

TOMISLAV GRADIŠAR, B.Eng.
Sarajevska 6a, Karlovac
SANJA STEINER, D.Sc.
STANISLAV PAVLIN, D.Sc.
Fakultet prometnih znanosti
Vukelićeva 4, Zagreb

Education in Traffic
Review
U. D. C. 656.71.001.85(497.5)
Accepted: Nov. 19, 1999
Approved: Feb. 15, 2000

CROATIAN AIRPORTS AS POTENTIAL EUROPEAN FLIGHT CREW TRAINING CENTRES

ABSTRACT

The paper deals with the possibilities of offering Croatian airports as potential flight crew training centres on the European market of services. With her available airport capacities, mainly those located on the Adriatic coast, Croatia has significant advantages compared to other countries of Western and Central Europe. The most important condition for establishing a specialised training centre for the European market is the harmonisation of the national aviation regulations i.e. the implementation of global and European standards of flight crew training, as well as conditions that have to be met by a specialised training centre from the aspect of the necessary infrastructure. The study has evaluated the potential airports of Rijeka, Pula and Lošinj, according to the basic criteria of their geo-traffic location, infrastructure resources (technical elements of runway, navigation equipment, airport services), availability of special equipment for flight crew training on the ground and in the air, as well as climate conditions.

KEY WORDS

flight crew training centres, Croatian airports, development of infrastructure, climate

1. INTRODUCTION

The interest of Croatia to join the JAA¹ lies not only in the political tendency towards European integration, but also in potential economic effects. Flight crew training at a specialised commercial institution made possible by the process of deregulation and liberalisation of air traffic, provides the countries with adequate infrastructure, suitable climate and low air traffic intensity with significant potentials. Apart from realising significant economic effects, the solving of legal issues, adequate development of infrastructure and adequate commercial approach, can also solve the problems of poor traffic at the existing airports in Croatia.

This paper makes a comparative analysis of the adequacy of three Croatian airports, Rijeka, Pula and Lošinj, for establishing flight crew training centre according to the ICAO² recommendations.

2. EUROPEAN SYSTEMS OF PILOT TRAINING

The most important regional administration-organisation mechanism is the European, Joint Aviation Authorities – JAA. It is a joined body of the European Civil Aviation Organization – ECAC which represents the civil aviation regulation in the European countries that have agreed to co-operate in development and implementation of joint standards and safety procedures. Agreements that refer to flight crew licensing are currently conceived as regulation Requirements for flight crew licensing (JAR-FCL³ and accompanying implementation procedures (JIP⁴).

The tendency of training pilots at a specialised institution stimulated by deregulation and liberalisation of air traffic has become global by introducing the joint standards of flight crew licensing. By the enactment of JAR-FCL, the licence valid in all the country members of JAA can be issued by any country member of that organisation. Under the pressure of reducing costs and increasing competitiveness, the aircraft companies give up employing potential pilots lacking flight experience and refuse to finance their training (the so-called *ab initio* flight training) and they exert pressure on the potential pilots to cover the costs of training themselves. Except in certain Asian countries, the flight crew today cover the training expenses themselves, at least to the professional pilot licence.

A great number of European pilots trained in the USA is primarily the result of lower training costs due to the state or local community support in subsidising investments in the infrastructure, free use of certain airports, tax relief for foreign students, and cheaper fuel. Such difference in prices results in great candidates' drain into the US flight schools. Since the JAR-FCL standards came into operation, the training of aircraft crews has been at least partly made impossible in the countries which are not members of JAA. This has reduced the competition in flight crew training only to the JAA country members.

3. TRAINING OF EUROPEAN PILOTS IN CROATIA

In the light of the existing trends, Croatia has a significant potential in fulfilling the huge European pilot training market. The comparative advantages of Croatia, in relation to other countries of western and central Europe are as follows:

- better weather conditions (fewer rainy days, fewer foggy days, shorter snowy periods);
- existence of adequate infrastructure (completely instrumentally equipped, paved airports) with poor traffic volume (Zadar, Osijek) or completely without traffic (Rijeka);
- smaller distance from overseas competitors (mainly USA);
- cheaper labour.

