Country report on the use of drones in construction-related activities

Comunidad de Madrid

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Prepared by:

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OVERVIEW (AT NATIONAL LEVEL)

- Regulations (Standard Operating Conditions)

  As of 31 December 2020, the European regulations of UAS apply. This standard affects all drones regardless of their use or size.

  - Consolidated European legislation:

    Consolidated Implementing Regulation (EU) 2019/947 including changes to Implementing Regulation (EU) 2020/639, Implementing Regulation (EU) 2020/746, Implementing Regulation 2021/1166 and Implementing Regulation (EU) 2022/425. (https://eur-lex.europa.eu/eli/reg_impl/2019/947/oj).

    Consolidated Delegated Regulation (EU) 2019/945 including changes to Delegated Regulation (EU) 2020/1058. (https://eur-lex.europa.eu/eli/reg_del/2019/945/oj).

  - EASA management resolution approving national standard scenarios (STS-ES) for UAS operations in the 'specific' category under an operational declaration in accordance with Implementing Regulation (EU) 2019/947. https://www.seguridadaerea.gob.es/sites/default/files/0_20201202__resolucion_escenarios_estandar_nacionales.pdf)

  - Easy Access Rules for Unmanned Aircraft Systems (Regulation (EU) 2019/947 and Regulation (EU) 2019/945). https://www.easa.europa.eu/en/document-library/easy-access-rules/easy-access-rules-unmanned-aircraft-systems-regulation-eu

  - EASA Frequently Asked Questions on European UAS Regulations: FAQ UAS EASA https://www.easa.europa.eu/en/the-agency/faqs/drones-uas

- Strategic plan for the development of RPAs/drones in the country. Priorities

  - Business development and R+D+i of the drone sector:

    Development and promotion of quality training for drone professionals. It also proposes the development of a center of excellence and the promotion of the use of drones in the different administrative and business areas.

    The promotion of R+D+i I tasks with actions related to their promotion and financing.

- Disclosure of industry information:

    Global disclosure. To this end, channels of communication with the Administration will be created. It also highlights the importance of heterogeneous aeronautical training for all actors in the drone world. To bring the sector closer to the public, informative forums and conferences will be held at universities and colleges. In addition to disseminating material and informative campaigns that help promote aeronautical culture.

    Dissemination in productive sectors, for which a sector dissemination portal and an observatory will be created to collect, manage and analyze the information on this activity. This initiative assumes the existence of a knowledge space on technological innovations in the RPAS sector and the regulations around it. On the other hand, in 2019 the ENAIRE Foundation Award for Innovation in the Drone Sector was created to reward the innovative work of Spanish companies and help their public recognition.

- Coordination between Administrations:

    To promote the development of the drone industry in Spain, coordination between the different Administrations involved in it is necessary. To this end, an Interministerial Group has been created, led by the General Directorate of Civil Aviation. It will work so that there is an effective coordination between administrations that allows an orderly development of the sector.

- Government agencies with jurisdiction over RPAs

    Ministerio de Transportes, Movilidad y Agenda Urbana

    https://www.mitma.gob.es/

    Agencia Estatal de Seguridad Aérea (AESA)- State Air Safety Agency

    https://www.seguridadaerea.gob.es/

    ENAIRE DRONES:

    https://www.enaire.es/servicios/drones

- RPA operator qualification requirements / Pilot certifications needed

    A UAS operator is any natural or legal person who uses or intends to use one or more UASs for both professional and recreational purposes (including modellers).

Registration should be carried out in the Member State of residence or where the economic activity takes place, and it is not possible to be registered in more than one State at a time.

- Must be registered as an operator when using any of the following types of UAS:

  Use in the 'open' category any unmanned aircraft:

  - o With an MTOM of 250 g or more, or which, in the event of a collision, is capable of transferring to a human a kinetic energy greater than 80 joules;
  - o Equipped with a sensor capable of capturing personal data, unless it complies with Directive 2009/48/EC ("Toys Directive").

  Use an unmanned aircraft of any mass in the 'specific' category.

