



Training Facilities and Test Sites in San Diego County for Unmanned Air Vehicles

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Prepared for the South County Economic
Development Council

by

The Ranger Group

3914 Murphy Canyon Road

STE A133

San Diego, CA 92123

www.therangergroup.com

Background

This report contains a brief synopsis of every Unmanned Aerial Vehicle (UAV) training program and a summary of the UAV test facilities in the County of San Diego.

Methodology

Research and analysis conducted for this report included a comprehensive Internet search of UAV training programs, identifying those located within San Diego County. This search, first focused on private and commercial training programs, was expanded to include traditional educational institutions. Upon identification of a training institution within San Diego County, contact was made with the institution to ascertain the type of training offered by the institution. Tours and visits were next undertaken in the case of those institutions that seemed to have the most comprehensive training programs.

Additionally, an exhaustive review of the UAV dedicated testing and training sites in San Diego County was conducted. These reviews included sites associated with education facilities, private UAV developers, and model aircraft clubs.

During the course of the research for this study, forty-one separate institutions or college programs were considered, thirty interviews were conducted, and seven UAV training sites were visited.

Summary of Findings

Training Offered in San Diego County

The analysis of the UAV training offered in San Diego County found fourteen functioning or planned programs. These are summarized in Tables 1 and 2.

| Organization | Course Title | Description of training | Source/ POC |
|-----------------------------|---|---|----------------------|
| Action Drone USA | Introduction to Drones | Currently schedules the Chula Vista UAV flying site for the City of Chula Vista. The Introduction to Drones course is offered as a five-day comprehensive course designed for professionals. This course introduces basic fundamental drone operations, mechanics, and mission planning. Students learn hands-on training using Action Drone products and platforms | Dhore Anunciado, CFO |
| San Diego Christian College | AVT 235 Fundamentals of Unmanned Aerial Systems AVT 435 Medium Unmanned Aerial System Operations I AVT 436 Medium Unmanned Aerial System Operations II AVT 335 Small Unmanned Aerial Systems Operations | BS in Aviation | Course Catalog |
| National University | PDX 8000X Unmanned Systems Fundamentals PDX 8005X Applications for Unmanned Systems PDX 8010X Unmanned Systems Engineering, Architecture & Design PDX 8015X Project Management for Unmanned Systems Applications | Planning to start a four-course Unmanned Certificate Program in 2018 | John A. Cicero |

| Organization | Course Title | Description of training | Source/ POC |
|--|---|--|--|
| Palomar College | GCIP 168 Digital Imaging with Drones GCIP 268 Digital Imaging with Drones II GEOG 110 Meteorology: Weather and Climate GEOG 120 Digital Earth: An Introduction to Geographic Information Systems GEOG 140: Introduction to Remote Sensing | Unmanned Aerial Vehicle (UAV) Certificate of Proficiency Program | Course Catalog |
| Drone University USA - Sacramento based – conducts training in San Diego | Commercial UAS/Drone Pilot Certification Advanced UAS Cinematography Production Certification UAS/Drone Structure Inspector Certification UAS/Drone Precision Agriculture Certification UAS/Drone First Responder Certification UAS/Drone Maintenance and Repair Certification | FAA Certified Flight Instructors and Part 107 training preparation - all classes include both classroom and hands on flight instruction | Barry Morris, Founder |
| Drone Universities - Los Angeles based – conducts training in San Diego | Introduction to Drones Drone Photography/Videography Drone GIS/Mapping | FAA Certified Flight Instructors and Part 107 training preparation. All classes include both classroom and hands on flight instruction | Michael Robbins, Business Manager |
| King Schools | FAA Part 107 Certification Training | Located in San Diego. Online only and no plans to extend to hands-on training | Bill Ziska, VP of Sales |

Table 1

Institutions Planning to Offer UAV Training

Several institutions of higher education are in the process of implementing UAV experimentation and training. These institutions are designing large-scale drone cages, 30 x 50 feet in the case of the University of California, San Diego (UCSD). These large cages provide several advantages: (1) prevention of flyaway drones; (2) the ability to test outdoors in wind and inclement weather; and (3) exclusion from FAA oversight as the cage prevents the UAV from entering controlled airspace.

