

UniKL-MIAT Gearing Towards Aviation Educational Excellent

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Abstract

Nowadays, the aviation industry has growing bigger. New aircraft such as A380, B787 and VLJ are introduced with the purpose of transporting passenger or cargo in a faster, bigger and more efficient way. This requires more specialized and experience personnel to operate and maintain this aircraft. On the other hand, the numbers of old-generation aircrafts have grown bigger and create a market to refurbish this aircraft to be in service again. Universities, colleagues and training institutes are the sources of producing engineers, technicians and mechanics to support this expanding industry. In Malaysia, the aerospace and aviation industries are mainly concentrated in the MRO segments with a turnover of RM1.4 billion in 2002 and continue to grow. To date UniKL-MIAT has successfully produced graduates supporting in this section of the industry. Only a few went to fulfill vacancies in non-aviation and non-aerospace sectors. Up until now the university's curriculum has evolved to ensure the graduates are well equipped with knowledge and experience in order to enter the industry. All of the graduates mainly went to MAS, Air Asia, CTRM, MHS etc. These are the result of our educational system that we have adopted, built and adjusted to the industries need and recognized by the DCA plus it is complied in accordance with the LAN requirements. UniKL-MIAT is continuing to improve their curriculum in order to support the development and success of aviation engineering industry. This paper is written to share the experience of UniKL-MIAT in order to support the aviation engineering educational system that is concentrating in its own specialized field and hopefully can be used as a benchmark to support and strengthen the engineering education in Malaysia

Keywords: Aviation, Aerospace, MRO, Malaysia, UniKL MIAT

Nomenclature

AN	Airworthiness Notices	LFC	Low Fare Carrier
ANO	Air Navigation Order	LWTR	License Without Type Rating
A&P	Airframe and Power plant	MARA	Majlis Amanah Rakyat
BCAR	British Civil Aviation Requirements	MAS	Malaysia Airline Systems
CAe	Canadian Aerospace	MCAR	Malaysian Civil Aviation Regulations
CTRM	Composite Technology and Research Malaysia	MD	McDonnell Douglas
DCA	Department of Civil Aviation	MIAT	Malaysian Institute of Aviation Technology
EASA	European Aviation Safety Agency	MiGHT	Malaysian Industry-Government Group for High Technology
EU	European Union	MHS	Malaysia Helicopter Services
FAA	Federal Aviation Administration	MLVK	Majlis Latihan Vokasional Kebangsaan
FAR	Federal Aviation Regulation	MNRI	Mara Northrop Rice Institute
GA	General Aviation	MoU	Memorandum of Understanding
ICAO	International Civil Aviation Organization	MRO	Maintenance & Repair Organization
IPTA	Institut Pengajian Tinggi Awam	NRUSA	Northrop Rice USA
IPTS	Institut Pengajian Tinggi Swasta	OJT	On Job Training
LAME	Licensed Aircraft Maintenance Engineer	PMA	Parts Manufacturing Approval
LAN	Lembaga Akreditasi Negara	SAS	Systematic Aviation Services
		SME	Subject Matter Expert

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TCS Total Component Support
 UniKL Universiti Kuala Lumpur
 VLJ Very Light Jet

1. Introduction

UniKL-MIAT was started back in 1998 in Institut Kemahiran MARA (IKM) Jasin, Melaka. Initially it was known as MARA-Northrop Rice Institute (MNRI) and had 50 students for the first intake. Initially the program in Jasin was aiming for certificate level and when MIAT has been established, the program has extended to a diploma level. The campus was then moved to a permanent location in Sepang which able accommodates better facilities. In 2003, MIAT was absorbed into Universiti Kuala Lumpur and the entity has changed to UniKL-MIAT.

In this institution, the classes are taught 40% in theory and 60% in practical. As an institution with a status of IPTS and also an aviation maintenance school, UniKL-MIAT needs to satisfy the national accreditations and at the same time, obligated to comply with DCA requirements. Failure to comply with any of these two parties will be resulted to unapproved institution from the authorities. Currently we managed to receive the LAN approval and now we are pursuing to attain the approval as an Approved Training Organization by DCA and also by EASA under Part 147. At present the campus is having 817 students with 100 students for each intake, intended for both certificate and diploma programs in each semester. The capacity of the campus can reach up to 1000 students and the number would increase in the future.

