

MODEL OF MILITARY PILOT EDUCATION AND TRAINING FROM THE ASPECT OF NEW AIRCRAFT ACQUISITION

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Military pilot education, including flight training is a long, expensive and complex process. The main goal is to produce as many skilled professionals ready to perform flight tasks on the front-line aircraft and push them to the limits with complete control. To achieve this goal it is necessary to select and educate young people with aptitude and abilities to perform the most demanding military flight tasks. The creation of the model of military pilot education and training hardly depends on aircraft types, which are used in operational service in the front-line units. The acquisition of new aircraft imposes the change of the model of military pilot education. This paper describes the possible model of military pilot education from the aspect of the acquisition of the new aircraft in the Serbian Air Force.

Key Words: military pilot education, flight training, aircraft acquisition

Introduction

The education and training of military pilots is a very long, complex and expensive process. The entrance into this process is very unique regarding medical requirements, aptitude testing and flight screening. This is intended to determine whether a candidate has the necessary aptitude to become a military pilot in a reasonably short time. Young people with aptitude and abilities become the Military Academy cadets and they finish their master studies for five years, which include a theoretical part and the basic flight training on a piston and jet trainer or a helicopter. After that, graduate pilots are assigned to the front-line units. The small Air Force front-line units are usually conversion units, as well.

The main goal of pilot education and training process is to produce a combat-ready pilot during the optimal time and at an affordable cost. There are many factors that affect this process, but some of the most important ones are curriculum and training equipment

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(i.e. training aircraft or helicopter), which strongly corresponds to the front-line equipment characteristics. Acquisition of new aircraft in combat units also means remodeling the education and flight training system. It is not an easy process and it has to be carefully designed and tailored to the needs. The capabilities of new aircraft and their specific characteristics have to be recognized. The role and purpose of new equipment also have to be considered, as well as their operational environment. This paper discusses the current model of military pilot education and flight training, the acquisition of new aircraft and their impact on the future model of military pilot education and training.

Current Model of Military Pilot Education and Flight Training

The only high education institution in the Republic of Serbia, which has the study program in aviation with its graduate and master studies is the Military Academy. This study program called Military Aviation is specific in many ways. First of all, it correlates with the Bologna Process standards and it also meets the Air Force requirements. Due to this, the program is unique. The purpose of the program is the education of the Military Academy cadets (the military term for students) for the occupation of Aviation officers – aircraft pilots or helicopter pilots, as well as traffic engineers. Master studies in Military Aviation are performed during five academic years (with total number of 300 ECTS). A cadet gains a degree of Master of Military Aviation and in addition to a Diploma, a Diploma Supplement is also issued to cadets, which certifies the cadet's competences for professional Air Force pilot. The whole process is very demanding for cadets and their professors and instructors. The study is divided into two main parts. The first one, which lasts six semesters, is conducted in the Military Academy headquarters that is situated in Belgrade. The main goal of this phase is a theoretical preparation for the upcoming flight training in training squadrons. This phase is also considered as a preparation phase in terms of core activities (flying) during studying.

During this phase cadets do 37 courses. The first group of these courses is theoretical, methodological and scientific ones. The second group is professional and practical courses. The study of the second group of courses is performed during 3rd academic year (5th and 6th semester). It includes the courses such as General and Radio Navigation, Communications (Phraseology), Mechanics of Flying, Aerodynamics, Aircraft Construction, Meteorology, Aircraft Engines, Flight Instruments and Systems and Air Law. Due to the international standardization most of the listed courses are compatible with similar courses, which are a part of studies in other aviation universities around the world. Professional and practical courses comply with the standards recognized by the Civil Aviation Directorate (CAD) of the Republic of Serbia. It means revision of the national protocols and harmonization with the demands of the JAA Europe as a full-fledged member of the abovementioned aviation family encompassing 44 European countries. The CAD has agreed to bring the national aviation in compliance with European standards, thus making the Serbian aviation an integral part of the European and world aviation area.¹ The CAD has standardized many fields and the most important from the Military Academy standpoint is standardization of