Using these advantages offers significant positive effects for the Croatian economy.

On the other hand, training of the European flight crew in Croatia would have a positive effect, both directly and indirectly, on the Croatian economy. Direct economic effects are in the possibility of charging the use of the airport and the possibility of charging the air traffic control services. In the interest of promoting the comparative advantages of Croatia and introducing Croatia into the world market of pilot training, it would prove useful to restrain from profit on the basis of charging direct services. The attempt to impose "heavy" charges on the direct service can be clearly seen in the training price, and it affects negatively the number of candidates, thus reducing the overall revenue.

On the other hand again, the indirect economic effects such as expansion of tourist offer, new jobs for the local inhabitants and foreign investments into the Croatian infrastructure exceed by far the direct revenue. It also needs to be mentioned that charges for services such as meals, accommodation and other needs of the students and the school staff are not transparent in the proposed price of training, thus allowing greater profits in this part of the service.

4. ANALYSIS OF THE POTENTIAL CROATIAN FLIGHT CREW TRAINING CENTRES

Potential training centres studied in this paper are the three airports: Rijeka, Pula and Lošinj. ICAO⁵ recommendations have been used in assessing the adequacy of every one of the airports for a training centre. The data on the existing infrastructure have been obtained from the available aeronautical publications⁶ and questionnaires filled in by the airport personnel, whereas meteorological data were supplied by

the Croatian meteorological institute exclusively for the purposes of this paper.

4.1. Rijeka Airport

Rijeka Airport is situated on the island of Krk, 27 km from the city of Rijeka. The visual training circle passes mainly above the sea with a single major elevation 1.2 NM south of the runway at 797 ft above the runway level. Within the wider area surrounding the airport there are the mountains Učka, Risnjak and Velika Kapela, which is considered to be unfavourable for a training airport, but previous experience has shown no increase in the risk factor. The airport is very well situated for instrumental flying, between the flight corridor N 742, R 45, B 95 and B 54 allowing short takeoff procedures (SID⁷) and fast inclusion of aircraft into the air path system. The radio-navigation equipment provides all the conditions for instrumental flying, except VOR-NDB approach which can be performed at the Pula airport nearby. Regarding the ground training facilities, the airport has a classroom equipped with a board, premises for flight preparation, pilots' briefing and debriefing, waiting room, and offices for the administrative staff. The accommodation for pilots and staff is available only at a distance of 4 km from the airport, whereas meals can be served in the airport personnel canteen.

The existing traffic at the Rijeka Airport is of very low intensity due to the lack of interest by the Croatian national carrier Croatia Airlines to maintain regular flights. It is generally considered that even in the future there is no economic justification to establish regular airlines to Rijeka Airport because Zagreb and Pula Airports are so near. Thus, the only traffic performed at the airport are the charter flights during summer season and general aviation. The predicted volume of traffic is insignificant, like the total share in the Croatian air traffic. Instead of the passenger number, better indicator for the traffic volume as a negative factor in the training process is the number of daily performed operations (takeoffs, landings, and touch-and-go). Over the period from June till September (summer season) 1998 it amounted to an average of 7.72 operations daily for aircraft up to 12 t, and 1.23 for aircraft over 12 t.

Investments needed for establishing a training centre at the Rijeka Airport include only the adaptation of the Airport landside. Primarily, a room should be provided for monitoring the airport flying, and a suitable part of the air traffic control tower would be ideal for that purpose. A bigger conference and video-projection room is necessary only for training of a great number of pilots at a time, whereas a classroom can meet the needs of a smaller group. There are no drink or sandwich machines that would be available 24

hours a day, but this is only a minor investment which may be very quickly solved should the need arise.

