ISASI FORUM

"Air Safety Through Investigation"

JANUARY–MARCH 2006

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This photo and two others on page 8 show the effect of reversers on the water depth in front of the main landing gear wheels. High-definition films taken in heavy rain conditions show clearly that the effect of the reverser flow appears to push the water in front of the wheels. While reversers are definitely a bonus for stopping on wet runways, the use of maximum reversers could result in a hydroplaning wheel from making contact with the runway surface. (Photo: Capt. A. Ranganathan)

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"Air Safety Through Investigation"

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AIR SAFETY INVESTIGATORS
INCORPORATED AUGUST 31, 1964

ISASI 'Fellow' a Coveted Status

By Frank Del Gandio, President

At our recent seminar in Fort Worth, Tex., I had the honor and privilege of announcing the elevation of John D. Rawson (U.S.A.), Raz Itzhak (Israel), and Ken Smart (United Kingdom) to the coveted status of ISASI "Fellow." Only 16 other ISASI members have been accepted into this senior membership class, established to denote peer recognition of extraordinary professional achievements and contributions to our Society. I am taking this opportunity to highlight the Fellow Membership because I believe, given the experience level of our membership, that the Fellow ranks and the accompanying recognition would swell if this membership category was better understood.

The distinguished ranking has been with us since 1993, but Ira Rimson first proposed its classification in March 1990. In April 1991, the Council approved the proposal. Qualification particulars and the application process development took two years. In October 1993, the Council approved the first 10 applicants. Since its inception, promotion standards to Fellow have been rigid, reflecting the high regard its framers placed on the membership grade—to wit: "to recognize those ISASI members whose achievements and contributions to air safety investigation, to accident prevention, and to ISASI merit the esteem of their peers."

Fellow status is not bestowed; it is an earned status for which application must be made. It is a permanent membership grade. Specific application procedures and the application form are available on our website under the "About ISASI—Join, Fellow" tabs. Applicants should know that none of the qualifications may be waived and that incomplete applications, and those lacking supporting documentation, will not be accepted. All applications for advancement to Fellow will be evaluated by a board comprised of not fewer than five, nor more than nine, ISASI Fellows. The board will review the application and its supporting documentation and may accept or reject the application as submitted, or return it to the applicant for additional information or substantiation. Upon election by a majority of the board voting, the applicant will be certified to the ISASI International Council for advancement to the grade of Fellow. The decisions of the Board of Fellows with regard to election of ISASI Fellows are binding and are not subject to dispute or appeal.

PHOTOS: E. MARTINEZ

ABOVE: President Del Gandio (right) announces "Fellow" status for Raz Itzhak (left) and John D. Rawson. Ken Smart was unable to attend the ceremony.
LEFT: Shown is the newly redesigned Fellow lapel pin.

Fellow Members

Fellow
- Kevin A. Darcy
- Frank Del Gandio
- David S. Hall
- Terry W. Heaslip
- Raz Itzhak
- Curtis L. Lewis
- Mike P. Papadakis
- John W. Purvis
- John D. Rawson
- Ken Smart
- Richard B. Stone
- A. Frank Taylor

Life/Fellow
- Ludwig Benner, Jr.
- Robert O. Besco
- John G. Boulding
- Ron Chippindale
- B. Victor Hewes
- Ira J. Rimson
- Frank E. Yeend

The present Fellow Board consists of five members with Fellow Membership and is chaired by Ron Chippindale, who also serves as the New Zealand Society Councillor. Dr. David Hall, who served as the chair for the Board for the past 10 years, reluctantly gave up the duty owing to other commitments.

Here, in general, are some of the requirements:

Membership: Ten consecutive years of ISASI Full Member status prior to application.

Investigative Experience: Attained significant accident investigation/prevention experience and achievement.

Education/Training: Any combination of two or more of (a) an earned post-baccalaureate degree in a discipline relevant to air safety, (b) professional certification (other than an airman rating) in a discipline relevant to air safety, (c) professional civil or military airman certification (higher than private pilot) by an ICAO member state.

Attendance: A minimum of five air-safety-related professional *(continued on page 30)*

Gerry Bruggink Goes 'West'

By Ron Schleede, Vice-President

"To fly west, my friend, is a flight we all must take for a final check."—*Author unknown*

One of the finest men I ever knew in the air safety business has left us.

Gerard "Gerry" M. Bruggink died Dec. 5, 2005, at his home in Skipperville, Ala., following a long illness. He was 88. He was a Life Member (LM492) of ISASI.

Our friendship began when I joined the U.S. NTSB in 1972. He had joined the Board in 1969. Gerry provided me and many others strong guidance and support throughout my NTSB career. He often called me to discuss ongoing major investigations, including making several important suggestions regarding the TWA 800 case.

Although he was not inclined to talk about it, Gerry had a fascinating career in aviation and left a huge mark, particularly in human factors and with his many publications over the years.

Gerry became an ISASI member on July 14, 1971, and urged me to join shortly after I met him.

Here is a brief history of his achievements.

Gerry was born in the Netherlands (Holland) in 1917. He attended a Catholic seminary for several years. He began his Royal Dutch Air Force flight training in the Dutch East Indies (Indonesia) in 1939. There, he met his wife, Corien, and married her in January 1942.

He flew combat over Singapore, Java, and other islands. When the Dutch and British forces surrendered in March 1942, Gerry was one of the last Dutch pilots to fly against the Japanese.

In early 1942, he became a prisoner of war and worked in forced labor camps in Thailand with thousands of other Allied prisoners. Part of his time was spent working on the Burma railroad that paralleled the River Kwai. He was unable to reunite with his wife until December 1945, as she too had been interned in a camp on Java during the war.

After the war, Gerry was awarded the Dutch Flying Cross, the Bronze Cross, and the Knight Fourth Class Militaire Willems Order (MWO) for his service. He remained with the Dutch Air Force until 1955, when he and his family immigrated to the U.S.