¹ The Joint Aviation Requirements (JAR) are a series of accepted and comprehensive aviation rules created by the JAA, more specifically the Joint Aviation Authorities of the European countries. The new system of the European aviation rules (EASA – European Aviation Safety Agency).

requirements for airplane pilots - JAR FCL 1. It means that learning objectives of all professional and practical courses (except the flight training syllabus) have to be standardized, including course description.² The English language standards are also taken into account. The cadets have to speak English fluently. This does not only mean being able to speak and understand the standard phraseology. If an individual has to function in a team, the English proficiency needs to be high enough.³

The second phase is flight training at airplanes and helicopters and it is crucial for the cadet-pilots. It consists of basic and advanced flight training either at an airplane or a helicopter.

Basic flight training: A cadet, who passes aptitude testing and a theoretical part, begins the basic flight training. Students learn the basics of flying, aerobatics, VFR/IFR⁴ navigation, night and formation flying. This is done at a light piston aircraft. Successful cadets progress to other courses based on flying ability and military need.

The existing pilot training model in Serbian Air Force and Air Defense (SAF&AD) still includes the piston-engine Utva-75. This plane belongs to the older generation of piston-engine trainers and the new trainer Lasta will replace it by 2018. This airplane has a lot of limitations regarding aerobatic, night and IFR flying. It is the airplane equipped with an analog cockpit and its operational scope is flight screening with up to 15 flight hours.⁵

The basic jet training prepares cadets for the advanced jet training by teaching more advanced maneuvering and tactics on more powerful aircraft. The advanced jet training includes night flying, low - level navigation, as well as weapons and tactics training on a jet-driven aircraft. The training prepares them to move to the front-line combat jets, such as Orao or MiG-29. Cadets complete both phases on Super Galeb G-4, the advanced jet trainer, which has been used in the national Air Force since 1978. Since the first flight, not even a minor modification has been done on this plane.

The helicopter pilot training includes basic maneuvering, such as hovering to more advanced training such as night flying and high terrain flying. The helicopter pilot training is conducted on the Sa-341/342 Gazelle utility helicopter. The Gazelle helicopter, which was licensed and built in the former Yugoslavia, has not been exposed to any modifications during the life time, as well.

The existing flight training system is not up to date. It is expensive and not effective enough.⁶

New Aircraft Acquisition

The acquisition of new aircraft involves much more than buying the latest equipment or the most capable one. In an ongoing series of capability acquisition projects, the SAF&AD has been upgrading its fleet of ageing aircraft. The particular case described

² Vlačić S. Rađenkov, S. Knežević, A. Vlačić I. Use of the commercial software tools in the preparation phase of the military pilot education and training, ITRO 2014, Zrenjanin, 2014.

³ Pilot Training Compass: Back to the Future, European Cockpit Association, 2013.

⁴ VFR-Visual Flight Rules, IFR-Instrument Flight Rules.

⁵ In the absence of a suitable training plane, Utva-75 was used for up to 60 flight hours.

⁶ The very first IFR and night flights are performed on a jet plane, not on a cheaper piston - engine trainer.

here involves the upgrading to a new type of fighter, utility helicopter, transport helicopter and trainer. Such acquisition produces a lot of consequences in terms of the necessary personnel with specific skillsets. The individual and collective training and provision of facilities, logistics management, and ultimately the level of effectiveness achieved in the conduct of operations is also under influence. SAF&AD is committed to acquiring the new variant of MiG-29 fighter called 9-13, the utility helicopter H145M and the transport helicopter Mi-17V-5.

