

MP-IDSA

Issue Brief

Reforms in Indian Aviation/Drone Technician Certification Policy

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S*ummary*

Indian aeronautics industry amid ambitious goals of becoming global drone hub by 2030 and atmanirbhar (self-reliant) in aviation manufacturing by 2047 faces challenges due to unfavourable regulatory policies and paucity of skilled aviation technicians. These challenges increase the manpower cost and make Indian aviation and drone manufacturing and maintenance, repair and overhaul (MRO) industry uncompetitive. Therefore, reforms in Indian regulations on certification of aviation technicians and mainstreaming of aviation technicians of defence forces in civil aviation are essential.

Introduction

India has set the goals of becoming ‘Atmanirbhar’ (self-reliant) in critical and emerging technologies, a global drone hub by 2030 and a developed nation by 2047. The self-reliance in civil aeronautics and drone manufacturing, and maintenance, repair and overhaul (MRO) is a natural progression for which its industry needs a large number of qualified aviation technicians and enabling policies on certification of aviation technicians to become competitive.

This Brief deliberates on the necessity to reform India’s policy on certification of aviation technicians and create a mechanism for utilisation of technicians of defence forces to fill skilling and human resource gaps, and enhance competitiveness of its civil aeronautics and drone manufacturing and MRO industry.

The certification of aviation technicians is dealt by Federal Aviation Administration (FAA) in the United States of America (USA), European Aviation Safety Agency (EASA) in Europe and Directorate General of Civil Aviation (DGCA) in India.

There are two aspects of certification of aviation technicians. The first relates to licensing of Aircraft Maintenance Engineers (AME) that are responsible for certifying aircraft for airworthiness under Civil Aviation Requirement (CAR) 66 Subpart-A (A.15) in India and under Part-147 rules in the USA. The second relates to certification of technicians involved in manufacturing, and Maintenance, Repair and Overhaul (MRO) of aviation components, and is covered under CAR-66 Subpart-C (A.205) in India and Part-145 rules in the USA and EASA.

In India, the CAR 145 deals with the approval of Maintenance Organisation,¹ CAR 147 deals with the approval of the Basic Maintenance Training Organisation² and CAR-66 deals with licensing of AME and aviation technicians.³

The CAR-66 is the focus area of this paper and it has three subparts with Subpart A dealing with AME license for aeroplane and helicopters, Subpart-B with aircraft other than aeroplane and helicopters, and Subpart-C with components.⁴ The CAR-66 aims to harmonise requirements of AMEs of India with international requirements. It is applicable to all the personnel and organisations engagement in maintenance and/or certification of aircraft registered in India. It establishes the requirement for the issue, extension, validity and use of the license.⁵

¹ [“Civil Aviation Requirements \(CAR 145\), Approval of Maintenance Organisation”](#), Director General of Civil Aviation (DGCA), 14 June 2017.

² [“Civil Aviation Requirements \(CAR 147\), Approved Basic Maintenance Training Organisation”](#), Issue 1, Revision 0, Directorate General of Civil Aviation, 27 December 2017.

³ [“Civil Aviation Requirements \(CAR-66\), Licensing of Aircraft Maintenance Engineers”](#), Issue II, R4, Directorate General of Civil Aviation, 5 February 2019.

⁴ Ibid., p. 7.

⁵ Ibid.

Indian defence forces, Defence Research and Development Organisation (DRDO) laboratories, Council for Scientific and Industrial Research-National Aerospace Laboratory (CSIR NAL), Hindustan Aeronautics Laboratory (HAL) and few other entities employ aviation technicians to undertake manufacturing, MRO of aircraft and components. Their experience can be utilised for civil aviation component manufacturing and maintenance entities with suitable policy provisions.

However, there are certain differences between regulatory provisions on certification of AMEs under CAR-66 Subpart-A (A.15) of India versus certification of Aircraft Maintenance Technicians under CAR-147 of the USA as well as between CAR-66 Subpart-C (A.205) and CAR-145 of the USA and EASA that place Indian aviation industry at a disadvantage vis-à-vis their global counterparts.