4.2. Pula Airport

Pula Airport is situated only 6 km north-east from the Pula city centre. The airside of Pula Airport satisfies completely the ICAO recommendations for establishing a training centre. Regarding training ground facilities, Pula Airport has adequate premises that are currently out of function, but could be very quickly adapted for the necessary activities. Thus, there is a conference and projection room in the airport building, with about ten seats, and a special classroom could be set up for the needs of a training centre. There is also a room for monitoring airport flying at the airport, with seven seats, telephone connections and connections with the tower. The flight planning room is not within the airport building but at the air traffic control centre which is also acceptable. The pilot briefing and debriefing room, the pilots waiting room and offices for the administrative staff and instructors have not been arranged yet, but there are such premises in the airport building and they could be easily arranged for the mentioned purposes. The accommodation for the pilots and school staff, as well as the adequate recreation facilities can be provided 5 km from the airport. The nearest hospital and laundry are only 4 km away. In the airport building there is one drinks machine and one sandwich machine, and the nearest restaurant is 1 km away.

Pula Airport, as well as the other two studied airports accommodate an exceptionally seasonal traffic with peaks during summer months. Although passenger traffic at the Pula Airport is somewhat greater than at the Rijeka or Lošinj airports, regarding the average number of daily performed operations of 15 takeoffs, landings or touch-and-goes, Pula Airport is ranked equally with Rijeka and Lošinj. The existing traffic volume at the Pula Airport, as well as the predicted one do not hinder the training process at this airport, especially if one considers its markedly seasonal character.

No major investments are necessary in order to establish a training centre at Pula Airport. It is primarily necessary to provide an adequate room for pilot briefing and debriefing, a waiting room for the pilots, and the offices for the school staff. Meals for the students and the school staff can be better organised by activating the existing canteen intended for the airport personnel.

4.3. Lošinj Airport

The Lošinj Airport, situated on the island of Lošinj, 6 km from Mali Lošinj, was built in 1984 as the

first airport on an island in the Adriatic. The visual training circle is mainly above the sea with one major elevation, the peak Osorščica 6 NM north from the runway at 1924 ft above the runway level. There are no mountains in the wider area surrounding the airport, except on the routes leading into the interior. For instrumental flying, the airport is excellently located, 4 NM from NDB⁸ LOS, which is the intersection of air routes B 4, M 3 and W 45 allowing short takeoff procedures (SID⁹) and fast integration of aircraft into the air paths system. The airport has a paved runway 900 m long and 30 m wide, thus satisfying the needs of piston-engined training aircraft. In 1999 the cracks in the carriageway structure were repaired, and the Ministry of Maritime Affairs, Transport and Communications promised to complete the documentation by the end of the year regarding expansion of the runway to 1200 m, thus enabling landings of bigger aircraft.¹⁰ Radio-navigation equipment does not fulfil the conditions for instrumental flying, and therefore overflight to Rijeka Airport (39 NM away) or Pula (28 NM) would be necessary. Regarding ground training facilities the airport has only rooms for flight planning, briefing and debriefing and waiting room for the pilots, as well as offices for administrative workers and instructors. The accommodation is available 12 km from the airport and the nearest restaurant is 7 km away.

The current traffic at the Lošinj Airport amounts to about 25 operations daily in high season. Regarding number of passengers, traffic is of low volume since the majority of operations refers to flights of general aviation, transit landings etc. The forecast volume of traffic is not significant, nor is the total share in the Croatian air traffic.

According to the ICAO¹¹ recommendations, the lack of instrumental procedures at the central airport is not a significant drawback since the use of a secondary airport is recommended for the IFR¹² procedures. A greater disadvantage is the lack of the equipment for night flying. In case the potential training centre was satisfied with an airport equipped only for visual day flying at the airside, no further investments would be necessary. At the airport landside, a classroom for theoretical instruction is missing, as well as a room for monitoring airport flying. Further drawback is that there is no canteen for the airport personnel, no restaurant, nor are there any drinks machines. Thus, the required investments would certainly include solving the problem of meals for the students and school staff.

4.4. Comparative analysis of single elements at the considered airports

The analysis which follows gives a list of requirements for establishing an aviation training centre, as

listed in the ICAO¹³ manual. If the airport fulfils a certain requirement the symbol used is (*), and if not then (-), whereas (?) stands for the lack of information.