MiG-29 9-13 is a fighter aircraft capable of operating by day and night in most weather conditions. These fighters will supplement the existing MiG-29 9-12 fleet acquired during the 1980s. The country is expecting a shipment of six Russian MiG-29 fighter jets in the short term, as well as the arrival of Russian aviation experts to help upgrade and modernize the arriving jets along with those already in use.⁷

The 9-13 variant (NATO reporting name Fulcrum-C) features extra fuel and a new active jammer whereas the 9-13S provides compatibility with the active homing Vympel R-77 medium range missile with beyond - visual - range capability. The aircraft is fitted with a bulged and extended spine, which reportedly houses both fuel and avionics including multi-function displays. Internal fuel is increased by provision of a larger fuel tank.⁸

It is expected that the 9-13 variant has a modified flight control system and upgraded radar with enhanced ground attack capability and provision for an active jammer. Certainly, the 9-13 has redesigned wingtips, which appear to accommodate new RWR antennas. A staged program of modifications will allow the aircraft to carry up to 4000 kg of external stores. An in-flight-refueling probe and laser, TV and radar-guided air - to - surface missile will be added. None of the SAF&AD airplanes have the capability to use precision guided munition yet.⁹

The utility helicopter H145M is equipped with a modern digital glass cockpit, night vision goggle (NVG) compatibility and Airbus Helicopters' advanced Helionix® avionics suite with a 4-axis digital autopilot. The enhancements include an upgraded transmission system and incorporation of Airbus Helicopters' signature Fenestron® shrouded tail rotor for the improved anti-torque control. For armed operations, the rotorcraft carries a mission computer, two rigid multi-purpose armament pylons that are easily removable, an infrared/TV electro-optical system and a laser range-finder/designator/pointer. With its open system architecture, this innovative weapons system contributes to full situational awareness for the crew.¹⁰ Equipped with an incremental modular weapon system, the H145M can handle all types of operational light attack scenarios, from conventional to asymmetric conflicts. Ballistic and guided weapons compatible with the H145M include 7-tube and 12-tube rocket launchers, a 20mm cannon pod, 12.7mm machine - gun pod and air-to-ground missiles. The growth potential exists for laser-guided rockets.

Serbia has ordered nine Airbus Helicopters H145M (six for the SAF&AD), becoming the third nation to commit to the latest variant of the German-built medium-twin rotorcraft.¹¹

⁷ <https://www.rt.com/news/377184-serbia-russian-jets-delivery/> accessed May 22, 2017.

⁸ <http://sirviper.com/index.php?page=fighters/mig-29/mig-29s> accessed June 6, 2017.

⁹ The exception was J-22 Orao armed with TV guided missile AGM-65B Maverick.

¹⁰ http://www.airbushelicopters.com/website/en/ref/H145M_47.html accessed May 22, 2017.

¹¹ <https://www.flightglobal.com/news/articles/serbia-orders-nine-h145m-helicopters-432874/> accessed May 23, 2017.

Mi-17V-5 helicopters are intended to be used as military transport/utility aircraft with auxiliary roles in conducting search and rescue, medical evacuation and disaster relief missions. The helicopters have a night-vision goggle compatible analog cockpit, meteorological radar GPS/GLONASS navigation system, TDS-84 color display unit and cargo hook capable of carrying a 2000 liter Bambi Bucket fire-fighting system, which is already in Serbia's inventory. Due to the budgetary restrictions, however, only one SLG-300 300 kg cabin-mounted rescue hoist, one FPP-7M searchlight and one 12-stretcher medical kit was procured for both helicopters.

Currently, Serbian helicopters are logistically problematic, under-equipped and due for the imminent retirement - the Mi-8Ts in 2018 and the Mi-17 in 2019. Serbia strives to build a fleet of 12 Mi-17s by 2020, including two aircraft already delivered to Serbia and follow-on procurement of additional two aircraft that was officially confirmed in April.¹²

The important place in the acquisition process is the introduction of indigenously built **training aircraft Lasta**.

