



INFRAERO
A E R O P O R T O S

VII ALACPA Pavement Seminar & V FAA Airport Pavement Workshop

December/2010



PAVEMENT MAINTENANCE



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SUMMARY

1. Structure of INFRAERO;
2. Pavement Maintenance Process;
3. Legislation Procedure Applied to the Measurement of Friction and Macrotexture Runway;
4. Requirements and criteria applied in the macrotexture measuring;
5. Requirements and criteria applied in the measurements of Friction;
6. Requirements and criteria applied in the removal of rubber;
7. Investments;
8. Equipments to Maintenance and Monitoring Runways.

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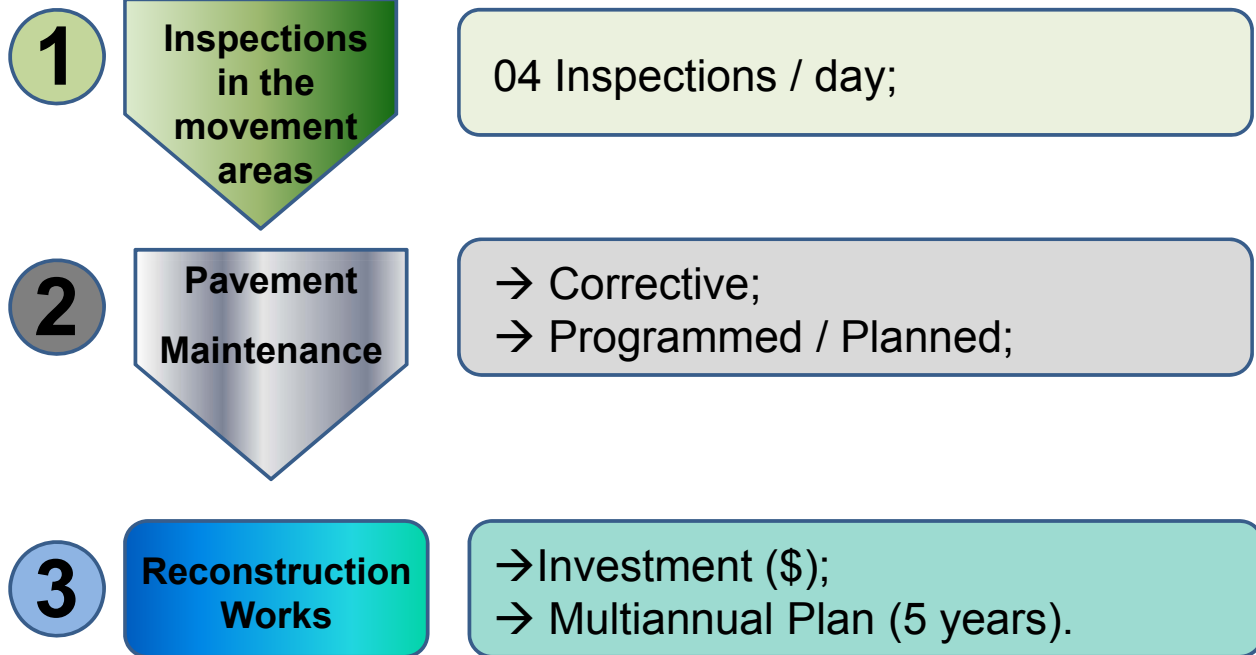
1. INFRAERO

(Empresa Brasileira de Infraestrutura Aeroportuária)

- Public company responsible for 67 airports administration (97% of regular air transport movement).
 - ↳ • More than 2 million takeoffs and landings per year;
 - Approx. 113 million PAX/year
- ✓ 79 Runway ($\pm 7.400.000 \text{ m}^2$);
- ✓ 400 taxiways ($\pm 3.500.000 \text{ m}^2$);
- ✓ 5.000.000 m^2 of paved apron;
- ✓ Total: $\pm 15.900.000 \text{ m}^2$.

