals in accordance with an individual’s demonstrated proficiency level.” (6) Additionally, there is a recommendation to evaluate language proficiency of those demonstrating Level 4 at maximum three years interval and those demonstrating Level 5 at maximum six years intervals.

According to JAR-FCL 1.200(a): “An applicant for an IR(A), MPL(A), ATPL(A) or validation shall have demonstrated the ability to use the English language as set out in Appendix 1 to JAR–FCL 1.200.” (7) In appendix 1 to JAR-FCL 1.200 it is stated that an applicant for instrument rating shall be able to use English for the purposes of radio telephony relevant to all phases of flight, including emergency situations, reading and understanding all information relevant to the accomplishment of a flight, communication with other crew members during all phases of flight. And according to JAR-FCL 1.010(a): “The language proficiency required must be at least Operational Level (level 4) of the ICAO Language Proficiency Rating.” (7) As can be seen, JAR-FCL 1 requirements for language proficiency are fully compatible with ICAO Annex 1.

In American regulations, language proficiency is dealt with in FAR part 61. According to § 61.65 a person who applies for instrument rating has to “be able to read, speak, write, and understand the English language.” (9) Similar paragraphs are contained in this regulation for every type of licence. The same applies for private pilot certificates issued on the basis of a foreign pilot license. But the main difference between FAR part 61 and ICAO Annex 1 is that there is no specification of the process or scale of language proficiency examination.

## 4.4 General licensing specifications

This topic is covered in chapters 2.1.1.1 to 2.1.1.3.1 of ICAO Annex 1. In chapter 2.1.1.1 there is a list of categories of aircraft for which a pilot needs an appropriate licence to act as pilot in command or co-pilot. These categories are:

- Aeroplane
- Airship of a volume of more than 4 600 cubic metres
- Free balloon
- Glider
- Helicopter
- Powered-lift.

The formalities concerning licensing, such as endorsement of another aircraft category on an existing licence, are dealt with in chapter 2.1.1.2. At last, chapter 2.1.1.3 states: “An applicant shall, before being issued with any pilot licence or rating, meet such requirements in respect of age, knowledge, experience, flight instruction, skill and medical fitness, as are specified for that licence or rating.” (6)

JAR–FCL 1.010 is dedicated to basic authority to act as a flight crew member and exercise of privileges. This chapter deals also with national motor gliders licences and restricted national private pilot licences. It is generally compatible with earlier mentioned ICAO Annex 1 chapters. JAR–FCL 1.225 states: “The holder of a pilot licence shall not act in any capacity as a pilot of an aeroplane except as a pilot undergoing skill testing or receiving flight instruction unless the holder has a valid and appropriate class or type rating. When a class or type rating is issued limiting the privileges to acting as co-pilot only, or to any other conditions agreed within JAA, such limitations shall be endorsed on the rating.” (7) The main difference between ICAO Annex 1 and JAR-FCL 1 is that the latter doesn´t provide such number of categories of aircraft. These are only mentioned in definitions: “Category (of aircraft): Categorisation of aircraft according to specified basic characteristics, e.g. aeroplane, helicopter, glider, free balloon.” (7)

Under the jurisdiction of FAA, this topic is covered in FAR 61.3. The information on requirements for acting as pilot in command or co-pilot is generally compatible with Annex 1 to ICAO convention. This is further extended to flight instructor certificate, category II pilot authorization, category III pilot authorization, ground instructor certificate and age limitation for certain operations. Then there is a provision for special purpose pilot authorization: “Any person that is required to hold a special purpose pilot authorization, issued in accordance with §61.77 of this part, must have that authorization and the person's foreign pilot license in that person's physical possession or have it readily accessible in the aircraft when exercising the privileges of that authorization.” (9) In part 61.63, there are additional requirements for issuing additional category and type rating, which is above the extent of ICAO Annex 1. The list of category and class ratings which can be issued is in part 61.5. There are more categories than in ICAO Annex 1:

- Airplane.
- Rotorcraft.
- Glider.
- Lighter-than-air.
- Powered-lift.
- Powered parachute.
- Weight-shift-control aircraft.

## 4.5 Category, class and type ratings

According to ICAO Annex 1, chapter 2.1.2.1, category ratings shall be established for categories of aircraft listed in 2.1.1.1. These are mentioned in the previous chapter of this work. Further rules are submitted in chapters 2.1.2.2. and 2.1.2.3.: “Category ratings shall not be endorsed on a licence when the category is included in the title of the licence itself. Any additional category rating endorsed on a pilot licence shall indicate the level of licensing privileges at which the category rating is granted.” (6)

According to ICAO Annex 1, chapter 2.1.3.1, class ratings shall be established for aeroplanes certificated for single-pilot operation and shall comprise:

- single-engine, land
- single-engine, sea
- multi-engine, land
- multi-engine, sea

ICAO Annex 1, chapter 2.1.3.2, states that type ratings shall be established for:

- Aircraft certificated for operation with a minimum crew of at least two pilots;
- Helicopters and powered-lifts certificated for single pilot operation except where a class rating has been issued under 2.1.3.1.1; and
- Any aircraft whenever considered necessary by the Licensing Authority.

In JAR-FCL 1 this topic is covered in several chapters. Chapter 1.215 deals with class ratings for aeroplanes. According to this chapter class ratings shall be established for single-pilot aeroplanes not requiring a type rating and the classes mentioned in Annex 1 are stretched beyond this with:

- All touring motor gliders

- Each manufacturer of single-engine turbo-prop aeroplanes (land)
- Each manufacturer of single-engine turbo-prop aeroplanes (sea)

Also according to this chapter: “In order to change to another type or variant of the aeroplane within one class rating, differences or familiarisation training is required.” (7)

Chapter 1.220 covers type ratings for aeroplanes. Requirements for the need of type rating issuance listed in this regulation are compatible with ICAO Annex 1 and are extended with:

- Each type of single-pilot multiengine aeroplane fitted with turbo-prop or turbojet engines
- Each type of single-pilot single-engine aeroplane fitted with a turbojet engine

Analogous to the class ratings, to change to another variant of the aeroplane within one type rating, differences or familiarisation training is required. Any other requirements for ratings are fully compatible with ICAO Annex 1.