After a stint as a civilian flight instructor in Texas, Gerry, in 1959, joined the Aviation Crash Injury Research (AvCIR) organization in Arizona.

AvCIR, under U.S. Army contract, was investigating the survival aspects of Army aviation accidents. AvCIR eventually merged into the Flight Safety Foundation. In 1963, Gerry began work in the Prevention and Investigation Division of the Army Board for Aviation Accident Research at Ft. Rucker, Ala., and was there until 1969, when he joined the NTSB as Chief of Human Factors.

In the early 1970s, Gerry, now assigned to the NTSB Seattle office, became the IIC of the Alaska Airlines Boeing 727 accident near Juneau, Alaska, on Sept. 4, 1971.

Steve Corrie, employed by corporate member the Air Line Pilots Association, worked with him on the Alaska Airlines accident and recalls one of Gerry's apt quotes: "In the land of the blind, the one-eyed is king." Gerry returned to NTSB

The 1979 recipient of our Jerome F. Lederer Award, Gerry's contributions to preventing accidents cannot be measured and can perhaps be best distilled through this strong belief he held, *"Aircraft accident investigation is an exercise in perception, imagination, and logic, in which the early identification of all cor-rectable failure elements is more important than the distillation of the one factor that made the accident unavoidable."*

headquarters in 1972, and was assigned as an Accident Inquiry Manager, overseeing several major investigations and final reports. He retired from the NTSB in 1982 as the Deputy Director, Office of Aviation Safety.

After retirement, Gerry remained very active in aviation safety matters and published numerous air-safety-related papers. In the ISASI bibliography database, I found 24 papers he authored. He also published in *Air Line Pilot* magazine, and he coauthored a chapter in *Aviation Pathology*, a book published by the Armed Forces Institute of Pathology. Many of Gerry's publications are well worth reading again.

The 1979 recipient of our Jerome F. Lederer Award, Gerry's contributions to preventing accidents cannot be measured and can perhaps be best distilled through this strong belief he held, *"Aircraft accident investigation is an exercise in perception, imagination, and logic, in which the early identification of all cor-rectable failure elements is more important than the distilla-tion of the one factor that made the accident unavoidable."* ◆

(Compiled with the assistance of Gerry Walhout, Jim Danaher, and Steve Corrie.)

2005 Safety Statistics in Historical Perspective

(Reprinted from Airliner Accident Statistics 2005, Jan. 1, 2006, with permission of Harro Ranter, Aviation Safety Network; Copyright 1996-2006. Sources of data are regulatory transportation safety boards, including ICAO, insurance companies, and regional news media. The full document is available on the ASN website, http://www.aviation-safety.net/pubs/.—Editor)

Statistical summary regarding fatal multiengine airliner accidents

Although the number of fatal accidents (35) was significantly lower than the 10-year average (40), the number of fatalities was almost equal to the 1995-2004 10-year average. This was caused by the high number of accidents resulting in 100 or more fatalities.

- The 2005 death toll of 1,059 was below the 1974-2004 average death toll of 1294 casualties.
- The 2005 death toll of 1,059 was just below the 1995-2004 average death toll of 1,095 casualties.
- The 2005 fatality rate (percentage of occupants killed in fatal airliner accidents) of 71% was lower than the 1994-2004 average of 74%.
- The 2005 number of 11 fatal jet airliner accidents was below the 1975-2004 average of 15.4 accidents per year.
- The 2005 number of 35 fatal airliner accidents was far below the 1975-2004 average number of fatal airliner accidents of 47.8 per year.
- The 2005 number of occupants involved in fatal airliner accidents of 1,498 was slightly higher than the 1994-2004 average of 1,474.
- The 2005 number of 35 fatal airliner accidents was far below the 1995-2004 average number of fatal airliner accidents of 39.6 per year.
- The 2005 number of accidents resulting in 100 or more fatalities was high: 6, which is the fifth highest number in aviation history.
- The 2005 number of 24 fatal prop airliner accidents was slightly higher than the 1975-2004 average of 23 accidents per year.
- The 2005 number of 0 fatal piston airliner accident was far below the 1975-2004 average of 9.2 accidents.
- The 2005 number of 0 fatal piston airliner accident was below the 1995-2004 average of 3.8 accidents.

Accident summary

The year 2005 recorded 35 fatal airliner hull-loss accidents, causing 1,059 fatalities and 44 fatalities on the ground.

