



WORKING PAPER

ASSEMBLY — 39TH SESSION

TECHNICAL COMMISSION

Agenda Item 36: Aviation safety and air navigation implementation support

NEED FOR REVIEW OF CHAPTER 8, RUNWAY RUBBER REMOVAL IN THE AIRPORT SERVICES MANUAL (DOC 9137 — PART 2)

(Presented by India)

EXECUTIVE SUMMARY

Standards 2.9.2, 8.4.1 and 10.3.1 of ICAO Annex 14 – *Aerodromes* refer to the *Airport Services Manual*, Part 2 — *Pavement Surface Conditions* (Doc 9137) for further guidance on Runway Rubber Removal. Chapter 8 of Doc 9137 Removal of Rubber deals with means of rubber removal. Four methods of rubber removal are described in this chapter. More methods/equipment are now available and are used by various airport operators. Considered review of Chapter 8 of Doc 9137 for inclusion of all prevailing rubber removal methods along with advantages/ disadvantages will help airport operators select suitable method for their airport.

Action: The Assembly is invited to instruct the Council to review Chapter 8 of the *Airport Services Manual* (Doc 9137), Part 2 — *Pavement Surface Conditions*.

<i>Strategic Objectives:</i>	This paper relates to the Safety and Air Navigation Capacity and Efficiency Strategic Objectives.
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<i>Financial implications:</i>	Nil
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<i>References:</i>	Annex 14 – <i>Aerodromes</i> Doc 9137, <i>Airport Services Manual</i> , Part 2 — <i>Pavement Surface Conditions</i> Airport Cooperative Research Program (ACRP) Synthesis 11 on Impact of Airport Rubber Removal Techniques on Runways (2008), (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_011.pdf) Rubber Removal Techniques Technical Information Paper, JORDAN CIVIL AVIATION REGULATORY COMMISSION (2010), (http://www.carc.jo/pdf/Directorate-Airports-Safety-and-Standards-DASS/091829Rubber%20Removal%20Technique%20Information%20Paper.pdf)
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1. INTRODUCTION

1.1 ICAO Standards 2.9.2, 8.4.1 and 10.3.1 of Annex 14 — *Aerodromes* refer to the *Airport Services Manual*, (Doc 9137) (Part 2) for further guidance on Runway Rubber Removal. Chapter 8 of Doc 9137 Removal of Rubber deals with means of rubber removal. Four methods of rubber removal are described in this chapter:

- a) Chemical Solvents (CS);
- b) High Pressure Water Blasting (HPWB);
- c) Chemical Solvents (CS) and High pressure water blasting (HPWB); and
- d) Hot Compressed Air (HCA).

1.2 Method c) is a combination of method a) and b). Manually operated high pressure water cleaner and hot compressed air cleaner are covered under Mechanical Removal (8.3 of Doc 9137).

1.3 More methods/equipment are available for rubber removal and are being used by airport operators:

- a) Ultra High Pressure Water Blasting (UHPWB);
- b) Shot Blasting (SB); and
- c) Mechanical Process (Grinding, Milling, Wire Bristle brushing, Scraping, Sandblasting).

1.4 Chapter 8, Doc 9137 needs to be reviewed and updated for inclusion of available rubber removal methods.

2. DISCUSSION

2.1 Aircraft movement has more than doubled in past 15 years and will double the present numbers in another 15 years. There has been a considerable rise in the number of jet aircrafts and more wide body aircrafts are joining the fray. The airport infrastructure has not been able to keep pace with the rising demand and many runways around the world are handling one flight every 3 to 5 minutes. Many airport operators are resorting to restrict runway closure time for routine maintenance for 1.5 to 2 hours twice or thrice a week. Under such circumstances, rubber deposit is causing reduction in runway friction value very rapidly. Reduced friction value pose more threat to landing aircrafts in wet conditions that is more likely at airports located in coastal area where rains are frequent or in high rainfall area.

2.2 In the light of the above, following modifications are suggested:

Reference	Content of Doc 9137, 2002	Suggested modified content	Remarks
8.1.3	depending upon the type and volume of traffic, cleaning may be required twice a year	depending upon the type and volume of traffic, frequent cleaning may be required	As discussed in 2.1 above
8.1.4	Observed productivity of high pressure water blasting during normal working conditions indicate a rate of 278 m ² per hour per unit while cleaning	200 to 1200 m ² of area can be cleaned with use of high pressure water blasting depending upon thickness of rubber accumulation and equipment efficiency.	Output depends upon level of rubber accumulation.

2.3 Apart from above, the following rubber removal methods are also proposed to be included.

Ultra-High Pressure Water Blasting (UHPWB)

2.3.1 This equipment generates ultra-high water pressure ranging from 1000 to 2800 bar. It can consistently remove 100% of rubber build-up and pavement markings from pavements without disturbing the pavement micro or macro texture. Its computer controlled nozzle system applies very little water at very high pressure. Some units use only 2700 litres of water per hour while cleaning about 3700 m² of runway surface using 1.8 meter wide cleaning strip. With about 12000 liters fresh water storage capacity and 6000 litres debris tank capacity, it can work for about 4 hours, non-stop, and can remove rubber from about 15000 m² of runway surface. This enables an environment friendly and most effective maintenance for all kind of surfaces. Cost savings through larger rubber removal intervals without damaging or destroying the aggregates on the pavement surface result in an increased pavement life. This environment friendly system can be used in any weather conditions, except sub-zero temperature.

Shotblasting

2.3.2 In this process, normally steel abrasive particles are propelled through onto the runway surface that blasts away the contaminants. There are a number of different proprietary machines that range in pattern width from roughly 15 cm to 1.8 m. The process involves a system that vacuums the debris, separates the abrasive particles for recycling, and stores the resultant debris for disposal. This process is also referred to as “high-velocity impact removal” and “shot-peening.” On a non-grooved surface it collects the abrasive particles, loose contaminants and dust from the runway surface. The steel is then recycled for re-use. This method is mainly used for paint removal and the resurfacing and retexturing of pavement surfaces but can also be used for removal of rubber deposits. The operation is environmentally clean since it is self-contained and the equipment can be adjusted to produce the desired surface texture result. The output varies from 900 to 2700 m² per hour and method is environment friendly. This process cannot be used in wet conditions.

Mechanical removal

2.3.3 This process is defined as any mechanical form of rubber removal that is not covered in the previous methods. It includes grinding, milling, wire-bristle brushing, scraping with blades, and other mechanical means to remove rubber. “Sandblasting” is also included in this category to differentiate it from shotblasting.

2.3.4 Most mechanical methods literally remove a thin (3 to 5 mm) layer of pavement surface along with the rubber. They are, however, probably the least friendly toward grooved runway pavements, and the grooves often have to be redone to return to their “design depths of (6 mm) to effectively drain water from the surface”

2.4 All the above methods of rubber removal from the surface of the runway are being used by different airport operators. Each method has its own advantages but field experience has shown that if these methods are not properly applied, they can cause damage to the runways and especially to the grooves. Most of the equipment are proprietary and have their own standards and specifications.