

# Airfield Pavements for the NextGen Decade

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Pavimentos Aeroportuarios

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Federal Aviation  
Administration

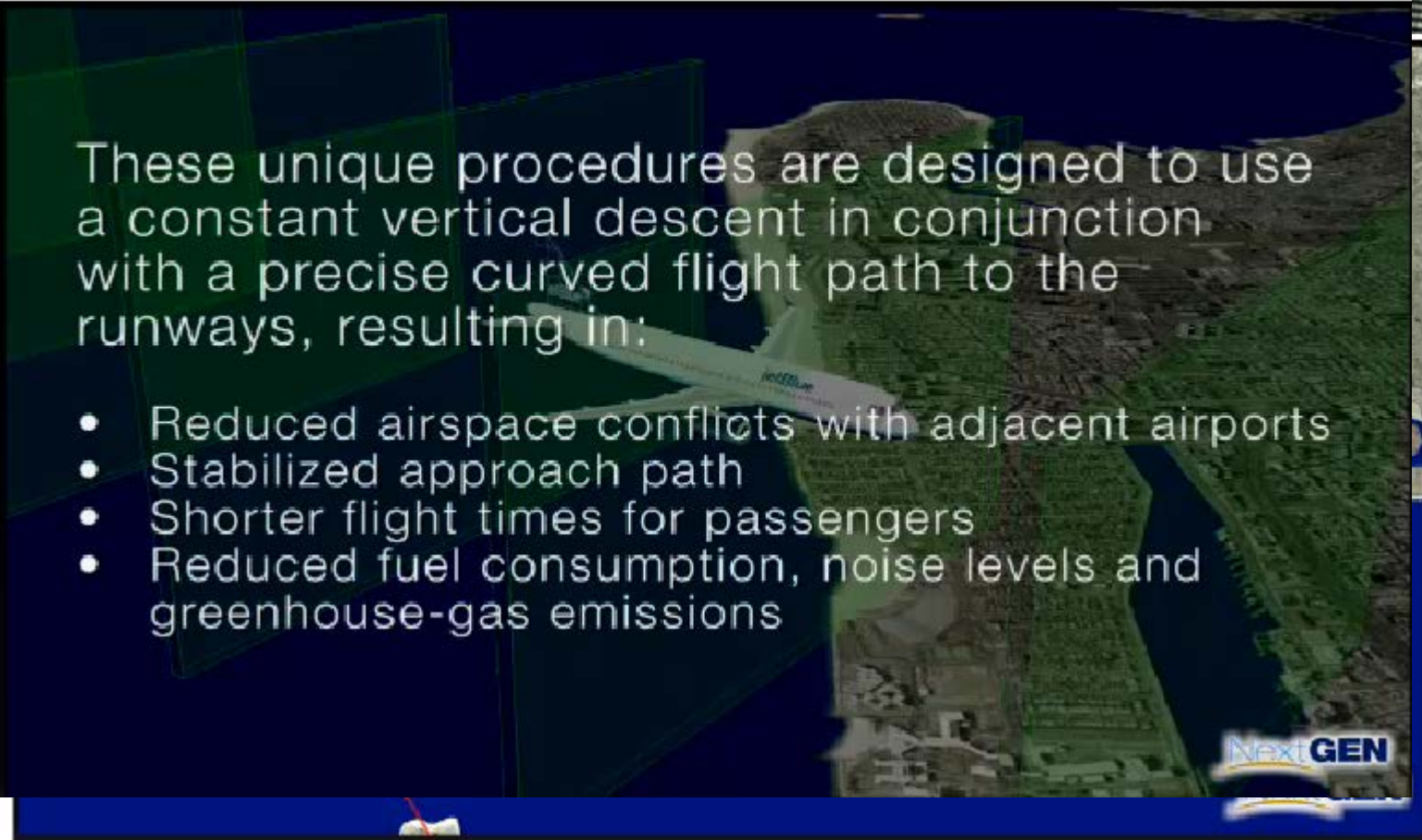


# FAA's NextGen

- **Comprehensive Overhaul of US National Airspace System**
- **Benefits**
  - Fewer Delays
  - Reduce Environmental impacts
  - Improve Safety
  - Improve Performance
- **Products**
  - Satellite Based Navigation
  - Performance Based Navigation (PBN)
  - Airport Surface Detection (ASDE-X)
  - Area Navigation (RNAV)