Discussions with these institutions indicated that they are planning on offering UAV training in the near future or are seriously considering doing so; these institutions are detailed in Table 2.

| Organization | Status | Source/POC |
|--|--|--|
| UCSD | Developing an outdoor drone cage – estimated completion: late 2018 at the earliest. No UAV courses listed in the course catalog | Eliud Escobedo Business Process Innovation Manager |
| CSU San Marcos | Extended Studies wanted to do something like this a couple of years ago but was unsuccessful in implementing. Currently looking at revitalizing the program. | David Schaafsma Extended Studies |
| Newschool of Architecture and Design, School of Architecture and Construction Management | Discussing drones in construction management courses but have no curriculum in UAV operations. | Glenn Welch School of Architecture and Construction Management |
| ENVI | Currently developing hands-on drone flying course. Estimated launch date: early 2018 | Bob Gubala Drone curriculum developer |
| Miramar College | Prepared a series of courses on drone operations that will be offered in Spring 2018 | Max Moore Director of Aviation Training |
| Point Loma Nazarene University | Physics workshop contemplating use of drones | Maria Zack |
| San Diego State University - Extended Studies | Developing a course, Processing Geospatial Information from UAVs. Launching summer 2018 | Andres Abeyta founder of GIS Bootcamp |

Table 2

UAV Test Sites in San Diego County

There are four sites identified as legitimate test sites for UAV operations in San Diego County. These are summarized in Table 3.

| | |
|--------------------------------------|--|
| Qualcomm Snapdragon Flight | Located in Sorrento Valley; this site has received FAA approval to test fly their Snapdragon drones using proprietary cell phone towers. This facility is for Qualcomm UAV development only. |
| Chula Vista UAV flying field | Located at 1945 Hunte Pkwy, Chula Vista this site is available for commercial test flights. Scheduling is through Action Drones USA at info-actiondroneusa.com. FAA part 107 certificated pilots only. |
| Electric Networked Vehicle Institute | Located behind Coleman University at 8888B Balboa Ave, San Diego; is an indoor UAV flying site that is open to the public |
| EZ Drones | Located on Miramar Road, a San Diego reseller of DJI drones has a small indoor cage that supports UAV testing. |

Table 3

The services available at these sites vary greatly. The Electric Networked Vehicle Institute (ENVI) has converted an abandoned building behind and owned by Coleman University into an incubation facility focused on autonomous vehicles including UAVs. Their facility is entirely operated by volunteers and does not have any formal association with Coleman University. ENVI is currently preparing to provide inexpensive initial drone courses. This is only an indoor flying site.

Qualcomm’s facility has FAA permission to fly Qualcomm proprietary UAVs within its campus and to conduct UAV testing. It is a closed facility.

Several drone manufacturers have very small cages, typically less than ten feet square, that they use to encapsulate unintended flyaway situations during initial drone testing. These are essentially “in-house” testing facilities.

Some UAV resellers have very small drone cages, less than four feet square, that they use for customer demonstration and initial customer familiarization. These are not available as public resources, but reflect the point that UAV resellers must provide some minimal training and testing infrastructure as part of their business model.

The Chula Vista UAV site is simply an open, undeveloped field with no improvements or facilities at this site. However, the airspace above it is convenient

for urban facilities and is outside of controlled airspace below 3500 feet. One of the commercial drone manufacturers, Action Drones USA, is the scheduling authority for the Chula Vista UAV training site.

