



# **XI ALACPA Seminar on Airfield Pavements**

## **IV Short Course on Airfield Pavement Maintenance**

# **Part 02**

**Santiago, Chile, 02 September 2014**



# IV Short Course on Airfield Pavement Maintenance

---

## Part 02



# **IV Short Course on Airfield Pavement Maintenance**

## **Course Outline**

**Introduction & Importance of the Subject**

**Scope of Airfield Pavement Maintenance**

**Strong & Weak Links in Pavement Maintenance**

**The (4\*W + 3\*O) Equation & Pavt. Performance**

**Pavement Types & Drainage/Wildlife Hazards**

**Types of Distresses (Flexible & Rigid Pavement)**

**Materials & Equipment for Pavt. Maintenance**

**“Don’t “Do(s)” & “Do(s)” in Pavt. Maintenance**

**Summary**



## **IV Short Course on Airfield Pavement Maintenance**

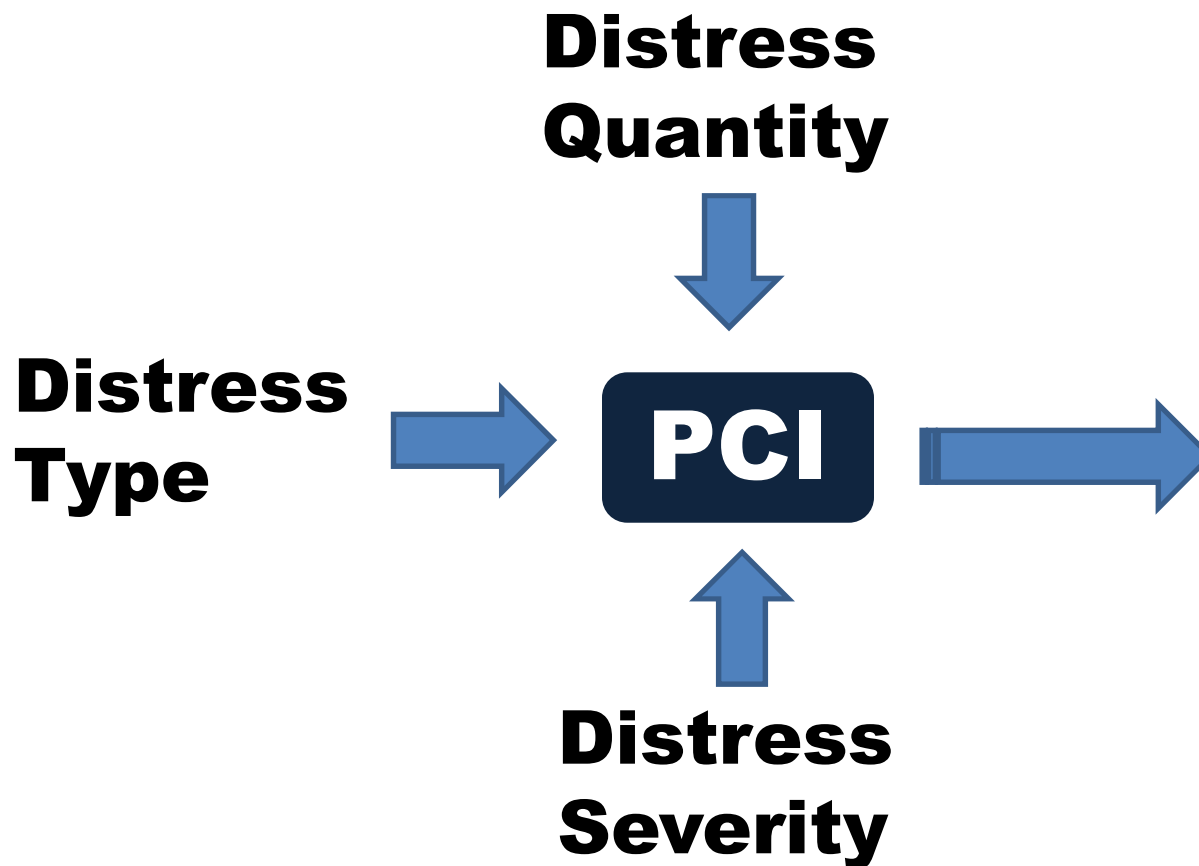
---

# **Types of Distresses (Flexible and Rigid Pavements)**



# IV Short Course on Airfield Pavement Maintenance

## PCI Method (ASTM 5340)



100	Good
85	
70	Satisfactory
55	Fair
40	Poor
25	Very Poor
10	Serious
0	Failed



# IV Short Course on Airfield Pavement Maintenance

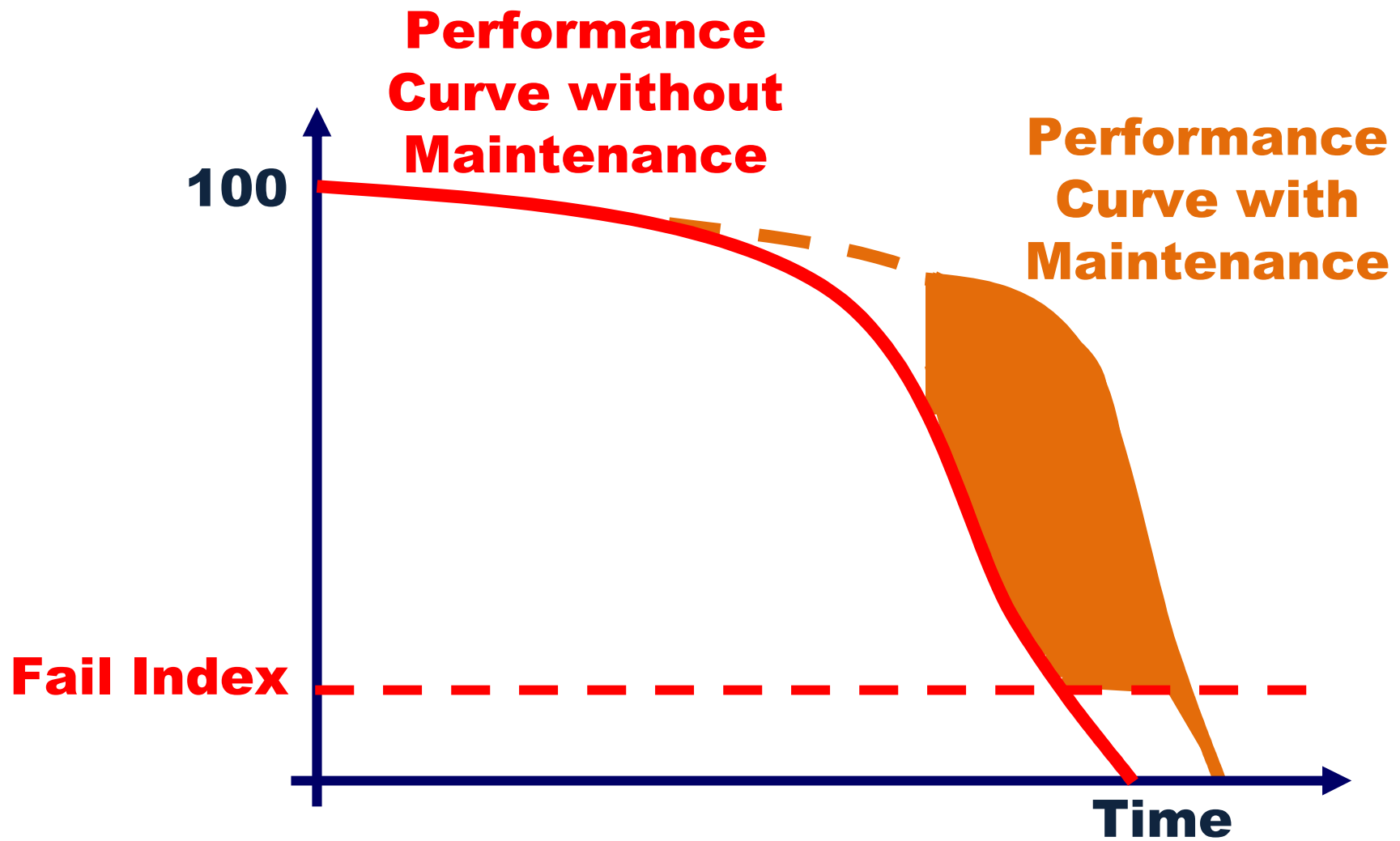
## Simplified PCI Rating

100 85	<b>Good</b>
70	<b>Satisfactory</b>
55	<b>Fair</b>
40	<b>Poor</b>
25	<b>Very Poor</b>
10	<b>Serious</b>
0	<b>Failed</b>