# FAA's NextGen



These unique procedures are designed to use a constant vertical descent in conjunction with a precise curved flight path to the runways, resulting in:

- Reduced airspace conflicts with adjacent airports
- Stabilized approach path
- Shorter flight times for passengers
- Reduced fuel consumption, noise levels and greenhouse-gas emissions



# FAA's NextGen

- Impacts
  - Closely spaced parallel operations (RW Separation <1,300 m)
  - Reduction in aircraft spacing
  - Reduction in taxiing times
  - Larger aircraft at smaller airports

***Doubling the number of aircraft in the air***

**\$24 Billion in Benefits**



**Reduce Delays**

38%



**Reduce CO2 Emissions**

14M Metric Tons Cumulative



**Reduce Fuel Use**

1.4B Gallons Cumulative

2020, are highly sensitive to traffic volume forecasts, which have been variable in recent years. In particular, we anticipate that the delay reduction estimate will continue to fluctuate within a range of 25-40 percent. These estimates reflect the difference between implementing planned NextGen improvements and doing nothing more than maintaining current operations. Aggregate nationwide benefits; local or facility delay reductions may differ.

# New Aircraft Designs

## Airbus A350 XWB

### Key Data

Airbus announced the A350 aircraft, a longer-range and lighter derivative of the A330 aircraft, in 2004. Following a reassessment of market requirements, Airbus announced the larger and heavier A350 XWB extra-wide-bodied aircraft in December 2009. The first flight is expected in early 2012. The aircraft is currently under construction.



## LH 748 – The first Boeing 747-8 Intercontinental

Lufthansa's Boeing 747-8 Intercontinental touched down for the first time in India on August 7, 2012. A grand water canon salute welcomed the arrival of this new aircraft at Terminal 3 of Delhi's India Gandhi International Airport. From 13 September, the "Queen of the Skies" will depart daily from Frankfurt for Bangalore. Lufthansa initiated commercial service of the new Jumbo jet in June 2012 along the inaugural route of Frankfurt to Washington, D.C.'s Dulles International Airport.



Little Times  
Pulitzer Prize

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## 77X by end of decade

Commercial CEO denies any slowdown in developing a new best-selling widebody.