2. Aviation Governing Bodies

Aviation and aerospace industries are massive and to ensure the safety of its people, assets and economy it is well protected by a system. This system is a combination of regulations and recommendations set by the authority in order to ensure the safety and harmonization of this industry. Currently there are two major regulations that govern the industry internationally, which are the FARs set by the United States government and the EASA set by the European Unions participating members due to their influential factors. Although the contents of FAR, EASA or any other countries' regulations are relatively different but their foundations conform to the minimum standard prescribed by ICAO. That is why any aircraft originated from one country can fly and land to another country, as long as the law of the land is adhered and agreement between governments has been established.

In Malaysia, the regulations concerning civil aviation activities are mandated by the parliament of Malaysia and are known as MCAR. The power of governing the

regulations and controlling the airworthiness of the civil aviation activities together with aerospace industries has been delegated to the DCA by Ministry of Transport. Thus, all parties involved in the industry have to comply with the requirements set by the DCA. One of the examples is conforming to the issued AN. As the name implies, AN consists of information and notices concerning of all aviation activities such as airworthiness, procedures, certifications, responsibilities, MRO, training etc. It is actually adopted from BCAR as its basis and it also details the MCAR.

Pertaining to aviation training institution, the information is contained in AN 85 which describes in detail the requirements to be an approved training organization.[7] The privilege of having this recognition is that the time spent during the study in UniKL MIAT is counted for a reduction experience requirement to sit for LWTR examination. This examination would qualify the students to obtain the basic professional license. Initially, MIAT had been given the approval as an aviation maintenance training institution however, after the inception of MIAT under UniKL, it has to be re-applied.

3. Curriculum

As the aviation industry is evolving drastically, so does UniKL MIAT. Initially the modular system was adopted from the FAA system due to the fact that NRUSA (originated from US) was the technology provider. At that time the number of students and staffs was quite small and the facilities available were adequate to run the program. The intake was only 50 students per semester.

As the time progressing, MIAT took the action of increasing the number of students' intake to 100 per semester. This is due to the fact that the number of aviation manpower is highly demanded either locally or globally. Along with the availability of the new and permanent campus in Sepang, the total number of students was also getting bigger, thus the practiced modular system was no longer applicable. Reason wise was due to the lack of teaching staff as well as the shortage accessibility of the shops, equipment and also training aids for project utilization. The transition from modular to semester systems has been successfully practiced this year. Any feedbacks from the DCA and the industries are taken into consideration for future development and improvement.

In the early establishment of UniKL MIAT, the Certificate of Aircraft Maintenance Technology required 2 years to be completed. At the end of the program, students are capable of working in the aviation industry

with adequate training and experience for the entry level. Given that the program was approved by DCA, it is recognized by the industry and the time spent in UniKL-MIAT carries weight for experience requirement in the LWTR examination placement. The general program flow for certificate level is illustrated as in Figure 1:



Figure 1: The Certificate Program Flow

The initial program itself was a straight forward program where the syllabus was divided into three major groups - General, Airframe and Powerplant, taught in 4 semesters. Towards completing the program, the students were required to complete a total of 1342 contact hours for theory and practical skills. A Phase Test was conducted at the end of each module and a Final Test was conducted at the end of the program for each major groups of the syllabus.

After MIAT's inception into UniKL in 2003, the program has been upgraded to Diploma level. Hence, the course outline is adjusted in which the certificate program has been extended to another year where in the 3rd year, the students are divided into three specializing areas. Those related areas are Avionics, Composite and Manufacturing Technology as depicted in Figure 2. In addition, between the 2nd and the 3rd year, students are given the opportunity to go on a structured OJT in MRO industry for 6 months to collect work schedule in related organizations such as MAS, MHS etc. In fact, this is one of the important and early steps for the students to be qualified to sit for their LWTR examination. Besides, the OJT also helps exposing the students to an actual industrial operation which also adds value for their job placement in the future.