100 71	<b>Good</b>
70 56	<b>Fair</b>
55 0	<b>Poor</b>



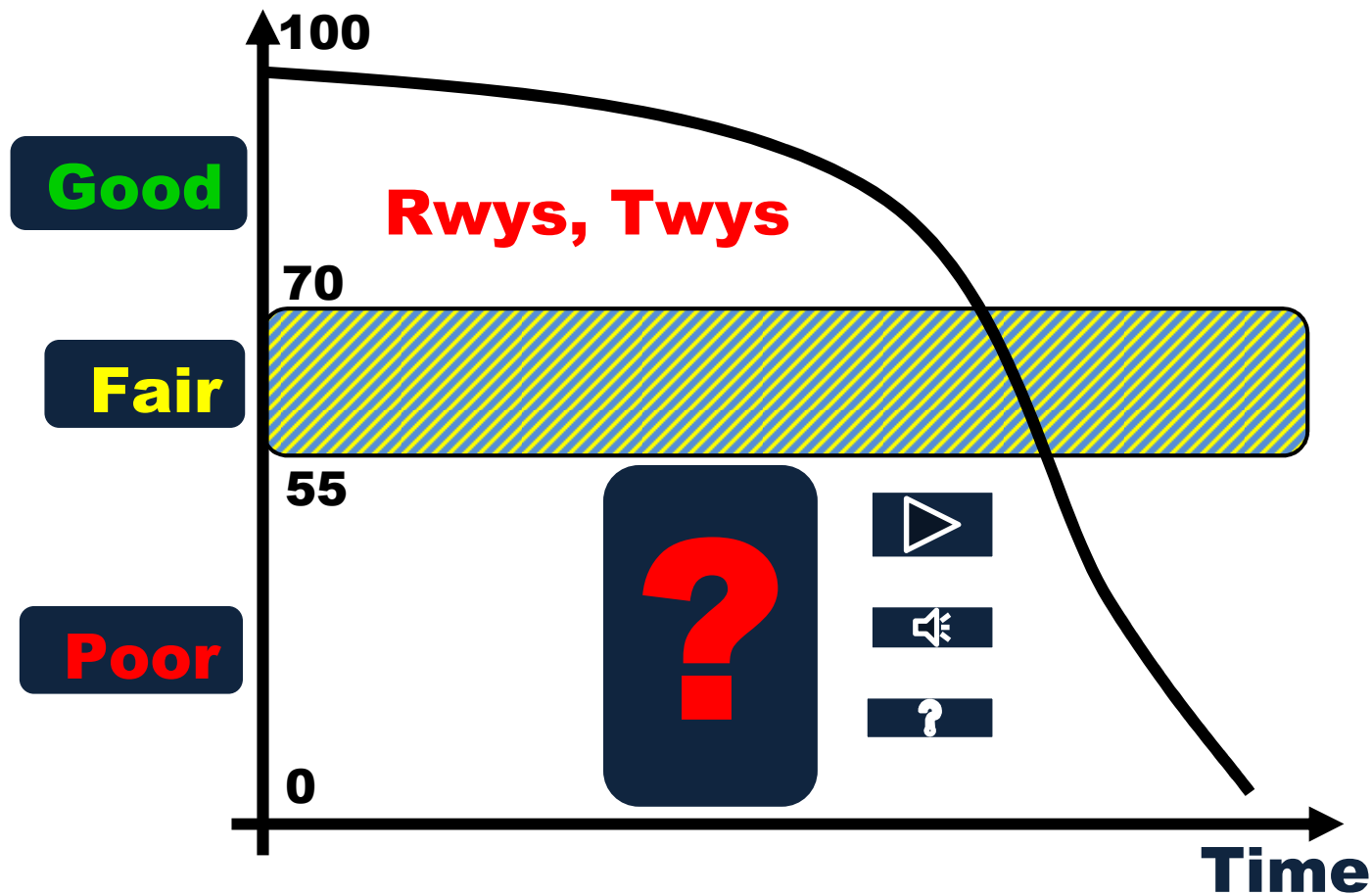
# IV Short Course on Airfield Pavement Maintenance