Model Aircraft Facilities

Although not considered commercial UAV testing sites, there are fourteen model airplane club facilities in San Diego County. These clubs are chartered or licensed for the recreational use of model aircraft enthusiasts, not commercial UAVs. However, in several cases, these clubs allow UAV operators permission to use their facilities for training or development. These clubs should be seen as potential resources for the expansion of UAV testing and training in the county. These clubs are listed in Table 4.

| Club | Facility Location |
|--|--|
| Chula Vista Model Radio Control Club Outlets | Dairy Mart Road, San Ysidro |
| Palomar RC Flyers Club | Intersection of I-15 and Hwy 78 |
| Miramar RC Flyers | NAS Miramar – restricted to military members only |
| Silent Electric Flyers of San Diego | Mission Bay by Sea World |
| Chollas Park RC Flyers | By the old Navy Radio Towers at 5997 College Grove Drive, SD |
| First Weedwacker Aerosquadron | 10295 Ashwood Street, Lakeside |
| Joint Military RC Flyers | North end of Camp Pendleton –LZ53. Restricted to military members only |
| Torrey Pines Gliderport | At the top of Black’s Beach, La Jolla |
| SD Wingmasters RC Club | I-15 and Gopher Canyon Road, Escondido |
| Alpine Aerosquadron | 11928 Singer Lane, Rancho San Diego |
| Fallbrook RC Flyers | North Calac Road, Valley Center |
| Lake Poway Skimmers | 14644 Lake Poway Road, Poway |
| Pacific Coast Sports Flyers | 11355 Affinity CT, Unit 186, San Diego |
| Poway Pilots | 14208 Woodcreek Road, Poway |

Table 4

These model aircraft clubs are predominately focused on private flying fields with paved runways for model aircraft and helicopters. They are somewhat reluctant to permit UAV flying and typically do not allow mixed aircraft and UAV flying, preferring to segment the UAV flying to a corner of the field on a not-to-interfere basis. Many of these sites have facilities that include a clubhouse, toilet facilities, covered workbenches, paved runways, run-up areas, established interface with the FAA, Academy of Model Aeronautics (AMA) liability insurance, etc.

The AMA restricts all flying from these fields to non-commercial flying. All of these fields will support flying UAVs. However, some commercial entities, such as private drone training companies, are flying from these sites.

Observations and Conclusions

General Trends in UAV Training in the San Diego Region

As is evidenced in Table 1, the preponderance of UAV training in San Diego County is currently offered by academic institutions. These institutions have the advantage of making training available to a broad range of County residents, including college students who can use this education as a springboard into the UAV or other high tech industries with obvious benefits to the region's workforce. There also seems to be ample room in the UAV training marketplace for commercial or private training and education.

Table 1 lists King Schools as a San Diego County training facility although it is a completely online institution. The research for this study identified at least seventeen online UAV training schools offering virtual training available to San Diego County residents.

San Diego County Institutions Not Hosting Training

The following San Diego County institutions were found not to offer any UAV courses:

- Alliant University
- Argosy University
- Ashford University
- California College San Diego
- California Miramar University
- California State University, San Marcos
- Coleman University
- Design Institute of San Diego
- John Paul the Great Catholic University
- Southern States University
- United State University
- University of California, San Diego
- University of Phoenix

A variety of reasons were given as to why these institutions are not pursuing training in UAVs as part of their curriculum. For example, CSU San Marcos looked into developing training several years ago, but failed to follow through with the intended program. Although aimed at media and journalism education, John Paul

the Great University, feels at this point that there is too much risk associated with students using UAVs.

UCSD announced in October that it was building a cage type test facility for UAVs using a grant from Qualcomm. Although this is planned to help the university expand its robotics research there are no plans now to use it for training. (*San Diego Union-Tribune*, October 30th, 2017)

Conclusions

Both recreational and commercial UAV flying can be conducted almost anywhere in San Diego County in Class G (uncontrolled) airspace, so it is not necessary to go to an established flying location to fly a UAV commercially. The use of the FAA Sectional Charts for San Diego as well as the FAA B4UFLY smartphone app will help users stay clear of controlled airspace. The app provides a status indicator that immediately informs the operator about the current or planned location of his or her operations and includes a planner function.