Contemporary airplane piston engines are, generally speaking, simple, air-cooled, horizontally opposed, four-stroke internal-combustion devices with low operating speed and low specific output. Trainers driven by the piston engine, such as Lasta, belong to the sort of the most economical trainers. Lasta is the trainer intended for flight training including basic flying, aerobatic flying, navigation flying, instrument flying, formation flying and night flying. It can also be deployed in homeland security, light close air support, patrol and light attack missions. Lasta has retracting landing gear and tandem seats. With its performance, Lasta can cover up to the 100 flight hours of syllabus. Lasta aircraft are fitted with Garmin G500 avionics suites, which include primary flight display (PFD) and a multi-function display (MFD). SAF&AD will introduce up to 14 aircraft into the service besides prototypes.

SAF&AD also bought one **Piper Seneca V** equipped with similar avionics suite as in Lasta. The aircraft underwent conversion to allow the installation of the Leica Geosystems ADS80 digital camera. The sensor will be used during aerial photography missions executed for the national Military Geography Institute. The other application of the Seneca V will include provision of civilian-standard multi-engine training capability for Serbian Air Force pilots plus the use for light transport and passenger transport duties.¹³

It is worth mentioning that every new aircraft has a semi or a full glass cockpit.

Acquisition Challenges

As it can be seen, SAF&AD has started the acquisition process of almost 30 new aircraft, either brand new types or new variants. It is a great challenge for the small Air Force such as SAF&AD.

The introduction of new aircraft into service will demand that pilots, load masters, aircraft handlers and maintenance personnel, who currently operate and maintain the existing aircraft, be trained to operate the new types. The new organizational structure has to be created simultaneously with the transition to the new type.

¹² <http://www.janes.com/article/61834/serbia-receives-first-two-mi-17v-5-helicopters-from-russia> accessed May 23, 2017.

¹³ <https://www.flightglobal.com/news/articles/picture-serbian-air-force-receives-multirole-seneca-367496/> accessed May 23, 2017.

There is a number of challenges in planning and managing the successful introduction of the new aircraft¹⁴ into service:

- acquisition of new aircraft;
- training of flying instructors;
- training of pilots;
- training of aircrew, which includes aircraft handlers and weapons technicians;
- preparation for new operational flying roles including both day and night, all weather and other specialist tasks;
- the need to conduct routine maintenance on the aircraft efficiently;
- the transition to the new organizational structure consistent with the new roles and
- the achievement of the defined levels of operational capability.

This military acquisition and introduction into service project involves the correlation between sets of complex problems. Each of the sub-systems such as aircraft hardware acquisition, pilot training, maintainer training and facilities upgrading and management, is complex. The sub-systems are related to each other in the context of both maintaining the current capability whilst upgrading to the higher levels of capability over a period of transition. The introduction of the major enhancement to the Air Force capability involves considerably more than acquiring new equipment. For example, the British Ministry of Defense has therefore adopted an approach known as the "Six Lines of Development" to ensure that all the elements required to deliver a given capability are put in place. Delivering defense capability involves more than just buying new equipment. The Six Lines of Development are:¹⁵

- Delivery of the equipment;
- Development of appropriate structures and infrastructure;
- Development of concepts and doctrine for how the equipment will be used;
- Delivery of the required training;
- Recruitment and retention of manpower and
- Supporting and sustaining the new capability once the equipment has been introduced to service.

This paperwork emphasizes the required training inside the Military Academy curriculum and flight training.

New Model of Military Pilot Education and Flight Training

As it can be seen, almost all categories of military aviation inside SAF&AD will see the change in the short term. Besides the abovementioned, this process imposes creation of the new model of military pilot education and flight training intended to optimize time in education and training, closing the gap between the skills of aircrew final training output and the skills

¹⁴ Mclucas A;Lyell D;Rose B, 2006, 'Defence Capability Management: Introduction Into Service of Multi-Role Helicopters', in *24th International Conference of the Systems Dynamic Society*, 24th International Conference of the Systems Dynamic Society, Nijmegen, The Netherlands, presented at 24th International Conference of the Systems Dynamic Society, Nijmegen, The Netherlands, 23 - 27 July 2006.