# IV Short Course on Airfield Pavement Maintenance

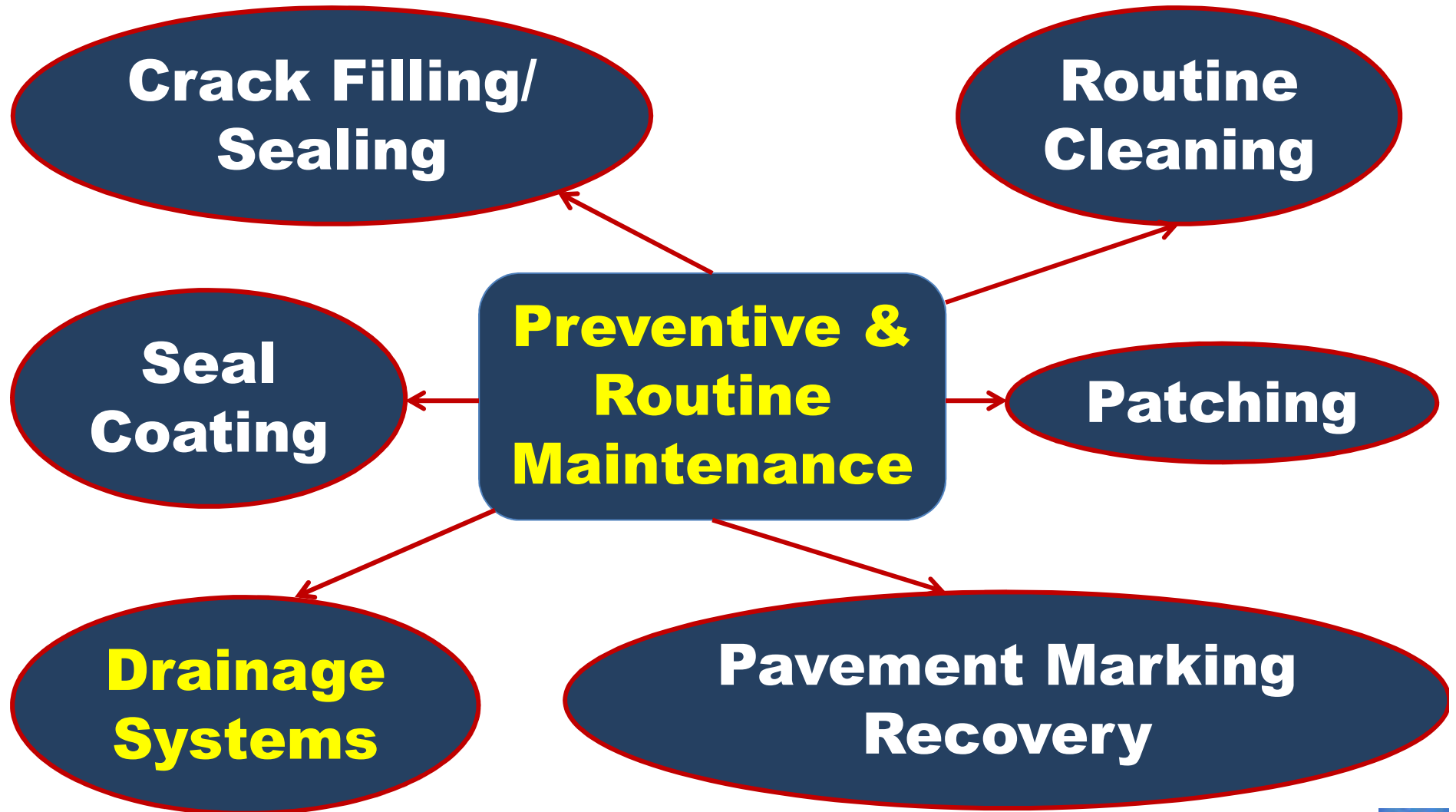
## Maintenance Level (Tolerability)

Performance



# IV Short Course on Airfield Pavement Maintenance

## Maintenance Types



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses

<b>Flexible Pavements</b>	
<b>#</b>	<b>Distress</b>
<b>01</b>	<b>Alligator Cracking</b>
<b>02</b>	<b>Bleeding</b>
<b>03</b>	<b>Block Cracking</b>
<b>04</b>	<b>Corrugation</b>
<b>05</b>	<b>Depression</b>
<b>06</b>	<b>Jet Blast</b>
<b>07</b>	<b>Joint Reflection (PCC)</b>
<b>08</b>	<b>Long./Transv. Cracking</b>
<b>09</b>	<b>Oil Spillage</b>
<b>10</b>	<b>Patching</b>
<b>11</b>	<b>Polished Aggregate</b>
<b>12</b>	<b>Raveling/Weathering</b>
<b>13</b>	<b>Rutting</b>
<b>14</b>	<b>Shoving from PCC</b>
<b>15</b>	<b>Slippage Cracking</b>
<b>16</b>	<b>Swell</b>