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2. Pavement Maintenance Process



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2 Corrective Maintenance

- When: After Inspection – if necessary;
- How: Infraero / Contracted Services;
- Control: Maintenance Management System (SCOM-MÁXIMO).

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2 Programmed Maintenance

- Runway Rubber Removal;
- Measurement of Friction and Macrotexture;
- Engineering Maintenance Services (Repairs);
- Horizontal Signaling removal and painting.

→When: For Standard / Other Demands;

→How: Infraero / Contracted Services;

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3 Reconstruction Works

- Investment Review (\$) → SGP Tool (M&R x \$)

↳ Multiannual Plan (5 years)

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3. LEGISLATION APPLIED

Legislation Administrative (Law 8.666/93);

Legislações Técnicas:

- I. Civil Aviation instruction - IAC 4302 de 28.05.2001, do Civil Aviation Department (DAC);
- II. Resolution 88 de 11.05.2009, da National Agency of Civil Aviation (ANAC);
- III. Resolution 25 de 25.04.2008 (ANAC).

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4. CRITERIA AND REQUIREMENTS MACROTEXTURE

4.1 When measuring?

Answer: According to item 3.2.3 of the IAC 4302, the macrotexture should be measured where they are traded Friction Measurements.

THE IAC 4302 guides: Macrotexture ≥ 0.5 mm

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4. CRITERIA AND REQUIREMENTS MACROTEXTURE

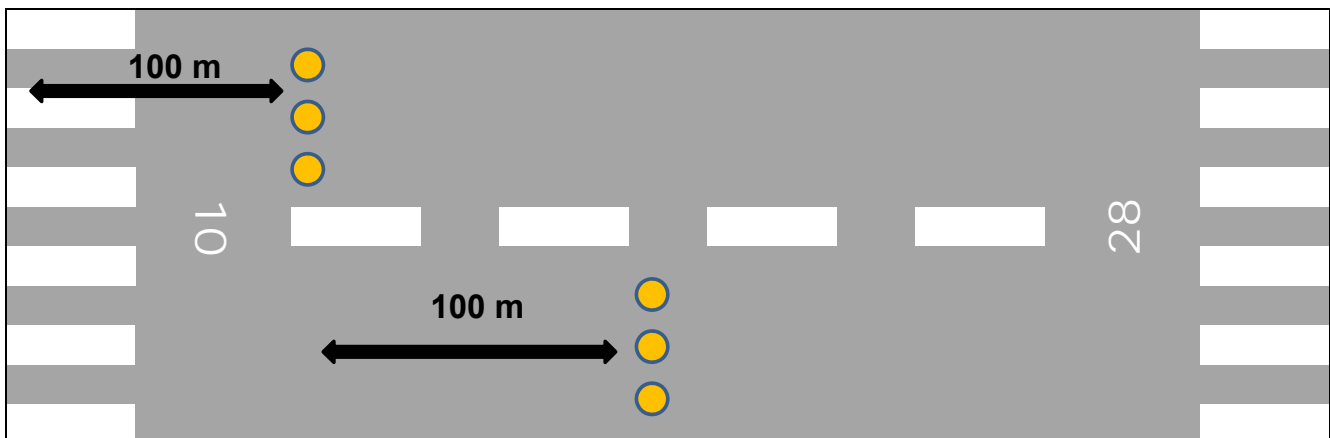
4.2 Macrotexture Measurement Methods

3.2.1 - Sand Patch Method;



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4. CRITERIA AND REQUIREMENTS MACROTEXTURE



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5. CRITERIA AND REQUIREMENTS OF FRICTION

Procedures regulated by Resolution 88 of the ANAC.