¹⁵ Building an Air Maneuver Capability: the Introduction of the Apache Helicopter, UK Commons Committee of Public Accounts; issued Nov. 18, 2003.

needed to use the front-line aircraft, and reducing the overall cost of flight training. The implementation of the new model can be complicated by the budget restrictions, even though many benefits of the improved model could be conducted in operational training.

Currently, there are no great discussions about the theoretical phase during first six semesters,¹⁶ but there is a risk that flight training takes too long due to the shortage of suitable training aircraft. There have been significant delays between the courses. The obsolete training equipment did not reduce the amount of training undertaken on the expensive front-line aircraft. Time spent on training significantly affects costs, in manpower and equipment. The time to train aircrew also affects the time available to fly during their career. Ageing analog training aircraft means that aircrews leave the training system less prepared to operate more complex, modern aircraft equipped with digital cockpits and aircraft management systems. This means they have to train on the front-line aircraft, which is costly.¹⁷

Flight training is expensive. Costs increase as aircrew progresses through the system and the cost per flying hour of the training aircraft also increases. Ageing training aircraft are unreliable and expensive to maintain.¹⁸ Reduction of failure later in the training system (where sunk costs are higher) could reduce unnecessary expenditure. Some other factors affect the time, cost and success of flight training. These include aircraft and instructor availability, runway conditions and available airspace.

The main aims for the new model are to:

- develop aptitude tests to help identify specific skills necessary for the future aircrew;
- optimize time in training;
- close the skills gap between aircrew finishing training and skills needed to use the front-line aircraft and
- reduce the overall cost of flight training.

The Air Medical Institute/SAF&AD made a great step forward with the implementation of the Vienna Test System. This is a computer-assisted application of a large number of highly diverse psychometric tests, which measure reaction times in a task that requires the choice among complex stimuli. This will improve aptitude tests ability to identify the skills necessary for fast-jet, helicopter and multi-engine pilots to make early and accurate decisions on streaming trainees.

The reduction of unproductive periods between the courses, increasing the number of available training aircraft and proficient instructors in a dedicated training airfield can optimize time in training.¹⁹

Closing the skills gap between aircrew finishing training and skills needed to use the front-line aircraft is a very demanding task. As it was mentioned before, analog cockpit training aircraft means less preparation to operate more complex modern aircraft with digital cockpits and aircraft management systems. In order to overcome this gap, there is a plan to use the glass cockpit trainer airplane (Lasta) from the very beginning. This is

¹⁶ The theoretical phase is regulated under the framework of the National Law on High Education and by EASA standards.

¹⁷ Military flying training, National Audit Office, June 2015.

¹⁸ All training aircraft in SAF&AD are older than 30 years on average.

¹⁹ Conducting the basic flight training in the airbase, which operates fighter jets, transport airplanes, utility helicopters and flight test unit is a great obstacle to safe and effective flight training.

one of the most obvious problems that must be solved in a new education and training model. A glass cockpit is an aircraft cockpit that features electronic (digital) instrument displays, typically large LCD screens rather than the traditional style of analog dials and gauges. Whereas a traditional cockpit is based on numerous mechanical gauges to display information, a glass cockpit uses several displays driven by flight management systems that can be adjusted to display flight information as needed. This simplifies an aircraft operation and allows pilots to focus only on the most pertinent information.²⁰

The change from conventional instruments to glass cockpit displays has created new challenges for interface and display design with implications for the way pilots monitor information in the cockpit. However, the differences between conventional and glass cockpit displays extend beyond appearance. Glass cockpit displays rely on computerized systems that integrate multiple data inputs and control. Glass cockpit displays can present more information in the space required for conventional instrument panels, but the increase in information places greater demands on pilot attention and creates a risk of overloading pilots with more information than they can effectively monitor and process. The complexity of the integrated computerized systems that drive glass cockpit displays may also limit pilots' understanding of the functionality of the underlying systems.²¹

