



THE FUTURE OF POSSIBLE

August 28, 2015

Via email: carrac@tc.gc.ca

Canadian Aviation Regulations Advisory Council
Transport Canada
330 Sparks Street
Ottawa, ON K1A 0N5

Re: Notice of Proposed Amendment #2015-012 (Unmanned Air Vehicles)
Comment Submission by DJI Technology

Thank you for the opportunity to submit our comments in response to Notice of Proposed Amendment #2015-012 (May 28, 2015) ("NPA") concerning Unmanned Air Vehicles (UAVs). DJI is the leading manufacturer of consumer and commercial UAVs worldwide, with an estimated 70% market share. Approximately 75% of the 1,200 commercial exemptions issued by the U.S. Federal Aviation Administration ("FAA") to date under its Section 333 program identify a DJI product as the UAV the operator intends to use. Our broad and deep experience with people and companies using our technology in countless beneficial applications provides us with a perspective on regulatory frameworks that can balance safety concerns with the economic and societal benefits of this emerging technology.

A. Applicability

We support Transport Canada's exclusion from the UAV rules indoor and underground UAV operations. Such operations do not implicate navigable airspace, cannot pose a threat to manned aircraft, and instead should be viewed as the operation of consumer or commercial equipment outside of Transport Canada's area of concern. We would also urge a clarification that a UAV operated outdoors but within the confines of a fixed enclosure structure that prevents free travel, such as netting, is similarly not subject to the rules.

B. Very Small UAV Operations

DJI believes it is critically important that there be a Very Small UAV category (2 kg) involving very minimal regulatory requirements. We note that Mexico, Australia and other countries have created similar categories in which there are virtually no regulatory requirements for operation other than for the operator to follow a short list of easy-to-understand operational parameters.

Such a category, which is sometimes referred to as a "micro" or "open" category, presents several benefits, including:

- Enabling innovation, education, and research by fostering the ability of individuals to use UAV technology its safest form without being encumbered by pre-operation exams, licensing, or registration.



- Promoting a culture of compliance and respect for the rules by identifying a set of rules that are non-burdensome, easy to understand and that people can aspire to.
- Assisting manufacturers as well as the UAV commercial and recreational community to promote and encourage compliance and self-regulating conduct.
- Freeing up Transport Canada's regulatory, compliance, and enforcement resources to focus on more complex UAV operations that carry greater risk.
- Allowing best practices for operations to develop organically with the technology, as manufacturers incorporate new safety and education features and as the UAV platforms become lighter in weight with advancements in technology.

We note that a study commissioned last year by UAS America Fund and conducted by Exponent Engineering determined that for all available FAA data (over 25 years' worth), there has never been a reported fatal bird strike in the United States involving birds of approximately this weight, in locations and altitudes for which Very Small UAV operations are contemplated.¹ Simply put, the low-altitude operation of lightweight UAVs at a distance from airports is inherently very safe, does not pose a significant hazard to other airspace users, and therefore does not require more than minimal safety-related regulations by civil aviation authorities.

With respect to specific provisions of the Very Small UAV framework, we have the following specific comments:

1. *UAV Specifications*

DJI does not support adding additional vehicle specifications to the 2-kilogram weight limit. Such criteria will create confusion among users as to which UAV products (including ones they custom-build themselves) are eligible for the Very Small category, without any identifiable increase in safety. As other jurisdictions such as Mexico and Australia have recognized, it is the mass of the UAV that is the primary risk factor in an impact. Moreover, the 2 kg weight criteria that Transport Canada identified in its exemption issued November 2014 has proven effective. We believe that an alternative kinetic energy calculation would become overly complicated, particularly since the kinetic energy of another approaching aircraft will not be known. Mass of the very small UAV is a sufficient substitute for the kinetic energy calculation, particularly if a reasonable ground speed limit is imposed on Very Small operations. We note that the suggested alternative peak energy calculation of 12 J/cm² likely would limit operations to a very slow ground speed and is therefore impractical. Although we do not have specific data for you at this time, we have yet to learn of a serious injury caused anywhere in the world by a UAV weighing 2 kg or less, despite sales by UAV manufacturers that likely number in the millions. This suggests, at least anecdotally, that no additional product specifications are needed in order to ensure reasonably safe operations.

2. *Built up areas*

DJI has concern about the proposed restriction on operations in "built up" areas, both in general and particularly as it might apply to Very Small UAVs. Our understanding is that the term "built up" is not defined, nor intended to be defined, by Transport Canada. That alone will lead to confusion across the industry.

¹ We enclose a copy of this report for your reference.



Moreover, it is our observation, based on the actual experience of our hundreds of thousands of customers around the world, that a Very Small UAV may be safely operated in locations that might be considered "built up," including residential and urban areas. Indeed, many of the most beneficial applications for UAV technology involve real estate photography, infrastructure maintenance, roof inspection for insurance claim purposes, and other UAV flights in proximity to industrial or residential structures. Our Phantom, Inspire and Matrice UAVs incorporate GPS positioning and downward-facing ultrasonic and vision positioning systems that can keep a UAV hovering in flight at a precise point in space, thus allowing safe operations close to structures and in confined areas. Although the "built up" concept may have made sense for the era of manned aircraft, involving aircraft that are large enough to carry persons and dozens of gallons of flammable fuel, it is not suitable for existing and emerging applications for the smallest UAV platforms, which weigh only a few pounds and are battery-powered. We urge Transport Canada to remove this restriction from the proposal and, if deemed necessary, replace the vague geographic prohibition with a specific risk assessment suitable for the technology.

