



Existing and Potential Maintenance Techniques for Low-Volume/Municipal Airport Runways

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Outline

- Low-volume/municipal airport
 - *Isolated location challenges*
- Airport runway pavements
 - *Loading characteristics*
 - *Other particularities*
- Typical degradations of runway pavements
- Maintenance techniques
 - *Existing*
 - *Potential*

Burlington Airpark Airport



Dawson City Airport



Alert, NU



Alert, NU

Dawson City, YT

Burlington, ON



Isolated Location Challenges

- Mobilization challenges
 - *Sea, air, ice road, long haul, rough access road*
- Small communities
- Harsh
 - *Short construction season*
 - *Permafrost challenges*
- Limited resources
 - *Equipment availability*
 - *Lack of materials*
 - *Work force*
 - *Contracted maintenance*

ANY ROUTINE TASK BECOMES DIFFICULT

EVERYTHING LEADS TO EXTREME COSTS

Loading Characteristics

Roadway pavement	Runway pavement
Low lateral dispersion	High lateral dispersion
High volume of traffic	Low volume of traffic
Uniform low loading	Low to very high loading
Low tire pressure	High to very high tire pressure
Uniform intermediate speed	High and low speed

Other Particularities

Roadway pavement	Runway pavement
Smoothness	
Comfort	Safety
Surface friction	
Stone polishing	Rubber deposits
Maintenance/Rehabilitation Work	
Low impact	Major constraints

Typical Degradations

- Loading
 - *Shearing*
 - *Rutting*
 - *Point loading*
- Climate
 - *Aging (durability)*
- Traffic
 - *Friction lost*



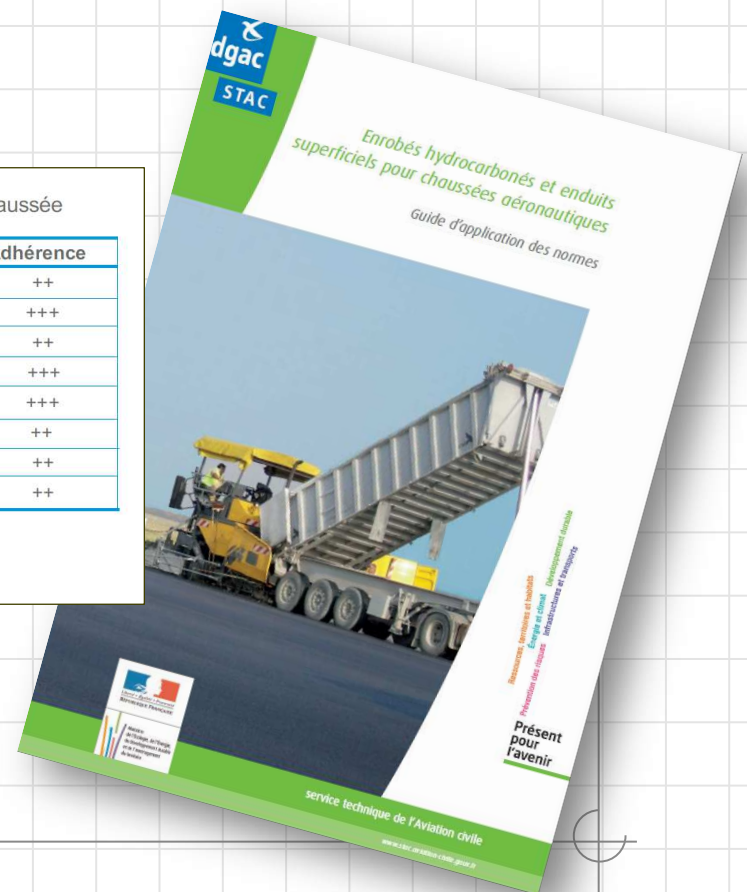
Typical Degradations

Tableau 3 – Appréciation du niveau d'agression et de la qualité des caractéristiques de surface d'une chaussée

		Cisaillement	Orniérage	Poinçonnement	Durabilité	Adhérence
Aire de stationnement		++	+++	+++	++	++
Piste	Partie courante	+	+	+	++	+++
	Raquette	+++	++	+	+++	++
	Sortie de piste	+++	+	+	++	+++
	Seuil de piste (*)	+++	+	++	+++	+++
Voies de circulation	Partie courante	+	++	+	++	++
	Raccordement	++	++	++	+++	++
Plate-forme ou aire d'attente		+	+++	+++	++	++