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## Another to SFO

Full story: SFGate

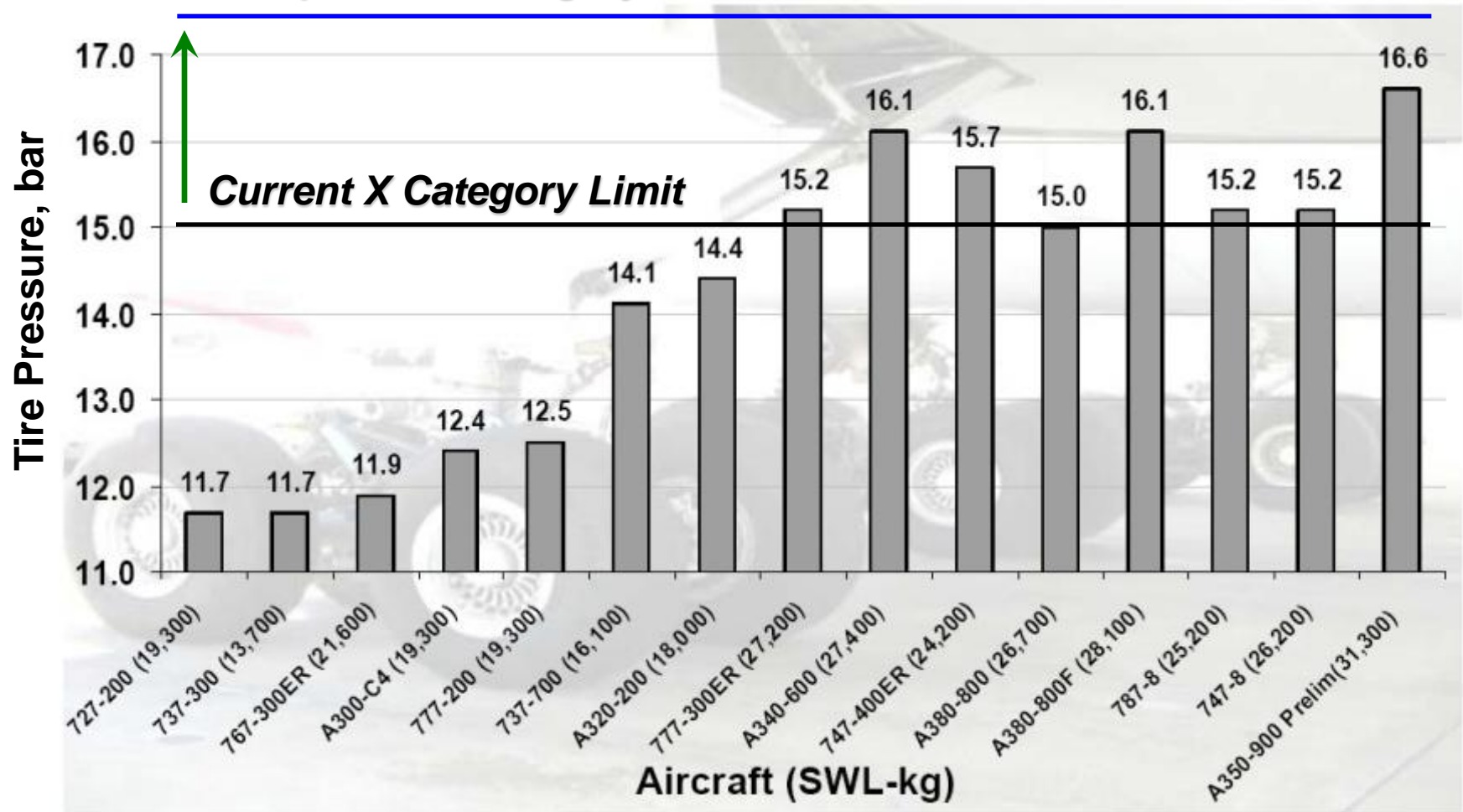
For the first time into San Francisco

more routes for



# New Aircraft Designs

## *Proposed X Category Limit*







# Future?



# New Aircraft Designs

- **Aircraft Manufacturers are**

- Increasing
  - Payloads
  - Range
- Decreasing
  - Fuel Burn
  - Drag
  - Noise during approach
  - Emissions

- **Max Takeoff Weight (MTOW) Increase**
- **Fuselage length increase**
- **Wing-span increase (& shape) for drag reduction**
- **Fewer wheels for:**
  - Weight saving, noise & drag reduction (approach)
  - Better maneuverability
- **larger wheels and tires**
  - higher load capabilities higher braking capabilities