3. *Registration*

We support the proposition that Very Small UAVs should not be required to be registered as aircraft. Identifying information for the owner/operator could be required to be affixed to the airframe as a means of effectively identifying the owner of an abandoned or lost Very Small UAV. Registration number markings are unlikely to be visible from the ground for this category, thus making such a requirement ineffective and merely burdensome. (Our comment about utility and practicality of registration also applies to UAVs in the other categories.)

4. *Licensing/Knowledge Testing*

DJI does not support the imposition of a pilot/operator certificate or required knowledge testing for the Very Small UAV category. We note that although the NPA states that operator certificates will not be required (page 14), it then sets out a list of personnel licensing, pilot permit, knowledge and training requirements in certain circumstances (pages 16-18, 32).² We kindly ask for clarification. Regardless, for the Very Small category, while we believe that basic aeronautical knowledge is important with respect to all operators, that knowledge can be provided by product instructions and training programs, information functions built into the UAV software control systems, on-line courses and training videos, and by smart-phone apps that provide airspace information to the user. We are concerned that requiring Very Small UAV operators to pass an examination prior to operation will discourage people who are not interested in doing so from complying with any of the safety parameters for Very Small operations, leading to a culture of noncompliance and a higher-risk environment than self-education. DJI has several customer education initiatives already in place, including placing FAA-endorsed "Know Before You Fly" campaign materials in boxes shipped to customers, our live New Pilot Experience program, online tutorial videos, a web-based Fly Safe program, social media outreach, and other initiatives that are in development. Moreover, the proposed list of subject areas for the Very Small UAV seems far broader than is pertinent to safe operation of such a device, including topics such as wake turbulence causes, airspace reporting requirements, air traffic control services and procedures, meteorology, etc. (NPA page 28). For the Very Small category, if any knowledge exam is nonetheless mandated, it should be very basic, focus on a small number of main concepts that are central to safe operations, and be accessible via internet with same-day education, training, and certificate issuance.

² We do not understand why the size of an organization (number of employees) should have an impact on the regulatory requirements relating to UAV operation. It is probable that insurance requirements for such organizations will lead to organizational standards that are similar to what you suggest in the NPA.



With respect to the proposed minimum distance from aerodromes of 5nm (9 km), we believe that operations of Very Small UAVs and, perhaps larger systems, ought to be permitted closer in, so long as notification is provided to the airport operator. In our experience, there are many valid reasons to allow operations near and even at airports, including product demonstrations at air shows, established model aircraft club sites, survey and mapping for airport use, accident investigation (such as the one recently conducted in Halifax after the Air Canada crash landing), emergency response, and others.

5. *Night Operations*

We respectfully disagree that UAV operations should be allowed only during the day. Our comment applies to all categories, but particularly to the Very Small UAS category. Our UAS are equipped with visible lights, and additional lighting could be added by the end-user to make them even more visible. Because UAVs are contemplated by the NPA to be operated within visual line of sight only, the operator will be able to see and hear approaching aircraft and take steps to yield right of way, even (or especially) at night. Outright prohibition of night operations threatens many beneficial applications, including agriculture (using multi-spectral sensors), search and rescue, wildlife monitoring, and photography. We would suggest, as an alternative to the all-out prohibition, a more restrictive set of operational parameters for operation at night, such as a lower maximum altitude, or a specified maximum distance from the operator.

6. *Maximum altitude*

We would strongly suggest that the maximum altitude for all civil UAV operations, and particularly the Very Small category, be raised from 300 to 400 feet above ground level. Four hundred feet is the altitude that the FAA identified in its model aircraft advisory circular in 1981, is the maximum altitude specified in FAA Section 333 exemptions, and has become something of an unofficial international standard for model aircraft and UAV operations for the past 35 years. As a manufacturer, we are interested in incorporating features into our products that can help educate the operator and reduce the possibility of inadvertent operation in sensitive locations. Thus, we currently implement a default maximum altitude of 120 meters (394 feet) on our consumer products. Having a single standard for the recommended or regulatory maximum altitude will enable us to provide a feature set that matches those parameters. We do not anticipate being able to incorporate a 300-foot default altitude limit feature in our products specifically for Canada when other jurisdictions have identified 400 feet AGL as the recommended (or required) altitude limitation for most operations. We also think it is important to note that UAV operators today have a much more precise way to measure altitude than they did in decades past, by using altitude telemetry sent live to their screens. Thus, to the extent the 300 foot limit was previously intended to provide room for judgmental error about perceived altitude observed visually from the ground, we believe the maximum may now be raised to 400 feet without an adverse impact on safety.