  The UAS pilot´s training required will depend on the UAS and the subcategory in which it is operated. This training and the corresponding examinations are carried out through the AESA Moodle platform after registering at the web site in the ´open´ category and in the ´specific´ category.

- The 'open' category covers transactions with UAS that involve a low risk and do not require authorisation or declaration.

  The 'open' category in turn is divided into three subcategories: A1, A2 and A3. The training required will depend on the UAS and the subcategory in which it is operated:

  - o A1/A3 (together)
  - o A2

- The 'specific' category covers transactions with UAS involving an average risk.

  Operate in 'specific' category under a standard scenario ('STS').

  - o The theoretical training for STS can be provided by a training organisation, a UAS operator, or on its own account, always following the syllabus published syllabus. It is for EASA to carry out the examination of theoretical knowledge of the STS and, if

appropriate, to issue the corresponding certificate.

- o Practical training is required for each scenario, provided by recognised entities or by declared UAS operators, which will consist of a continuous assessment and, obtaining an accreditation of practical skills for this standard scenario by recognised entities or UAS operators that have declared to provide such practical training.

Operate in 'specific' category upon request for an operational authorisation.

For these remote pilots, theoretical and practical training based on the concept of operation ('ConOps') is required. The training required shall be determined in the context of the application for operational authorisation.

- Key figures (nº of registered operators like corporations, SMEs…; registered aircrafts; …)

Registration as UAS operator in AESA is free of charge and is done through its electronic site.

The generated UAS operator registration number shall be included in all drones of the operator.

Only if you are to perform operations in the 'specific' declaration or LUC category, it is necessary to enter the UAS in the profile of the UAS operator.

Currently, the UAS must carry an identification plate with the following information:

- o Responsible operator
- o Brand and model
- o Serial number
- o Nº of registered operator
- o Contact information

INDUSTRY OVERVIEW

- Related activities linked to RPAs

    The main activities in which they use drones are listed below:

    - o Audiovisual industry
    - o Industrial inspections
    - o Precision farming
    - o Topography
    - o Thermography
    - o Surveillance and security emergencies building
    - o Civil works
    - o GIS
    - o Logistics
    - o Environment risk prevention
    - o Defense
    - o Archeology
    - o Fire control
    - o Fumigation
    - o Reforestation
    - o Fishing
    - o Control wildlife
    - o Livestock

- Developments

    In recent years, the drone sector has experienced an extraordinary evolution, not only in the global market, but also in the national market. The increasing number of applications in the field civilian life, made possible through continued technological development of these aircraft, point to an explosive growth to medium term.

    We find ourselves, therefore, before a sector with an enormous potential for expansion, in which Innovation and continuous technological progress are configured as fundamental elements to make their extraordinary development prospects a reality.

    We find ourselves, therefore, before a sector with an enormous potential for expansion, in which Innovation and continuous technological progress are configured as fundamental elements to make their extraordinary development prospects a reality.

    The use of drones for certain applications it is not new. Since the 1960s this type of

aircraft began to be used in reconnaissance missions by the US Army. Later, in the 1980s, these platforms were extended to civil applications. The first of These experiences were carried out in Japan, in crop fumigation tasks.

However, the development of technology and its reduction in costs, together with the improvement in efficiency and reliability of these systems has made it possible, More recently, there has been a wide diffusion of the use of drones.

In the European Union (EU) it is estimated that there is a fleet of between 1 and 1.5 million drones in use civil society, which has been achieved fundamentally by a strong growth of drones for recreational use, with increases of more than 100% per year in last years. From the above figures, it is calculated than 10,000 units correspond to drones for professional use.

The European market is estimated at 7 million drones in use recreational and 400,000 for commercial and government use for 2050. Precision agriculture, rapid transportation of parcels and critical goods such as medicines, inspections of large infrastructures, observation and surveillance, cartography, precision, emergency management, etc. are identified as some of the sectors in which drones can allow development of high added value and economic impact.

- Sector statistics

  The drone sector in Spain has grown by 9.4% in 2021, reaching the following figures:

  - o Pilots: 51.000
  - o Operators: 2.500
  - o AS/Drones: 4.200
  - o The turnover of the sector: 1.500 Millions Euros

- Sector challenges → Technology adoption and gaps (Drone adoption)

  Availability and effective and efficient management to allow the use of airspaces that allow the testing of technologies related to the operation of UAS and its management of traffic. Some of these spaces must have access to the maritime environment.