Under FAR part 61 this topic is covered in chapter 61.5. Aeroplane class ratings listed in this regulation are exactly the same as in ICAO Annex 1. Class ratings for other categories of aircraft aren´t subject of this project, so they will be left off.

The type ratings issued under this part are:

- Large aircraft other than lighter-than-air.
- Turbojet-powered airplanes.
- Other aircraft type ratings specified by the Administrator through the aircraft type certification procedures.
- Second-in-command pilot type rating for aircraft that is certificated for operations with a minimum crew of at least two pilots.

In comparison to ICAO Annex 1 the requirement for type rating for any multi-pilot aeroplane is missing. This requirement is set only for second-in-command pilots. However, requirements are extended by some other specified groups of aircraft.

### 4.5.1 Circumstances in which class and type ratings are required

Circumstances in which class and type rating are required are set in ICAO Annex 1 chapter 2.1.4. In JAR-FCL 1 it is in chapters 1.225 and 1.230. Chapter 1.225 states: “When a class or type rating is issued limiting the privileges to act as co-pilot only, or to any other conditions agreed within JAA, such limitations shall be endorsed on the rating.” (7) This is in disagreement with chapter 2.1.4.1.1 of ICAO Annex 1: “When a type rating is issued limiting the privileges to act as co-pilot, or limiting the

privileges to act as pilot only during the cruise phase of the flight, such limitation shall be endorsed on the rating." (6) Endorsement of limitation to act as pilot only during cruise phase of flight is covered in JAR-FCL 1 only in the very general statement about any other conditions agreed within JAA. Any other rules stated in JAR-FCL 1 are compliant with ICAO Annex 1.

In ICAO Annex 1 it is stated that for the purpose of training, testing, or specific special purpose non-revenue, non-passenger carrying flights, special authorization may be provided in writing to the licence holder by the Licensing Authority in place of issuing the class or type rating in accordance with 2.1.4.1. This authorization shall be limited in validity to the time needed to complete the specific flight.

In FAR part 61 the validity of such authorisation is limited to 60 days, although if the flight or series of flights cannot be accomplished within the time limit of the authorization, the Administrator may for this purpose authorize an additional period of up to 60 days. This flight or series of flights can involve only carriage of flight crewmembers essential for the flight.

Any other statements in FAR part 61 concerning circumstances in which class and type rating are required are in harmony with the text of ICAO Annex 1.

### 4.5.2 Requirements for the issue of class and type ratings

Requirements for the issue of class and type ratings are contained in chapter 2.1.5 of ICAO Annex 1. The relevant requirements of JAR-FCL 1 are stated in chapters 1.240, 1.250, 1.261(a), 1.262 (a) and (b), 1.285 and 1.295. All these requirements are compatible with ICAO Annex 1, but some extend beyond the sphere of this regulation. In chapter 1.240 there is provision for issuance of class or type rating to a pilot holding a non-JAA pilot licence. This is not necessary in terms of ICAO Annex 1 and will be explained in more detail inside the comparison of American and European regulations itself.

In FAR part 61 the requirements for class and type rating issuance are located in paragraph 61.63. Above the requirements of ICAO Annex 1 there are some more restrictive requirements: "a person who applies for an aircraft type rating or an aircraft type rating to be completed concurrently with an aircraft category or class rating-

(1) Must hold or concurrently obtain an appropriate instrument rating, except as provided in paragraph (e) of this section.

(3) Must pass the practical test at the airline transport pilot certification level.

(4) Must perform the practical test in actual or simulated instrument conditions, except as provided in paragraph (e) of this section." (9)

If the aircraft is not capable of instrument manoeuvres and procedures, the rating will be limited to "VFR only." When an instrument rating is issued to a pilot holding one or more type ratings, the amended pilot certificate must bear the "VFR only" limitation for each aircraft type rating for which the person did not demonstrate instrument competency.

## 4.6 Use of synthetic flight trainers for demonstration of skill

According to ICAO annex 1 chapter 2.1.6 any flight simulation training device used for acquiring experience or demonstration of skill must be approved for this purpose by the licensing authority, which shall ensure that the flight simulation training device used is appropriate for the task.

Chapter JAR-FCL 1.005(a)(4), which deals with this topic, is fully compatible with ICAO Annex 1.

The text of FAR part 61 (paragraph 61.64) is much more restrictive concerning flight simulators used for demonstration of skill. At first, it must represent the category, class, and type of airplane (if applicable) for the rating acquired after the skill test. Then it must be qualified and approved as a Level C flight simulator if the applicant performs the entire skill test in a flight simulator. If the rating is for turbojet or turbo-propeller airplane, there are additional requirements for previous pilot experience if the whole skill test will be executed on a flight simulator. If not meeting the criteria, the pilot must take several parts of the skill test in an appropriate aircraft; otherwise he will get a limitation to act as a pilot-in- command. Although these requirements are above the extent of Annex 1, there are compatible with its text.

## 4.7 Circumstances in which an instrument rating is required

According to ICAO Annex 1 chapter 2.1.7., in order to act as a pilot under IFR a person must be a holder of instrument rating appropriate to the aircraft category. In JAR-FCL 1 this area is dealt with in chapters 1.175 and 1.275(a)(1). Text of these chapters is fully in compliance with ICAO Annex 1, but also provides a possibility to fly under IFR provided that the pilot holds a qualification appropriate to the circumstances, airspace and flight conditions in which the flight is conducted without instrument rating, if the national legislation requires flight in accordance with IFR under specified circumstances (e.g. at night).

Under the American jurisdiction this is handled in FAR part 61.63 (e). The text of this chapter prohibits IFR flight or flight under the VFR minimums without an instrument rating or airline

transport pilot certificate with the appropriate category, class and type rating (if applicable). The only and main difference is in not limiting this for all pilots, but only to act as a pilot-in-command.

## 4.8 Crediting of flight time

This topic is covered in ICAO Annex 1 chapter 2.1.9. In JAR-FCL it is chapter 1.050 (a). JAR-FCL 1.050(a)(3)(i), when stating: “The holder of a pilot licence, when acting as co-pilot, is entitled to be credited with all of the co-pilot time towards the total flight time required for a higher grade of pilot licence.” (8) is fully in accordance with ICAO Annex 1 chapter 2.1.9.

