

BSCE 18/WP 29  
Copenhagen, May 1986

MAY 86

BIRD HAZARDS  
TO  
LARGE TRANSPORT  
AIRCRAFT ENGINES

PRESENTED BY: A T WEAVER  
PRATT & WHITNEY  
E HARTFORD CT

18TH MEETING  
BIRD STRIKE COMMITTEE EUROPE  
COPENHAGEN MAY 26-30, 1986

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THE ENGINE HAZARD

- o FAN DAMAGE
- o AIRFLOW DISRUPTION

SIGNIFICANT PARAMETERS

- o MOMENTUM TRANSFER
- o ROTATIONAL SPEED
- o AIRCRAFT SPEED
- o BIRD SIZE

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HOW THE ENGINE RESPONDS

- o VARIES FROM NO EFFECT  
TO  
COMPLETE LOSS OF THRUST

PERCEPTION

- o COST
- o SAFETY

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SAFETY CONSIDERATIONS

- o THRUST LOSS AT TAKEOFF
- o PILOT WORKLOAD
- o MULTIPLE ENGINES

DESIGN AND CERTIFICATION  
STANDARDS

ENGINE

- o POUND AND A HALF BIRDS
- o PARTIAL POWER LOSS

AIRCRAFT

- o SINGLE ENGINE OUT AT T/O

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NO ENGINE IS PERFECT

RISK

$P1 \times P1 \times M = \text{RISK FACTOR}$

WHERE P1 = PROBABILITY FOR SINGLE  
ENGINE OUT

M = PROBABILITY OF MULTIPLE  
ENGINE INVOLVEMENT

CORRECTIVE ACTION

REDUCE "P1"

o LESS STREAMLINED  
COMPRESSOR PARTS

HIGHER FUEL CONSUMPTION

SIGNIFICANT COST TO OPERATOR

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CORRECTIVE ACTION (cont.)

REDUCE "M"

- o CONTROL BIRD FLOCKS  
ON AIRPORTS
  
- o BIRD TRAFFIC CONTROL  
AT AIRPORTS

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AIRPORT BIRD HAZARDS

- o VERY FEW AIRPORTS HAVE AN EVERY DAY FLOCK PROBLEM
- o MOST STRIKES ARE SINGLE BIRDS
- o MANY "PROBLEM" AIRPORTS HAVE NON-FLOCKING BIRDS SUCH AS BLACK KITES
- o AN AIRPORT BECOMES "UNSAFE" WHEN THE FLOCKS MOVE IN ON OR NEAR AN ACTIVE RUNWAY
- o TRANSIENT FLOCKS USUALLY ARE NOT A SAFETY RISK UNTIL THEY SET DOWN ON THE AIRFIELD
- o BAD WEATHER OR WEATHER CHANGES SHOULD BE THE FIRST WARNING THAT AN UNSAFE FLOCK HAZARD MAY BE PRESENT

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SUMMARY

THE MANUFACTURERS ARE  
COMMITTED TO SIGNIFICANT  
IMPROVEMENTS

AIRPORT OPERATORS MUST  
FOLLOW SUIT

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