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COMMITTEE A

Agenda Item 5: Emerging issues
5.5: Other emerging issues impacting the global air navigation system including unmanned aircraft systems (drones), and supersonic and commercial space operations

EMISSIONS FROM SUPERSONIC AEROPLANES

(Presented by Austria on behalf of the European Union and its Member States[1], the other Member States of the European Civil Aviation Conference[2] and the European Organisation for the Safety of Air Navigation (EUROCONTROL))

EXECUTIVE SUMMARY

This paper presents the European views on civil supersonic aeroplane projects. While the Committee on Aviation Environmental Protection (CAEP) is developing environmental Standards and Recommended Practices (SARPs) for supersonic aeroplanes, AN-Conf/13-WP/13 invites ICAO and regulators to engage their regulatory mechanisms to ensure that the necessary policies are in place before supersonic operations become regular again. However, the environmental impact of this type of aviation remains a major concern in Europe and a challenge that must be overcome before considering their introduction into the global air navigation system.

1. INTRODUCTION

1.1 Considering that supersonic aeroplane projects could come to fruition as early as 2022, the ICAO's Committee on Aviation Environmental Protection (CAEP) is in the process of developing environmental standards and recommended practices (SARPs) that are intended to enable supersonic aeroplane flights in ICAO Member States. The Authors of this paper welcome this effort forming part of challenges for the introduction of future supersonic aeroplanes in global aviation.

1.2 While the standard setting process is ongoing, AN-Conf/13-WP/13 right now invites regulators to implement their respective regulatory mechanisms to ensure that the necessary policies are in place before supersonic aircraft operations become regular again.

[1] Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

[2] Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Iceland, Republic of Moldova, Monaco, Montenegro, Norway, San Marino, Serbia, Switzerland, The former Yugoslav Republic of Macedonia, Turkey and Ukraine.

1.3 The Authors of this paper would like to share their opinion on the standard setting challenges to be overcome and, more broadly, on the public acceptability of supersonic aeroplane projects.

2. NOISE OF SUPERSONIC AEROPLANES

2.1 In September 1968, the Sixteenth Session of the ICAO Assembly adopted Resolution A16-3 which is based on two main recitals: (i) the problem of aircraft noise in the vicinity of many of the world's airports is so acute that public reaction is growing to the point of causing serious concern and requiring an urgent solution, (ii) the introduction of new aeroplane types could increase and aggravate this noise unless measures are taken to improve the situation.

2.2 Standards and Recommended Practices (SARPs) relating to aircraft noise were first adopted in 1971 pursuant to the provisions of Article 37 of the Convention on International Civil Aviation (Doc 7300). They were developed in the light of the subsonic aircraft fleet in service to improve their environmental footprint and thus improve the public acceptability of air transport. These first SARPs set noise levels not to be exceeded that reflect the level of aircraft technology being planned at that time. Since then, the standard development has been following technological improvements and gradually more stringent limits for newly designed aircraft have been established. These new limits are therefore implicitly associated with aircraft noise levels that the public now agrees to accept.

2.3 The authors of this paper consider that supersonic aeroplane projects should not be noisier than current and future subsonic aircraft in landing and take-off (LTO) operations. Indeed, over the past 50 years, the aviation sector has made considerable efforts to reduce noise pollution around airports. Granting less stringent noise limits would be a step backwards and would run the risk of extending dissatisfaction to all air transport. Beyond that, aviation's "license to grow" as a whole would be at stake if less stringent noise limits would be put in place for supersonic aeroplanes. Social acceptance of air transport and its development are linked to noise limits in force, which must be maintained whatever the aircraft type. The standard setting process cannot, therefore, be entirely separated from the political reality. In fact, CAEP receives its remit from the Council and Assembly and has a clear political direction from Assembly Resolution A39-1 to "take due account of the problems which the operation of supersonic aircraft may create for the public". Political realities and non-technical factors therefore have and will rightly continue to set the context within which the technical work of CAEP is conducted.