**Higher wheel loads &  
Tire pressures**



# ICAO Tire Pressure Categories

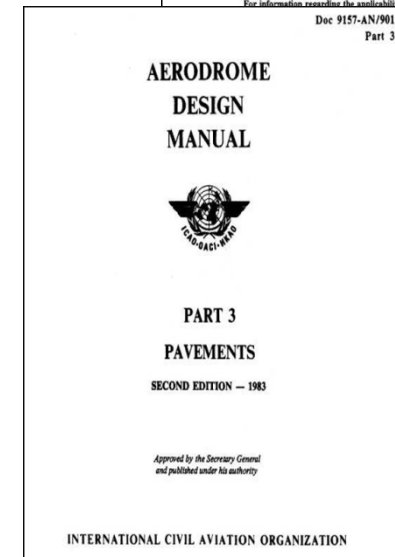
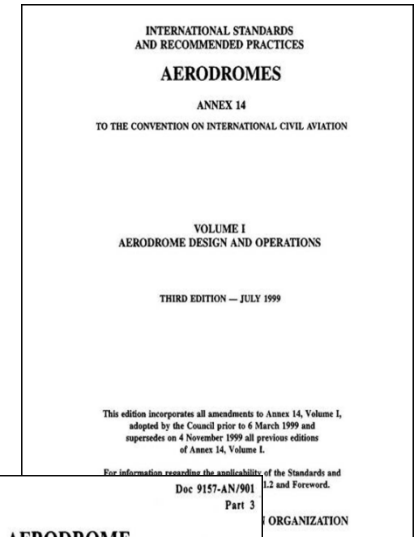
Tire Pressure Category	Current ICAO Limits psi (MPa), loaded	Proposed New ICAO Limits psi (MPa), loaded
W	Unlimited	Unlimited
X	217 (1.50)	254 (1.75)
Y	145 (1.0)	181 (1.25)
Z	72 (.50)	72 (.50)