Certification of Aviation Technicians for Airworthiness Certification

The technicians or engineers certifying aircraft for airworthiness for flying are called AMEs in India and Aviation Maintenance Technicians (AMTs) in the USA. The AMEs and AMTs are involved in operational safety of products and articles, and in operating registered aircraft safely and efficiently. In the USA, the FAA Part 147 deals with certification of AMTs through Aviation Maintenance Technician Schools (AMTS).⁶

The FAA certifies AMTs through written (three), oral and practical tests. The AMTs can obtain rating certificates in Airframe (A), Power plant (P) and both (“A&P”). They work at Maintenance and Repair Organisations (MRO), airlines or in commercial, corporate or General Aviation (GA).⁷ The AMT certification can be obtained by direct training or by graduating from an FAA approved AMTS⁸ or by completing the Joint Services Aviation Maintenance Technician Certification Council (JSAMTCC) course. The eligibility and experience requirements for ATM certification include:

1. Minimum 18 years of age
2. Able to read, write, speak and understand English language
3. 18 months of practical experience, and
4. 30 months’ practical experience concurrently performing the duties appropriate to both the airframe and power plant ratings.⁹

⁶ [“Code of Federal Regulations, Title 14, Chapter-1, Sub-Chapter-H”](#), National Archives.

⁷ [“Become An Aviation Mechanic”](#), Federal Aviation Administration (FAA).

⁸ Ibid.

⁹ Ibid.

The aviation mechanic should be familiar with Title 14 of the Code of Federal Regulations (14 CFR) Part 65, subpart D. Mechanics.¹⁰ The AMT Test Questions are based on the following:

- AMT General Handbook
- AMT Airframe Handbook (two volumes)
- AMT Powerplant Handbook (two volumes)¹¹

Aviation Mechanic General, Airframe and Power plant Airman ‘Certification Standards’ are laid down as appropriate to the rating sought (implemented after 31 July 2023). The written tests are followed by oral and practical tests by a Designated Mechanic Examiner (DME).¹² The Aviation Mechanic General, Airframe and Powerplant ‘Practical Standards’ are laid down in the FAA-S-8081-26B.¹³ The details on guidelines, references, standards, test centres for the mechanic testing are placed on the FAA website.¹⁴

The FAA certified Airframe and/or Power plant mechanics requires ‘Academic Training’ and ‘On Job Training (OJT)’. Academic Training can be obtained through an AMTS certified by FAA in accordance with the 14 CFR Part 147. The AMTS are also known as 147 Schools in the USA. An AMTS may offer Airframe, Power plant and Avionics courses, which also cover electronics and instrumentation.¹⁵

The eligibility requirements to join the AMT course at AMTS are as follows:

1. High School diploma, which its equivalent to 10+2 or class 12 exams in India or equivalent General Educational Development (GED) Exam (10+2) conducted by the U.S. State Educational Departments.
2. Ability to read, write and understand English
3. Estimated duration of AMT course is 18 to 24 months.¹⁶

The OJT provides practical experience and OJT can be done through military service or civilian aviation maintenance entities. The OJT activities need to be documented in log book comprising maintenance task performed, time spent on each task and

¹⁰ [“Code of Federation Regulations, Title 14, Part 65, Subpart D”](#).

¹¹ [“Become An Aviation Mechanic”](#), n. 7.

¹² Ibid.

¹³ [“Aviation Mechanic General, Airframe, and Powerplant Practical Test Standards”](#), FAA-S-8081-26B, Flight Standards, Service, U.S., Department of Transportation, Federal Aviation Administration, 1 November 2021.

¹⁴ [“Mechanic Testing”](#), Federal Aviation Administration, United States Department of Transportation.

¹⁵ [“Experience Requirements to Become an Aircraft Mechanic”](#), FAA.