Flying a glass cockpit aircraft requires a different cognitive style of thinking. As a result, conversion from a traditional aircraft with dozens of individual instruments to a glass cockpit with a few displays requires more than just learning where to look. The older pilots, who have flown thousands of hours in traditional cockpits, usually experience some difficulty transferring to a glass cockpit aircraft.²² Without familiarization training, a basic change of a radio or navigation frequency can cause confusion, distract the pilot and take longer than using a stand-alone radio in a traditional cockpit. While glass cockpits offer an abundance of useful features in fully integrated cockpit nowadays, learning how to use effectively these new tools while still maintaining control of the aircraft is something that will keep training squadron busy for years to come. There are numerous training options for pilots who are going to be converted to a glass cockpit and want to gain the numerous advantages of modern avionics. Many suppliers provide Internet-downloaded trainers free of charge, and there are free online interactive courses. Commercial DVDs and simulator training are extremely useful, as well. Therefore, it can be concluded that the increased use of simulated training combined with the use of more advanced, reliable and efficient training aircraft could reduce live flying and maintenance costs.

The use of the modern training aircraft Lasta could enable more training to be done on less expensive aircraft and free up the front-line aircraft and crews for use in operations. There is the potential to make more use of simulators in training. However, it must be clear that Lasta can cover up to 100 flight hours of syllabus including basic, aerobatics, navigation, IFR, night and formation flying. This syllabus can download the flight hours on a more expensive advanced jet aircraft.²³

²⁰ Decker, T.: "Improving Safety in Glass Cockpits", *Plane & Pilot*, July 6, 2010.

²¹ <http://blog.covingtonaircraft.com/2012/11/14/theglass-cockpit-advantage/> accessed June 2017.

²² Roscoe, A.H., *Workload in the glass cockpit*, *Flight Safety Digest*, 1-8. 1992.

²³ Estimated ratio in flight hour price between Lasta and G-4 is 1:10. Downloading only a few hours from G-4 syllabus means significant cost saving.

The developer of Lasta had not provided training devices and simulators, yet. The Military Academy staff has developed its own trainer only by use of COTS components including both software and hardware. The Military Academy staff has acquired Flight Simulator X. In order to simulate national airplanes (UTVA-75, Super Galeb G-4, Gazelle), which are not involved in FSX package, the specific add-ones have been created as a long-term process. This software package was installed on the high-end hardware configuration that was commercially available at the moment.²⁴

The introduction of Lasta trainer in a new flight training model supported by synthetic training devices could enable downloading of expensive flight hours on a more sophisticated jet trainer.

The next steps in the flight training of fixed-wing pilots are basic and advanced jet training on Super Galeb G-4. This type of airplane has not been the subject of any modernization during its service life. It has old - fashioned analog cockpit that is not compatible with MiG-29 9-13 cockpit. Forming the effective flight training model without modernization of G-4, which is the cornerstone of any modern model of flight training, will not be possible.²⁵ Only the use of modern or modernized training aircraft could free the front-line aircraft and crews for engagement in operations. Some part of the front-line training has to be moved to cheaper training aircraft for the advanced fast-jet training. The increased proportion of simulated training in this flight training phase will further reduces cost.

The fixed - wing flight training model presented in Figure 1 gives the quantitative, not qualitative picture.