  Defend and consolidate the technological heritage generated in Spain by facilitating and helping in obtaining and maintaining patents.

  Development of new traffic management technologies that allow long-term

operations distances and place us as one of the first countries to be able to authorize this type of operations.

Support from the local, regional and national public administration for the development of new applications with high added value through the use of instruments such as Innovative Public Procurement and the Association for Innovation.

Encourage and promote the development of applications in the field of inspection and intelligent infrastructure monitoring, emergency management, observation and surveillance, traffic management, advanced mapping, smart tourism.

Development of digital systems with simple interfaces for the implementation of the UTM/U-space system in all its phases.

Identify aspects related to the use of the spectrum.

Creation of interoperable database systems that enhance both the UAS operator records such as the use of big data to improve security of operations and their integration into society.

Projects for the development of specific protocols for emergency operations.

Projects to demonstrate the feasibility of delivering goods with UAS.

Study projects of systems that allow inspections to be carried out by the authority remotely.

Development of certification bases for remote control stations on land and the certification bases for aerial platforms.

Detection, monitoring and mitigation of threats related to UAS.

Support the deployment of UAS detection systems as protection in the critical infrastructures.

Definition, development (technical and regulatory) and implementation of the Spanish system of electronic identification and tracking of unmanned aircraft.

Incorporation of electronic identification technologies and monitoring of unmanned aircraft to other traditional airspace users, especially at low altitude (microlights, general aviation, aerostats, skydivers, …)

Integration of non-aeronautical data sources in current geoawareness systems (ENAIRE/Drones).

Precision navigation systems in urban environments and operation in infrastructures or strategic areas and generation of technologies to increase the

operational safety (collision detection and avoidance, shock absorption capacity, impacts etc).

Technologies that allow flight in confined spaces in a robust and safe.

Systems and tools that facilitate the homologation of hardware systems and software (HW and SW) for medium and high risk operations (levels M and H of the SORA).

Robust communications for operations beyond pilot visual range (BVLOS, for its acronym in English 'Beyond Visual line of Sight') and automatic systems.

Advanced interfaces on land.

Define what regulation would be necessary based on risk, focused on security, training and certifications and standards.

Integrated ATM + UTM, as digitized and automated services, within a

ecosystem to maximize flexibility and efficiency, in an environment driven by

Satellite-based CNS, performance-based operations and services personalized.

Modeling and simulation, fed with urban flow data, which allow understand how UAM can add mobility solutions to networks existing and future cities.

Establishment and validation of digital protocols for information exchange that allow communication and coordination between all the agents involved (Ground and air segment).

- Key takeaways from the survey (from companies & professionals)

The drone sector in our country is dominated by small businesses and is dealt with in general of young companies. It is, as we can see, a fragmented, volatile market with strong growth.

  o 56% of the operators indicate that they have their own equipment compared to the remaining 44% who hire a service provider.

  o 70% of the operators indicate that they have between 1 to 4 employees for the use or management of the operator and only 30% have 5 or more employees, never exceeding 24 employees.

  o 50% of the operators indicate that they use drones occasionally, 35% indicate that they use them extensively and 10% very exceptionally.

  o 87% of operators indicate that they have expectations of using drone

technology to a greater extent.

o The drone applications most used by operators are Project Planning and Staking, Project Tracking and Communication, First Evaluation and Bid Preparation, and First Evaluation and Bid Preparation.

o Operators indicate that the tasks they perform most with drones are video and photography, digital models, project monitoring and thermography, respectively.

o The operators indicate that the tasks that they would be most interested in implementing in the future with drones are the monitoring of projects, the making of digital models, and video and photography.

o According to the operators, the main advantages of using drones are cost and time savings.

o 50% of the operators indicate that it is difficult to find qualified professional profiles in the use of drones, and 35% neutral.

o Operators indicate that the main reasons for the shortage of qualified professionals are lack of training pathways, students have limited exposure to this type of technology during their education and/or training periods, and low adoption of innovative technology by companies. Business.

o The operators indicate that the solutions to address this lack of skills Implement standardized training appropriate to the different jobs in the sector, favor communication and cooperation between companies and educational and training institutions and knowledge of the technology associated with the use of drones and its benefits in the construction sector.

o 80% of the operators indicate that they agree that the establishment of a standardized and certified training program would help promote the use of drones in the different sectors.

o 80% of the operators indicate that they agree that cooperation between the different institutions and companies would reduce the gap between existing training and the real needs of the sector.