¹⁶ Ibid.

validation by a certified Airframe and/ or Power plant technician. As regards OJT (Military), a letter from the Executive Officer, Maintenance officer or Classification Officer of the military Service can be submitted as the proof of OJT experience with the following information:

1. Length of military service;
2. Amount of time worked on each Military Occupational Speciality (MOS), Navy Enlisted Code (NEC) or Air Force Specialty Code (AFSC). The MOS, NEC or AFSC depict specific technical activity on an aircraft or aero-engine;
3. Make and model of aircraft and/ or engine on which practical experience was acquired; and
4. Location where experience was gained.

The OJT in civil needs to be supervised by a mechanic who holds an Airframe and/or Power plant certificate and a documentary evidence of OJT may be submitted.¹⁷ After the completion of the OJT, the candidate can pass the airman knowledge written, oral and practical tests.

The US Department of Defense (DoD) in collaboration with the FAA, established the JSAMTCC which steers conduct of civil aviation training courses to military personnel through a partnership with the Community College of the Air Force (CCAF). The JSAMTCC also evaluates aviation related specialties for all US Military Branches of Service (BOS).¹⁸ The FAA Order 8900.1.Flight Standards Information Management System (FSIMS) Volume 5, Chapter 5, Section 2, Figure 5-135 MOS Codes provide guidance for the aviation mechanic certification and their rating.

The MOS codes have been defined for the U.S. Army, Air Force, Navy, Marine Corps and Coast Guard enlisted personnel. The codes provide credits to military aviation maintenance experience towards meeting the requirements of the FAA Airframe and Powerplant Mechanic Certificate requirements. The MOS codes are used for providing credits to enlisted people for their aviation maintenance (Airframe and Propulsion) work done during their service in the U.S. Army, US Marine Corps and Coast Guard. The MOS for the U.S. Air Force and the U.S. Navy are called AFSC and NEC respectively. These codes depict aviation maintenance (Airframe and Propulsion) work done on different aircraft and systems by their enlisted personnel during their service.¹⁹

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ “[FAA Order 8900.1](#)”, Flight Standards Information Management System (FSIMS), Volume 5, Chapter 5, Section 2, Figure 5-135 Military Occupational Speciality Codes.

In India, the eligibility criteria for the applicant of the AME as per DGCA CAR 66 Subpart-A (Para A.15), are as follows:

1. Must have passed 10+2 examination in Physics, Chemistry and Mathematics from a recognised board or university or its equivalent.
2. Shall be at least 18 years of age.

The basic knowledge and experience requirements are laid down in CAR-66 Para A.25 and A.30 respectively. Also, different modules have been formulated and examinations for these modules need to be passed by AME to qualify for certification and details of these are given in Appendix A to the CAR.

Certification of Aviation Technicians for Components Manufacturing & MRO

There are differences in regulatory provisions of USA, EASA and India. The certification of technicians who certify aviation components or maintenance are covered under FAA Part145.157 in the USA, EASA Part 145 on Component Certifying Staff Qualification Criteria in Europe and CAR-66 Subpart-C (A.205) Certification of Staff Employed for Maintenance and Certification of Components/Aircraft Maintenance in India.

FAA Part-145 Subpart-D, para 145.157 lays down the process of certification of persons authorised to approve an article for return to service under the repair station certificate and operations specifications under part 65 (as mechanic or repairman).

1. **Mechanic.** The US Code of Federal Regulations under Title 14 Chapter-1 Subchapter-D Part 65 defines the eligibility requirements of a Mechanic and Repairman. Both need to be at least 18 years of age and should have the ability to understand, read, write and speak English. A few of the specific requirements for the certification of a Mechanic are as follows:
 - a) Passed all tests within a period of 24 months (65.71)
 - b) Issued ratings under Airframe and Powerplant categories (65.73)²⁰
2. **Repairman.** The specific requirements for becoming a repairman include:²¹
 - a) Qualified for maintenance on aircraft or components.
 - b) Employed by certified commercial operator or air carrier to provide airworthiness maintenance according to maintenance manual.