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5. CRITERIA AND REQUIREMENTS OF FRICTION

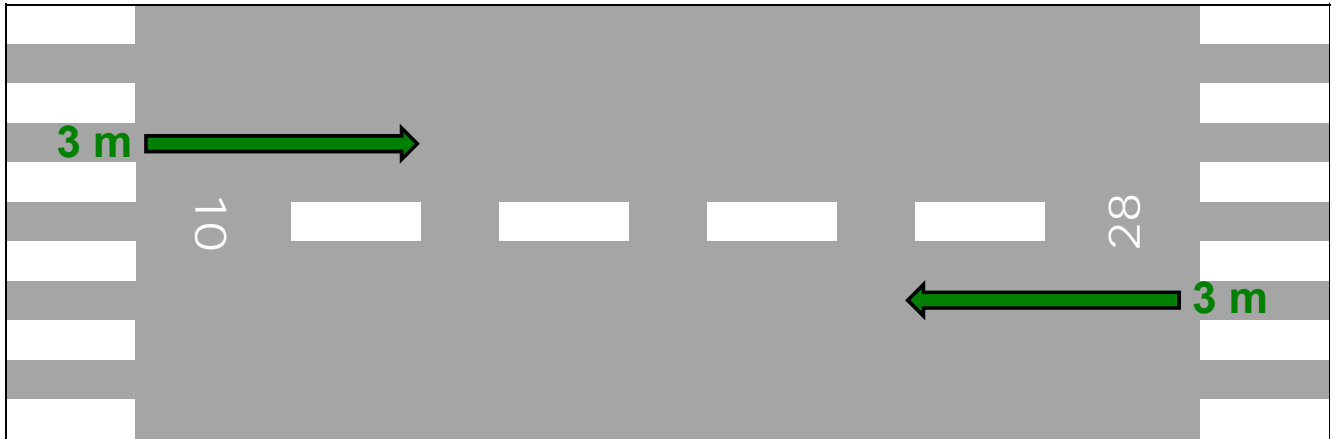
Resolution 88 ANAC: Minimum Parameters for Measuring Friction

Equipamento	Pneu		Velocidade de teste (Km/h)	Espessura da lâmina de água (mm)	Coeficiente de atrito mínimo			#
	Tipo	Pressão (KPa)			Pavimentos novos	Nível de manutenção	Nível aceitável	
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Mu-meter	A	70	65	1,0	0,72	0,52	0,42	1
	A	70	95	1,0	0,66	0,38	0,26	2
Skiddometer	B	210	65	1,0	0,82	0,60	0,50	3
	B	210	95	1,0	0,74	0,47	0,34	4
Surface friction tester vehicle	B	210	65	1,0	0,82	0,60	0,50	5
	B	210	95	1,0	0,74	0,47	0,34	6
Runway friction tester vehicle	B	210	65	1,0	0,82	0,60	0,50	7
	B	210	95	1,0	0,74	0,54	0,41	8
TATRA	B	210	65	1,0	0,76	0,57	0,48	9
	B	210	95	1,0	0,67	0,52	0,42	10
RUNAR	B	210	65	1,0	0,69	0,52	0,45	11
	B	210	95	1,0	0,63	0,42	0,32	12
GRIP TESTER	C	140	65	1,0	0,74	0,53	0,43	13
	C	140	95	1,0	0,64	0,36	0,24	14

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5. CRITERIA AND REQUIREMENTS OF FRICTION