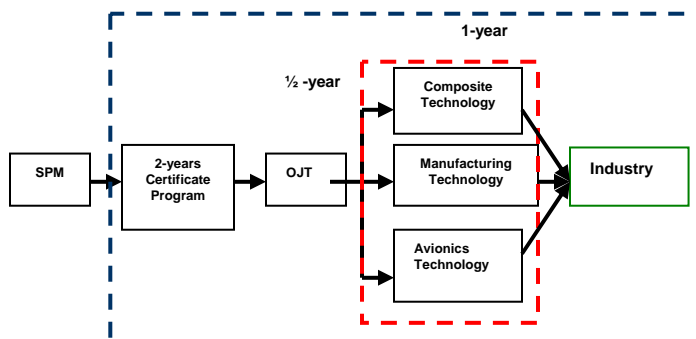


Figure 2: Diploma of Aircraft Maintenance Technology Flow

In the coming July 2006, the curriculum is going to be evolved again to suit the industry needs. Unlike the previous curriculum program, a student will be streamed

right from the first semester. This new Diploma of Engineering Technology is divided into three specialization areas which are Avionics Maintenance, Aeroplane Maintenance and Helicopter Maintenance. The syllabus used is by pursuing the JAR 66 requirements and the time duration to complete the program is reduced to 3 years. In addition to this, UniKL MIAT is also preparing for a degree program which will focus towards aviation engineering technology and aviation management in the near future.

4. On-Job-Training

To ensure the students' competitiveness and readiness to the industry, all of the students have to undergone 6 months structured OJT between semester 4 and semester 6. The students are sent to maintenance engineering facilities at MAS, MHS and other MRO organizations for educational and industrial exposure.

The structured OJT is established to comply with DCA requirements for the qualifications of the LWTR examination. This professional license examination requires the students to collect work schedule in a certain period of time before their application can be accepted for the assessment. [6] With the license in hand, the student unquestionably is competent in working on the maintenance of live aircraft. In other words, the six months OJT relatively assists in accomplishing the necessity of knowledge and practical aspects when they enter the real job operation environment.

5. Approval and Accreditation

One of the roles of an educational institution is to supply the students with knowledge and experience by having a recognized qualification before entering the job market. During this endeavor, all the required theory and practical skills have been sufficiently supplied to them, hoping that they will fully utilize them in their profession.

As a technical educational center, the MLVK is currently the reference standard to gain qualification in the technical field. However, these technical students lack in the academic qualification. On the other hand, students in an extensively academic institution are more exposed to theoretical environment rather than the hands-on approach. Therefore, it is the role of UniKL MIAT to close this gap by fulfilling the technical students with academic qualification.

As stated earlier, we have been accredited by LAN and now pursuing an approval from DCA. Having the

approval from DCA plus with the accreditation, UniKL MIAT will be recognized as an Approved Training Organization and also as a distinguished higher academic institution. It will benefit our students in the job placement since their accomplished skills both in theory and practical are acknowledged.

6. Student Job Prospect

Until now, UniKL MIAT students have been accepted in various companies within the aviation industry in

Malaysia. So far, a total of 375 students have been graduated from the university. As has been mentioned earlier, UniKL MIAT has upgraded the certificate program to a diploma level, but the demand for the certificate program is continued to be highly required. Thus, the certificate program is being offered again. Therefore, it is the intention of this paper to illustrate the job employment findings of previous students from both the certificate and diploma programs. The Figure 3 above exhibits the break up of the data for students from certificate program.

Student Batches	No. of Student/ Semester	MAS	Eagle/CTRM	MIAT-US	Transmile	Airod	Miat-Stf	AirAsia	MHS	GE	Aeroclear	Vendor	Deltaria	SAS	DCA/	Royal Brunei	ACM	PAW	ATSC	F/study	Others	
Jun-96	50	20	6	12		15			1							1						
Jun-97	49	20	7	1	2	1		1				3	1		1	1						9
Jun-98	42	26	3	2			2	1			2									1	3	
Jan-99	44	24	4	1		1	2	3	1				1				1	1	1	2	3	
Jan-00	48	27	5	4	1		1		5				1		1					1		
Jun-00	49	15					3	4	15											1	2	
Jan-01	40	27	2					2												6	3	
Jun-01	53	40			7		3	2		1	2			3							21	1
Total	375	19	27	20	0	17	1	13	22	4	4	3	3	3	2	2	1	1	1	32	21	

Figure 3: Break-up of Students' Job Findings

From the findings, there are 5 areas in which students have been employed and utilized, which are the MRO, manufacturing, MIAT development program, pursuing studies and others. A thorough break up is displayed in Figure 4.