²⁰ [“Code of Federal Regulations, Title 14, Chapter-I, Subchapter D part 65”](#), National Archives.

²¹ Ibid.

- c) Certificate by the employer that he was able to satisfactorily maintain aircraft or components and is recommended for certification.²²
- d) At least 18 months practical experience or completed formal training.

The Mechanic/ Repairman should be familiar with applicable regulations and proficient in inspection methods, techniques, tools, etc., for the work being performed and approved for return to service.

The EASA user guide titled “Foreign Part-145” related to approvals for components, engines and APU certifying staff has been issued vide UG.CAO.00126-004. It is meant for the use by the Approved Maintenance Organisations (AMO) and assigned inspector when defining the component certifying staff qualification and for assessing component certifying staff authorisation. The criteria for components certifying staff qualification is as follows:²³

1. Minimum school level education or certificate of apprenticeship.
2. **Basic Training Requirements.** The basic training requirements as per para 1.3.1.2. are:
 - a) An aeronautical school diploma or certificate or;
 - b) A technical school diploma or certificate, or;
 - c) *An aeronautical military school diploma or certificate.*²⁴
3. **Aeronautical experience requirements.** The para 1.3.1.3 of Part-145 stipulates experience requirements of Component Certifying Staff (CC/S):
 - a) Two years’ Aeronautical maintenance experience including 12 months of practical experience in the specific component maintenance workshop or area.
 - b) Three years’ experience in maintaining complex components such as engine/APU and Landing gears including two years of practical experience in the specific component maintenance workshop or area.

The above rules of EASA mandate that the technician certifying the aviation components needs to possess a Diploma certificate and trade experience. However, there is no need for part 66 license or passing of module examinations and time-duration of Diploma is also not mentioned.

²² [“Subpart E-Repairman, 65.101 Eligibility Requirements: General”](#), Code of Federal Regulations.

²³ [“Foreign Part1 145 Approvals- Components, engines and APU Certifying Staff, UG.CAO.00126-004”](#), European Aviation Safety Agency, 11 November 2022.

²⁴ Ibid.

The DGCA CAR-66 subpart-C (Para A.205) lays down the minimum requirements in respect of knowledge, training, experience, examination and procedure for issue of authorisation by CAR -145/CAR M Subpart-F approved organisations to certify staff employed for maintenance and certification of components/aircraft maintenance according to manufacturer maintenance data. The Candidate for grant of authorisation to carry out and certify overhaul, major repairs of aircraft, power plants, components and accessories thereof, shall meet the following requirements:

1. Minimum 21 years of age.
2. Passed 10+2 with Physics, Chemistry and Mathematics or equivalent examination.
3. CAR 66 licence or three-year basic AME training course or Diploma or Degree in Engineering.
4. Passed relevant modules of CAR 66 knowledge examination approved by the DGCA or eligible for grant of suitable credit for particular module.
5. CAR 66 Aircraft Engineers License holders need one year experience in overhaul, modifications and major repairs including three months recent experience.
6. Diploma holders need two years' experience in overhaul, modifications and major repairs including six months recent experience.²⁵

Challenges of Certification of Aviation Technicians in India

The regulations and policies create opportunities as well as pose challenges. The challenges faced by Indian industry due to unfavourable policies on certification of AMEs and aviation technicians are deliberated next. The comparison of the US and Indian regulations concerning certification of AMEs/AMTs indicates the following challenges for the Indian companies:

Lack of Enabling Provisions for Civil Certification of Defence Aviation Technicians

India has a large number of skilled technicians working in defence and public sector entities that include Defence Research and Development Organisation (DRDO), Hindustan Aeronautics Limited (HAL), other DPSUs, Central Scientific and Industrial Research (CSIR) Laboratories, Coast Guard and Defence Forces. This skilled workforce is under-utilised due to lack of provisions in the regulations (CAR-66) to harness their technical potential for certification of airworthiness of civil aircraft as well as for manufacturing, maintenance, repair and overhaul of components. The