Date, Aircraft Type, Operator, Location, Fatalities

1. January 8, Antonov 12, Service Air, Bukalaza, 6
2. January 13, Embraer 110, AirNow, Swanzey, 1
3. January 27, Let 410, Farnair, Hungary near Iasi, 2
4. February 3, Ilyushin 76, Air West, near Khartoum, 7
5. February 3, Boeing 737-200, Kam Air, near Kabul,104
6. February 22, DHC-6 Twin Otter, MAF, near Wobegon, 2
7. March 16, Antonov 24, Regional Airlines, near Varandey, 29
8. March 18, Canadair CL-415, SOREM/Protezione Civile, Versilia, 2
9. March 23, Ilyushin 76, Airline Transport, off Mwanza, 8
10. March 26, Let 410, West Caribbean Airways, near Providencia, 8
11. April 12, DHC-6 Twin Otter, GT Air, near Enarotali, 17
12. April 20, Boeing 707-300, Saha Air, Tehran, 3
13. April 20, Lockheed P-3B Orion, Aero Union, near Chico, CA, 3
14. May 2, Swearingen Metro III, Airwork, NZ, near Stratford, 2
15. May 5, Antonov 26, Kisangani Airlift, near Kisangani, 10
16. May 7, Swearingen Metro 23, Aero-Tropics Air Services, near Iron Range, 15
17. May 25, Antonov 12, Victoria Air, near Biega, 27
18. June 2, Antonov 24, Marchsland Aviation, Khartoum, 5
19. July 16, Antonov 24, Equatorial Express Airlines, near Baney, 60
20. August 1, Canadair CL-415, Securité Civile, near Calvi, 2
21. August 6, ATR 72-200, Tuninter, off Palermo, 16
22. August 14, Boeing 737-300, Helios Airways, near Grammatikos, 121
23. August 16, MD-82, West Caribbean Airways, near Machiques, 160
24. August 23, Boeing 737-200, TANS, near Pucallpa, 40
25. September 5, Boeing 737-200, Mandala Airlines, Medan-Polonia, 102+44
26. September 5, Antonov 26, Kavatshi Airlines, near Isiro-Matari, 11
27. September 9, Antonov 26, Air Kasai, near Brazzaville, 13
28. October 4, Antonov 12, Wimbi Dira Airways, Aru, 2
29. October 22, Boeing 737-200, Bellview Airlines, near Lagos, 117
30. October 30, Let 410, Trade Air, Bergamo, 3
31. November 11, Ilyushin 76, Royal Airlines Cargo, near Kabul, 8
32. December 10, DC-9-30, Sosoliso Airlines, Port Harcourt,108
33. December 19, Grumman G-73, Chalk's Ocean Miami, FA, 20
34. December 23, Antonov 140, AZAL, near Baku, 23
35. December 24, Antonov 28, African Union, Zalinge, 2

TOTAL 1,059+44

Other occurrences

Two occurrences that resulted in fatalities have not been included in the analysis as they were outside the scope:

Date, Aircraft Type, Operator, Location, Fatalities

1. September 8, Boeing 747-300, Saudi Arabian, Colombo, 1
2. December 8, Boeing 737-700, Southwest Airlines, Chicago, IL, 0+1

Number of accidents per manufacturer 2005-1999 (2004, 2003, 2002, 2001, 2000, 1999 in parentheses)

A breakdown by aircraft manufacturer shows that Antonov suffered the highest number of accidents for the third year in a row. The majority of Antonov accidents happened in Africa, a continent with the highest accident rate. Early model Antonovs (An-12, 24, 26) are widely used by a variety of central African airlines and are not always maintained and operated in accordance with international standards. Sadly, in 2005 Antonov's An-140 regional turboprop suffered its first fatal scheduled passenger accident.

Aérospatiale/BAC **0 (0 0 0 0 1 0)**
Airbus 0 (0 0 0 1 2 0)
Antonov 11 (2 3 5 2 5 3)
ATR 1 (0 0 2 0 0 2)
BAC 0 (0 0 1 0 0 0)
BAe/Avro 0 (2 1 0 1 2 1)
Beechcraft 0 (2 2 1 1 1 3)
Boeing 6 (2 3 7 6 3 5)
Canadair 2 (2 1 0 0 0 0)
CASA 0 (0 0 0 1 0 1)
Consolidated 0 (0 0 1 0 0 0)
Convair 0 (2 1 0 0 0 0)
Curtiss 0 (0 0 0 0 2 0)
de Havilland Canada 2 (2 1 4 1 3 4)
Dornier 0 (0 0 0 0 0 2)
(MDD) Douglas 2 (2 1 1 3 4 10)
Embraer 1 (2 0 2 0 1 3)
Fairchild 0 (0 1 1 0 0 0)
Fokker 0 (1 1 2 1 1 2)
GAF 0 (0 0 0 1 0 0)
Grumman 1 (0 1 0 0 0 0)
Hawker Siddeley 0 (1 0 1 0 0 1)
Ilyushin 3 (2 1 1 2 0 1)
Let 3 (2 3 4 4 1 2)
Lisunov 0 (1 0 0 0 0 0)
Lockheed 1 (0 1 1 0 1 2)
PZL Mielec 0 (0 0 0 1 0 0)
Saab 0 (0 0 0 0 1 0)
Shorts 0 (0 1 0 1 3 0)
Sud Aviation 0 (0 0 0 1 0 0)
Swearingen 2 (0 2 1 3 1 0)
Transall 0 (0 0 0 1 0 0)
Tupolev 0 (0 1 2 2 0 1)
Yakovlev 0 (1 0 0 1 1 2)
Yunshuji 0 (0 0 0 0 2 0)
Western Built 18 (18 17 25 22 29 36)
(former) Eastern Block built 17 (8 8 12 12 9 9)
TOTAL 35 (26 25 37 34 36 45)

Number of accidents per country [where the accident happened] 2005 (2004, 2003, 2002, 2001 in parentheses)

In 2005, the Democratic Republic of Congo suffered the highest number of fatal airliner accidents: 4. Given the fact that six aircraft were owned by Congolese companies, the Ministry of Transport acted in September by revoking the air operator certificates (AOC) of 33 of the country's airlines. Similar measures were taken in Nigeria, where several airlines were (temporarily) grounded.