(*) Zone de toucher des roues incluse

+: Niveau faible
 ++: Niveau moyen
 +++: Niveau élevé



Typical Degradations

Pavement/Mode		Shearing	Rutting	Puncturing	Durability	Friction
Aprons		++	+++	+++	++	++
Runway	Main	+	+	+	++	+++
	Turning zone	+++	++	+	+++	++
	Exit	+++	+	+	++	+++
	Threshold & Touchdown	+++	+	++	+++	+++
Taxiway	Main	+	++	+	++	++
	Intersections	++	++	++	+++	++
Holding areas		+	+++	+++	++	++

Maintenance Techniques

Tableau 9 – Produits utilisables en couche de roulement

Ouvrage / Section d'ouvrage		NS 1	NS 2	NS 3	NS 4
Aire de trafic		EB-BBA 2, ESU, ECF, EP, EB-BBM 1	EB-BBA 3, EB-BBM 2 EB-BBME 1, EP	(***) EP ⁽¹⁾	(***) EP ⁽¹⁾
Piste (*)	Partie courante	EB-BBA 1, EB-BBM A1, EB-BBM B1, BBTM	EB-BBA 1, EB-BBM A2, BBTM	EB-BBA 2	EB-BBA 2
	Raquette		EB-BBA 2, EB-BBME 1	EB-BBME 2 ⁽²⁾	EB-BBME 3 ⁽²⁾
	Sortie/Entrée de piste		EB-BBA 2, EB-BBM A2	EB-BBA 3 EB-BBME 2	EB-BBA 3
	Seuil (**)		EB-BBA 2, EB-BBM A2	EB-BBA 3 ⁽²⁾	EB-BBA 3 ⁽²⁾
Voies de circulation	Partie courante	EB-BBA 1, ECF, EB-BBM B2, BBTM	EB-BBA 2, EB-BBM B3, BBTM	EB-BBA 2, EB-BBME 1	EB-BBA 3, EB-BBME 2
	Raccordement		EB-BBA 2, EB-BBM B3	EB-BBA 3, EB-BBME 2	EB-BBA 3, EB-BBME 2
Plate-forme ou aire d'attente		EB-BBA 1, ECF, EB-BBM B2, BBTM	EB-BBA 3, EB-BBM B3	EB-BBME 3	EB-BBME 3

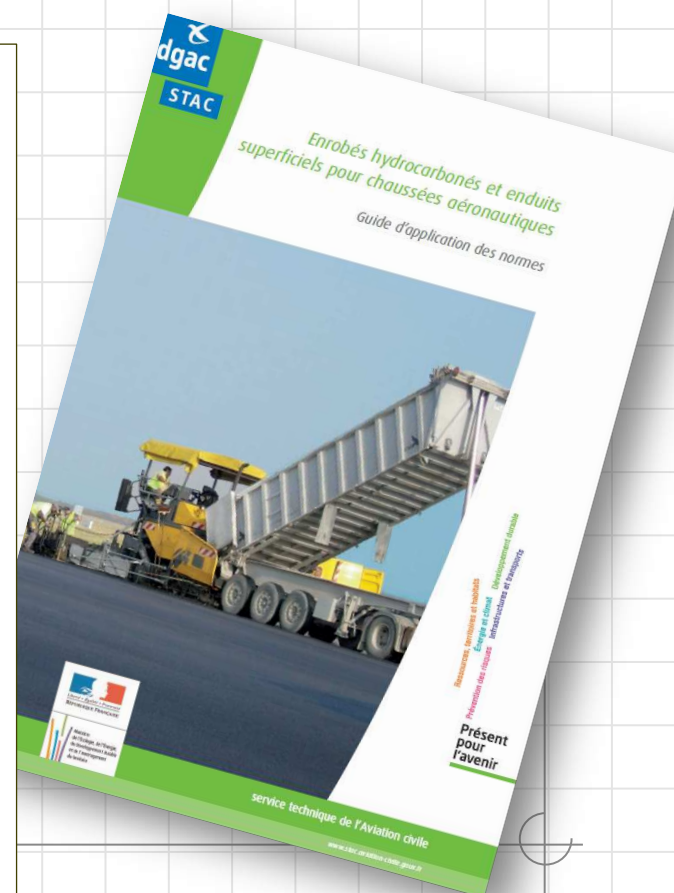
(*) L'utilisation de l'EB10-BBA C est à proscrire (rugosité géométrique assez faible).

