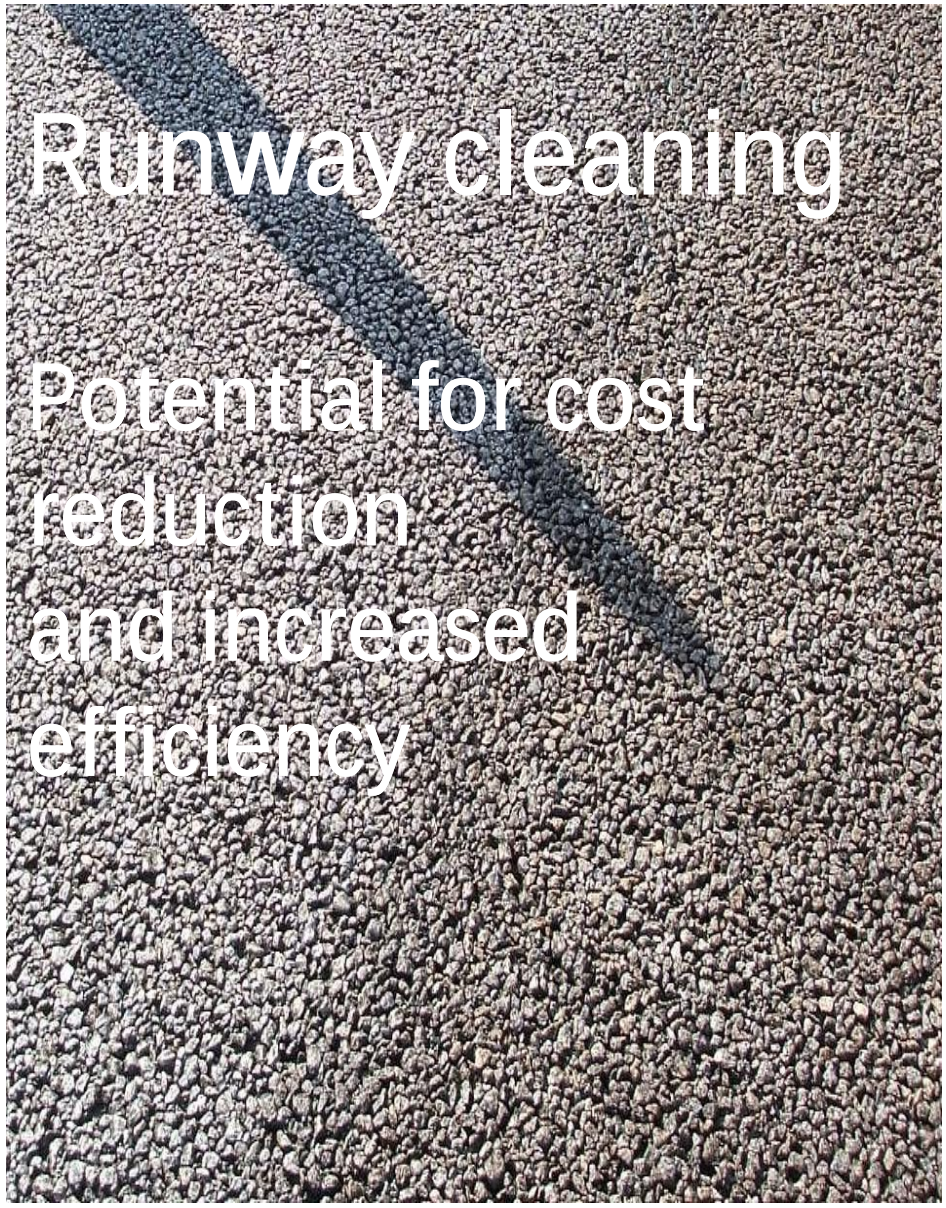


Airfield Engineering and Asset Maintenance 2012

HONG KONG, 21 JUNE 2012

GERD HEINRICH
DIRECTOR SALES

WEIGEL TRACKJET COMPANY
GERMANY

The reason why...

Runway Excursions

Landing incidents on wet or contaminated (reduced friction) runways are the second largest cause of incidents and accidents in aviation.*

* http://www.skybrary.aero/index.php/Portal:Runway_Excursion

Runway Condition Impact of Rubber Deposits

The build up of rubber deposits affects the friction level of the runway.

>>> Slippery surface in wet conditions.

-The number of landings

-The size of the aircraft

-The period between runway surface cleanings.

Aquaplaning speed

Aquaplaning speed is calculated
if you multiply the square root of the tire pressure by 9 i.e:

Aircraft	Aquapl. Speed	Touch down speed
B 727	117 kts.	111 – 122 kts.
Airbus 380	127 kts.	138 – 144 kts.

If the friction value is decreased by rubber by 0,01

you reduce...