Afghanistan 2 (0 0 0 0)
Algeria 0 (1 1 0 0)
Angola 0 (0 0 0 1)
Argentina 0 (0 1 0 0)
Australia 1 (0 0 0 0)
Azerbaijan 1 (1 0 0 0)
Benin 0 (0 1 0 0)
Brazil 0 (2 0 2 0)
Canada 0 (1 1 0 1)
Central African Rep. 0 (0 0 1 0)
China 0 (2 0 1 0)
Colombia 1 (1 1 3 2)
Comoros 0 (0 0 1 0)
Congo (Brazzaville) 1 (0 0 0 0)
Congo (former Zaire) 4 (0 0 0 2)
Djibouti 0 (0 0 1 0)
East Timor 0 (0 1 0 0)
Egypt 0 (1 0 0 0)
Equatorial Guinea 1 (0 0 0 0)
Estonia 0 (0 1 0 1)
France (incl. overseas) 1 (0 1 0 1)
Gabon 0 (1 1 0 0)
Germany 0 (0 0 1* 0)
Greece 1 (0 0 0 0)
Guatemala 0 (0 0 0 1)
Guyana 0 (0 1 0 0)
Haiti 0 (0 1 0 0)
Indonesia 2 (1 1 2 2)
Iran 1 (0 0 2 1)
Italy 3 (0 0 0 1)
Kenya 0 (1 2 1 0)
Liberia 0 (0 0 1 0)
Luxembourg 0 (0 0 1 0)
Mexico 0 (0 0 1 1)
Morocco 0 (0 0 1 0)
Nepal 0 (1 0 2 0)
New Zealand 1 (0 1 0 0)
Nigeria (2 0 0 2 1)
Papua New Guinea 1 (1 0 0 0)
Peru 1 (0 1 0 0)
Philippines 0 (0 0 1 0)
Romania 1 (0 0 0 0)
Russia 1 (1 1 2 3)
Spain 0 (0 0 2 2)
South Africa 0 (0 0 1 0)
South Korea 0 (0 0 1 0)
Sudan 3 (3 2 0 0)
Surinam 0 (0 0 0 1)
Switzerland 0 (0 0 0 1))
Taiwan 0 (0 0 1 0)
Tanzania 1 (0 0 0 0)
Thailand 0 (0 0 0 1)
Tunisia 0 (0 0 1 0)
Turkey 0 (0 2 0 0)
Uganda 1 (0 0 0 0)
UK 0 (0 0 0 1)
United Arab Emirates 0 (1 0 0 0)
USA 2 (4 3 3 7)
Uzbekistan 0 (1 0 0 0)
Venezuela 1 (1 1 0 2)
Atlantic Ocean 0 (1 0 0 1)
Pacific Ocean 0 (0 0 1 0)
TOTAL 35 (26 25 37 34)
*collision

Summarized by region 2005 (2004, 2003, 2002, 2001 in parentheses)

In 2005 Africa was again the most unsafe continent. A total of 37% of all fatal airliner accidents happened in Africa, while Africa only accounts for approximately 3% of all world aircraft departures. The moving 10-year average trends show a decrease in the average number of fatal accidents for Asia, North-, South-, and Central America over the past 6-7 years. Africa, on the other hand, shows an increase from a 10-year average of 5.1 accidents in 1993 to 8.4 accidents in 2005. The average number of accidents per year in Australasia has remained stable at approximately 1.3 since 1995. Europe's steady decrease was halted in 2005 at a 10-year average of 6.7 accidents.

Africa 13 (7 7 10 4)
Asia 6 (7 2 11 4)
Australia 3 (1 1 0 0)
Central America 0 (1 1 0 2)
Europe 7 (1 5 7 10)
North America 3 (5 4 4 9)
South America 3 (4 5 5 5)
TOTAL 35 (26 25 37 34)

Flight nature

Eleven fatal passenger flight accidents in 2004 was an all-time low. However, 2005 showed a marked increase to 21. Although still lower than the 10-year average, measures seem necessary to continue the trend. Where in 2004 cargo airplanes were reason for concern, 2005 showed a remarkable decrease in cargo airplane crashes to 8.

Class 2005 (2004, 2003, 2002, 2001, 2000, 1999 in parentheses))
Ambulance 0 (0 0 0 1 0 0)
Executive 0 (1 1 0 0 0 0)
Ferry/positioning 0 (1 2 5 0 1 3)
Firefighting 2 (0 1 2 0 1 0)
Freight 8 (13 7 9 5 9 16)
Non-scheduled passenger 5 (3 5 4 7 9 4)
Skydiving 0 (0 1 0 0 0 1)
Scheduled passenger 14 (8 8 13 13 14 19)
Training 1 (0 0 0 1 0 0)
Passenger *) 2 (0 0 4 3 0 1)
?
3
1 (0 0 4 2 0)
-
0 (0 0 0 0 0 1)
TOTAL 35 (27 25 37 34 36 45)
*unknown if these flights were scheduled or non-scheduled passenger flights

Flight phase

The number of approach and landing accidents stabilized at 12. As the August 23 accident involving a Peruvian Boeing 737 showed, the survival rate of approach and landing accidents is relatively high. The airplane crash-landed in swampland in windshear-prone weather conditions, but 58 of the 98 occupants survived the crash. Statistics show that in the last 10 years 33% of all occupants survived approach and landing accidents. Most accidents happened in the enroute phase of flight.

Figures 2005 (2004, 2003, 2002, 2001, 2000, 1999 in parentheses)
Standing 0 (0 0 0 1 0 0)
Takeoff 1 (2 2 2 3 3 2)
Initial climb 5 (2 4 0 2 4 2)
Enroute 14 (8 9 14 15*) 13 21)
Maneuvering 1 (0 2 2 0 1 0)
Approach 8 (9 8 17 12 11 11)
Landing 4 (3 0 2 1 3 8)
Unknown 2 (2 0 0 0 1 1)
TOTAL 35 26 25 37 34 36 45
*incl. 5 other occurrences (shootdown + 4 hijackings)
1999: 1 landing, 2 enroute accidents shootdown & criminal act

Average survival percentage per flight phase

Phase 2005 (1996 to 2005 in parentheses)
Takeoff 88.1 (50.1)
Initial climb 13.6 (14.5)
Enroute 3.3 (9.2)
Maneuvering 0.3 (1.4)
Approach 45.2 (17.7)
Landing 69.9 (82.0)
Unknown 0
TOTAL 29.4 (25.9)

Wet Runway Overruns: Pilot Error? System Deficiency?

The rules and definitions for wet runway operations must be clearly defined. Training manuals should place more emphasis on the correct landing techniques in wet runway conditions, taking into account that the correct information may not be available to the flying crew.