Under FAA this part is covered in paragraphs 61.51 and 61.159. According to paragraph 61.51 (f) a person may log second-in-command time only for flight time when occupies a crewmember station in an aircraft that requires more than one pilot by the aircraft's type certificate or the regulations under which the flight is being conducted. This is in contradiction to ICAO Annex 1 chapter 2.1.9.2 (quoted above). Additionally, this requirement is also expressed in section 61.159 (c), where there are similar requirements for credit of commercial pilot flight time towards the 1,500 hours of total time as a pilot required by paragraph (a) of the same section for an airline transport pilot certificate.

## 4.9 Student pilot

Requirements for student pilots are set in chapter 2.2 of ICAO Annex 1. In chapter 2.2.2 it is stated that a student pilot shall not fly solo unless under the supervision of, or with the authority of, an authorized flight instructor. And chapter 2.2.3 says: “A Contracting State shall not permit a student pilot to fly solo unless that student pilot holds a current Class 2 Medical Assessment.” (6) This topic is covered also in JAR-FCL 1.085, 1.090 and 1.095. All these paragraphs are equal to the appropriate paragraphs of ICAO Annex 1. Also FAR part 61 subpart C covering this issue in American regulations is compatible with the appropriate chapters of ICAO Annex 1. There is, however, a discrepancy between FAR part 61.23 (A)(3), according to which a student pilot has to have a third class medical certificate and chapter 2.2.3 of ICAO Annex 1, which prescribes the second class medical certificate.

## 4.10 Private pilot licence – Aeroplane

The private pilot licence is covered in ICAO Annex 1 chapter 2.3, JAR-FCL 1.100, 1.105, 1.120, 1.125,1.130, 1.135 and appropriate appendices, FAR part 61.23, FAR part 61 subpart E and FAR part 141 appendix B. In the field of aeronautical knowledge, human performance is missing in FAR part 61.105 in comparison to chapter 2.3.1.2 of ICAO Annex 1. One of the differences between ICAO Annex 1 and JAR-FCL 1 is that the latter defines also credit for pilots with flying experience in other categories. They can credit 10% of their total flight time as pilot-in-command in such aircraft up to a maximum of 10 hours towards a PPL(A). According to ICAO Annex 1, licensing authority shall determine whether such experience is acceptable.

| | ICAO Annex 1 | JAR-FCL 1 | FAR part 61 |
|---|---|---|---|
| **Minimum age** | 17 | 17 | 17 |
| **Medical class** | 2 | 2 | 3 |
| **Experience (hours)** | 40 | 45 | 40 |
| **In approved training** | 35 | N/A | 35 (FAR part 141) |
| **Maximum on FSTD** | 5 | 5 | N/A |
| **Minimum solo hours** | 10 | 10 | 10 |
| **Minimum dual hours** | N/A | 25 | 20 |
| **Dual cross country** | N/A | N/A | 3 |
| **Solo cross country** | 5 | 5 | 5 |
| **Solo cross country flight requirement** | 1 solo cross country >150NM, full-stop landings at 2 points | 1 solo cross country >150NM, full-stop landings at 2 points different from aerodrome of departure | 1 solo cross country >150NM, full-stop landings at 3 points, one segment > 50 NM, also part 141: 1 solo cross country >100NM |
| **Night training** | 2.3.2.2- separate qual. | Separate qual.- 5 hours May be part of PPL | 3 |
| **Instrument training** | N/A | N/A | 3 |
| **Preparation for skill test** | N/A | N/A | 3 hours, max. 2 months prior skill test |

Table 4-2: PPL overview

As can be seen in the previous table, there are some minor differences between the three regulations (marked grey). Most of them are stricter than in ICAO Annex 1. One significant difference is in JAR-FCL 1.125(c): "If the privileges of the licence are to be exercised at night, at least five additional hours flight time in aeroplanes shall be completed at night comprising 3 hours of dual instruction including at least 1 hour of cross-country navigation and five solo take-offs and five solo full-stop landings. This qualification will be endorsed on the licence." Annex 1 mentions here only dual instruction without time specification. FAR part 61.109 (a) has this included into the PPL training, such as basic instrument training.

The most important divergence from ICAO Annex 1 is in FAR part 61.23, which prescribes the private pilots to be holders of third class medical certificate instead of the second class.

## 4.11 Commercial pilot licence – Aeroplane

This topic is covered in ICAO Annex 1 chapter 2.4, JAR-FCL 1.140, 1.145, 1.155, 1.160, 1.165 (a) and 1.170 and in FAR part 141 appendix D, FAR part 61 subpart F and part 61.23.

The first difference is human performance missing in FAR part 61.125 in aeronautical knowledge areas in comparison to chapter 2.4.1.2 of ICAO Annex 1.

| | ICAO Annex 1 | JAR-FCL 1 | FAR part 61 |
|---|---|---|---|
| **Minimum age** | 18 | 18 | 18 |
| **Medical class** | 1 | 1 | 2 |
| **Experience (hours)** | 200 | 200 | 250 |
| **In approved training** | 150 | 150 CPL/ 180 CPL/IR (integrated course) | 120, must have PPL and IR (FAR part 141) |
| **Maximum on FSTD** | 10 | 5 | N/A |
| **Minimum PIC** | 100 | 100 | 100 |
| **Minimum PIC in approved training** | 70 | 70 | 10 (in training) |
| **Minimum dual hours** | N/A | 25 modular/ 80 integrated | 20/55(FAR part 141) |
| **Dual cross country** | N/A | N/A | 2 + 2 night |
| **PIC cross country** | 20 | 20 | 50 |
| **Solo cross country** | 1 solo cross country | 1 solo cross country | 1 solo cross country |

| | | | |
|---|---|---|---|
| **flight requirement** | >300NM, full-stop landings at 2 points | >300NM, full-stop landings at 2 points different from aerodrome of departure | >300 NM total distance, landings at 3 points one of which is a straight-line distance of at least 250 nautical miles from the original departure point |
| **Night training** | 2.4.2.2- separate qual.= 5 hours + 5 take offs and landings as PIC | 5 (3 hours dual, 1 hour of cross-country navigation, 5 solo take-offs and landings) * | 5 solo hours + 10 take offs and landings + 2-hour cross country flight |
| **Instrument training** | 10 | 10# | 10 |
| **Max. instrument ground time** | 5 | 5 | N/A |
| **Preparation for skill test** | N/A | N/A | 3 hours, max. 2 months before skill test |