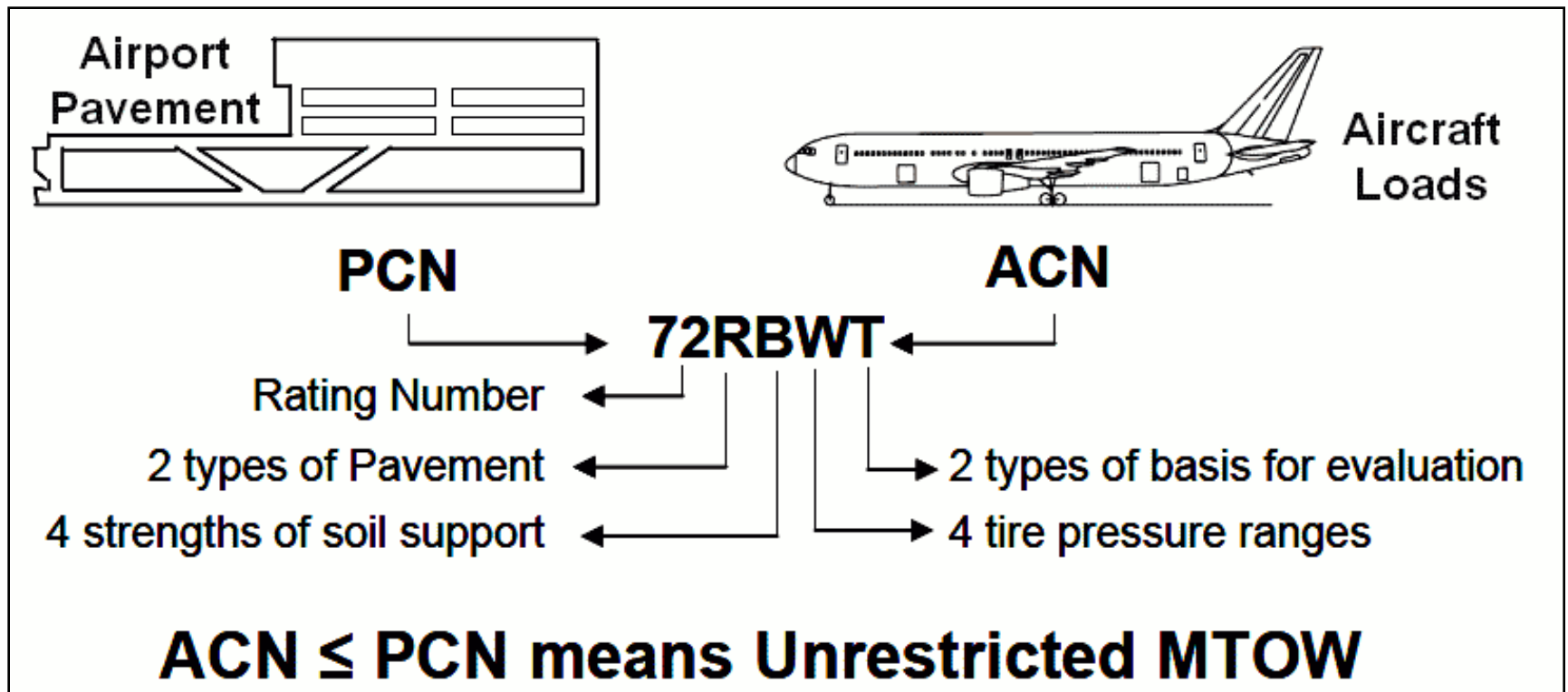


# Pavement Rating System

- **The ACN-PCN System**

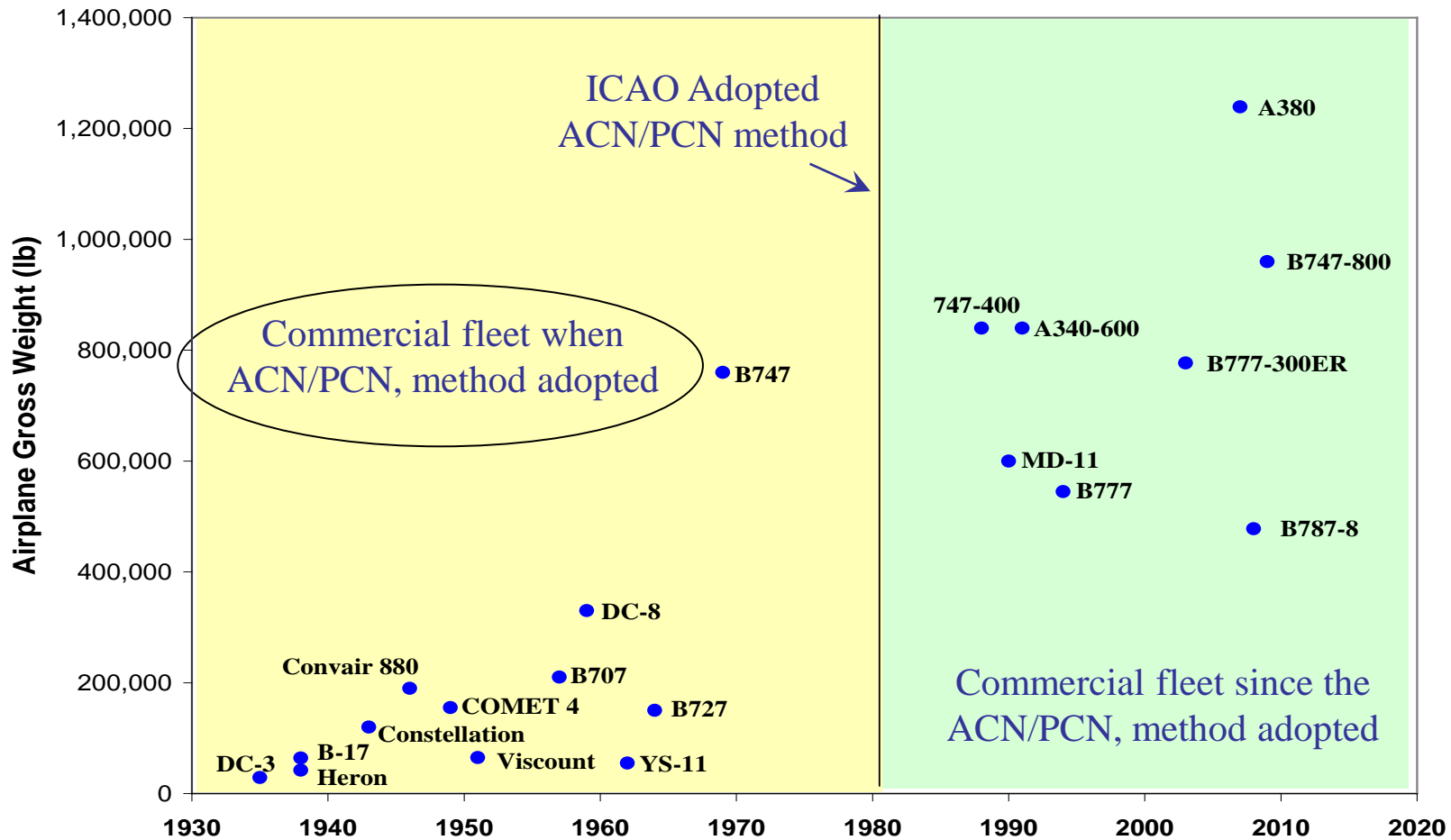
- Aircraft Classification Number (ACN) is precisely specified as a standard by ICAO in Annex 14 to the Convention on International Civil Aviation.
- Aircraft manufacturers are required to publish properly computed ACN values for all of their aircraft.
- Procedures for determining Pavement Classification Number (PCN) are given in the ICAO Aerodrome Design Manual, Part 3, Pavements.
- **The PCN procedures in the manual are for guidance only and a great deal of latitude is provided.**
- Airport operators are responsible for determining and publishing PCN values for runways.