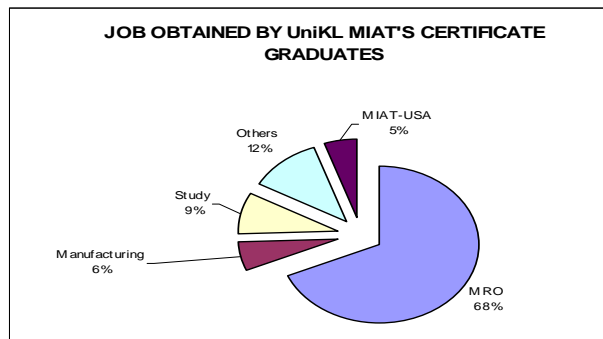


Figure 4: Job Obtained by UniKL MIAT's Certificate Graduates

The above pie chart depicts that 68% of the total graduated students went to MRO airlines such as MAS, Air Asia and Transmile. By joining the MRO, these students have a better opportunity to pursue their professional qualification as a Licensed Aircraft Maintenance Engineer (LAME).

Statistically, the MRO helicopter activities are getting more visible in Malaysia that it has attracted 7% of the group to join this sector. The demand is increasing every year. Establishment of Eurocopter Service Center in Subang and the future Agusta Westland facilities in Penang also contributes to support this progress.

The MRO contracts are also emerging well in supporting this sector of the industry which 4% of the students went to this area. The concerned companies may or may not have any aircraft but they support the industry by providing maintenance services such as contract workers, specialized repair shops etc. The

future in this sector is also promising as more and more aircraft are projected to be owned and operated in Malaysia.

Again as the Figure 4 illustrates, the second largest group of the students opted to further their studies. In 2001, a group of 20 ex-students from MNRI were selected to pursue a degree in Aviation Maintenance Technology at Rice University, Los Angeles, USA. In 2003 they finished the program and were offered place as instructors in UniKL-MIAT. Currently, another batch of future instructors is also being selected to pursue their LWTR in one of the Australia's training institute. Any UniKL MIAT graduates are welcomed to join the program and this is part of the university's continuous development program for future employees.

The remainder of the graduated students were working on their own or becoming a part of UniKL MIAT technical staff. Some of them even had their own business or work for non-aviation companies.

To date, 47 UniKL MIAT students have graduated with the Diploma in Aviation Technology in Composite, Avionics and Manufacturing. Most of them successfully secured a job in the industry as illustrated in Figure 5.

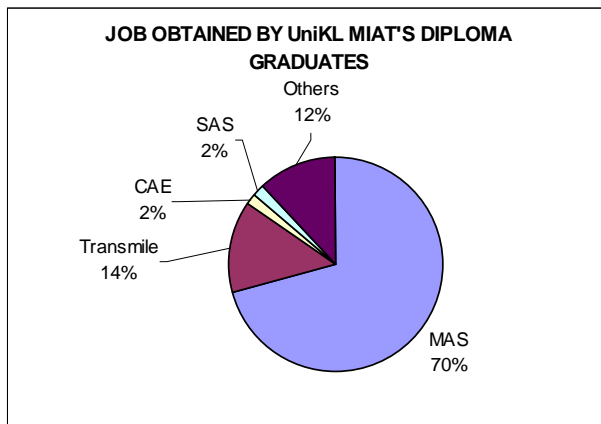
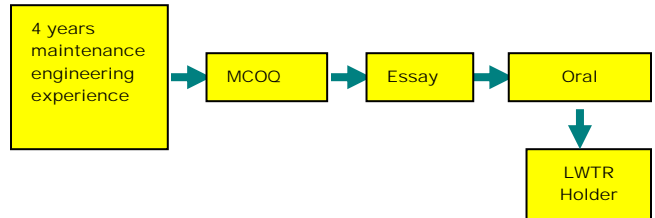


Figure 5: Job Obtained by UniKL MIAT's Diploma Graduates

About 86% of the graduates were found to be accepted in the MRO industries in such organizations as MAS, Transmile and SAS. One student went to CAE in which the company involves in manufacturing the simulator system for aircraft's pilot. The other 12% went on pursuing studies, pilot training and etc.