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Flexible Pavements)



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Flexible Pavements)



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Flexible Pavements)



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Flexible Pavements)



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Flexible Pavements)



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Flexible Pavements)



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Flexible Pavements)



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Flexible Pavements)



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Flexible Pavements)



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses

<b>Rigid Pavements</b>	
<b>#</b>	<b>Distress</b>
<b>01</b>	<b>Blow Up</b>
<b>02</b>	<b>Corner Break</b>
<b>03</b>	<b>Long./Transv./Diag. Crack</b>
<b>04</b>	<b>Durability Crack</b>
<b>05</b>	<b>Joint Seal Damage</b>
<b>06</b>	<b>Patching, 5 sf</b>
<b>07</b>	<b>Patching, Utility Cut</b>
<b>08</b>	<b>Pop Outs</b>
<b>09</b>	<b>Pumping</b>
<b>10</b>	<b>Scaling/Map Crack/Crazing</b>
<b>11</b>	<b>Settlement/Fault</b>
<b>12</b>	<b>Shattered Slab</b>
<b>13</b>	<b>Shrinkage Crack</b>
<b>14</b>	<b>Spalling Joints</b>
<b>15</b>	<b>Spalling Corner</b>



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Rigid Pavements)



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Rigid Pavements)



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Rigid Pavements)



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Rigid Pavements)



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Rigid Pavements)



# IV Short Course on Airfield Pavement Maintenance

## Types of Distresses (Rigid Pavements)



# IV Short Course on Airfield Pavement Maintenance

<b>Distresses by Groups (Flexible Pavement) (AC150/5380-6C)</b>	
<b>Cracking</b>	<b>Longitudinal &amp; Transverse Cracking</b>
	<b>Block Cracking</b>
	<b>Joint Reflection (PCC)</b>
	<b>Alligator Cracking</b>
	<b>Slippage Cracking</b>
<b>Disintegration</b>	<b>Raveling</b>
	<b>Weathering</b>
	<b>Potholes</b>
	<b>Asphalt Stripping</b>
	<b>Jet Blast Erosion</b>
	<b>Patching &amp; Utility Cut Patch</b>
<b>Distortion</b>	<b>Rutting</b>
	<b>Corrugation</b>
	<b>Shoving from PCC</b>
	<b>Depression</b>
	<b>Swelling</b>
<b>Loss of Skid Resistance</b>	<b>Polished Aggregate</b>
	<b>Contaminants</b>
	<b>Bleeding</b>
	<b>Fuel/Oil Spillage</b>



# IV Short Course on Airfield Pavement Maintenance

## Distresses by Groups (Rigid Pavements) (AC150/5380-6C)

<b>Cracking</b>	<b>Longitudinal/Transverse/Diagonal Crack</b>
	<b>Corner Break</b>
	<b>Durability Crack</b>
	<b>Shrinkage Crack</b>
	<b>Shattered Slabs/Intersecting Cracks</b>
<b>Joint Seal Damage</b>	<b>Joint Seal Damage</b>
<b>Disintegration</b>	<b>Scaling/Map Crack/Crazing</b>
	<b>Alcali-Silica Reactivity (ASR)</b>
	<b>Spalling Joints</b>
	<b>Spalling Corner</b>
	<b>Blowups</b>
	<b>Pop Outs</b>
	<b>Patching (&lt; 5 sf<sup>2</sup>)</b>
	<b>Patching, Large Utility Cut (<math>\geq 5</math> ft<sup>2</sup>) or (<math>\geq 5</math> m<sup>2</sup>)</b>
<b>Distortion</b>	<b>Pumping</b>
	<b>Settlement/Faulting</b>
<b>Loss of Skid Resistance</b>	<b>Polished Aggregates</b>
	<b>Contaminants</b>



## **IV Short Course on Airfield Pavement Maintenance**

---

# **Materials and Equipment for Pavement Maintenance**



## IV Short Course on Airfield Pavement Maintenance

### Materials for Pavement Maintenance (AC150/5380-6C)

**Hot-Mix Asphalt (HMA):** blend of asphalt binder + well-graded high-quality aggregates. HMA is used for **new airfield pavement/patching/overlay (P-403)**. Also used for **base course/leveling/surface course**