TRAINING

- Specific training and licensing for RPAS pilots

  - The 'open' category covers transactions with UAS that involve a low risk and do not require authorisation or declaration. In 'open' category the UAS operator must register at the AESA website provided that the UAS with which it operates has a maximum take-off mass (MTOM) exceeding 250 g, transfers power in case of impact greater than 80J or is equipped with a personal data capture sensor such as camera or microphone.

    The 'open' category in turn is divided into three subcategories: A1, A2 and A3. The training required will depend on the UAS and the subcategory in which it is operated. This training and the corresponding examinations are carried out through the AESA Moodle platform after registering at the web site

    The different cases to operate in the three 'open' category subcategories are:

    Operate in 'open' category, subcategory A1, with UAS:

    - o Of private construction with MTOM less than 250 g and a speed of less than 19 m/s; O
    - o With a maximum take-off mass of less than 250 g without class marking and placed on the market before 1 January 2024; O
    - o They have a Class C0 marking.

    In all the above cases, the training required for remote pilots shall be familiar with the manufacturer's user manual.

    Operate in 'open' category, subcategory A1, with a class C1 UAS; or in subcategory A3 with UAS having a class C2, C3, C4 or privately constructed UAS with MTOM up to 25 kg.

    In these cases, the training required for remote pilots will be, in addition to being familiar with the user manual, completing an online training provided by AESA followed by an equally online examination given by AESA. The agenda under discussion consists of 9 different subjects, resulting in 40 questions with a duration of 40 minutes.

    To obtain the "Online training pass test" certificate, you must pass the exam with at least 75 % of the correct answers and will appear at the end of any attempt as Apto. Once the test is passed, no action is required. When the certificate has been issued, the user will receive a notice in the email in which he/she has registered. The certificate is valid for 5 years and the renewal

process must be initiated with EASA prior to the expiry date. In the event that the 2 test attempts are exhausted and an unfit qualification is obtained, the remote pilot will receive a negative resolution and must re-register in order to get two new attempts and pass the test.

Operate in 'open' category, subcategory A2 with Class C2 UAS.

In this case, the remote pilot must have successfully passed case 2 and submit to AESA a statement that a self-training of practical skills has been completed during his/her registration for the exam. This self-training of practical skills must be carried out in an area where no non-participant person is endangered and at a minimum horizontal distance of 150 meters from residential, commercial, industrial or recreational areas.

When performing the self-training of practical skills, the remote pilot must take as many flights as he deems necessary to acquire a reasonable level of knowledge and skills to operate the UAS.

In order to obtain the certificate of remote pilot competence, the pilot must complete his/her self-practice declaration during the registration procedure for the examination of subcategory A2.

- The 'specific' category covers transactions with UAS involving an average risk. In 'specific' category the UAS operator must register with the AESA website and incorporate the registration number provided in the UAS with which it operates.

  The possible cases to operate in 'specific' category are:

  Operate in 'specific' category under a standard scenario ('STS').

  o The theoretical training for STS can be provided by a training organisation, a UAS operator, or on its own account, always following the syllabus published syllabus. It is for EASA to carry out the examination of theoretical knowledge of the STS and, if appropriate, to issue the corresponding certificate.

  o To obtain the certificate of a standard scenario, the remote pilot must pass the AESA exam with at least 75 % of the correct answers and will appear at the end of any attempt as fit. Once the test is passed, no action is required. When the remote pilot theoretical knowledge certificate has been issued, the user will receive a notice in the email in which he/she has registered.

  o The remote pilot theoretical knowledge certificate obtained is unique for

both national standard scenarios and as certificates issued under national standard scenarios are valid until 31 December 2025.