By observing figure 4 and 5, it can be concluded that the total percentage of graduated students that are being employed is more than 85%. The rest of the percentage makes their own move by continuing studies, venturing in non-aviation industry and etc.

In achieving the professional qualification, 5 students from the first batch of the certificate program were successfully passed their LWTR examination in 2003 and now pursuing their type rating license. Many of the ex-students are still progressing in taking the LWTR examinations. Presently, 20 students from the first batch of the diploma students are yet to sit the LWTR examination in September and a few more groups will pursue it later. The common process flow for the LWTR placement is shown in Figure 6.



* The current details of the process for the LWTR placement is discussed in AN 5 [7]

Figure 6: LWTR Placement

7. Industry needs

According to MiGHT report, a total number of 20,000 specialist, engineers, technicians and mechanics are needed in the aviation industry by the year 2010.[8] This indicates that the industry needs about 4000 of them each year and most of the vacancies are in the MRO sectors. In the process of meeting the demand, a group of 92 students will be graduated from UniKL MIAT this year under the diploma program. Although the number is relatively small as compared to the need of industry, UniKL MIAT has placed a plan to increase the number of graduates each year.

There are a few factors that cause the shortage of labor in the industry. Scarce of the manpower is mainly due to the retirement or near-retirement of existing workforce. New airline company establishments together with the increasing number of aircraft fleet as well as expatriates in other countries do reflect to the shortage. The arrival of the Airbus A380 and A320 for MAS and AirAsia also have created more job opportunities and thus increasing the demand.

In addition, the number of civilian registered helicopters is increasing especially from the Police Air Wings, Bomba Air Wings, Hornbill Skyways and others. The commitment of Eurocopter Malaysia and Agusta Westland to set up their regional maintenance and services in Malaysia has also played a role to this positive trend.

In conjunction with this, the flying academies also contribute to the growth. This year has seen that Langkawi Flying Academy and Integrated Logistic Services set up their base operation in Langkawi and Ipoh, respectively which again open the aviation job prospects widely. Plus, at present the public has interest in aviation sport activities and it is getting more popular. Paramotor, paragliding and experimental aircraft activities are continuing to grow.

Hopefully, this escalating scenario will increase the aviation turnaround revenue from RM 1.4 billion in 2002 to a higher echelon in the future.[9]

8. Industry Collaboration

In order to provide adequate knowledge and expertise for its graduates, UniKL MIAT has made collaboration amongst the industry in order to support the industry. Several MoUs have been signed between the university and the industry companies such as MAS, Police Air Wing, Bomba and Grouptech. The inking of these MoUs has opened new opportunities between UniKL MIAT and the industries to mutually support each other.

As for the MRO industry, two MoUs have been signed, that are with MAS and Grouptech. Their 'live' aircraft and facilities would benefit the university's students during their OJT. In return, the industries can send their trainees to UniKL MIAT for academic courses, short courses, seminar or even utilize the available engineering facilities. In the future, UniKL MIAT is hoping that the MoUs between the universities and foreign partners can be materialized thus benefit our students to work globally.

To date there have been groups of recruits from the industry sent to UniKL MIAT for the academic education and short course programs. Mainly they are from Police Air Wings, Bomba Air Wings, MHS etc. Figure 7 illustrates the statistics of their employees joining courses in UniKL MIAT.

9. Future Obstacles and Globalization

As the new millennium impending, a lot of changes and advancement occur in the aviation and aerospace industry. As the air traffic increases in volume, faster and bigger airplanes are needed in the industry. From the Asian Airlines & Aerospace magazine, it is reported that 35,000 of various types of airplane will be delivered to customers in the next 20 years time, world widely. [2] This will give a higher demand for aircraft maintenance program.