## IV Short Course on Airfield Pavement Maintenance

### Materials for Pavement Maintenance (AC150/5380-6C)

**Tack Coat:** Emulsified asphalt to provide **bond** between **overlying course & existent pavement** (HMA overlay). Also, applied on the **sides** of an existing pavement that has been **cut vertically before patching** (P-603)

**Crack and Joint Sealing Material:** Material for sealing cracks, according to the type of pavement & service (**ASTM standards**)



## IV Short Course on Airfield Pavement Maintenance

### Materials for Pavement Maintenance (AC150/5380-6C)

**Joint Sealant:** Cold applied, single component, chemically curing silicone joint sealant for PCC (**ASTM D 5893**)

**Joint and Crack Sealants:** Hot Applied joint and crack sealants for ACC & AC (**ASTM D 6690**)



## IV Short Course on Airfield Pavement Maintenance

### Materials for Pavement Maintenance (AC150/5380-6C)

**Crack Filler Material:** Material for filling cracks, hot-Applied, for AC & PCC (**ASTM D 5078**)

**Concrete:** Blend of Portland cement + fine and coarse aggregate + water + additives (or no) (**P-501**)



## IV Short Course on Airfield Pavement Maintenance

### Materials for Pavement Maintenance (AC150/5380-6C)

**Other Materials and Products:** Several other products, for example, epoxy resins and special concrete mixtures (**Check local conditions and follow providers instructions**)



## IV Short Course on Airfield Pavement Maintenance

### Equipment for Pavt. Maintenance (AC150/5380-6C)

**Power Saws:** It is usually a one-person-operated, dolly-mounted unit with an abrasive circular blade. It can cut a straight line through AC & PCC, leaving vertical sides. A random crack saw has a small diameter saw blade capable of tracking the crack



## IV Short Course on Airfield Pavement Maintenance

### Equipment for Pavt. Maintenance (AC150/5380-6C)

**Cutting Disks:** A circular, heavy-duty steel plate with a sharpened edge. Motor grader or other piece of equipment capable of pushing the disk through a bituminous pavement. It is limited to approximately 3 inches (75 mm) in cutting depth.



## IV Short Course on Airfield Pavement Maintenance

### Equipment for Pavt. Maintenance (AC150/5380-6C)

**Jackhammers:** (Pneumatic drill or demolition hammer) with chisel head. Commonly used for removal of existing pavement surfaces



## IV Short Course on Airfield Pavement Maintenance

### Equipment for Pavt. Maintenance (AC150/5380-6C)

**Pavement Grinders:** Dolly-mounted unit with an abrasive cylindrical head 4 inches (10 cm) or more wide, or it may be variable-width diamond grinding equipment. Used for tasks as varied as paint removal and pavement texturing



## IV Short Course on Airfield Pavement Maintenance

### Equipment for Pavt. Maintenance (AC150/5380-6C)

**Cold Milling Machines:** Shall be capable of cutting a vertical edge without chipping or spalling the edges of the remaining pavement or a saw must be used to create a vertical edge for the patch



## IV Short Course on Airfield Pavement Maintenance

---

### Equipment for Pavt. Maintenance (AC150/5380-6C)

**Hand Tools:** Hand tools such as chisels, sledgehammers, shovels, pry bars, etc.

Front-end Loaders and Skid-steer Loaders,  
Dump Trucks,



## IV Short Course on Airfield Pavement Maintenance

### Equipment for Pavt. Maintenance (AC150/5380-6C)

**Asphalt Kettle:** Small-tractor-mounted units that have the capacity to heat and store 40 to 500 gallons (150 to 2000 liters) of bituminous material



## IV Short Course on Airfield Pavement Maintenance

### Equipment for Pavt. Maintenance (AC150/5380-6C)

**Vibratory Plate Compactors, Vibratory and Non Vibratory Steel-Wheel Rollers**

**Joint Plow:** Used to remove old sealer from joints. This is usually a specially made tool attached to a small loader or tractor



## IV Short Course on Airfield Pavement Maintenance

### Equipment for Pavt. Maintenance (AC150/5380-6C)

**Joint Router:** Used to clear existing cracks or joints to be resealed. A rotary routing tool with a V-shaped end can be used for cleaning out random cracks. The use of a **random crack saw is preferred for PCC pavements**