However, UAVs are dangerous, not because of their potential to harm persons, animals or property with their spinning rotors but because they are powered by lithium ion batteries. If a lithium ion battery is cracked open, as might occur in a crash, the lithium will immediately burst into flames in the presence of oxygen. This would be particularly dangerous in the case of an uncontrolled crash subsequent to a flyaway or loss of control signal casualty. As a result, it should be considered mandatory that permission to fly and the possession of liability insurance are in place before flying.

The research conducted for this report discovered several training vendors and UAV product developers who are in search of UAV operational sites where they can conduct training and expand their UAV development efforts. Needed at these facilities are infrastructure such as classrooms, office space, and restrooms. Also needed is the permission to operate UAVs in a manner consistent with either the training or testing scheduled. This includes enough room to adequately fly UAVs in realistic patterns with the permission to do so.

There is a need for facilities that can support high-end operational training with UAVs that encompasses research and development as part of the expanding role of UAVs in a variety of enterprises. For example, law enforcement agencies need not only basic training in the handling and maneuvering of UAVs, but also need to practice the integration of UAV operations into their field tactics. Such ability would require the room and infrastructure to support basic UAV operations and allow the participation of other units in a specific scenario. The limited sites available for UAV testing and training in San Diego County at this time do not support this level of training and experimentation.

Appendix A – UAV Operations Guidelines

The following summarizes the operational requirements for operating UAVs in general.

FAA Safety Guidelines

- Fly at or below 400 feet
- Be aware of airspace requirements and restrictions
- Stay away from surrounding obstacles
- Keep UAVs within sight
- Never fly near other aircraft, especially near airports
- Never fly over groups of people
- Never fly over stadiums or sports events
- Never fly near emergency response efforts such as fires
- Never fly under the influence of drugs or alcohol

UAV operators should download the FAA's B4UFLY safety app, which provides real-time information about airspace restrictions and other flying requirements based on GPS location. The B4UFLY app is available at:

https://www.faa.gov/uas/where_to_fly/b4ufly/

Below are the FAA rules for operating unmanned aircraft – both recreationally and commercially:

| The rules for operating an unmanned aircraft | | |
|---|---|--|
| | <u>Fly for Fun - Recreational</u> | <u>Fly for Work – Commercial</u> |
| Pilot Requirements | No pilot requirements | Must have Remote Pilot Airman Certificate Must be 16 years old Must pass TSA vetting |
| Aircraft Requirements | Unless exclusively operated in compliance with Section 336 of Public Law 112-95 (<i>Special Rule for Model Aircraft</i>), the aircraft must be registered if over 0.55 lbs. | Must be less than 55 lbs. Must be registered if over 0.55 lbs. (online) Must undergo pre-flight check to ensure UAV is in condition for safe operation |

| The rules for operating an unmanned aircraft | | |
|---|---|---|
| | <u>Fly for Fun - Recreational</u> | <u>Fly for Work - Commercial</u> |
| Location Requirements | 5 miles from airports without prior notification to airport and air traffic control | Class G airspace* |
| Operating Rules | Must ALWAYS yield right of way to manned aircraft Must keep the aircraft in sight (visual line-of-sight) UAV must be under 55 lbs. Must follow community-based safety guidelines Must notify airport and air traffic control tower before flying within 5 miles of an airport | Must keep the aircraft in sight (visual line-of-sight)* Must fly under 400 feet* Must fly during the day* Must fly at or below 100 mph* Must yield right of way to manned aircraft* Must NOT fly over people* Must NOT fly from a moving vehicle* |
| Example Applications | Educational or recreational flying only | Flying for commercial use (e.g. providing aerial surveying or photography services) Flying incidental to a business (e.g. doing roof inspections or real estate photography) |
| Legal or Regulatory Basis | Public Law 112-95, Section 336 – <i>Special Rule for Model Aircraft</i> FAA Interpretation of the Special Rule for Model Aircraft | Title 14 of the Code of Federal Regulation (14 CFR) Part 107 |

*These rules are subject to waiver.

To fly for work (Commercial) you must have an FAA Part 107 Remote Pilot Airman Certificate.