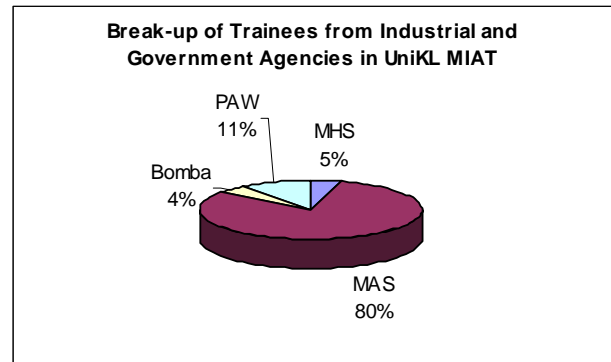
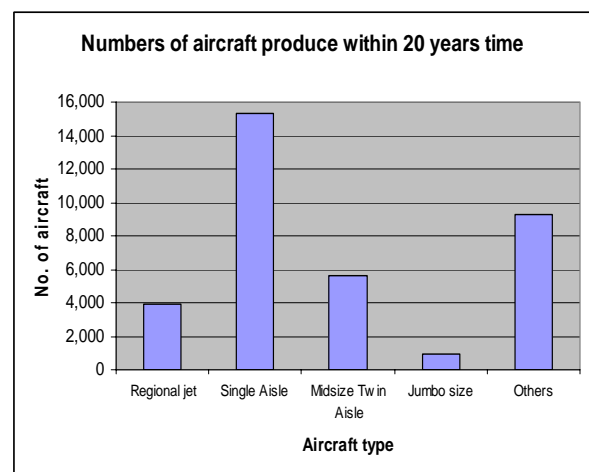


Figure 7: Break-up of Trainees from Industrial and Government Agencies in UniKL MIAT



Courtesy of Asian Airlines & Aerospace

Figure 8: Numbers of Aircraft Produced within 20 years Time.

A number of aircraft nearing its retirement age also develops this trend. Aircraft fleet such as DC-10, 727, A318 etc is no longer in the production but a lot of them are still flying and need to be maintained. In Malaysia for example, the launching of the MRO hub in Subang recently has provided the market for this old-aircraft to be converted from passenger-plane to freighter-plane.[11] The old generation aircraft such as Boeing B737 and B747 are involved. Therefore, as this industry expanding, more manpower is needed to support it.

Other than the market for the existed-production aircraft and the ended-production aircraft, a newly developed aircraft are also entering the market. These new aircraft bring in the latest technology that the maintenance sector has to cope with. Composites and nano technologies, fly by wire and Gen-x engine are a few innovations that will challenge the MRO sectors and its man power. Referring to Table 1, currently 256 Boeing B787 and 159 Airbus A380 are being ordered. [3]&[4] In Malaysia, MAS has acquired six Airbus

A380 which will be delivered in 2006. Due to its gigantic size, the total number of man power needed to maintain this new aircraft is critical. Along with the novel technology that comes with it A380 requires a large group of people to handle it. New apprentices and job vacancies will be opened in order to support this new and unique aircraft.

By the same token, the VLJ are coming into the market especially in North America and Europe. VLJ is a light weight aircraft with weight less than 5300 kg, installed with twin jet engine and having six seats including the pilot. It is also known as ‘air taxi service’ where it travels faster and further distance as compared to twin engine propeller aircraft.[5] Throughout the continent, a few companies have ventured into this industry such as Eclipse 500, Honda jet, Piaggio and in Malaysia, the Aero Nimbus.

Since many of the VLJs are still in the development stages, a closer study needs to be done to support this aircraft once it is available in the market. Currently the demands and orders have been placed although some of the aircraft are still in the design stage or just completed a few hours of flight test. Table 1 shows the statistics of the current order requisition of the aircraft under development.

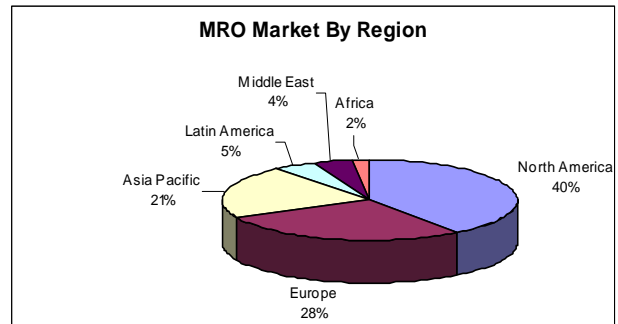
Table 1: Aircraft Order Status

Manufacturer	Product	Current Order
Airbus	A 380	159
Boeing	B787	256
VLJ (other players are Honda Jet, Aero Nimbus etc.)	Eclipse 500 Citation Mustang	239 220