²⁵ [“Civil Aviation Requirements \(CAR-66\), Licensing of Aircraft Maintenance Engineers”](#), n. 3.

defence aviation technicians can fill the skilled manpower gaps in the Indian civil aviation MRO and manufacturing industry. Also, there are certain gaps due to differences in training of technicians of Indian defence forces vis-à-vis training required for civil aviation. The policy and training gaps in India can be better understood by FAA policy on the subject, which is deliberated next.

Skilling Gaps

The US Defence Forces in collaboration with FAA established JSAMTCC to overcome skilling gaps and shortage of aviation technicians in the USA and the role of JSAMTCC is defined in the FAA Part-147. The JSAMTCC has representation of the U.S. Air Force, Army, Marine Corps, US Navy and the Coast Guard. It aims to bridge the gap between training provided to aviation technicians by the US defence forces and the civil aviation training.²⁶ They resorted to modification of training curriculum of defence force technicians as well as started training courses/modules in partnership with the Community College of the Air Force (CCAF). The JSAMTCC also evaluates aviation related specialties for all US Military Branches of Service (BOS).

The FAA has established a formal mechanism to recognise the OJT and experience gained by aviation technicians in the defence forces for their certification for civil aviation. The codes have been created for doing work on each aircraft and type of work performed in Air Force, Army, Navy, Marine Corps, etc., which are defined as MOD, NEC and AFSC codes. The FAA Part 147 has a provision that enables defence services to issue certificate with details such as time spent on carrying out work on each aircraft, type of work and period of service, which is taken into consideration while issuing civil aviation technician certificate. However, aviation technical manpower of defence forces and other entities is under-utilised in India due to lack of enabling provisions in the CAR-66 Subpart-A issued by DGCA.

Certification Gaps

The comparison amongst regulations of India, the USA and Europe on certification of defence technicians for civil aviation indicates the following gaps in India:

- a) Non-availability of regulatory/policy mechanism for optimum utilisation of aviation technicians of defence forces and other entities for civil aviation industry.
- b) Absence of institutional mechanism to identify and bridge the gaps in the training of aviation technicians of defence forces and other entities and the civil aviation technicians.
- c) Absence of regulatory/policy provisions for accreditation of defence aviation technicians’ academic and technical training, OJT and experience of working on defence aircraft for civil aviation certification.

²⁶ **“Joint Service Aviation Maintenance Technician Certification Council”**.

Online Availability of Study Material

The US (FAA Part 147) has well-defined standards and published study material in the form of handbooks for certification of technicians. This helps applicants and leaves little room for ambiguity or subjectivity in the scope of exams. India (DGCA) can explore publishing of standard handbooks for aviation technician certification examination.

Challenges of Certification of Component Technicians in India

The challenges of certification of aviation technicians that certify aviation components in India are deliberated below:

Mandatory PCM Requirements

It is mandatory to have Physics, Chemistry and Mathematics (PCM) in the 10+2 while applying for certification of aviation technician in India; this is not a mandatory requirement in the USA and Europe, which places the Indian industry at a disadvantage.

Module Knowledge Examinations

The CAR-66 Subpart-C, Para 66.A.205 (c) mandates that applicants must pass relevant portion of modules of knowledge exams for the purpose of Maintenance Organisation Exposition (MOE). There is no such requirement of module knowledge exams for aviation technicians employed in certification of components and aviation maintenance as per the FAA and EASA regulations.²⁷

Age Criteria

The minimum age requirement of 21 years for certification of technicians certifying aviation components in India (CAR-66 subpart-A para A.15) is higher as compared to the 18 years required for certification of aviation technicians in the USA (FAA 145). The lower age requirement helps them employ technicians at a lesser age and thus provides an edge to aviation components manufacturing and MRO companies in the USA.