C. **Model Aircraft**

Transport Canada proposes that its new rules would apply to all UAVs with MTOW of 25 kgs or less, regardless of the purpose of the operation. Although we support the adoption of a risk-based approach that does not unduly focus on the purpose of the operation, we strongly support the continued ability of recreational operators who are operating model aircraft safely and responsibly to be exempt from burdensome aviation regulations. Our observation is that today's hobbyist is tomorrow's innovator, and that it is important to maintain this open informal path for outdoor recreation, technology-related education, and innovation.



DJI strongly disagrees with the proposition in the NPA that a model aircraft equipped with a camera payload is no longer a recreational model aircraft for purposes of exclusion from the UAV rules. (This proposition is identified as "Approach 2.") In our experience, the vast majority of purchases of small UAVs at present are not "conducting surveillance or collecting data," as you suggest, but are instead engaged in recreational pursuits. The enjoyment of seeing the world from the model aircraft's point of view, and capturing a photograph of that perspective, is just as thrilling and enjoyable a recreational activity as operating a model aircraft, or taking its picture, from the ground perspective.³ We also believe that dividing the recreational category by this arbitrary criterion will create confusion among hobbyists without any added safety benefit. The last few years have seen the emergence of organizations that bring together enthusiasts who use camera-equipped UAVs for recreational purposes, such as the international Drone Users Group Network.⁴

As to Approach 1, although DJI prefers it to Approach 2, we would discourage an approach that would, perhaps inadvertently, subject children playing with small flying toys to aviation rules if they are not members of an organization. We kindly ask for clarification of criteria with respect to the term "aeromodelling organization" as well as what is meant by "members in good standing" and "safety program." We note that one benefit of a minimally-burdensome Very Small UAV category is to provide a default framework for recreational use of the smallest category of UAVs, for those who are not able to join MAAC or who may not even be aware of its existence.

D. Airworthiness and Design Standards

DJI supports Transport Canada's proposal that UAVs not be subject to type certificates, production approvals or certificates of airworthiness. These technologies are being developed too rapidly for the application of traditional aircraft production standards, and the risks to life and property are dramatically lower because no one is on board.

With respect to design standards, DJI is strongly supportive of the implementation of a design standard in place of any more restrictive regulatory regime, if those are the only two options. In our view, a simple design standard should be set out for "limited" operation UAVs, and no design standard should be required for Very Small UAVs that weigh 2 kg or less which are essentially consumer (or "prosumer") products. If a design standard is implemented, we support the concept that manufacturers self-declare compliance rather than await regulatory review or approval of designs. However, it is important to us that any requirements developed by the Working Group be consistent with international standards, including the absence of such requirements in other jurisdictions, so that manufacturers like DJI are not placed in a position of having to meet different -- and potentially incompatible -- standards in different jurisdictions.

While we are supportive of establishing a design standard for more complex operations and heavier UAVs, we require additional information, beyond the bullet list provided in the NPA, to make a complete assessment of the burdens and achievability of proposed standards. Any standard that is developed should

³ On a personal note, I submit this observation as a model aircraft enthusiast with over 20 years of experience, who now enjoys all aspects of this dynamic hobby, including traditional fixed-wing model aircraft, FPV piloting, and camera-equipped multirotor models.

⁴ In the event a data collection distinction of this kind is to be made, we support Transport Canada's recognition that first person view (FPV) operations are distinct from data acquisition, and that FPV piloting is squarely a part of the model aviation hobby today.



reflect the unique aspects of UAV platforms and take into consideration the rapid pace of technological improvement. We also are not sure what to make of the indicated "guiding principle" that "the probability of a hazardous failure condition (i.e. one that may result in no more than a single fatality) must not be greater than extremely remote." (NPA page 18) Because nobody is on board a UAV, we believe the probability of such an occurrence, if related to a design issue, is already extremely remote, particularly when an operation is conducted pursuant to regulatory operational standards.⁵ This makes the standard suggested by the principle more difficult to measure, because it must account not only for the probability of a catastrophic failure (which would always be fatal for a manned aircraft), but also the location in which the UAV is operating, and proximity to persons or manned aircraft who would be put in harm's way by that failure. Unmanned aircraft should not have to meet the same standards as manned aircraft, because of the absence of any person on board. We would be happy to work with the Design Working Group on developing appropriate design standards for this technology.

E. Foreign Operators

We support allowing operations by non-Canadian citizens/corporations, especially within the Very Small UAV category. We note that international meetings, competitions, and other events are now being held worldwide (such as "drone racing") and are of growing interest to both the recreational and commercial communities. We encourage Canada to continue to be receptive to innovators who would like to share their skills, talent, and inventions with Canadians, by recognizing and cross-honoring operators who hold authorization from peer countries.

* * *

We note on page 2 of the NPA that you indicate an interest in collaborating with key industry partners. We share that interest and hope that you will let us know if we may ever be of assistance in these endeavors. Thank you again for your thoughtful consideration of our comments.

Respectfully,

Brendan M. Schulman, Esq.
Vice President of Policy & Legal Affairs
Brendan.Schulman@DJI.com

Enclosure

⁵ We are not aware of any multirotor UAV fatality anywhere in the world despite what must be tens of millions of operations to date.