## IV Short Course on Airfield Pavement Maintenance

### Equipment for Pavt. Maintenance (AC150/5380-6C)

**Random Crack Saw:** A random crack saw is designed to follow irregular crack patterns in concrete and asphalt surfaces



## IV Short Course on Airfield Pavement Maintenance

### Equipment for Pavt. Maintenance (AC150/5380-6C)

**Power brush, Air Compressor and Sand Blasting, Pavement Sweeper, Heating Kettle**

**Pouring Pot:** Hand carried or mounted on a hand-pushed pot dolly, is used to pour hot sealing materials into a prepared crack or joint



## IV Short Course on Airfield Pavement Maintenance

### Equipment for Pavt. Maintenance (AC150/5380-6C)

**High-pressure Water:** With the proper selection of spray nozzle and pressure, can be used to clean out joints prior to resealing and to clean vertical faces of pavement to be patched

**Hot Air Lance:** A hot air lance can be used to dry and heat cracks in existing bituminous material



## **IV Short Course on Airfield Pavement Maintenance**

### **Equipment for Pavt. Maintenance (AC150/5380-6C)**

# **“Don’t Do(s)” & “Do(s)” in Pavement Maintenance**



## IV Short Course on Airfield Pavement Maintenance

# Don't DO (Rigid Pavement)



**Mixing Materials**



## IV Short Course on Airfield Pavement Maintenance

# Don't DO (Rigid Pavement)



## IV Short Course on Airfield Pavement Maintenance

# Don't DO (Rigid Pavement)

### Patch Crossing Joints



## IV Short Course on Airfield Pavement Maintenance

# Don't DO (Rigid Pavement)

**Brand New Pavement**



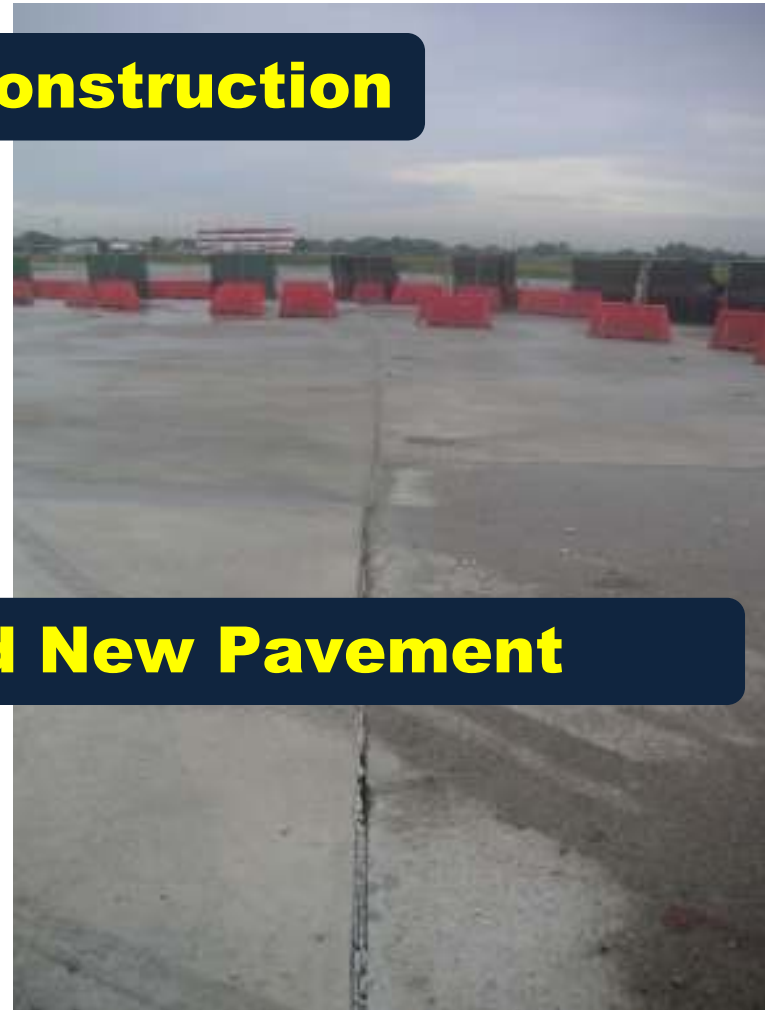
## IV Short Course on Airfield Pavement Maintenance