Diploma/ Degree in Engineering

The CAR-66 Subpart-C para A.205 in India mandates a three-year diploma or degree in Engineering while EASA accepts Aeronautical/Technical Diploma or Certificate, or Military Schools Diploma or Certificate. Also, engineering and science are not mandatory. The FAA does not require technical/ aeronautical/engineering degrees or diploma or certificate from a recognised institute for certification of aviation

²⁷ [“Civil Aviation Requirements \(CAR-66\), Licensing of Aircraft Maintenance Engineers”](#), n. 3.

technicians. The FAA even accepts certificate of work and recommendation by an aviation employer for issuing aviation technician certificate.

Table 1: Policy Comparison Technicians Certification: India, USA and Europe

Certification of Technicians Certifying Aviation Components				
S No	Requirements	DGCA (India)	EASA (Europe)	FAA (USA)
1	Regulation/ Policy Reference	CAR-66/ A.205	EASA:Foreign Part-145, UG.CAO.00 126-003	FAA Part-145.157
2	Age (Years)	21	N/A	18
3	Minimum Educational Qualification 1. School Level (10+2) with Physics (P) Chemistry (C) & Maths/ Mechanic (M)/ Repairman (R) or Certificate of Apprenticeship (COA)	10+2/ PCM	10+2/ COA	No / M/R (To be able to read, write & understand English)
	2. AME License (AME)/ Three Year Diploma (TD) or Degree in Engineering (DE) or Aeronautical Diploma or Certificate (ADC)/ Technical Diploma or Certificate (TDC) or Military School Diploma/ Certificate (MSD/MSD)	Yes (AME/ TD/ DE)	Yes (ADC/ TDC/ MDS/MSD)	No
	Passed relevant Module Knowledge Examination by Regulator (EASA/ FAA/DGCA)	Yes	No	No
4	Training/ Work Experience gained in Approved Maintenance Organisation / Certified Repair Station to be counted as qualification for the certification of aviation technician	No	No	Yes
5	Experience Aviation Maintenance (AM)/ Component Maintenance Workshop (CM) Experience/ Major Overhaul Experience (ME) / Recent Experience (RE)/ Complex Components Maintenance (CCM)/ Practical Experience (PE) in Component Workshop (in months)	Yes (ME-24/ RE-6 for Diploma holders & MOE-12/ RE-3 for CAR-66 License holders)	Yes (AM-24/CM-12 or CCM-36/PE-24)	Yes (PE-18 for Repairman/ PE-24 for Mechanic)

Source: Compiled by the author

Certification of Drone Technicians

The Drone Rules-2021 were published on 25 August 2021. The provisions of Aircraft Rules 1937 do not apply to unmanned aircraft systems except in the case of unmanned aircraft systems weighing more than 500 kg due to unique nature of drones. The drone rules cover almost every aspect related to drone operations, training, certification, etc. However, they do not have provisions for the certification of drone technicians.²⁸ While the certification of aviation technicians is covered under the CAR-66 as has been deliberated earlier, there is no corresponding CAR for certification of drone technicians. Therefore, there is a need to create a policy of certification of drone technicians while keeping the uniqueness of this emerging technology, which may require less stringent provisions than CAR-66.

Way Forward

The increased requirements of regulatory compliance, examinations, training and other qualifications decrease the availability of technicians and increase the cost of hiring them in India. This adversely impacts the competitiveness of Indian companies. The non-availability of regulation for formal certification of drone technicians would reduce professionalism, quality and acceptance of Indian drones in the global market. The factors enumerated above create challenges for the Indian aviation manufacturing and MRO companies and make them less competitive vis-à-vis their global counterparts.