Location of races in friction measurement

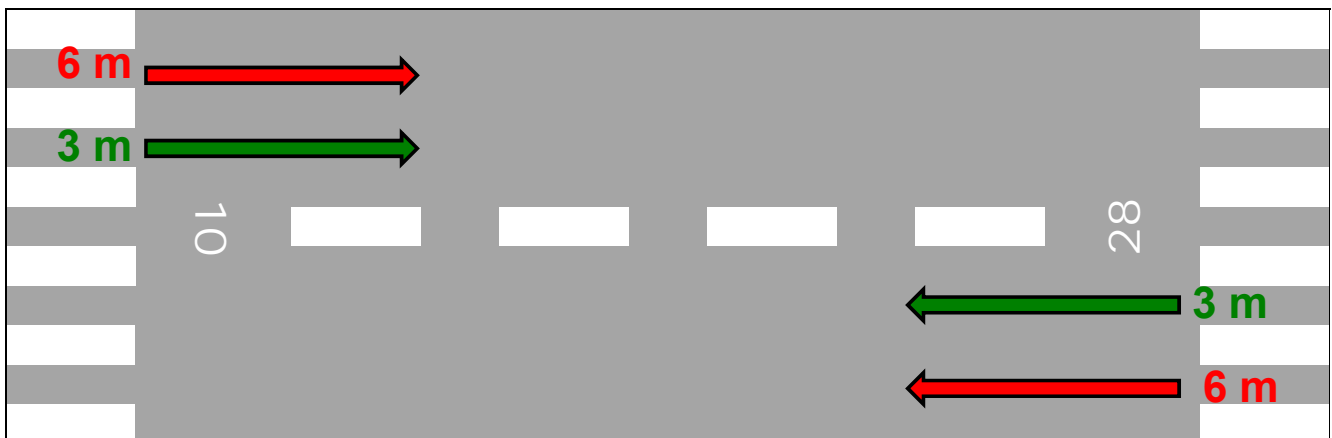


RUNWAY WITH AIRCRAFT TYPE A, B or C → A-320

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5. CRITERIA AND REQUIREMENTS OF FRICTION

Location of races in friction measurement



RUNWAY WITH AIRCRAFT TYPE D, E ou F

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5. CRITERIA AND REQUIREMENTS OF FRICTION

Frequency for friction Measurements

- Should be considered all the landings of all aircraft (except for rotary-wing aircraft).

#	Pousos diários de aeronaves na pista	Frequência mínima de medições de atrito
[1]	[2]	[3]
1	Menos de 15	Cada 12 meses
2	16 a 30	Cada 6 meses
3	31 a 90	Cada 3 meses
4	91 a 150	Cada 30 dias
5	151 a 210	Cada 15 dias
6	Mais de 210	Cada 7 dias

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6. CRITERIA AND REQUIREMENTS FOR REMOVAL OF RUBBER

Steps to achievement the Removal Rubber Service

- 1º Meeting with the airlines;
- 2º Elaboration of POOS (Operational Plan of Works and Services) to ANAC approval;
- 3º Request for issuance of NOTAM;
- 4º Horizontal Signaling interdiction / Displaced threshold;
- 5º Execution of rubber removal services.

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7. INVESTMENTS (2009-2011)

- Acquisition of 11 Rubber Removal Trucks
(R\$1.872.222,00 / Unit) → Total R\$ 20.594.442
(US\$ 12.000.000)

- Acquisition of 18 Friction measuring equipment
(R\$ 477.700,00 / Unit) → Total R\$ 8.598.600
(US\$ 5.000.000)