**Table 4-3: CPL overview**

*See JAR–FCL 1.165 (b)

#See JAR-FCL 1.155(d): An applicant holding a Course Completion Certificate for the Basic Instrument Flight module, as set out in Appendix 1 to JAR-FCL 1.205, may be credited up to 10 hours towards the required instrument instruction time in the integrated or modular course

As can be seen in the previous table, there are some minor differences between the three regulations (marked grey). Most of them are stricter than in ICAO Annex 1. The approved training under FAR part 141(Appendix D) deviates from ICAO Annex 1 chapter 2.4.3.1.1 in the way that it has only 120 hours total flying experience in training, but this is compensated by requirement to hold PPL and IR prior to conducting skill test. From this rises also the requirement for only 10 PIC training hours. Additional PIC hours shall be flown while acquiring training for the PPL. The most important divergence from ICAO Annex 1 is in FAR part 61.23, which prescribes the commercial pilots to be holders of second class medical certificate instead of the first class.

JAR-FCL also requires the skill test and part of the CPL course training to be conducted on a complex aircraft with retractable gear variable pitch propeller and a complement of at least four people.

In JAR-FCL 1 there is also provision for pilots holding MPL(A) licence to obtain CPL(A).

## 4.12 Airline transport pilot licence – Aeroplane

This topic is covered in ICAO Annex 1 chapter 2.6, JAR-FCL 1.265 (a), 1.270, 1.280, 1.285, 1.290, 1.295 and in FAR part 141 appendix E, FAR part 61 subpart G and part 61.23.

As for minimum age for obtaining airline transport pilot licence the limit in both ICAO Annex 1 chapter 2.6.1.1 and JAR-FCL 1.265 is stated as 21 years of age. The difference is in FAR part 61, where it is 23 years.

| | ICAO Annex 1 | JAR-FCL 1 | FAR part 61 |
|---|---|---|---|
| **Minimum age** | 21 | 21 | 23 |
| **Medical class** | 1 | 1 | 1 |
| **Experience (hours)** | 1 500 | 1500 | 1,500 |
| **Multi pilot operations** | N/A | 500 | N/A |
| **Maximum on FSTD** | 100 | 100 | 100 (only in part 142 training centre) |
| **Minimum PIC** | 500 hours as pilot-in-command under supervision or<br>250 hours, either as pilot-in-command, or made up by<br>not less than 70 hours as pilot-in-command and the<br>necessary additional flight time as pilot-in-command<br>under supervision; | 500 hours as pilot-in-command under supervision or<br>250 hours, either as pilot-in-command, or made up by<br>not less than 70 hours as pilot-in-command and the<br>necessary additional flight time as pilot-in-command<br>under supervision; | 250 hours as a pilot in command, or as second in command performing the duties of pilot in command under the supervision of a pilot in command, or any combination thereof, which includes at least—<br>(i) 100 hours of cross-country flight time; and<br>(ii) 25 hours of night flight time. |
| **Minimum dual hours** | CPL/IR or MPL | CPL/IR(ME) + MCC | CPL/IR |

| | | | |
|---|---|---|---|
| **Cross country experience** | 200 | 200 | 500 |
| **PIC cross country experience** | 100 | 100 | 100 |
| **Night experience** | 100 | 100 | 100 (25 PIC or SPIC) |
| **Instrument time** | 75 | 75 | 75 |
| **Max. instrument ground time** | 30 | 30 | 25/50 (in part 142 training centre) |

**Table 4-4: ATPL overview**

As can be seen in the previous table, there are some minor differences between the three regulations (marked grey). Most of them are stricter than in ICAO Annex 1. One of the bigger differences is that JAR-FCL 1 requires in addition 500 hrs in multi-pilot operations on aeroplanes. Also multi engine and multi crew cooperation training is required in JAR-FCL. FAR part 61 deviates more. Some of big deviations can be seen in the table above. It requires only 250 hours of PIC or SPIC instead of 500, but this is compensated by § 61.159(d): An applicant is issued an airline transport pilot certificate with the limitation, "Holder does not meet the pilot in command aeronautical experience requirements of ICAO," as prescribed under Article 39 of the Convention on International Civil Aviation, if the applicant does not meet the ICAO requirements contained in Annex 1 "Personnel Licensing" to the Convention on International Civil Aviation, but otherwise meets the aeronautical experience requirements of this section.

JAR-FCL is also much stricter than FAR in that it requires the skill test to be conducted on a multi-pilot aircraft as the pilot in command. Thus the ATPL candidate has to be holder of a type rating prior to the ATPL skill test. This leads to existence of a group of ATPL pilots under FAA who may not be ATPL under JAA.

There is also remarkable possibility of lowering night flight experience requirements in paragraph 61.159 (b): A person who has performed at least 20 night takeoffs and landings to a full stop may substitute each additional night takeoff and landing to a full stop for 1 hour of night flight time to satisfy the requirements of paragraph (a)(2) of this section; however, not more than 25 hours of night flight time may be credited in this manner.

## 4.13 Instrument rating – Aeroplane

This topic is covered in ICAO Annex 1 chapter 2.7, JAR-FCL 1.174, 1.180(a), 1.190, 1.195(b), 1.205, 1.210 and appropriate appendices and in FAR part 141 appendix C, and FAR part 61.65.

| | ICAO Annex 1 | JAR-FCL 1 | FAR part 61 |
|---|---|---|---|
| **Medical class** | According to the licence held, plus hearing acuity as in class 1 | As in ICAO Annex 1 | N/A (appropriate to the licence held) |
| **PIC cross country experience** | 50 | 50 | 50 |
| **Night training** | Not mentioned (only appropriate licence) | Must have CPL or PPL + night training | N/A |
| **Instrument training** | 40 | 50(SE)/ 55(ME) | 40 |
| **Dual training** | 10 | 50(SE)/ 55(ME) | 15 |
| **Max. instrument ground time** | 20/30(flight simulator) | SE: 20(FNPT I)/35 (flight simulator or FNPT II)<br>ME: 25(FNPT I)/40(flight simulator or FNPT II) | 20/30 (part 142)* |

Table 4-5: IR overview

* Even when flight simulator is used, the limit is 20 hours if not under part 142. Under part 142 the 30 hour limit is for usage of flight simulator or flight training device.