By Capt. A. Ranganathan

(This article was adapted, with permission, from the author's presentation entitled Wet(?) Runway Operations, *presented at the ISASI 2005 seminar held at Fort Worth, Tex., September 12-15, which carried the theme "Investigating New Frontiers of Safety." The full presentation including cited references index is on the ISASI website at www.isasi.org. Capt. Ranganathan received ISASI's Award of Excellence for development of the finest paper of the seminar. The Award marks the first such ranking of seminar papers. (See* Forum *October/December 2005, page 11, for details.—Editor)*

***Capt. A. Ranganathan** is a B-737NG training captain, with 19,000 hours. He has been working on the ALAR India project for the last 5 years and compiled an "Adverse Weather Operations Training Kit," which is the standard training aid for all airline pilots in India. He is a specialist on "wet runway operations" study and is employed by a new low-cost carrier SpiceJet of India. During his airline career, he has received two commendations: 1) Partial gear-up landing on a scheduled passenger flight with Indian Airlines in November 1987 and 2) Partial gear-up landing procedure while operating a scheduled passenger flight with SilkAir in Singapore in 1994.*

Air safety statistics during the last 30 years show an average of four to six runway overruns, or excursions, every year. However, since 2004 there has been a dramatic increase in the number of wet runway overruns/excursions. The average during the last 2 years is more than 10 per year. In the majority of the cases, pilot error or human error has been identified as the cause. The 1-month period from July 2 to August 2 brought into focus the importance of wet runway operations. Two hull losses involving the Bangladesh Biman DC-10 accident at Chittagong and the most recent Air France A340 accident at Toronto and the Air India 747-400 overrun in Mumbai should be eye openers for the subject.

Questions to ponder include Do we take this subject seriously only when there are lives lost? Are pilots really to blame, or is the system deficient for safe operation in wet conditions?

Several safety studies involving air accidents/incidents have identified that almost one in three approaches are not stabilized. But not all the unstabilized approaches result in a runway overrun or excursion. Those that do mostly happen in runway conditions that are reported as "wet." In most of the cases, the landing before the accident has been and is normal. Have the pilots been lucky, or have they made a stabilized or safe approach to landing? Are the pilots getting the correct information on the runway condition?

A recent paper presented by D. Paul Geisman of Boeing on wet runways has some interesting statements.

The first one is, "Airplane braking coefficient is **not** tire to ground friction, but instead it is the percentage of the total airplane weight on the wheels which is converted into an effective stopping force."

The second statement under the heading "runway friction and runway texture or how slippery is wet" claims that a wet runway results in less friction available to stop the airplane in an emergency. The

Figure 1

Figure 2


Figure 3


Figure 4

question is How much is the runway friction reduced by the presence of moisture on the runway surface? This is a function of the material and techniques used to construct the runway.

Another interesting fact that comes out of the article is that certification flights are conducted in controlled "dry" conditions, where the friction coefficient is taken as 4 mu and the wet runway criteria are extrapolated with a friction coefficient of 2 mu. Certification flights are not done in actual wet conditions!

Figures 1 and 2 show two different pictures of a dry runway. The rubber deposits on the runway in Figure 2 make it a potentially lethal surface in wet conditions.

A common factor in most of the wet runway overrun and excursion accidents is the fact that the actual condition of the runway is not reported to the pilots. ICAO Annex 3 requires the runway information to be provided:

ICAO Annex 3—Meteorological Service for International Air Navigation
4.12.7 Recommendation: *Information on the state of the runway, provided by the appropriate airport authority, should be included in reports in the METAR/SPECI code forms in accordance with regional air navigation agreement.*

For such information to be disseminated, several agencies must act in coordination. Unfortunately, a real-time report on the actual runway condition is not likely because of this multi-agency function.

There is no clear-cut definition of a "wet" runway in FAA rules, and while there are mentions of different categories of runway conditions like "wet," "damp," etc., in JAA rules, the subject has several grey areas. The only information that a pilot gets is based on the assumption that the water depth is less than 3 mm when the runway is reported wet. The air traffic controllers rarely report "contaminated" or "slippery" conditions. The wet runway condition becomes more critical in heavy rain and in crosswind. Even for grooved and sloped runways, the water depth can be more than 15 mm during the period of heavy rain.

Most of the runways, worldwide, are not grooved. The rubber deposits on the runways can be as much as 8 mm, depending on the number of landings and the period

Figure 5

E. MARTINEZ

Capt . Ranganathan displays "Award of Excellence" presented by President Frank Del Gandio for the development of the finest paper presented at ISASI 2005.

between runway surface cleaning. Figures 3 and 4 show the visual perception from the cockpit.

They show the effect of the rain on rubber patches on the runway, which seem to disperse the water at varying depths. During a landing in heavy rain, these patches can play a major part in whether the aircraft manages to stay on the runway surface. As flight tests are not done in "actual" wet conditions, can the data available be accurate to decide on whom the blame rests in the case of an overrun?

Training manuals of different manufacturers are strangely silent on "wet runway" operations, this in spite of so many overruns during the past 30 years. To quote: Shoot a firm touchdown and select MAX REV as soon as MLG is on ground—Reference: A320 instructor support issued by Airbus Industrie. Similar instructions are contained in the flight crew training manuals issued by Boeing for various aircraft types.

Figures 5, 6, and 7 show the effect of reversers on the water depth in front of the main landing gear wheels. High-definition films taken during heavy rain conditions show clearly that the effect of the reverser flow appears to push the water in front of the wheels. While reversers are definitely a bonus for stopping on wet runways, the use of maximum reversers could result in a hydroplaning wheel from making contact with the runway surface.

The common factors in all of the most recent wet runway accidents seems to be
1. heavy rain,
2. crosswind/tailwind conditions,
3. runway condition reported wet (not flooded or contaminated?),
4. maximum reversers used.

Are we justified in blaming the flight crew, even if the approach and landing were not carried out in stabilized conditions? Did they have the correct information to carry out a safe landing?