...the runway available length by 70 meters

(LFV Teknik, Sweden)

Frequent Rubber Removal

is recommended by FAA-USA+ICAO

Number of daily turbojet aircraft landing per runway end	Suggested rubber deposit removal frequency
Less than 15	2 years
16 to 30	1 year
31 to 90	6 months
91 to 150	4 months
151 to 210	3 months
Greater than 210	2 months

In their advisory circular 150/5320-12C the U.S. Department of Transportation / Federal Aviation Administration recommends frequent rubber removal.

Supporting Organizations

- EUROCONTROL -- Runway Excursion Prevention Initiative in Europe
- IATA -- Runway Safety Initiative
- Schiphol Airport -- Airport Operators Role in preventing Rwy Excursions
- Gatwick Airport -- Friction Management at Gatwick Airport
- ACRP Synthesis 11 -- Impact of Airport Rubber Removal Techniques on Runways (Airport Co-operative Research Programm sponsert by FAA)
- Weigel Company -- PAVEMENT LIFE EXTENSION THROUGH UHWP PRESSURE for RETEXTURING ,RUBBER + PAINT MARKER REMOVAL, AGL cleaning, APRON cleaning needs (www.trackjet.de)
- http://www.trb.org/news/blurb_detail.asp?id=9944

How to remove rubber from a runway?

Chemical Removal Method

Chemical removal was the standard till environmental awakening of the 1960s

Advantages

- Min. potential for pavement damage due to softened rubber before removal
- Ability to use inhouse maintenance equipment and personnel
- Process speed (750 to 1600 m²/hour)
- Biogradable / environmentally-friendly chemicals

Disadvantages

- Possible pavement damage to asphalt pavement and grooves when „soap“ is removed
- Paint loss during rubber removal
- AGL damaged (UK CAA report)
- Environmental issues regarding disposal of waste water and dangerous influence on staff
- Damage to in-house equipment hoses, increased mechanical breakdowns
- Inability to reopen rwy in case of an emergency (6-8 hours closure reported)

Steel brushes

Advantages

- Improves surface friction by removing existing polished surface contaminants
- Can use existing sweepers with steel tipped brushes

Disadvantages

- Possible groove damage
- Damage to AGL
- Damage to paint markings
- Polishing of runway texture
- Environmental issues with appropriate disposal of residues
- Slow production rate
- FOD risk

Shot peening

Advantages

- Retextures the pavement in addition to removing rubber
- Process speed (900 – 2700 m²/hour)
- Ease of getting rubber removal equipment off the runway
- Environmentally compatible

Disadvantages

- Possible pavement/groove/paint damage to asphalt pavements
- Possible AGL damage
- FOD hazard owing to in asphalt embedded shots (USAF statement)
- Environmental issues with appropriate disposal of residue
- Process cannot be used in wet conditions
- Process cannot be used at high temperatures

High pressure water blasting

[600 – 1.500 bar]

Advantages

- Improved pavement friction
- Improved micro texture
- Retexturing possibility
- Environmental compatibility
- Equipment maneuverability i.e. RWY clearance below 3 minutes

Disadvantages

- Risk of pavement damage
- Damage to grooves
- No AGL cleaning
- No center line cleaning
- High water consumption
- High number of vehicles and personnel on runway

Usual UHP water jetting

[≤ 2.500 bar]

Advantages

- Improved micro texture
- Retexturing possibility
- Multiple applications
- Equipment maneuverability i.e. RWY clearance below 3 minutes

Disadvantages

- Possible pavement damage
- Damage to grooves
- No center line cleaning
- No AGL cleaning
- Ambient air temperature limitations
- Reduced working width

Risk / Cost Analysis
Usual Ultra High Pressure Water Jetting

Risk Usual Ultra High Pressure Water Jetting

Air traffic disturbance

- Break down of equipment on RWY
- Equipment with long runway evacuation period
- Several vehicles on RWY

Risk Usual Ultra High Pressure Water Jetting

Safety risk

FOD risk, due to

- equipment , not produced by experienced manufacturers
- insufficiently educated staff
- high number of components

TRACK JET

Risk Usual Ultra High Pressure Water Jetting

Damages to runway pavement

Use of equipment

- Limited working width → multiple cleaning track overlaps → double stress of RWY
- Large diameter fixed nozzle rotor → different impact of inner and outer nozzles
- Low number of nozzles and uneven nozzle configuration
- No computer controlled working parameters

Risk Usual Ultra High Pressure Water Jetting

Damages to runway installations

Damage to AGL-Prism and sealing

Unwanted removal of runway markings

Cost

Working cost (contracting)

Direct cost for cleaning operation

Analysis of different contracting offers

Working cost (own equipment)

Direct cost for cleaning operation

Analysis of total cost, e.g. cost for:

- *Amortization*
- *Spare parts / Maintenance*
- *Staff*
- *Fuel*
- *...*

Considering:

- *Availability*
- *Local after sales service*
- *...*

Cost

Security and escort

Cost for inspection and approval of equipment and staff

Choosing a system with low equipment and staff number

Cost

Waste removal

Cost for waste treatment and disposal

Optimization by selecting a system with low water consumption and internal liquid / solid waste separation

Cost

Water

Cost for fresh water

Optimization by selecting a system with low water consumption

Cost

Repair Cost

In case using an insufficient system, cost for
- runway renovation
- applying new marking
- replacing damaged AGL

Optimization by selecting a appropriate system

Ideal rubber removal system

99% Rubber removal

Friction Values higher than 0.7 (Saab CFME) after rubber removal mission

Extreme low water consumption 2.5 ltrs/m² (protecting the environment)

No Damage to any type of Surface texture

No Damage to grooving, joint sealing

Frequency of rubber removal required per annum can be reduced

Cleaning Output level up to 1000 m²/hour

AGL are cleaned during Rubber Removal mission without damage to lenses or sealing

99% removal of waste water

Computer controlled cleaning process

One man operation

Frequency of re-surface can be prolonged (Runway life time increase)

Runway vacation time for incoming emergency flight is about 3 minutes

TRACKJET MEETS THESE REQUIREMENTS

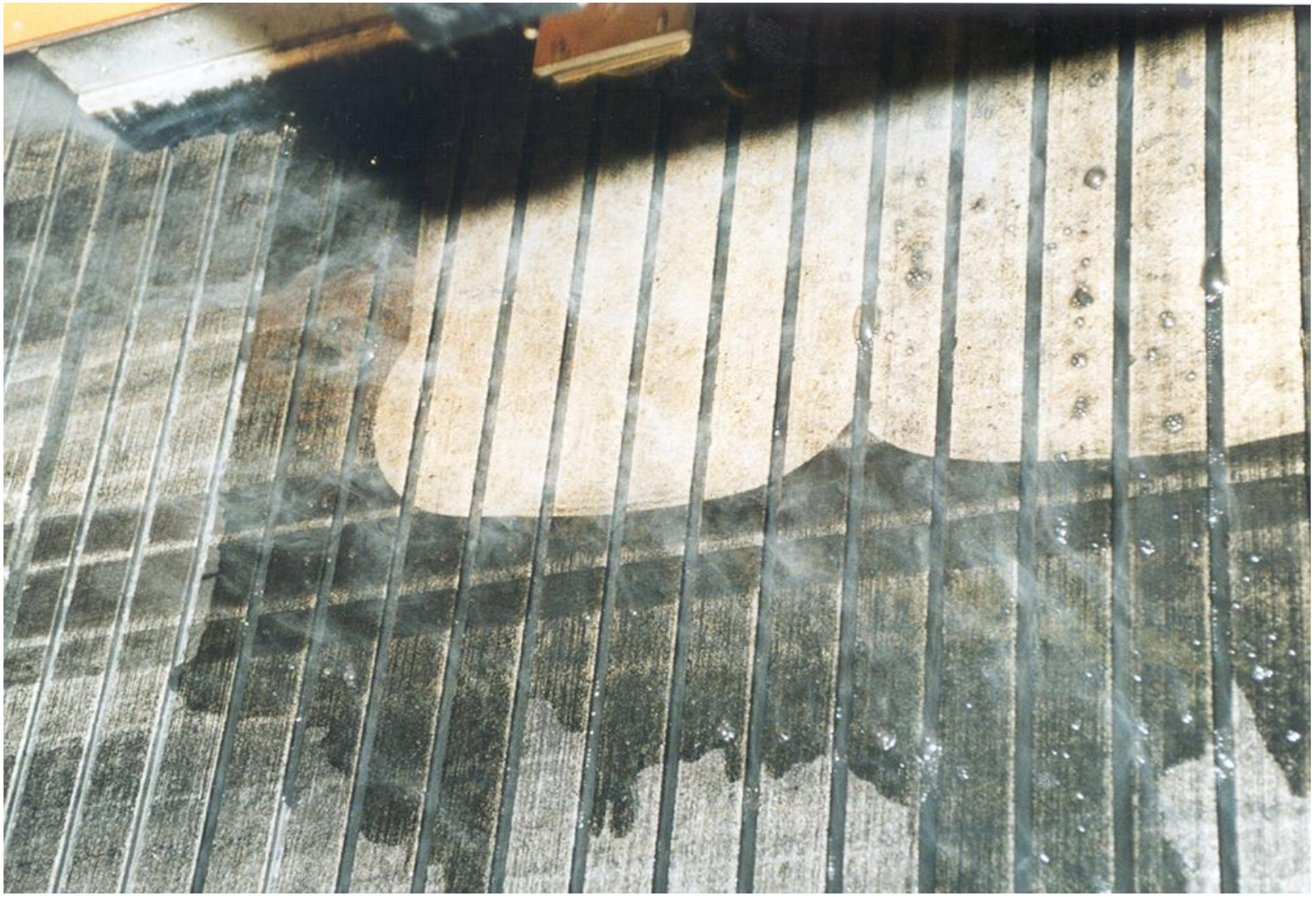
Optimum adjustment – No overlaps

NO DAMAGE TO ANTI-SKID STONE LAYER !