The differences between regulations are a bit larger than in other areas. Especially JAR-FCL 1 allows more instrument ground time, but extends the hours of training for multi engine training. It is also the only regulation which divides IR training to SE and ME and requires previous night training.

The biggest discrepancy between ICAO Annex 1 and FAR part 61 is that the latter doesn't have any special medical requirements above the medical class appropriate for the licence held, whereas Annex 1 requires hearing acuity on par with medical class 1.

## 4.14 Flight instructor rating

This topic is covered in ICAO Annex 1 chapter 2.8, JAR-FCL 1.310(a), 1.330, 1.335, 1.340, 1.345 and appropriate appendices, AMC FCL 1.340 part 1 and in FAR part 141 appendix F, FAR part 61 subpart H and FAR part 61.23.

| | ICAO Annex 1 | JAR-FCL 1 | FAR part 61 |
|---|---|---|---|
| **Minimum age** | N/A | 18 | 18 |
| **Medical class** | N/A | N/A | 2 |
| **Validity** | N/A | 3 | N/A |
| **Experience (hours)** | As for CPL (2.8.1.3) | At least a CPL(A) or 200 hours of flight time of which 150 hours as pilot-in-command if holding a PPL(A) Of them 30 SEP (5 during 6 months before pre-entry flight test) | A CPL/IR or ATPL with the appropriate ratings for the instructor rating sought |
| **Instrument experience** | N/A | 10 (Max. 5 FNPT or a flight simulator) | Must have IR |
| **Cross country experience** | N/A | 20 PIC including a flight totalling not less than (300 nm) in the course of which full stop landings at two different aerodromes | N/A |
| **Training for obtaining FI(A)** | N/A | 30(25 dual of which 5 can be flight simulator or FNPT ) The remaining 5 may be two applicants flying together | 25(Max. 10% flight simulator and max. 5% flight training device, 10% max. together) |
| **Training for MPL(A) instructor** | N/A | 14 | N/A |
| **Experience on type/class** | N/A | 15 | 15 |
| **Restricted period** | N/A | 100hours and 25 solo flight supervisions | N/A |
| **Experience for CPL training** | N/A | 500 including 200 hours of flight instruction | N/A |
| **Experience for** | N/A | 200 hours IFR (50 can be FNPT II or | N/A |

| | | | |
|---|---|---|---|
| **night flying** | | flight simulator ) | |
| **Experience for training of FI(A)** | N/A | 500 hours of flight instruction | N/A |
| **Experience for MPL(A) training** | N/A | for the core flying phase 500 hours from which 200 is flight instruction, for the basic phase of training (requiring IR(ME)) 1500 hours of flight time in multi-crew operations | N/A |

**Table 4-6: FI overview**

Speaking of flight instructor rating, the ICAO Annex 1 is rather minimalistic. Both JAR-FCL 1 and FAR part 61/141 are much more comprehensive and strict in delineating of privileges and responsibilities, speaking nothing of requirements for flight instructor rating issuance. ICAO Annex 1 doesn´t even set the minimum flight training duration. JAR-FCL JAR–FCL 1.310(d)(1) also contains instructor competencies for multi pilot licence flight instruction.

Status of restricted period implemented into JAR-FCL 1.325 (conditions in the table above) is also a very important difference:

"(b) Restrictions. The privileges are restricted to carrying out under the supervision of a FI(A) approved for this purpose:

(1) flight instruction for the issue of the PPL(A) – or those parts of integrated courses at PPL(A) level – and class and type ratings for single-engine aeroplanes, excluding approval of first solo flights by day or by night and first solo navigation flights by day or by night; and

(2) night flying, provided a night qualification is held, the ability to instruct at night has been demonstrated to an FI(A) authorised to conduct FI(A) training in accordance with JAR-FCL 1.330(f) and the night currency requirement of JAR-FCL 1.026 is satisfied." (7)

Also night flight instruction is restricted to certain criteria which have to be fulfilled:

JAR–FCL 1.330 (c): "night flying, provided a night qualification is held, the ability to instruct at night has been demonstrated to an FI(A) authorised to conduct FI(A) training in accordance with JARFCL 1.330(f) and the night currency requirement of JAR-FCL 1.026 is satisfied" (7)

JAR-FCL also sets a requirement for 130 hours of instructor theoretical ground training.

As for FAR part 61, this regulation is somewhat less comprehensive than JAR-FCL 1 concerning requirements for various types of flight instruction. It is also possible, as one interesting distinction, to credit some academic experience for half of the theoretical knowledge training:

§ 61.185:

"(b) The following applicants do not need to comply with paragraph (a)(1) of this section:

(1) The holder of a flight instructor certificate or ground instructor certificate issued under this part;

(2) The holder of a current teacher's certificate issued by a State, county, city, or municipality that authorizes the person to teach at an educational level of the 7th grade or higher; or

(3) A person employed as a teacher at an accredited college or university." (9)

## 4.15 Multi-crew pilot licence

This topic is covered in ICAO Annex 1 chapter 2.5 and Subpart K of JAR-FCL 1. Neither FAR part 61 nor part 141 does have provision for issuance of multi-crew pilot licence.

| | ICAO Annex 1 | JAR-FCL 1 |
|---|---|---|
| **Minimum age** | 18 | 18 |
| **Medical class** | 1 | 1 |
| **Knowledge** | As for ATPL | As for ATPL |
| **Experience (hours)** | 240 | 240 |
| **Flight experience requirements** | As for PPL: 35 (10 solo of which 5 solo cross country) | As for PPL: 45 (25 dual, 10 solo of which 5 solo cross country) |

Table 4-7: MPL overview

According to Appendix 3 to ICAO Annex 1: 1.1 "In order to meet the requirements of the multi-crew pilot licence in the aeroplane category, the applicant shall have completed an approved training course. The training shall be competency-based and conducted in a multi-crew operational environment." (6) This is met in both regulations in a similar manner. The only difference is the required actual flight experience, which differs slightly due to discrepancies in private pilot licence criteria, which is used for the purpose of issuing of this licence.