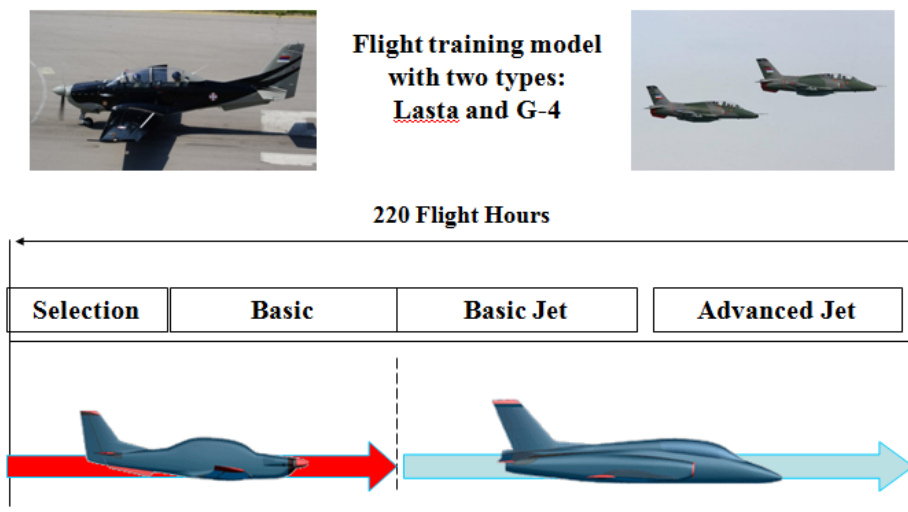


Figure 1 – Fixed - wing pilots training model

²⁴ Vlačić S. Knežević A. Milutinović M. Application of commercial available hardware in the making of flight trainer, ITRO 2015, Zrenjanin 2015.

²⁵ Idea of G-4 modernization has existed since 2004. Due to the budget restrictions the fate of G-4 modernization is uncertain.

There is a big difference in flight training model, which includes 220 flight hours on analog or a digital cockpit and with or without synthetic training devices (STD), which includes:

- Flight and Navigation Procedures Trainer (FNTP);
- Flight Training Device (FTD) and
- Full Flight Simulator (FFS).²⁶

Today, STD are usually supported by interactive computer based training (ICBT), which represents a cheap and affordable way of teaching.

An example of using trainers and simulators for flight simulation is presented in Figure 2, which shows the use of trainers and simulators in the case of MiG-29. This STD configuration can be applied on any aircraft in operational use. Cost savings by avoiding the STD in different phases of flight training is very dangerous, ineffective and counter-productive. Instead of closing the gaps between skills, it will deepen the gap between existing analog jet trainer and first - line fighter aircraft in the new variant.



Figure 2 – Use of trainers and simulators in the case of MiG-29

²⁶ More on FTD in Vlačić S., Training devices and flight simulators variants of application in pilots training on the aircraft Lasta, OTEH 2011 Proceedings, pp 144.

Helicopter flight training will be more sophisticated by introduction of H145M. There is no STD that supports the helicopter training. Training on a basic variant jet helicopter Sa-341/342 Gazelle before Gama²⁷ is possible and sustainable because there are no significant differences between two helicopters. The gap between Sa-341/342 and Mi-8/17 is far more serious. For many decades, young pilots were transferred in this way, but this conversion will be more effective by introducing FTD or FFS in the syllabus.²⁸ Flight training model of helicopter pilots is shown in Figure 3.

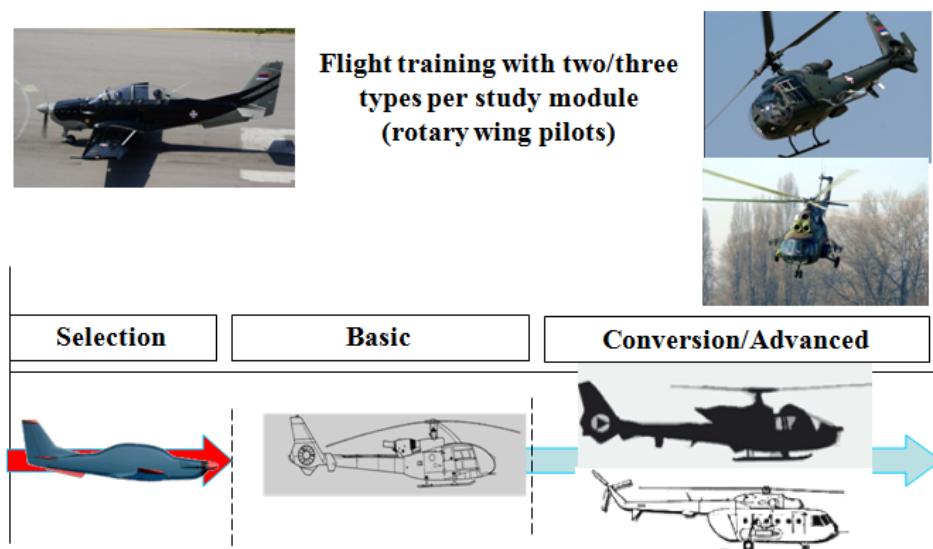


Figure 3 – Flight training model of helicopter pilots

Any conversion from Gazelle to H145M will be cost ineffective without providing the STD. The lack of experience in high-tech helicopter such as H145M limits consideration of its use in the Military Academy flight training model in the midterm period.

