International Civil Aviation Organization

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WORKING PAPER

ASSEMBLY — 40TH SESSION

EXECUTIVE COMMITTEE

Agenda Item 26: Other high-level policy issues to be considered by the Executive Committee

AUTOMATED FORMATION FLIGHT

(Presented by the International Coordinating Council of Aerospace Industries Associations (ICCAIA))

EXECUTIVE SUMMARY

Reduction of environmental footprint is key for the commercial aviation community. Significant technical progress has been made since 2000. Today, automated formation flight operations in cruise applied to civil aircraft is one of the most promising ways to reduce fuel burn.

To standardize automated formation flight operations and considering the timeframes for standardizing new systems to be used in the aviation sector, long-term planning and engagement are required. In order to enable these operations, an active participation by the aviation regulatory authorities and industry in the national and international discussions and standardization activities is needed.

Action: The Assembly is invited to:

a) acknowledge the potential benefits of automated formation flight regarding reduction of the environmental footprint of the commercial aviation;
b) request that ICAO further liaise with industry in order to establish an inclusive dialogue at the strategic level that will encourage further collaboration in this area; and
c) request ICAO to explore the options for allowing industry, and other stakeholders, to address the demand for new provisions that would support the implementation of automated formation flight.

Strategic Objectives:	This working paper relates to all Strategic Objectives.
Financial implications:	The activities referred to in this paper will be subject to the resources available in the 2020-2022 Regular Programme Budget and/or from extra budgetary contributions.
References:	Doc 10115, Report of the Thirteenth Air Navigation Conference (AN-Conf/13), Corrigenda Nos. 1 and 2, and Supplement No. 1. Doc 10075, Assembly Resolutions in Force (as of 6 October 2016)

[1] Arabic, Chinese, English, French, Russian and Spanish versions provided by ICCAIA.

1. INTRODUCTION

1.1 Reduction of its environmental footprint is key for the commercial aviation community. Significant technical progress has already been made in new aircraft designs that are quieter and that burn less fuel per passenger kilometre, resulting in lowering emissions. However, there is an unexplored field of optimization in operation design.

1.2 Automated formation flight operations in cruise applied to civil aircraft allow significant fuel burn savings and associated CO2 emission reduction without additional ground infrastructures or aircraft sensors. The automated formation flight concept is inspired by the V-shaped formations of migrating geese, who have naturally found a way to save energy whilst flying long distances.

2. DISCUSSION

2.1 The value of automated formation flight is linked to the local fuel savings obtained for the follower aircraft while surfing the vortex. The principle relies on harvesting a part of the energy from the wake vortex generated by a leading aircraft, by actually surfing it. Whilst wake turbulence is commonly considered as a threat for commercial airplanes, this concept aims at taking benefit from the energy contained in trailing vortices, without compromising safety (which is paramount). Thus, positioning a trailing aircraft in a right way in the area where the vortex pushes air upward enables the trailing aircraft to save over 10% fuel.

2.2 A new end-to-end operational concept has to be developed to ensure seamless integration of automated formation flight operations in the air traffic management environment and airspace users' operations. New separation schemes have to be introduced to update current Standards in cruise whatever the airspace environment. These Standards will need to continue evolving over the next ten years. The automated formation flight concept also requires the use of specific procedures and reduced separations to manage the formation. The new operations and procedures related to Automated Formation Flight, in particular for the separation within the formation and with surrounding traffic, will have to be developed within that timeframe.

2.3 At aircraft level, airborne functions are developed to automatically position and maintain the trailing aircraft in the optimum position near the vortex generated by a leader aircraft, while guaranteeing a protection with regard to wake vortex encounter and mid-air collision risks. Those airborne systems have to be interoperable to enable automated formation flight with different aircraft manufacturers. Finally, automated formation flight operations needs to be based on a collaborative approach between airspace users, urging again for standardization.

2.4 Development of International Standards and Recommended Practices (SARPs) to support automated formation flight will require significant work through multiple ICAO Technical Panels. Given the current ICAO work priorities and resources available during the next triennium, new and innovative work processes involving the engagement of industry groups to advance the work should be considered. This approach has precedent in other United Nations bodies. For instance, the International Telecommunications Union (ITU) employs a variety of focus groups to undertake additional work for expeditious development of Standards in defined areas. These bodies are ultimately responsible to a specific area of ITU but have a high degree of freedom in determining appropriate working methods, types of outputs, membership, financing, and administration.

3. CONCLUSION

3.1 Automated formation flight operations offer yet an additional means to improve capacity and efficiency while lowering the environmental impact of international civil aviation. To develop the use of automated formation flight operations and ensure interoperability, it is necessary for ICAO to develop SARPs. However, it is recognized that given the Organization's resource limitations and current working processes, it is expected that the work in automated formation flight operations could experience significant delays. New frameworks are needed to permit increased collaborative frameworks and new partnerships between States and industry to advance innovative technologies in a timely basis.

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