4.4.1. Airport location

	Rijeka	Pula	Lošinj
absence of interference with airport traffic of another airport	*	*	*
small distance to instrumental air routes	*	*	*
distance to the nearest airport with ILS and VOR approach (NM)	35	35	39
absence of obstacles in the training circle area	*	*	*

4.4.2. Physical characteristics of the runway

	Rijeka	Pula	Lošinj
main paved runway	*	*	*
dimensions of the runway (optimal 1200 x 30/35)	2500 x 45	2950 x 45	900 x 30
wind lawn runway	-	-	-

4.4.3. Airport equipment

	Rijeka	Pula	Lošinj
minimum one instrumental approach	*	*	-
ILS approach	*	*	-
NDB approach	*	*	-
locator non-precise approach	*	*	-
VOR-DME approach	-	*	-
approach lights and runway lighting	*	*	-
approach lights	SALS 420 m	ALS 420 m	-
runway centre line lights	-	-	-
runway edge lights	*	*	-
taxiway lights	*	*	-
angle of approach indicator	VASIS	PAPI	-
air traffic control airport service	*	*	*
rescue and firefighting service (CAT)	III	VI	II
types of fuel	100LL JP-1	100LL JP-1	100LL JP-1

4.4.4. Accommodation and meals for students and staff

	Rijeka	Pula	Lošinj
distance from the airport to the nearest accommodation (hotel, motel, apartment, etc.)	4 km	5 km	12 km
distance from the airport to the nearest laundry	?	4 km	12 km
distance from the airport to the nearest recreation centre	?	5 km	10 km
distance from the airport to the nearest hospital	?	4 km	13 km
drinks machine in the airport building	–	*	–
sandwich machine (sandwiches, chocolate, etc.) in the airport building	–	*	–
canteen for airport personnel	*	–	–
restaurant in the airport building	–	–	–
distance from the airport to the nearest restaurant	4 km	1 km	7 km

4.4.5. Ground training facilities

	Rijeka	Pula	Lošinj
lecture room in the airport building	*	–	–
number of seats	?		
classroom equipment: – board	*		
– OHP	–		
– air-condition	–		
conference and video projection hall	–	*	–
number of seats		10	
hall equipment: – TV set with a wide screen or projector with a screen		–	
library with professional literature	–	–	–
premises for practical work	–	–	–
photocopy machine	*	*	–

4.4.6. Airborne training monitoring and preparation facilities

	Rijeka	Pula	Lošinj
room for airport flying monitoring	–	*	–
number of seats		7	
equipment in the room: – telephone connections		*	
– connection with the tower		*	
room for flight planning	*	*	*
equipment in the room:			
– access to aeronautical and meteorological data	*	*	*
– navigation preparation desk	*	*	*
– connection to the air traffic control	*	*	*
room for <i>briefing</i> and <i>debriefing</i> of pilots	*	–	*
waiting room for pilots	*	–	*
offices for administrative workers and instructors	*	–	*
synthetic flight training simulator	–	–	–

4.4.7. Climatic conditions

The suitability of a certain airport for establishing of the training centre is described by the data on the number of days with precipitation, fog, and strong wind throughout the year, and the wind directions chart (contingency).