- o After passing the theoretical examination before EASA, for the operation under a standard scenario, practical training is required for each scenario, provided by recognised entities or by declared UAS operators, which will consist of a continuous assessment and, obtaining an accreditation of practical skills for this standard scenario by recognised entities or UAS operators that have declared to provide such practical training.

Operate in 'specific' category upon request for an operational authorisation.

For these remote pilots, theoretical and practical training based on the concept of operation ('ConOps') is required. The training required shall be determined in the context of the application for operational authorisation. Guidance material on "training of pilots in 'specific' category under authorisation" has been developed, which details the UAS operator how to demonstrate the justification for compliance with remote pilot training, together with the subjects of theoretical knowledge and practical skills training, recurrent training, registrations, in addition to requirements of instructors and examiners.

- Description and comparison of the current training offer

The current training offer focuses a lot on the legislative part and the legislative part, being mostly merely theoretical and leaving in the background both the practical part (configuration and drone flights) and the administrative part of the normal activity of a drone operator. The final consequence is that the students do not obtain enough knowledge to function safely when carrying out the operations, as well as being able to carry out all the administrative procedures that are required of a drone operator.

Regarding training to specialize in a specific sector, we see how something similar happens, a lot of theory but little practice, as well as a lack of sufficient knowledge on the part of the trainers to be able to give them enough tools to be able to present in the form of report an acceptable product.

For this reason, the number of hours of flight and configuration of the drones should be increased, such as the subsequent production of the final product (videos, photos, report, …) in the cabinet to be able to undertake or work for a company with all the guarantees.

- Key takeaways from the survey (from learners/trainees; maybe trainers?)

    o 80% of the students surveyed have university education.

    o 70% of the students surveyed indicate that they know drone technology and that they have used it on occasion.

    o The students surveyed indicate that the sector in which they want to develop their activity or are developing it is with 21.21% in Civil Works, 20.45% in Engineering and 17.42% in Building.

    o Surveyed students indicate that the drone applications they are most interested in are photography and/or video and pre-construction and site planning.

    o 80% of the students surveyed indicate that they do not know which are the most demanded or emerging professional profiles in the construction sector.

    o 40% of the students surveyed indicate that access to drone-related training that matches their interests is difficult, while another 32% indicate that access is neutral.

    o The students surveyed indicate that the main reasons for the lack or difficult access to training related to drones are the slow implementation of new training programs adapted to the new trends in the sector and the lack of training itineraries.

    o The students surveyed indicate that the possible solutions to address this problem of access to training would be the dissemination of the wide existing job offer for these professionals, knowledge of the technology associated with the use of drones and its benefits in the construction sector and implement standardized training suitable for the different jobs in the sector.

    o 90% of the students surveyed indicate that they agree or totally agree that the spread of drone applications in the different sectors and of the different related professional profiles most in demand in each of them would increase the number of workers with the proper qualification.

    o The students surveyed indicate that the most important aspects for effective learning and subsequent job placement are active internships, visits to companies when they use drones in real situations, and specialized and accredited teachers.

CONCLUSIONS

The UAS sector shows a potential for growth and development that can be an important economic driver of the Spanish economy and industry.

The special socioeconomic, educational and geographical conditions of our country place us in a privileged position to promote research and the industry of technologies associated with operation of UAS and obtain leadership in certain strategic areas of the sector such as Training in long-range operations, UAS applications in maritime environments and long-range operations, Certification of new traffic management systems, etc.

We are facing a completely new industry: Urban Air Mobility (UAM) and the new technologies (propulsion, structures, avionics/autonomous systems), infrastructures and business models will radically rethink urban and aerospace space.

The airports of the future will be all around us, in our homes and workplaces, on the roofs of buildings, on top of delivery vans and fire engines.

The UAM not only changes the way we travel but the way we live.

Taking into account the great importance of the construction, agriculture and logistics sectors in Spain, and on the other hand the socio-economic changes that are taking place with the rise of this new technology, new trained professionals will be needed in this sector due to its great growth at all levels.

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