10. The MRO Industry

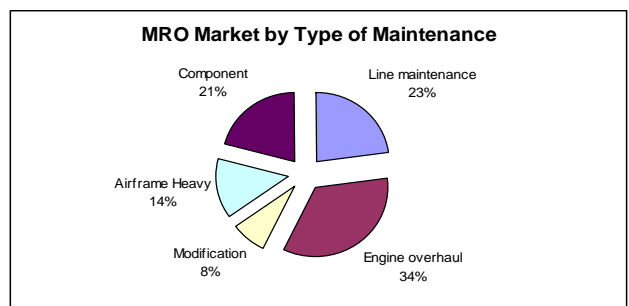
The establishment of aviation training school in UniKL does not overlap with other local universities which offer aerospace engineering degree. UniKL MIAT establishment is mainly focusing on the MRO industry. This sector is the biggest player for aviation business in Malaysia as compared to commercial and military aviation.

The same scenario grows throughout the world. As illustrated in Figure 9, in Asia Pacific region, the MRO market is valued at \$7.7 billion or 21% of the total world market. [8] Asia and Africa are reported to have the most significant increase in the growth as newer aircraft will be coming and older aircraft are going to be refurbished.



Courtesy of Aircraft Technology Engineering & Maintenance
Figure 9: MRO market by region

One of the reasons of this MRO expansion is due to the establishment of more low cost airlines such as AirAsia, Tiger Airways, ValuJet etc. The LFC are currently booming in the Asia Pacific region and China as well as India which are the largest nations in Asia, have not yet ventured into it properly. Figure 10 below depicts the segregation of the MRO activities universally.[10]



Courtesy of Aircraft Technology Engineering & Maintenance
Figure 10: MRO Market by the Type of Maintenance

Signing MoU between the MRO and PMA organizations to service their aircraft parts domestically is also another trend. The agreement will save MRO’s cost and time since the parts can be repaired locally. Recently in Malaysia, Airod had signed MoU with AAR Corporation from America to overhaul the aircraft landing gear. [1]

Other than that, the recent announcement to develop Malaysian International Aerospace Center in Subang airport as an aviation hub will tremendously change the shape of aviation industry in the future. It is hoped that more industries will take this as an advantage to set up aviation facilities and create more employment in this specialized sector.

Globalization also guides this industry to open their market and contracted out their MRO activities to a potential service provider. Examples are:

- Parker Aerospace and SIA Engineering have established joint venture to maintain and

overhaul the hydraulic and mechanical MRO activities in Singapore

- Lufthansa Technik had MoU with Spirit Airline for a total of 15 years for TCS done.[10]

In other words, this scenario of globalization has resulted to wide employment opportunities in MRO either locally or globally.

Those are the examples and key factors that will ensure a continuing growth in the MRO sector. In Malaysia, the major players in this sector are MAS, Airod and MHS, to name a few. They have been in the market for quite some time and the need of entry level employees with competency in knowledge and experience is highly required in order to succeed in this business. Competent employees would bring in profitable revenue to the organization especially when the aircraft are hardly on the ground due to its effective maintenance serviceability.

11. Conclusion

Lastly, UniKL MIAT is fulfilling its responsibility to be the Center for Aviation Training Excellent. To date, the students are highly recognized by the industry and the employment is relatively demanded. In order to be the best training and educational provider, several key elements have been considered to develop and improve the current situations, such as:

- market demand
- offset opportunities
- OJT and industrial attachment for staffs
- Research and Design
- Technopreneur
- hiring SME

As a conclusion, UniKL MIAT has successfully 'airborne' their graduates distinctly into the industry as has been discussed above. The factors such as recognition from aviation as well as higher education authorities, adaptability of curriculum development in relation to the industrial needs, structured OJT and also understanding the opportunities behind the projected market trend have made UniKL MIAT as an entity which supports this strategic industry.

Besides, UniKL MIAT is unique in its role to lead the aviation and aerospace industry in Malaysia. The vision is to enhance the aviation business, engineering and education to an international span. Hence, more skillful, qualified and competent personals are needed to support the industry. Yet, UniKL MIAT is accomplishing its goal and will continue to succeed in it.

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