# 5 Comparison of American and European pilot training syllabi

For the purpose of this project I compared flight training syllabus from two universities on both sides of the Atlantic with own flight training organisation. The first was the University of Žilina, Slovakia, the second Dowling College from New York. The European syllabus is an integrated ATP course, whereas the American syllabus is an approved course according to part 141, which is divided into PPL, IR, ME, and CPL due to differences in pilot training systems (nonexistence of integrated courses under FAA).

The first part of syllabus is private pilot licence course. Planned flight time till the first solo flight is similar at both schools, 11 respectively 12 hours. The most striking distinction between these courses is absence of night training in European syllabus, which is, on the other hand, set by differences in regulations stated in chapter 4.10. Night training is independent part of the European syllabus. The American PPL syllabus is 43 flight hours, whereas length of the European syllabus can't be determined due to integration in the integrated course (PPL ends in the middle of cross country flight experience building part of this syllabus). However, according to JAR-FCL 1, the minimum flight experience for PPL is 45 hours, which is comparable. As a conclusion, PPL syllabus differs very slightly and only in terms of differences in regulatory requirements.

The night flight training in European syllabus is divided into 2°40´ VFR night flight and 4°00´ MEP IFR cross country.

The American CPL syllabus contains 124°30´ of flight of which 45 are cross country, 3,5 night and 6 hours check rides. The multi-engine training consists of 20°30´ of which 8 are cross country and 2 hours is a single check ride. The last part is instrument training, which consists of 42°30´ of which 6 are cross country and 2 hours check rides.

On the other hand, the European syllabus as a whole includes 26°20´of multi engine flight plus multi crew cooperation training, which we will disregard as it is not part of the American syllabus. Of this ME flight time, 10 hours are cross country, which is comparable to the American ME syllabus. All of these are also instrument hours.

Total instrument time in European syllabus is 90 including 5 hours of basic instrument training. This is due to better utilisation of flight time in integrated course. Part of the cross country flying is

transformed into IFR cross country. Here we can see the biggest advantage of European integrated courses over American approved courses, which is much sooner beginning of instrument training.

To sum up the differences, the American syllabus has in total more flight hours (230), but this is in favour of more experience for the student pilots. On the other hand, European integrated ATP syllabus has the advantage of more instrument hours and the integration of multi crew cooperation training.

| | JAR-FCL 1 | FAR part 141 |
|---|---|---|
| PPL part | 45° | 43° |
| PIC in PPL part | 11° | 12° |
| Night | 6°40´ | 6°30´ |
| Instrument | 90° | 42°30´ |
| Multi-engine | 26°20´ | 20°30´ |
| Total flight hours | 201 | 230 |

**Table 5-1: Pilot training syllabus comparison**

# 6 Competence based pilot training

Competence based training is rather a new phenomenon in civil aviation pilot training. This method was incorporated into ICAO Annex 1 - Personnel Licensing, in the 10th edition of this regulation, in the form of multi-crew pilot licence (MPL) for the first time in 2006. ICAO Flight Crew Licensing and Training Panel (FCLTP) realized that the standards set by the Annex 1 in 1948 no longer kept up with new methods of training and new technology available in the field of advanced flight simulation devices. There is some perception that MPL was designed for the purpose of saving time and money spent in the conventional training courses, but "the FCLTP experts who tailored the programme during the 2002-06 period were unanimously motivated by a desire to improve the safety standards that govern the operation of modern multi-crew civil aircraft. The MPL initiative was not driven by economic factors, although most members of the FCLTP, now disbanded, foresaw that the operations-oriented training approach could also reduce the duration and cost of pilot training." (10)

## 6.1 Multi-crew pilot license

MPL substitutes conventional training courses for the role of second-in-command pilot in civil aviation. A graduate from this course can act as a co-pilot of an aeroplane required to be operated with a co-pilot. Unlike normal modular and integrated courses, the graduate can't perform duties of a pilot in single pilot operations except of PPL. Even after obtaining his airline transport pilot licence later in his career, there is a limitation for operations only in multi-crew environment that can be removed under certain conditions. The regulatory requirement set by ICAO Annex 1 in terms of total flight time is 240 hours minimum.

The most fundamental requirement for an MPL course to be approved by the appropriate authority is close partnership between the flight training organisation (FTO) providing the training and an airline that will employ the students after the completion of the course. The MPL normally consists of several stages. At first it is basic flight training on a single engine aircraft with a minimum of 10 solo hours. Afterwards a dual multi-engine training and several phases of instrument training in multi-pilot environment follows, where two trainees co-operate as a pilot flying and a pilot non-flying. All this is ended with a normal type rating training (40 hours of full flight simulator) with required landings on a real aircraft. The type rating is often provided by the airline or at least instructors from

the airline are involved. As the integrated ATP course doesn´t contain the type rating and the minimum requirement is 200 flight hours, the total flight time to become a co-pilot is essentially the same between the two ab-initio courses available. The difference is that in the MPL course a lot of flight hours, usually well above half, are flown on a flight simulation training device (FSTD). Most of these hours are full flight simulator (FFS) hours supplemented with some flight and navigation procedures trainer (FNPT) hours. Emphasis is laid on multi crew cooperation, threat and error management and standard operating procedures (SOPs). The main advantages of MPL are:

- The airline can pick best students to accommodate their needs.
- The airline business culture and SOPs are built in from the beginning.
- Safety and threat and error management culture is integrated in the course.
- The environmental impact is reduced in comparison to other courses.
- The procedural and interpersonal competences of the trainees are taught throughout the entire course.

You can see an example of the much steeper learning curve in comparison to integrated ATP course on Figure 6-1: Integrated ATP course learning curve and Figure 6-2: MPL course learning curve.