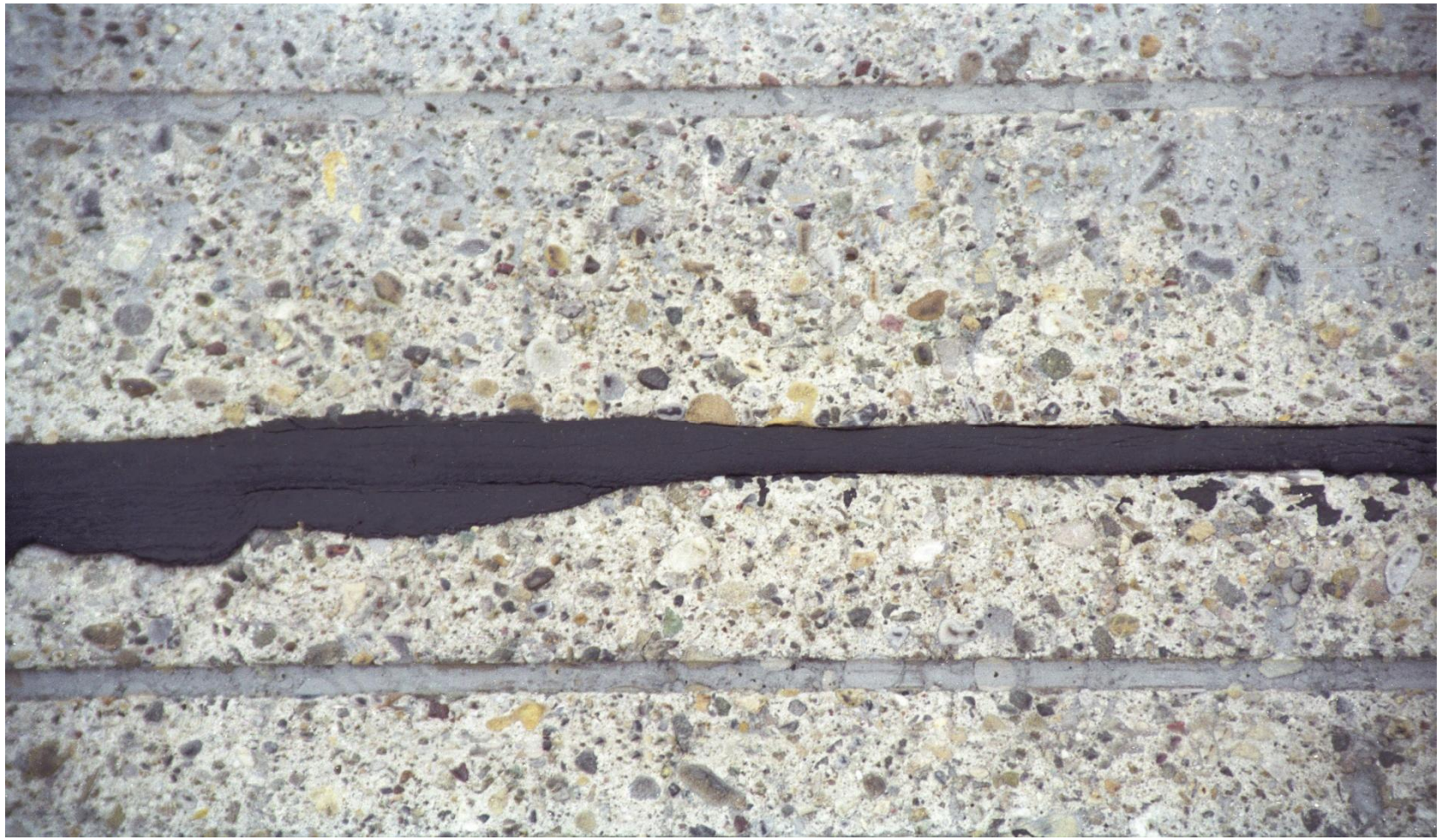
Centre line cleaning

AGL cleaning

No damage to grooves



No damage to joint sealings



Apron and hangar cleaning

Paint marking removal

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Thank you for your Attention!

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