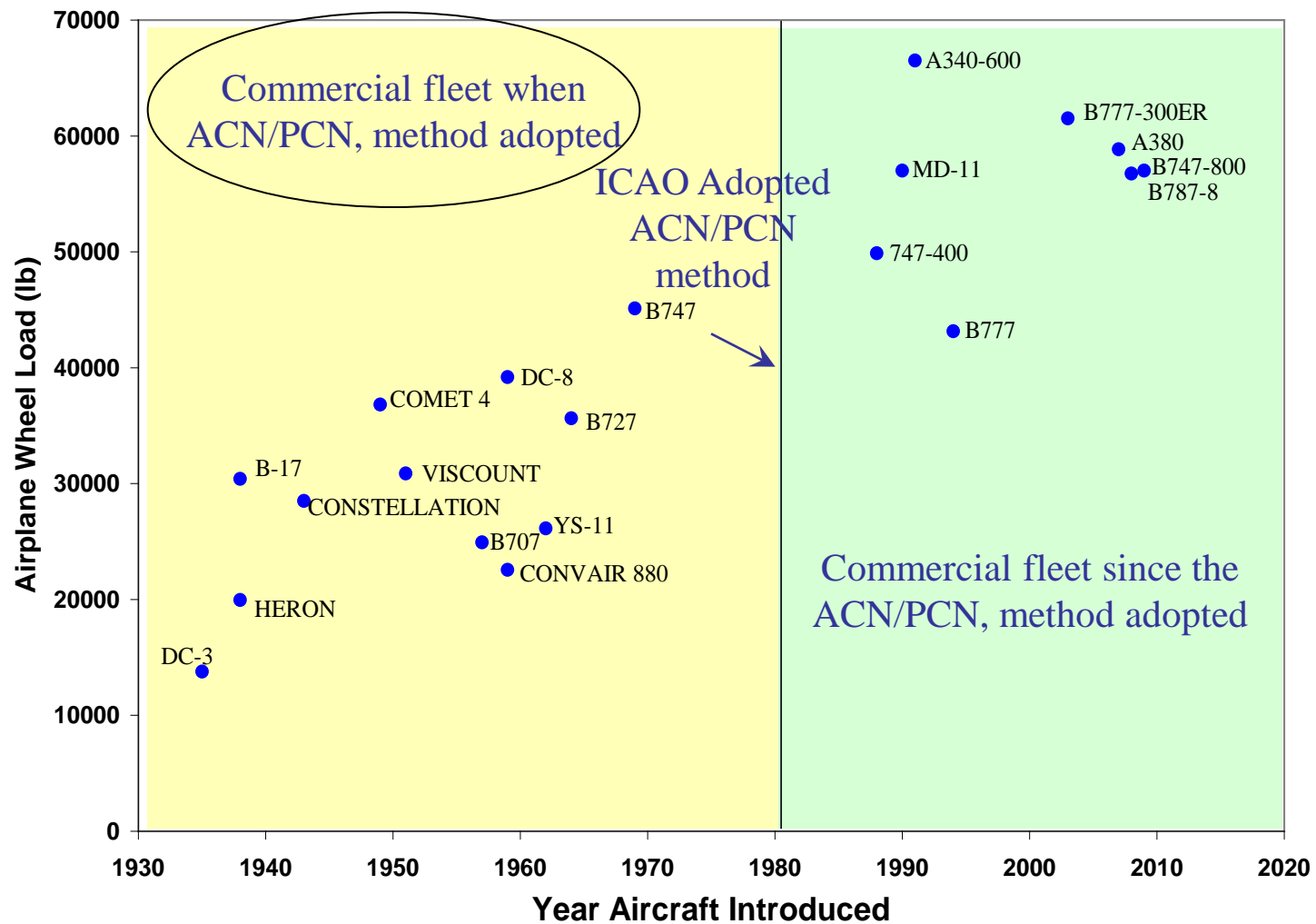
- The aircraft mfg. provides the ACN.
- In the US, the airport determines the PCN using FAA advisory circular guidance.