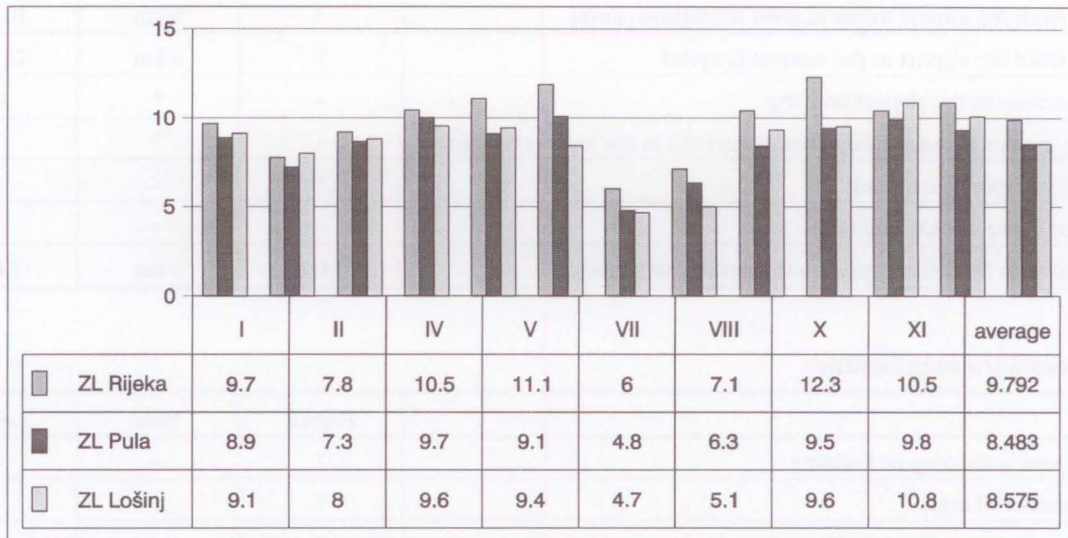


Figure 1 - Ten-year average of the monthly number of days with precipitation greater than or equal to 0.1 mm

Note: Due to incomplete data for certain months of the years 1991 and 1992, these years have been excluded and the average for the years 1985-1990 and 1992-1996 has been calculated.

Source: Database of the climatic meteorological sector of the National meteorological institute

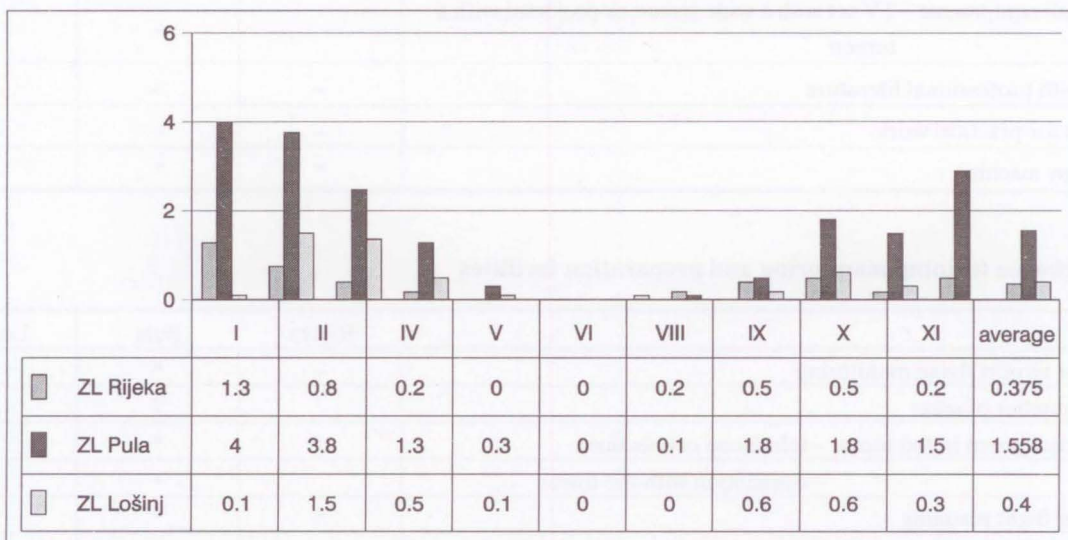


Figure 2 - Ten-year average of the monthly number of foggy days

Note: Due to incomplete data for certain months in the years 1991 and 1992, these years have been excluded and the average for the years 1985-1990 and 1992-1996 has been calculated.

Source: Database of the climatic meteorological sector of the National Meteorological Institute.