The rules and definitions for wet runway operations must be clearly defined. Training manuals should place more emphasis on the correct landing techniques in wet runway conditions, taking into account that the correct information may not be available to the flying crew. The manufacturers of aircraft should consider a minor change in reverser flow, to prevent water accumulation in front of the wheels. A 10 to 15 percent loss of reverser action will definitely go a long way in reducing the number of overrun and excursion accidents taking place on wet runways. Finally, safety investigators should look at wet runway accidents in a different perspective. Is it a system error, or do we still continue to call them "human errors"? ◆

Figure 6

Figure 7

Selecting the Next Generation Of Investigators

(This article was adapted, with permission, from the author's presentation entitled Selecting the Next Generation of Investigators, *presented at the ISASI 2005 seminar held at Fort Worth, Tex., September 12-15, which carried the theme "Investigating New Frontiers of Safety." The full presentation including cited references index is on the ISASI website at www.isasi.org.—Editor)*

Characteristics such as logic, objectivity, and writing are very difficult to improve significantly through training, so these skills need to be identified during the selection process.

By Keith McGuire (M02416)
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One of the important aspects of improving aviation safety is to select the right people as air safety investigators. While selecting a systematic and objective investigator is the goal of the selection process, seldom is the selection process itself also systematic and objective. This article will provide an overview of the characteristics essential to being a successful air safety investigator and how to evaluate these traits during the selection process. The traditional approach of classifying people is based on their technical skills. Aspects such as logical thinking, objective approaches, and the ability to communicate effectively are often overlooked.

While technical skills are important, the more process-oriented traits have shown to be critical characteristics of a good investigator and are not adequately evaluated prior to the investigator's selection. Since training programs are of limited value in dealing with these areas, this article will emphasize the "how" of determining these characteristics prior to selecting a new investigator. Using the premise that some traits, such as a logical thought process, can be enhanced but not truly taught during a training program, we will also concentrate on ways to evaluate these traits during the selection process.

A logical starting point for determining the desired characteristics for an air safety investigator is to look at the characteristics found in successful investigators. Admittedly, the evaluation of who is a successful investigator is somewhat subjective, but there are some objective measures that can be used. For instance, has the investigator been directly involved in the investigation process with responsibility for results or has he or she been on the fringes of the investigation with little responsibility and influence? What results has the investigator produced in previous investigations? Has the investigator been able to resolve complex issues without becoming fixated on irrelevant details? Does he or she work well with others and effectively elicit the expertise of others to thoroughly examine all aspects of an investigation?

While not an exhaustive list, some of the characteristics associated with good air safety investigators are

Technical Competence—While much of the technical knowledge necessary to perform an investigation can be learned after starting the position, the ideal candidate will already have an extensive background in the aviation industry.

Trained in the Investigative Process—Some investigators come to a new position with experience in investigations, but most do not. While there are certainly advantages to selecting an experienced investigator when the position requires an immediate contribution, many organizations prefer to train new people from the beginning rather than trying to retrain previous thought processes. Both ways, there needs to be a combination of formal training and structured OJT (on-the-job training) provided to the investigator.

Thorough—The thorough investigator has a balanced approach to gathering factual information during an investigation. While all aspects of the accident will be considered, only the relevant facts are developed in depth. As the investigation develops, the investigator will exercise appropriate judgment of the available facts to decide what areas need more development.

Accurate—The facts developed and reported accurately portray the accident sequence. While the reports that are written may vary in the amount of space given different subjects, that determination is a result of their relevance rather than the investigator's bias or specific background.

Experienced—Experience is a necessary part of being a good investigator. However, as with most occupations, for the experience to be effective it has to be varied, progressive, and mentored. There also needs to be a level of responsibility for the experience to be meaningful. While it is helpful to indirectly assist the investigative process, there is a unique learning experience when you actually have the responsibility for some portion of the investigation.

Logical and Systematic—The investigation is done in a sequential and consistent manner so that all the relevant facts are collected before any conclusions are formed. What happened is determined before an attempt is made to determine why it happened. The facts lead to a conclusion rather than the other way around.

Objective—The investigator has an open

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mind and does not concentrate on any one area early in the investigation to the exclusion of other areas. Even though some evidence may quickly indicate causal factors in the accident, a thorough review is done of all of the conditions surrounding the accident. This not only provides accurate conclusions, but also develops all of the contributing factors in an accident so that there is an opportunity to address the safety issues inherent in the underlying factors.

***Good Writing Skills*—**The investigator's written reports create an accurate picture of the facts developed during the investigation. They are grammatically correct, accurate, timely, and create a word picture that is easily understood by the reader. While the significance of the facts reported might not be completely understandable to a layman unfamiliar with aviation, the facts themselves should be presented in a clear manner.

***Strong Interpersonal Skills*—**Air safety investigators do not operate alone as technical experts who know everything about all aspects of aviation. Instead, they need to gather information from other people and rely upon the inputs of other people. Some of the information will come from aircrew members or witnesses who observed portions of the accident sequence. Other information will come from technicians who are involved in the testing of aircraft components or provided technical information. In all areas of the investigation, the interpersonal skills of the investigator will influence the quality of the cooperation and, therefore, the quality of the investigation.

***Psychologically and Physically Prepared*—**Many air safety investigators will be working under stressful and physically challenging conditions. This is particularly true for those who have responsibility to respond to the accident scene or process data immediately after the accident. Since stress is a common aspect of the job, it is important to know how a prospective investigator deals with it.

***Continually Learning*—**One of the subtle, but important, traits of a good investigator is the ability to continually learn new things. While this is most obvious in the technology area, it is actually more important in terms of a mindset. The investigators who "know it all" will find it very difficult to use the input from other participants in the investigation and will frequently defend inaccurate positions because they do not want to ever be wrong.