# ACN-Aircraft Timeline (Gross Wt)



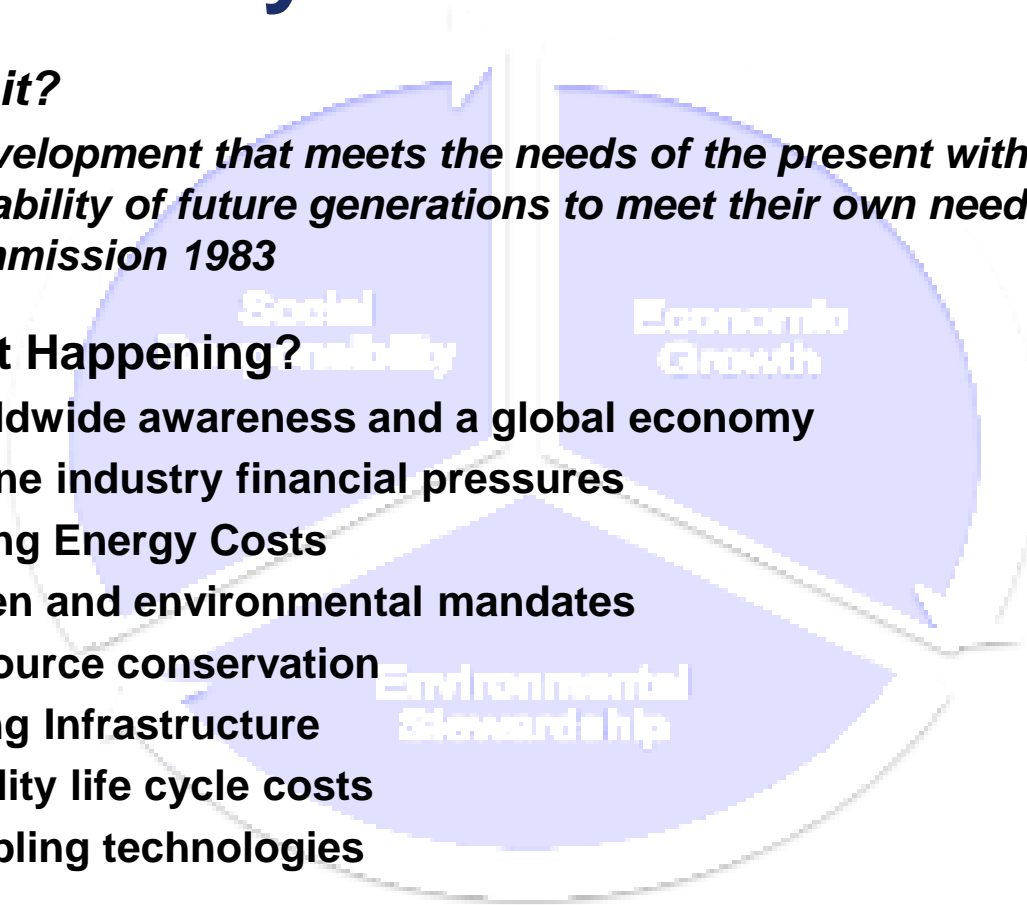


# ACN-Aircraft Timeline (Wheel load)



# Sustainability

- **What is it?**
  - *“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs” - Brundtland Commission 1983*
- **Why Is it Happening?**
  - Worldwide awareness and a global economy
  - Airline industry financial pressures
  - Rising Energy Costs
  - Green and environmental mandates
  - Resource conservation
  - Aging Infrastructure
  - Facility life cycle costs
  - Enabling technologies



***“Triple Bottom Line”***

# Sustainability

- **Rating Systems**

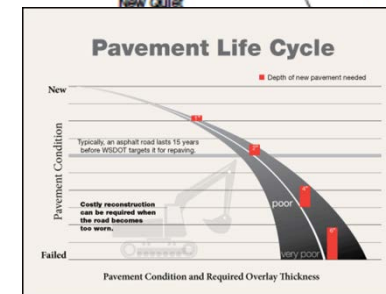
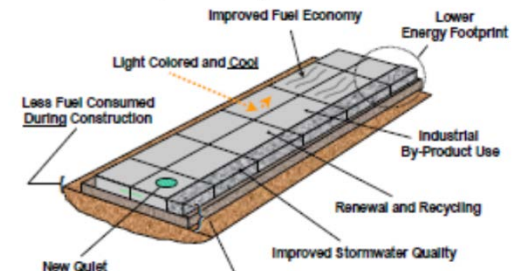
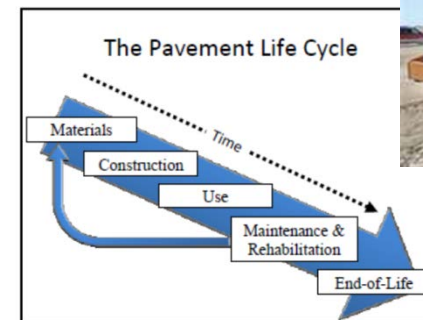
- US Green Building Council (USGBC) LEED® program
- Institute for Sustainable Infrastructure
- Airport Authorities



# Sustainability

- “New” Technologies/Materials

- Stone Matrix Asphalt
- Warm Mix Asphalt
- Half-Warm Mix Asphalt
- Increased amount of recycled materials
- Concrete admixtures
- Supplementary Cementing Materials (SCM)
- Life Cycle Assessment (LCA)
- Design Beyond Fatigue Cycles
- Increase Pavement Design Life (20 to 40 years)






# Summary

- Continuous worldwide aircraft traffic growth
- Better aircraft control on the ground
- Climatic changes
- Reduction of natural resources
- Economic Environment
- More precise pavement design and analysis methods
- Combination of PMS with airport traffic simulation tools
- Advanced and innovative paving materials
- Performance based specifications
- Adapted pavement maintenance program
- Improved pavement construction techniques

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# Gracias



# Airport Technology R&D Branch

<http://www.airporttech.tc.faa.gov>