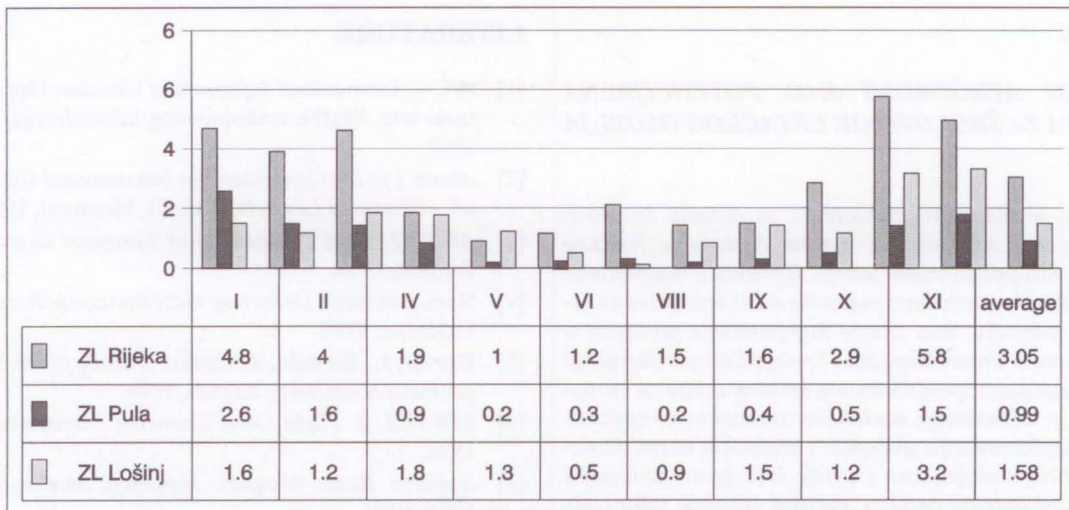


Figure 3 - Ten-year average of the monthly number of days with strong winds

Note: Due to incomplete data for certain months in the years 1991 and 1992, these years have been excluded and the average for the years 1985-1990 and 1992-1996 has been calculated.

Source: Database of the climatic meteorological sector of the National Meteorological Institute.

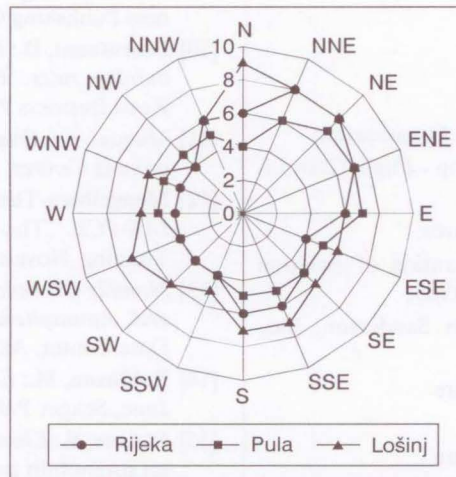


Figure 4 - The strongest recorded wind according to direction for the period between 1980-1996 at 2 p.m.

Source: Database of the climatic meteorological sector of the National Meteorological Institute.

5. CONCLUSION

In the light of current trends, Croatia has a significant potential in satisfying the huge European market for pilot training. The comparative advantages of Croatia with relation to the other states of the western and central Europe are better weather conditions, existence of adequate infrastructure, smaller distance from the overseas competitors and cheaper labour.

This paper analyses three Croatian airports as potential training centres: Rijeka, Pula and Lošinj. Using comparative analysis of certain infrastructure elements of the analysed airports, results in the conclu-

sion that all the three airports satisfy the conditions for establishing a training flight centre with minor reconstruction of the infrastructure. Regarding traffic, all the three airports have a very low and markedly seasonal traffic, and may be considered almost completely free for flight training. Here, Rijeka Airport stands out, whose main disadvantage is the relatively great number of days with strong winds outside the season. Since without major investments in infrastructure the Lošinj Airport is suitable only for visual training, certain advantage can be given to the Pula Airport.

SAŽETAK

HRVATSKI AERODROMI KAO POTENCIJALNA SREDIŠTA ZA ŠKOLOVANJE LETAČKOG OSOBLJA EUROPE

U radu se obrađuju pretpostavke za ponudu hrvatskih aerodroma kao potencijalnih središta školovanja letačkog osoblja na europskom tržištu usluga. Hrvatska s raspoloživim aerodromskim kapacitetima, poglavito onim lociranim na jadranskom priobalju, ima znatne komparativne prednosti u odnosu na ostale države Zapadne i Srednje Europe. Najvažniji preduvjet uspostave specijaliziranog training centra za europsko tržište je usklađivanje nacionalne zrakoplovne regulative odnosno implementacija globalnih i europskih normi školovanja letačkog osoblja, kao i uvjeta koje mora zadovoljiti specijalizirani training centar s motrišta potrebne infrastrukture. U radu su valorizirani potencijalni aerodromi Rijeka, Pula i Lošinj prema osnovnim kriterijima geoprometnog smještaja, infrastrukturnih resursa (tehnički elementi uzletno-slijetne staze, navigacijska oprema, aerodromske službe), raspoloživosti specijalne opreme za školovanje letačkog osoblja na zemlji i u zraku te klimatoloških uvjeta.