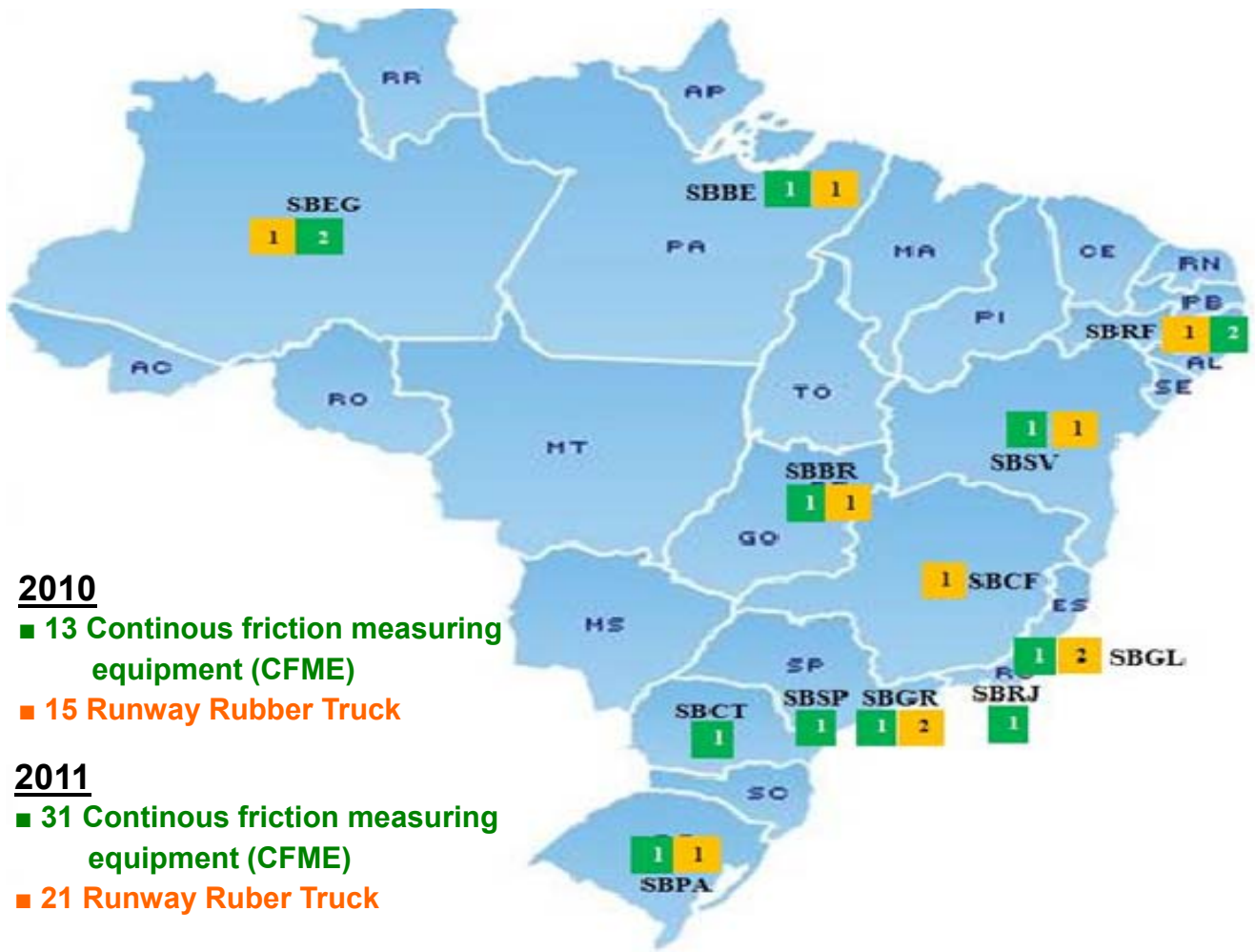
- Pavements (Investments until 2014): R\$ 1.600.000.000
(US\$ 940.000.000)

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8. EQUIPMENTS TO MAINTENANCE AND MONITORING OF RUNWAY

- Measurement of Friction;

- Removal of Rubber.



8. EQUIPMENTS TO MAINTENANCE AND MONITORING OF RUNWAY



MuMeter MK-6



ASFT (T-10)

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8. EQUIPMENTS TO MAINTENANCE AND MONITORING OF RUNWAY



Skiddometer (BV-11)



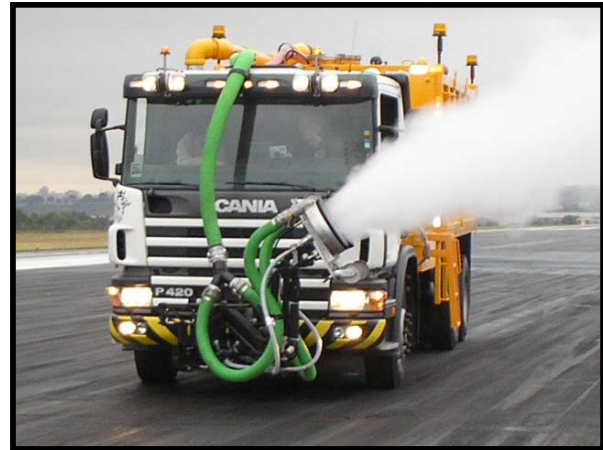
Grip Tester

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8. EQUIPMENTS TO MAINTENANCE AND MONITORING OF RUNWAY



LAVRITA Truck



RUCKER Truck

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THANK YOU !