(**) Sur les bases militaires, les avions de chasse peuvent provoquer des dégradations sur les chaussées en enrobés (brûlures superficielles/déversement d'hydrocarbure) : une chaussée en béton de ciment est préconisée.

(***) Sur les aires de trafic où les risques de poinçonnement sont importants, la réalisation d'une chaussée en béton de ciment est fortement recommandée.

(1) Son emploi est lié au support (couche de base) qui doit présenter un haut module de rigidité (par exemple structure semi-rigide ou bitumineuse). En général, le support est composé soit d'une grave hydraulique, soit d'un enrobé à module élevé ou d'une grave bitume.

(2) Pour une meilleure résistance aux contraintes de cisaillement, il est préconisé un liant modifié.

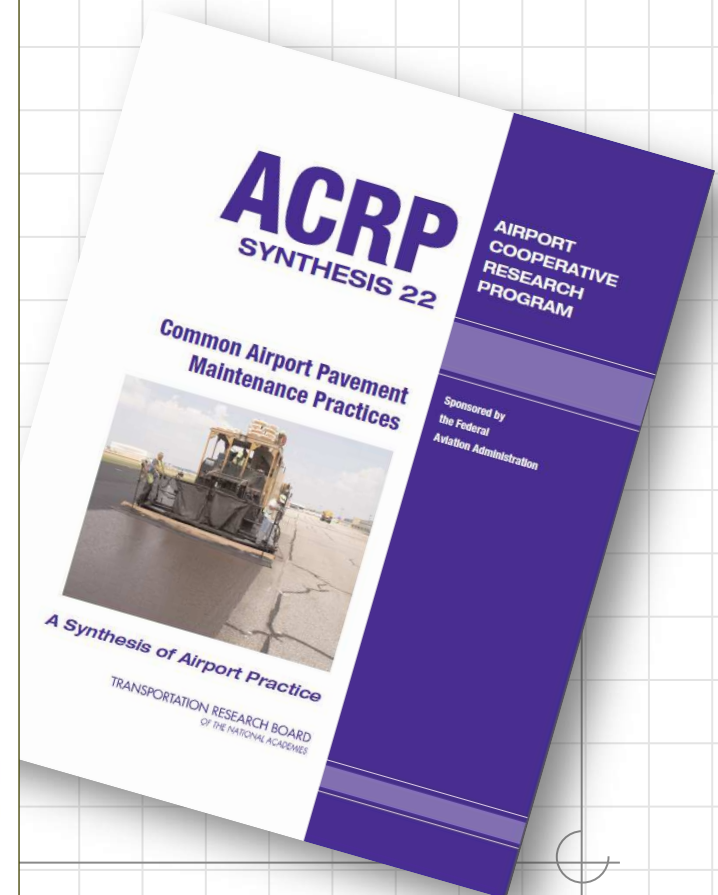


Existing Maintenance Techniques

TABLE 3
PAVEMENT PRESERVATION TREATMENTS FOR ASPHALT
CONCRETE PAVEMENTS

Treatment Type		Survey Result, %					
		Usage			Performance		
		Routine	Have Tried	Total	Very Good	Good	Poor
<i>Crack sealing with</i>	hot-poured sealant	84	11	95	19	71	10
	cold-applied sealant	9	7	16	17	66	17
<i>Small area (pothole) patching using</i>	hot mix	52	16	68	42	58	0
	cold mix	43	18	61	13	50	37
	proprietary mix	9	11	20	25	50	25
<i>Spray patching (includes manual chip seal)</i>		5	7	11	0	100	0
<i>Machine patching with AC</i>		27	14	41	39	55	6
<i>Milling and machine patching with AC</i>		34	18	52	39	61	0
<i>Texturization using</i>	fine milling	7	5	11	20	80	0
	controlled shot blasting	0	16	16	0	71	29
<i>Rejuvenators, fog seals, etc.</i>		30	23	52	23	59	18
<i>Surface treatment</i>		15	18	43	6	81	13
<i>Slurry seal</i>		23	25	48	10	75	15
<i>Microsurfacing</i>		2	9	11	25	75	0
<i>Hot-mix overlay</i>		45	23	68	48	48	4
<i>Milling and hot-mix overlay</i>		45	18	64	58	42	0
<i>Hot in-place recycling</i>		5	2	7	N/A	N/A	N/A
<i>Cold in-place recycling</i>		2	0	2	N/A	N/A	N/A
<i>Whitetopping (PCC overlay)</i>		7	7	14	60	20	20

Notes: Treatments traditionally considered preventive maintenance treatments are in italics.
N/A: sample size is too small.