Training the new investigator

Traditionally, many organizations have selected new investigators based on their technical qualifications. A look at most recruiting announcements reveals requirements like pilot certification, number of flight hours, engineering degrees, and experience in investigations, perhaps with specific desired job titles and responsibilities. Once an individual is selected, then training is provided to enhance weaker skills. This works well with technical skills since it is easier to quantify weak areas and provide knowledge to improve those areas. Unfortunately, thought processes and "people skills" are not so easily taught. If the selected investigator does not have a logical thought process when selected, no training course will completely change that. Certainly, there are courses that will improve these abilities, but they will not improve in the same way technical skills can improve.

Most investigators will learn more from a good mentor(s) than they will learn from the classroom. Unfortunately, many organizations do not have a structured program of mentoring new investigators.

Once a new air safety investigator is selected, it is important to tailor the training to the individual. This starts with the orientation to the organization and carries through to the journeyman level. After that, the training shifts to maintaining some skills and developing new ones.

Most people will need a course covering the basics of investigation methodology and organizational procedures applicable to their position. For some people who are not going to be deeply involved in accident investigation, this basic overview may be sufficient exposure. However, for a professional investigator, there needs to be ongoing specialized courses to develop technical skills as applicable to the individual investigator's job duties. If the investigator is going to be responsible for overseeing an entire investigation, then the specialized courses might educate him or her in areas not already worked in and enhance the basic subjects covered in the indoctrination course.

For example, if the initial course includes an overview of inflight fires, then an advanced course in inflight fires can be planned for a few years later in the career. This provides a refresher in the principles of investigating an inflight fire as well as the opportunity for the investigator to use his or her increasing experience in the field to understand more complex techniques.

If the person is categorized as a specialist, then the courses will typically involve more narrow and detailed instruction into how that specialty is incorporated into the accident investigation process. For instance, a corporate safety position may need only limited training in accident investigation but will require extensive education in trend analysis of data from FOQA, system safety, or incident investigation. The important point is to ensure that a training program is tailored to the individual needs of both the investigator and the organization using the investigator's services.

Formal training programs can be a valuable resource in providing help to a new investigator, but they need to be coordinated with structured OJT. Most investigators will learn more from a good mentor(s) than they will learn from the classroom. Unfortunately, many organizations do not have a structured program of mentoring new investigators.

Techniques for selecting investigators

Most managers select someone similar to themselves*—**It seems that anytime the discussion about successful investigators comes up in a group of investigator managers, the opinions expressed will closely resemble the background of the manager expressing the opinion. In other words, managers tend to pick people like themselves. Complicating this situation even more, many managers feel that they are able to select good candidates based on their review of a resume and/or an interview. While investigators are expected to be objective, thorough, and systematic, all too frequently those same techniques are not used in the selection process. However, using an objective and systematic approach to selecting investigators ***will produce a distinctively better product than the common "resume review and/or interview" approach used by so many managers.

Suggested elements in the selection process—Prepare for vacancies before they happen. Whenever you can anticipate that a person will be needed, begin to develop sources of potential investigators and perhaps even a pool of applicants.

Determine what it is that you want done—While this sounds easy, it can be difficult to get agreement if there are multiple people involved in the decision process. Do you want an investigator who is capable of quickly filling a critical position temporarily or do you have the time to find a potentially long-term employee who will provide continuity in the safety department for many years? Perhaps you need someone who can not only investigate a variety of accidents, but also provide air traffic control expertise for the rest of the team? These qualities have to be determined ahead of time to produce good applicants.

Publicize the position—Where you publicize the position will depend on where the largest pool of potential applicants exists and the limitations on your selection process. While a newspaper advertisement may result in numerous calls of interest, it will probably not result in as many qualified applicants as will an advertisement on a specialized website or an aviation magazine. However, if the qualifications are more general and you are limited to a specific geographic area, a local newspaper may be appropriate.

Screen the applicants

Review written applications—The first stage is to eliminate applicants who are clearly not qualified and then rank those who are qualified. It is best if someone knowledgeable about investigations and the language of aviation does this since the written applications may not always have the right "buzzwords" that a human resources specialist may be looking for.

Telephone screening—Once the qualified applicants are ranked, a knowledgeable person can further screen them during a telephone conversation. One recommended approach for the telephone interview is to check the accuracy of the resume by asking for names of persons who can confirm the experience of the applicant and by asking technical questions appropriate for the level of experience listed in the resume. Unfortunately, some resumes are exaggerated, but this can usually be evaluated during the telephone interview. If the resume lists an engineering degree, the applicant should be proficient in the use of basic mathematical equations to solve a scenario. Remember, if the resume isn't accurate, the reports later filed by the individual, as an investigator, may not be accurate either.

▼ **Just as in a good accident investigation, where the facts lead to a conclusion, a thorough, objective evaluation of both technical and subjective characteristics will lead to the best investigators.** ▲

Personal interviews—Personal interviews should be done by the hiring manager and one other person knowledgeable about the job requirements. This provides a broader, more objective evaluation of the applicant. Likewise, if the applicants do well during the management interview, they should be introduced to several of the people with whom they would work and be allowed to informally discuss the job one-on-one with these staff members. The feedback from the staff will be very valuable.

Scenarios—One helpful technique is to provide scenarios to the applicants to see how they handle various situations. During the oral part of the interview, the way the applicants handle difficult scenarios may be an indication of the way they will respond to people as an investigator. Likewise, written scenarios can be used to evaluate the applicant's ability to work under stress and time constraints. Using photos and/or diagrams, applicants can be asked to write a written description of what they see. In addition, a series of increasingly difficult scenarios can be developed to evaluate the applicant's thought processes. If all of these scenarios are given to the applicant at once with a set time limit, the way the applicant allocates his or her time can be evaluated.