2.4 Early evidence available indicates that supersonic aeroplane projects will not be able to meet current noise limits of subsonic aeroplanes due to criteria that designers have set themselves while detailed information on HISAC (environmentally-friendly HIgh Speed AirCraft) preliminary study presented at the ICAO/CAEP/WG1/LTO Workshop#5, in Washington, 30 April to 4 May 2018, indicate that it could be possible to design a supersonic aeroplane that meets maximum permitted noise levels for subsonic aeroplanes, even with conventional engines. The authors of this paper are of the opinion that internationally agreed environmental certification Standards are essential for the sustainable development of the aviation sector. Past development of subsonic noise standards has been effective at ensuring public acceptability of subsonic aircraft operations as one element contributing to the balanced approach to noise management. Therefore, the adoption of standards that would allow higher noise levels than subsonic aircraft does not guarantee the public acceptability of supersonic aeroplane projects in Europe. Such a situation would inevitably call into question the purpose of ICAO Standards.

2.5 At the 39th ICAO Assembly, the importance of ensuring that no unacceptable situation for the public is created by sonic boom from civil supersonic aeroplanes in commercial service was reaffirmed[3].

2.6 With regard to sonic booms that would be perceived on the ground when the aircraft reaches and also maintains a supersonic speed over populated lands, pursuant to 39th Assembly Resolution A39-1, ICAO is attempting to reach international agreement on the definition of the expression "unacceptable situations for the public" and the establishment of the corresponding limits. Technical evidence shows that during the acceleration phases sonic boom levels will be of the same magnitude as those previously produced by Concorde in cruise. Such sonic boom levels led to the prohibition to fly at supersonic speeds over inhabited territories. As regards the cruise phase, the authors of this paper consider that perception of sonic booms in populated areas would constitute a new form of nuisance, whatever their intensity.

2.7 Currently there are no civil supersonic aeroplanes operating commercially anymore and new market opportunities for supersonic aeroplanes must be assessed in light of their scope, quantity and effects on the environment. In this context, the European RUMBLE program contributes to the CAEP work. According to the CAEP work program, assessment of sonic boom public acceptance is expected by 2025, since it requires a low boom demonstrator aeroplane.

3. EMISSIONS AND CLIMATE IMPACT OF SUPERSONIC AEROPLANES

3.1 The provisions of Annex 16 — *Environmental Protection*, Volume II — *Aircraft Engine Emissions*, Chapter 3 applicable to supersonic aeroplanes emissions are outdated and need to be revised to avoid certifying a new product to this regulation and to provide an incentive to fit aeroplanes with best available environmental technology.

3.2 As for CO_2 emissions, since ICAO adopted a global Standard limiting emissions of subsonic jet aeroplanes, it seems to be essential to also subject supersonic aeroplanes to a standard, particularly as this new class of aircraft will have significantly increased fuel burn and therefore CO_2 emissions on both a per aircraft and per passenger basis, compared to existing aircraft. The absence of a Standard would place supersonic aeroplanes in a situation of unfair competition.

3.3 In addition, the full climate impact of supersonic air transport is likely to be different to subsonic aircraft, due to the higher altitudes at which these aircraft would operate. This includes impacts of particulates and NOx on stratospheric ozone depletion and ultraviolet radiation. The science of these effects is not well understood but represents an additional climate impact compared to subsonic aircraft.

3.4 The authors of this paper consider that the set of supersonic Standards under development should provide a consistent regulatory framework for environmentally friendly civil supersonic airplanes.

4. CONCLUSION

4.1 The environmental impact of civil supersonic aeroplane projects remains a major concern. The adoption of certification standards that would allow higher noise levels than those for

[3] Assembly Resolution A39-1 Appendix G.

current and future subsonic aeroplanes does not guarantee the public acceptability of supersonic aeroplane projects in Europe. The authors of this paper consider that the environmental impact must be addressed holistically for noise and emissions before considering the introduction of supersonic aeroplane projects into the global air navigation system.

4.2 In doing so, ICAO cannot divorce itself from the political context. The political realities outlined above have and will rightly continue to set the context within which the technical work of CAEP is conducted.

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