Conclusion

Serbian Air Force & Air Defense has recently started the acquisition process of almost 30 new aircraft, either brand new types or new variants. SAF&AD is committed to acquiring the new variant of MiG-29 fighter called 9-13, utility helicopter H145M and transport helicopter Mi-17V-5. It is a great challenge for the small Air Force such as SAF&AD. It means

²⁷ Gama is an anti-armour variant of basic Sa-341/342 Gazelle helicopter.

²⁸ First Mi-17 V-5 conversion course of Serbian helicopter pilots was supported by the use of leased FFS. The course has accomplished great success.

that almost all categories of military aviation inside SAF&AD will see the change in the short term. There is a number of challenges in planning and managing the successful introduction of the new aircraft into service. The introduction of new aircraft into service will demand that pilots, aircraft handlers and maintenance personnel, who currently operate and maintain the existing aircraft, be trained to operate the new types. The new organizational structure has to be created simultaneously with the transition to the new type. The introduction of aircraft of a new generation in the front - line units imposes a completely new approach to the education and flight training. The basic step forward has been done with the establishment of master academic studies in military aviation at Serbian Military Academy. This study program called Military Aviation is specific in many ways. First of all, it correlates with the Bologna Process standards and it also meets the Air Force requirements. Professional and practical courses comply with the standards recognized by the Civil Aviation Directorate (CAD) of the Republic of Serbia. The CAD has standardized many fields and the most important from the Military Academy standpoint is standardization of requirements for airplane pilots - JAR FCL 1. It means that learning objectives of all professional and practical courses (except the flight training syllabus) have to be standardized. The English language standards are also taken into account. Currently, there are no remarks about the theoretical phase during first six semesters.

The second phase of master studies in Military Aviation is flight training on airplanes and helicopters. It is crucial for the cadet-pilots. It consists of basic and advanced flight training either on an airplane or a helicopter. In order to support the whole process, the Air Medical Institute has implemented the Vienna Test System. This system has improved aptitude tests, which can identify the skills needed for fast-jet, helicopter and multi-engine pilots in order to make early and accurate decisions on streaming trainees. Having in mind that every new aircraft in the SAF&AD inventory has a semi or a full - glass cockpit, the training philosophy has to be changed. Preparation of the pilot to fly the glass cockpit front - line aircraft means the very first flights have to be done on a similar glass cockpit. This will be achieved by the introduction of the Lasta trainer. The developer of Lasta had not provided training devices and simulators, yet. The Military Academy staff has developed its own trainer only by use of COTS components including both software and hardware. The new model of education and training of military pilots must be supported by synthetic training devices to enable downloading of expensive flight hours on a more sophisticated jet trainer. To overcome the bridge between Lasta and MiG-29 9-13, the advanced jet trainer G-4 must be modernized to a glass cockpit standard with suitable training devices and simulators. Only the use of modern or modernized training aircraft could free up the front-line aircraft and crews for use in operations. This is the critical point in the new model of military pilot education and training. The increased proportion of simulated training in this flight training phase will reduce cost. The same approach has to be implemented in the helicopter pilot training model, especially having in mind capabilities of the new generation of the utility helicopter H145M.

The implementation of aptitude tests to identify the skills of the future pilots using suitable training aircraft (new or modernized) with the increased use of simulated training will optimize time in training and reduce the overall cost of flight training. The skills needed to use the front-line aircraft will emerge in a proper way in order to meet SAF&AD requirements.

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