The following are therefore recommended to overcome limitations of regulations on certification/licensing of AMEs and technicians certifying aviation components in India as well as leverage defence aviation technicians for the civil aviation industry:

1. DGCA (MoCA) in collaboration with DMA, DDP, CSIR, DST and other stakeholders may formulate a policy on certification of aviation technicians of defence forces and other stakeholders for civil aviation;
2. DGCA (MoCA) in collaboration with DMA, DDP and other stakeholders may establish a joint body to take following measures to facilitate issue of civil certification to aviation technicians of defence forces and other entities:
 - a) Formulate syllabus, standards and study material for civil certification of aviation technicians of defence forces and other entities.
 - b) Formulate criteria for OJT and experience of working on military aircraft that would be considered for civil certification.

²⁸ **[“The Drone Rules-2021”](#)**, The Gazette of India, 25 August 2021.

- c) Identify gaps in the training of aviation technicians of the defence forces and other stakeholders vis-à-vis their civil counterparts.
- d) Create an accreditation mechanism for academic and technical training of aviation technicians of defence forces and other entities.
3. Standardise study material for aviation technician examination and make it available online.
4. The educational requirements of PCM in Class 10+2 and Diploma/ Degree in engineering for AME and Certification of Components technician as per CAR-66 Subpart-A para A.15 and CAR-66 subpart-C para A.205 respectively be reviewed and aligned with global standards. The review of requirement of PCM is recommended since the aircraft/ engine/ component maintenance and servicing is carried out in accordance with the pre-approved maintenance documents provided by the OEM.
5. The age requirement of 21 years as specified in CAR-66 subpart-C para A.205 (a) be reviewed.
6. The requirement of a minimum three-year Diploma or Degree in Engineering as specified in CAR-66 subpart-C para A.205 (c) (i) be reviewed.
7. The module examination passing criteria as specified in CAR-66 Subpart-C, Para 66.A.205 (c) be reviewed.
8. DGCA may formulate a policy on certification of drone technicians on the lines of CAR-66 that is less stringent in view of uniqueness of this emerging industry to create a balance between safety and competitiveness of Indian drone industry that aims to make India the global drone hub by 2030.
9. The certified aviation/drone technicians should be authorised to certify the aviation/drone components and maintenance as per the maintenance documents of the OEMs.
10. DGCA could examine signing MoUs/agreements with EASA and FAA for mutual recognition of aviation technician certification to help increase competitiveness and acceptability of the Indian aviation and drone industry in the global market.

Conclusion

India's goals of becoming global drone hub by 2030 and *atmanirbhar* in civil aviation manufacturing by 2047 require large skilled manpower, enabling regulations, harnessing the skilled technical manpower of defence forces and making process of certification of aviation technicians transparent. Also, Indian regulations would need to be aligned with their global counterparts.

The higher qualification and training requirements than what is required for the manufacturing and maintenance of aircraft significantly increases the cost of manpower for the Indian aircraft manufacturers and MRO service providers. On the other hand, technical personnel with higher engineering qualifications are likely to get less job satisfaction as their expertise is better suited for complex engineering works such as design, modification and complex repairs of aircraft. Therefore, provisions of CAR (CAR-66) such as requirements of higher age, qualification, written examinations for technical modules, etc., for aviation technicians need to be reviewed and rationalised.

The certification process needs to be made agile and transparent for enhancing skilling to meet the requirements of the Indian aviation manufacturing and MRO industry. The creation of enabling policy provisions for civil certification of aviation technicians of defence forces, CAPFs, DRDO and CSIR-NAL, HAL and other entities is essential to mainstream the huge untapped skilled manpower for civil aviation manufacturing and MRO industry and overcome paucity of manpower. India's emerging drone manufacturing industry needs an enabling, transparent and agile regulation for certification of drone technicians to make India the global drone hub by 2030.

The aim of making India an aeronautics and drone manufacturer by 100 years of independence (@2047) can be achieved by reducing the complexity of certification, shedding the overcautious approach to aviation technician licensing/certification, making Indian industry a partner in certification and mainstreaming aviation technician of defence forces and other entities. The success of Indian emerging aviation and drone manufacturing industry would largely depend upon the speed of policy and regulatory reforms, and their implementation.

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