# Don't DO (Rigid Pavement)

**Pavement Under Construction**



**Brand New Pavement**



## IV Short Course on Airfield Pavement Maintenance

# Don't DO (Rigid Pavement)

### Pavement Under Rehabilitation



### Pavement With Risk of FOD



## IV Short Course on Airfield Pavement Maintenance

# Don't DO (Rigid Pavement)



**Brand New Pavement**



## IV Short Course on Airfield Pavement Maintenance

# Don't DO (Rigid Pavement)

### Brand New Pavement



## IV Short Course on Airfield Pavement Maintenance

# Don't DO (Rigid Pavement)



**Brand New Pavement**



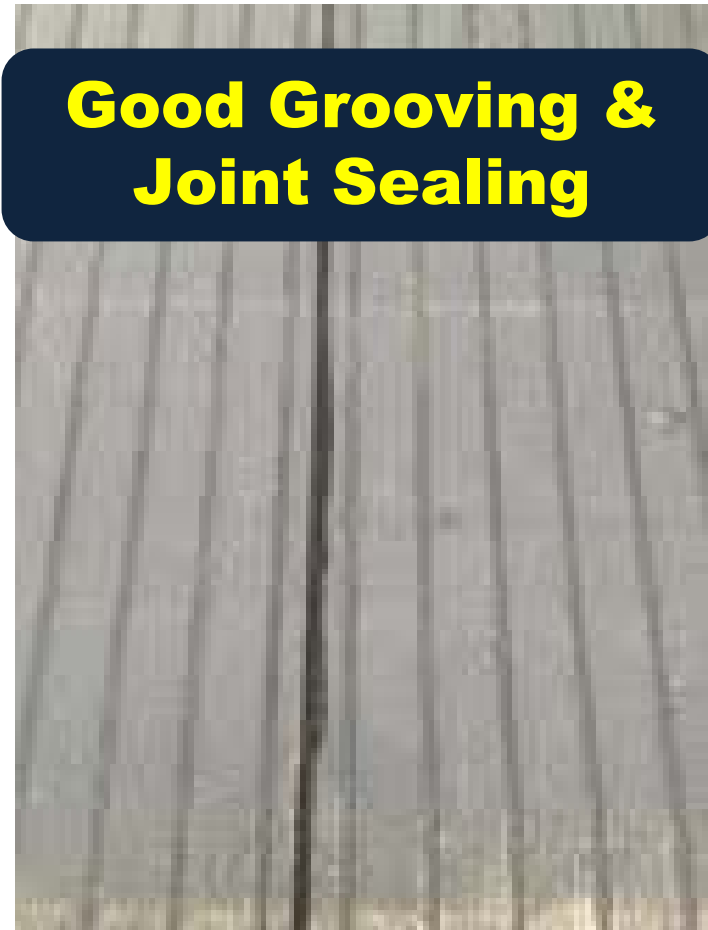
# IV Short Course on Airfield Pavement Maintenance

## DO (Rigid Pavement)

**Good Patch**



**Good Grooving & Joint Sealing**



## IV Short Course on Airfield Pavement Maintenance

# DO (Rigid Pavement)

**PMS & Good Sealing**



**Use Only Rigid Pavement for Aprons**



# IV Short Course on Airfield Pavement Maintenance

## DO (Rigid Pavement)

### Good Joint Sealing



## IV Short Course on Airfield Pavement Maintenance

**Don't DO (Flexible Pavement)**

**Use Only Rigid Pavements for Aprons**



# IV Short Course on Airfield Pavement Maintenance

## Don't DO (Flexible Pavement)



# **IV Short Course on Airfield Pavement Maintenance**

## **Summary**

**Introduction & Importance of the Subject**

**Scope of Airfield Pavement Maintenance**

**The (4\*W + 3\*O) Equation & Pavt. Performance**

**Strong & Weak Links in Pavement Maintenance**

**Pavement Types & Drainage/Wildlife Hazards**

**Types of Distresses (Flexible & Rigid Pavement)**

**Materials & Equipment for Pavt. Maintenance**

**Don't Do(s) & Do(s) in Pavement Maintenance**



# Food For Thought

### La Piedra

**“El distraído tropezó con ella.**

**El violento la utilizó como proyectil.**

**El emprendedor construyó, con ella.**

**El campesino cansado la utilizó como asiento.**

**Para los niños fue un juguete.**

**David mató a Goliat y**

**Miguel Ángel le sacó la más bella escultura.**

**En todos los casos, la diferencia no estuvo en la piedra,  
sino en el hombre.**

**No existe piedra en tu camino que no puedas aprovechar  
par tu propio crecimiento.”**

**Anónimo**