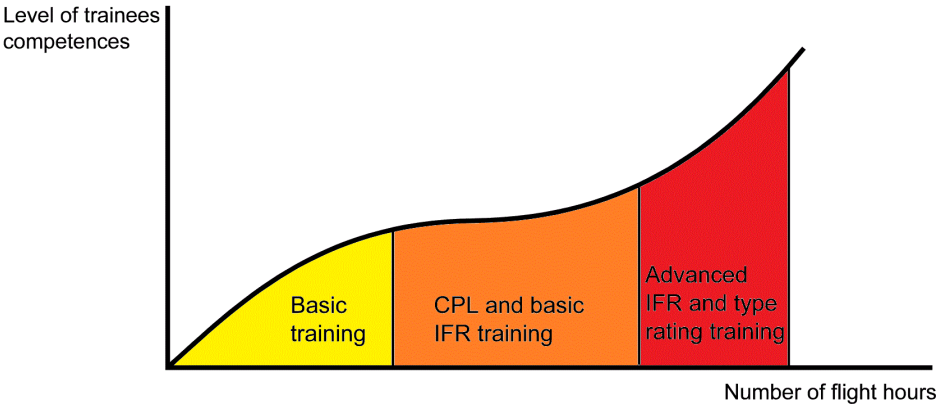
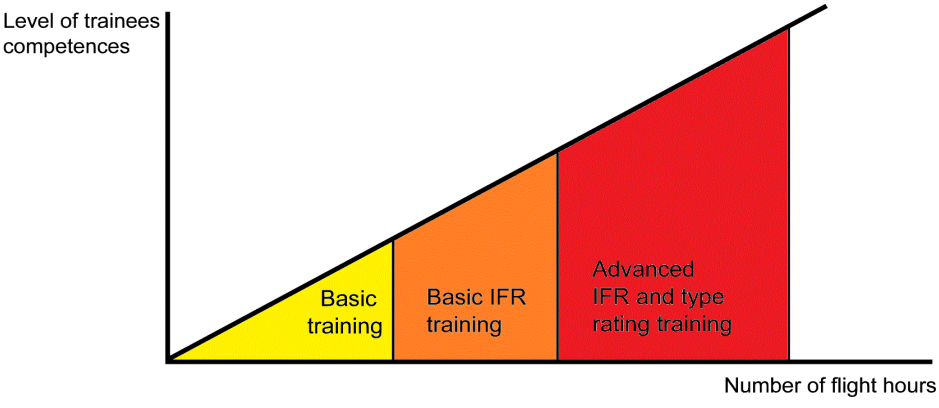



**Figure 6-1: Integrated ATP course learning curve**



### Figure 6-2: MPL course learning curve

As you can see from the figures above, the students in MPL start with multi-engine and multi-crew training much sooner in the training course. They sometimes even fly jet aircraft from almost the beginning of the instrument training. This puts more pressure on students to learn in a quickly manner.

## 6.2 MPL implementation in various regions

The situation around the world rather differs between states and continents. Generally, Asian and European countries have positive attitude to this new type of training. Some other countries such as Australia or Canada start to implement MPL courses into their national regulations and open first courses. The country that hesitates the most is the United States of America. Not only the long discussion leads nowhere so far, but what is more, there is a new initiative where The House of Representatives passed far-reaching legislation designed to boost the safety of the country's regional air carrier system as a response to a February 2009 crash near Buffalo. The bill, which passed the House 409 to 11, pushed the Federal Aviation Administration to ensure that all airline pilots obtain airline transport pilot certificates, which require 1,500 hours of flight time. (11) This was later on August 2nd 2010 signed and will come into force three years after this date. This can in the end lead to total impossibility to implement multi-crew pilot licence in the USA.

Generally much better situation is on the Asian continent, where they appreciate the possibility of more advanced training and recognize the positive impact on safety. What is more, Asian carriers usually tend to invest more into the quality of flight crew training, and thus into safety. Asian civil aviation authorities require from 325 to 355 hours minimum for approval of an MPL course. (12) This is far beyond the 240 hour requirement in the ICAO Annex 1. All this of course doesn’t apply to every country. In Europe, there are mainly large traditional carriers that like the idea of MPL, because it provides training more suited for their needs. These carriers appreciate the possibility to control the amount and quality of their new hired co-pilots up to three years in advance. Pre-selection is widely used in these companies. I can illustrate the effectiveness of this process on fig. 3, which is, such as the previous figures, an example from Lufthansa´s own MPL course. In Europe, the minimum of 240 hours is usually sufficient for the course to be approved.

## 6.3 Principles of competence based training

Competence based training is a training principle known for several decades. This technique moves away from a bottom-up, classroom approach. This entails teaching a candidate until they are deemed competent, rather than relying on prescriptive rules such as counting the number of hours trained. (13) Except MPL which is the first step towards competency based training in aviation, there are also tendencies to implement this method into other trainings, such as PPL, CPL and instrument trainings. "In partnership with industry and academia, the FAA/Industry Training Standards (FITS) program creates scenario-based, learner-focused training materials that encourage practical application of knowledge and skills. The goal is to help pilots of technically advanced aircraft." (14) These syllabi are scenario based and are not regulatory requirements. They rather give an alternative opportunity for more efficient and quality training and at the same time fully comply with current FAA regulations. Also on the European side there are similar efforts. Task number FCL.006 (a) in EASA Rulemaking Programme 2011-2014 states: "Extension of competency-based training to all licences and ratings and extension of TEM principle to all licences and ratings." (15) As we can see, there is a similar goal on both sides of the Atlantic, but the means of achieving this goal are considerably different.

So what exactly is competence based training? "Simply put, competency based training and assessment means that a person is trained and assessed to meet specified standards that define the skills, knowledge and behaviours required to safely and effectively 'do a job'." (16) This training must comply with specified standards and should reflect real world activities and situations encountered at the typical workplace. It is focused on the outcome of the training, not on the duration/extent of the training (number of hours flown).