Slurry Surfacing

- Micro-surfacing
- Slurry seals
- Design factor
 - *Quick wear*



Surface Seals

- Fog seals
- Rejuvenating seals
- Design factor
 - *Friction lost*



Surface Treatment (Seal Coating)

- Chip sealing
 - *Multiple systems*
- Graded-aggregate sealing
- Design factor
 - *Aggregate wipe-off*

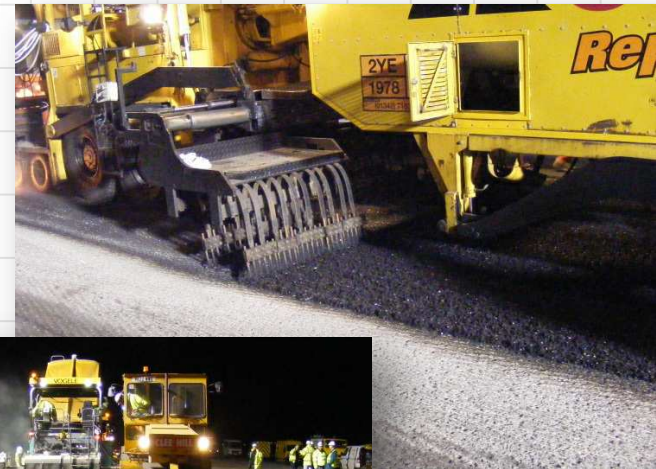


Types of Surface Treatments

<i>Systems</i>	<i>Aggregate</i>	
	<i>Chip Seals</i>	<i>Graded-Agg. Seals</i>
<i>Single layer</i>	<i>Single</i>	<i>Single</i>
<i>Multiple layer</i>	<i>Racked-in</i> <i>Double</i> <i>Sandwich</i> <i>Cape seal</i> <i>Triple</i> <i>Sandwich /double</i> <i>Inverted (double)</i>	<i>Double</i>
<i>Options</i>	<i>Fibre-reinforced (FiberMat)</i> <i>Pavement fabric reinforcement</i> <i>Flush, scrub and fog seals</i>	

Hot In-place Recycling

- Surface recycling
- Remixing
- Repaving



Hot Mix Overlay

- Resurfacing
- Milling and overlay



Potential Maintenance Techniques

- SAMI Systems
- High modulus asphalt concrete
 - *EME & BBME*
- Fog/flush seals
 - *Rejuvenators*
- Fuel resistant techniques
 - *Slurry surfacing*
 - *Asphalt concrete*
 - *Resin based surface treatments*
- Dust control systems