NOTES

1. JAA – Joint Aviation Authorities
2. ICAO – International Civil Aviation Organization
3. JAR-FCL – Joint Aviation Regulation – Flight Crew Licensing
4. JIP – Joint Implementation Procedures.
5. Manual on Establishment and operation of Aviation training Centres, ICAO, Montreal, 1983.
6. Jeppesen Route Manual, Jeppesen Sanderson, Inc., 1986, 1999.
7. SID – Standard Instrument Departure
8. NDB – Non-directional Beacon
9. SID – Standard Instrument Departure
10. *Lošinj Airport opened*, Zagreb Airport Magazine, No. 3., June 1999, Zagreb Airport, Zagreb, 1999.
11. Manual on Establishment and Operation of Aviation Training Centres, ICAO, Montreal, 1983.
12. IFR – instrumental flight rules
13. Manual on Establishment and operation of Aviation training Centres, ICAO, Montreal, 1983.

LITERATURE

- [1] *AIC – Aeronautical Information Circular*, Uprava kontrole leta, Služba zrakoplovnog informiranja, Zagreb, 1999.
- [2] *Annex 1 to the Convention on International Civil Aviation – Personnel Licencing*, ICAO, Montreal, 1998.
- [3] *APATSI report on capacity of European airports*. ACI Europe, 1996.
- [4] Baza podataka Državnog hidrometeorološkog zavoda Hrvatske, 1999.
- [5] **Horvat, L., Kaštela, S.**: *Osnove zračnog prava*. Fakultet prometnih znanosti, Zagreb, 1998.
- [6] *JAR-FCL 1, Flight Crew Licencing (Aeroplane)*, JAA, 1998.
- [7] *Jeppesen Route Manual*, Jeppesen Sanderson, Inc., 1986, 1999.
- [8] **Kempffer, C.**: *Third-party training offers important benefits to entities needing to focus on key activities*. ICAO Journal, ICAO, Montreal, 52, 5, 1997.
- [9] **Learmount, D.**: *Common currency: Europe's JAA is about to be replaced by a new European Aviation Safety Authority*. Flight International, 9-15 June, Reed Business Publishing Group, Sutton, 1999, p. 59-60.
- [10] **Learmount, D.**: *FAA performs a U-turn on non-US pilot training rules*. Flight International, 14-20 October, Reed Business Publishing Group, Sutton, 1998, p. 25.
- [11] *Manual on Establishment and operation of Aviation training Centres*, ICAO, Montreal, 1983.
- [12] **Mengelberg-Thissen, A.**: *The Way Forward with JAR-FCL*. The Journal of Professional Aviation Training, November / December 1998, pp. 10-13.
- [13] *Monthly Climatic Data for the World, National Oceanic and Atmospheric Administration*, National Climatic Data Center, Asheville, North Carolina, 1998.
- [14] **Robinson, M.**: *European Licence Harmony*. Flyer, 6, 8, June, Seager Publishing Ltd., Bath, 1996, p. 50-51.
- [15] **Stainer, S.**: *Elementi sigurnosti zračnog prometa*. Fakultet prometnih znanosti, Zagreb, 1998.
- [16] **Veselić-Bruvo, J., Pavlin, S.**: *Održivi razvoj zračnih luka Hrvatske*. 18th Conference on Traffic systems *Automatizacija u prometu (Automation in Traffic) '98.*, KOREMA, Stubičke toplice, Graz, Vienna, 25-28 Nov. 1998, Proceedings, pp. 235-238.
- [17] **Wells, A.T.**: *Airport Planning & Management*. McGraw-Hill, New York, 1996.