The cornerstone of a competency based training and assessment system is objective assessment of the trainee. The teaching methods may vary between training organisations, but the final result must be that a trainee meets a consistent and appropriate standard. To ensure the quality of the assessment, the standards must be measurable, objective, valid, authentic, sufficient and current. This competency standard includes several stages, namely units, elements, performance criteria, range of variables and underpinning knowledge. This system is of pyramidal construction. A unit consists of a number of elements; an element consists of a number of performance criteria, etc. "A unit of competency represents a discrete job or function that is written as a measure of outcome." (16) As an example, Land Aeroplane is a Unit. "The unit is subdivided into the elements which detail the various functions that must be carried out to satisfy the Unit Description." (16) As an example, the elements of the Land an Aeroplane unit are: Land an aeroplane; Land an aeroplane in a

crosswind; and Perform a mishandled landing procedure. “Each element has a number of performance criteria. The performance criteria are evaluative statements that specify what is to be assessed and the required level of performance. The performance criteria applicable to the element ‘Land an aeroplane’ are for example: Identifies and selects aiming point; Selects power to idle prior to touchdown; Flares the aircraft at an appropriate height; Controls ballooning during flare and bouncing after touchdown by adjustment of attitude without the application of power;” (16) Range of variables sets concrete conditions which must be met during the evaluation, such as for example day time, class of aircraft and flight rules used. If these conditions aren’t met, the evaluation or assessment is invalid. The underpinning knowledge comprises specific knowledge, which should be thought by the instructor during lessons and which is specific for the particular unit of competency, such as interpreting windsock indications is underpinning knowledge for Land an aeroplane competency. “The assessment process must take into account task skills, management and contingency skills, role skills and transfer skills. For example, instead of just assessing a 30° banked turn against the specified standard, it may be more realistic to observe the candidate performing the manoeuvre during a precautionary search (a contingency) where the turn is used to position the aircraft to observe and assess the landing surface (a role).” (16)

The assessment occurs in several stages. At first it is a formal assessment, which monitors learning process during instruction. The instructor should do this assessment after almost every flight and the student should be aware of his progress in completion of the final standard. The second stage is a diagnostic assessment measuring the current trainee’s skills, such as the formative assessment, but it has a different purpose. It is used to set the proper strategy to get rid of the student´s learning difficulties and it requires a deeper insight by the instructor to do this job thoroughly. At last but not least, there is a summative assessment, which occurs at the end of the training and compares the trainee’s skills to the set competency standards and determines if the instructional objectives were achieved.

## 6.4 Effects on pilot training quality

Competence based training together with its most common incarnation, the MPL, contribute heavily to the aviation safety and quality of pilot training. This is the reason why not only MPL, but also competency based training as a means of pilot training delivery, should be a standard in 21$^{st}$ century pilot training all around the world. This training offers a great potential in terms of pilot training graduates skills and abilities resulting from usage of new, highly sophisticated flight simulation training devices and aircraft with complex systems and avionics.

# 7 Evidence based pilot training

Evidence based training is a new approach to training mainly aimed at type rating training and line training. “Evidence based training (EBT) means the process of introducing CBT principles into the additional type rating training. It stands for the shift from prescriptive training tasks to fleet- and operation-specific training tasks.“ (17) It uses collected flight data, accident data, training feedback and other available relevant data to regularly adapt training sessions for the current fleet- and operation-specific risks. This adaption is done through means of flight data monitoring analysis, air safety reports and instructor observations. “Presently recurrent training sessions follow a set of syllabi, in which the content is largely determined by the requirements pre-established in aviation regulations. The use of this relatively fixed syllabus offers few opportunities to include developments for a particular organisation or operation.“ (18)

## 7.1 ATQP

Evidence based training is represented by two similar initiatives on both sides of the Atlantic. At first, “the European Aviation Safety Agency (EASA) offers the Alternative Training and Qualification Programme (ATQP) as an alternative to the traditionally prescribed ‘one size fits all’ syllabus. Because EASA guidelines for ATQP are brief, the adoption of ATQP by airlines has been limited.“ (18)

ATQP as an approved training offers a possibility to establish training and qualification standards that are higher than the core requirements of EU-OPS and to choose priority areas which need more training in order to provide safety benefits. Training and testing under ATQP is based on training objectives rather than on specific tasks (manoeuvres and other items) and associated validity periods. “The ATQP, when fully developed and approved, will enable the operator to change both the structure and validity periods of the qualification requirements for flight crew and hence obtain specific operational benefits.” (19)

## 7.2 AQP

„The Advanced Qualification Program (AQP) is a voluntary alternative to the traditional regulatory requirements under CFR 14, Parts 121 and 135 for pilot training and checking." (20) This program provides a possibility to depart significantly from usual regulatory requirements in order to define new proficiency objectives for all phases of pilot training. These objectives are derived from a systematic analysis of training requirements. FAA can approve such deviation only in case of equivalent or better level of safety.

## 7.3 AQP and ATQP comparison

In the following few paragraphs, you can find similarities and differences of AQP and ATQP, which arose, although the target and goals of both programmes are essentially the same.

"(a) The Advanced Qualification Program (AQP) is a voluntary alternative to the traditional regulatory requirements under CFR 14, Parts 121 and 135 for pilot training and checking. Under the AQP the FAA is authorised to approve significant departures from traditional requirements, subject to justification of an equivalent or better level of safety. The programme entails an initial systematic analysis of training requirements from which explicit proficiency objectives for all facets of pilot training are derived. It seeks to integrate the training and evaluation of cognitive skills at each stage of a curriculum.

(b) In the AQP after initial qualification the follow-on training occurs within a scheduling interval called a continuing qualification cycle. Its initial duration is 26 months, but it may be subsequently extended by the FAA in three-month increments to a maximum of 39 months.

(c) The regulatory requirements of the two programmes differ in terms of structure; in particular the entry requirements of the ATQP are tightly controlled.

(d) The FAA AQP has been in development since 1990 and with regulatory support and development is being introduced within the regional carrier operators within the US.

(e) The ATQP has been developed to provide an alternative regulatory framework in the JAA code for flight crew training and qualification and thereby provide targeted training and enhanced safety." (19)

(f)"The quality of data collected is a significant component of AQP/ATQP. Regulatory agencies have established that, when requesting training interval extensions or training reductions from present

approved levels, the organization must support its request with statistically valid data that indicate crew performance warranting the extension. Additionally, the carrier must be able to continue to collect accurate data showing that performance does not degrade as a result of the extension." (21)

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