Engineering Challenge

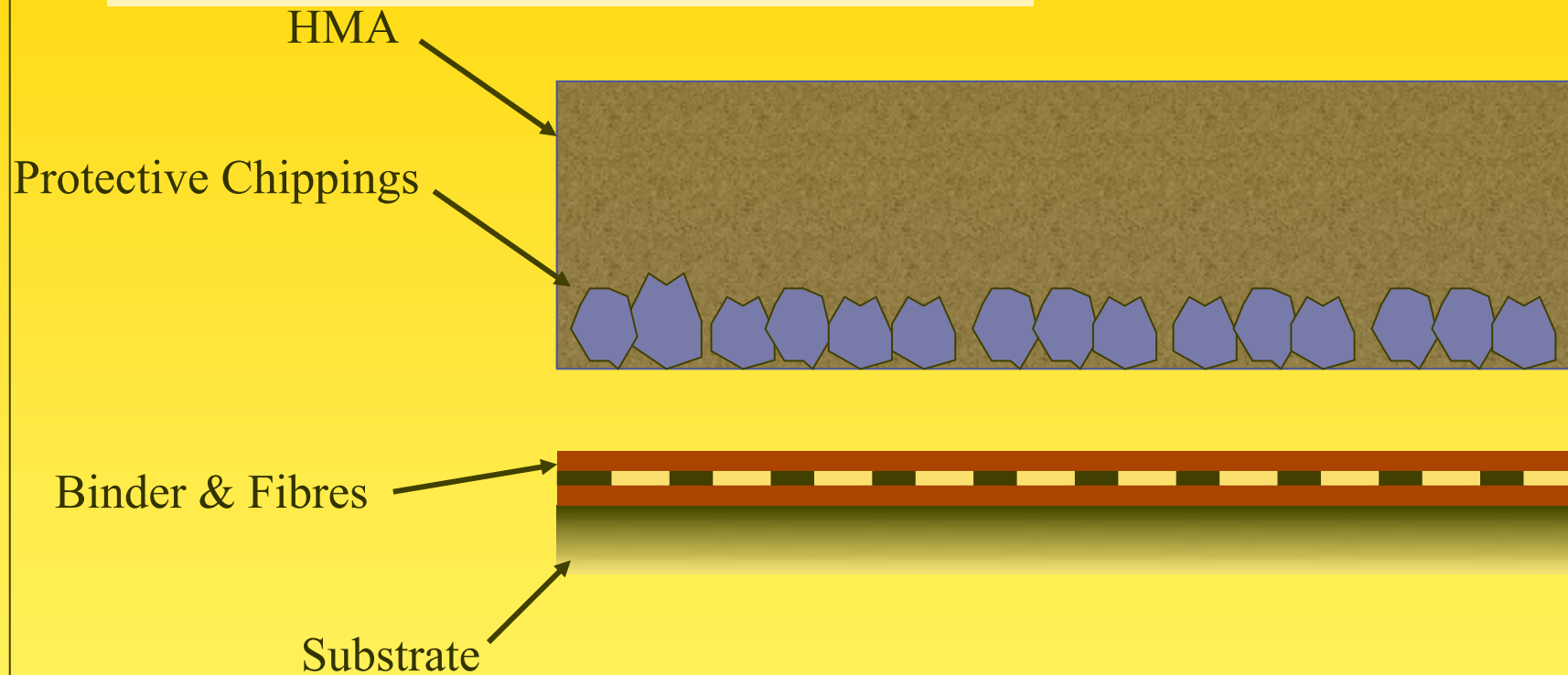


SAMI Systems

- Fibre-related systems
 - *Slurry surfacing*
 - *Chip seals*
- Fibreglass meshing
- Sand asphalt



Fibre-Modified System



Fibre-reinforced bond coat with protective chippings - SAMI

Fibre-Modified System



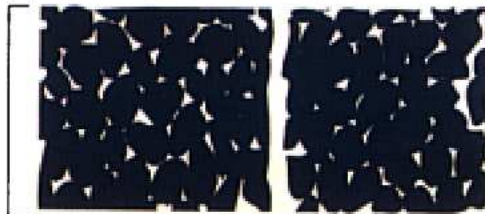
Sand Asphalt Interlayer

WITHOUT SAFLEX AF

cracked
wearing
course

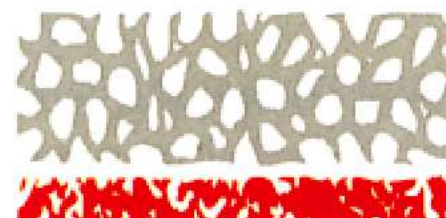


cracked
road base
course



WITH SAFLEX AF

(1.5 cm to 2 cm)



cracked
wearing
course
SAFLEX

cracked
road base
course



Fibreglass Meshing



Fuel Resistant Techniques

- Asphalt concrete
 - *Low porosity mixture*
 - *Modified binder*
- Surface coating system
 - *Resin-based*
 - *Emulsion spray seal*
 - *Slurry surfacing*

BBSG 0/10 au bitume pur



COLNAK 0/10



on dans le kérosène

Dust Control System

- Water absorbing
 - ...chloride
- Petroleum-based
- Organic non-petroleum
 - Lignin derivatives
 - Tall-oil derivatives
 - Vegetable oils
- Others
 - Electrochemical
 - Synthetic polymer
 - Clay additives