Background evaluations—One of the most common mistakes made is to not thoroughly check an applicant's background. References given in a resume are useful, but they rarely provide any negative information about the applicant. Likewise, the current supervisor of the applicant may not provide an accurate picture of the applicant. For legal reasons, or perhaps even from a desire to get rid of the applicant, a current supervisor may have nothing bad to say about the applicant. A better source of information is previous supervisors who have nothing to gain or lose by being honest. In one actual case, a potential employee was receiving very high praise from his current supervisor, but the previous supervisor stated, "It was the happiest day in my life when he left." The hiring managers also need to network until they find people they know or who were referred to them by trusted contacts they know who can give a candid evaluation of the applicant.

Select the best match—No single candidate will be the perfect candidate, but an objective review of the information gathered during the evaluation process will provide a ranking of the candidates. The person at the top of the list will not necessarily be the "best person" but is usually the "best match" for the job at hand.

The selection process for new air safety investigators is a critical item that requires the same thorough and objective investigation as that which we give our accident investigations. The quality of the next generation of investigators needs to be established through a systematic approach of evaluating both technical and logic skills. While technical skills are necessary for a successful investigator, they can be provided through training later. However, characteristics such as logic, objectivity, and writing are very difficult to improve significantly through training, so these skills need to be identified during the selection process. Just as in a good accident investigation, where the facts lead to a conclusion, a thorough, objective evaluation of both technical and subjective characteristics will lead to the best investigators. ◆

(The views expressed in this paper are those of the author and not necessarily the views of the NTSB.)

Applying Human Performance Lessons To Smaller Operators

Looking at human performance lessons from a flight deck perspective, with primary focus on threat and error management and its role.

By Kathy Abbott, Ph.D., FRAeS, Chief Scientific and Technical Advisor, Federal Aviation Administration

(This article was adapted, with permission, from the author's presentation entitled Applying Human Performance Lessons to Smaller Operators, *presented at the ISASI 2005 seminar held at Fort Worth, Tex., September 12-15, which carried the theme "Investigating New Frontiers of Safety." The full presentation including cited references index is on the ISASI website at www.isasi.org.—Editor)*

Human performance, especially flight crew error, has long been identified as a primary factor in a significant percentage of accidents. This has been addressed in a number of ways in the larger air carrier operations, including improved equipment, safety data monitoring of service experience, improved flight crew procedures, and improved flight crew training and qualification (including crew resource management and threat and error management knowledge, skills, and procedures). All of these human performance lessons have contributed to the "safety net" that has resulted in reduced accident rate for these larger operators. These lessons have not yet made their way in a widespread manner to the smaller operators.

Applying the human performance lessons to allow more widespread use of such knowledge, skills, and procedures could contribute to improved safety in smaller operators, as well. This is increasingly important because of the evolution of the airspace system and introduction of many new technologies. These new technologies are coming quickly, especially to smaller operators and aircraft. Changes such as these can bring risk as well as benefits.

Some differences

Accident rates are declining overall, and this is a tribute to the attention to safety within a very safe industry. But a gap still remains between the accident rates for large jet transports (especially those aircraft operated under US 14 Code of Federal Regulations Part 121 or equivalent) and smaller jet and turboprop aircraft, based on data from the Flight Safety Foundation. However, it should be noted that the accident rates of the corporate/executive segment (business aircraft flown by professional pilots) are comparable to, or better than, the Part 121 air carrier accident rates.

Why do differences exist? There are many reasons, but it is useful to consider some factors that may contribute to the differences. In the large jet-transport community, the increased reliability of the equipment has contributed significantly to reduced accident rates. As the equipment reliability has improved, attention has turned to other areas, such as flight crew error, because it is cited as a major factor in a significant portion of accidents. This is important because the pilot populations may have very different training and experience between the two communities.

Even within the air carrier community, there are important differences in the pilot population. Research has shown that the regional airline pilot population has some important differences from the larger air carriers (Lyall and Harron, 2003). The regional airline pilots tend to have less experience, higher turnover, and operate a wider range of flight decks. All these factors may contribute to vulnerability to error—and that's within the air carrier community. The range of experience levels, turnover, and operation of flight decks may be even greater when considering the non-air carrier community.

Larger operators—lessons learned

Mitigation of flight crew error is being done through several mechanisms, including aircraft equipment designed to alert the flight crew to safety threats, safety data monitoring and analysis of service experience, improved flight crew training and procedures, and improved operational concepts (such as area navigation [RNAV] and Required Navigation Performance [RNP]).

Implementation of TAWS (Terrain Awareness and Warning System) is an example of aircraft equipment that has had a significant effect on improving safety. Other

Hull Loss Record

Accident Type	Non-U.S. Carriers, FOQA Users	European Carriers, NOT Using FOQA	U.S. Carriers, Most NOT Using FOQA Data
Hull Loss	0.51	1.10	0.60
Hull Loss Crew Factor	0.20	0.52	0.37

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examples include TCAS (Traffic Alert and Collision Avoidance System), GPWS (Ground Proximity Warning System), and improvements in automation capability and reliability as noted by Robert Matthews' technical paper delivered at ISASI 2004.

Larger operators have also implemented safety data monitoring of service experience, such as FOQA (Flight Operations Quality Assurance), LOSA (Line Operations Safety Audit), ASAP (Aviation Safety Action Program), and other voluntary reporting systems. See Capt. John Cox's paper delivered at ISASI 2005 for discussion of the application of this proactive approach to smaller operators.

Larger operators have improved flight crew procedures. Examples include the altitude awareness program that was first implemented by a major U.S. airline to address altitude deviations. This program was quite successful and is now in widespread use by many other airlines. Other programs have recognized the important of addressing flight crew monitoring of flight deck operations (Sumwalt, 2004) so that now many airlines and manufacturers describe pilot roles as "pilot flying and pilot monitoring" (rather than "pilot flying" and "pilot not flying"). And, of course, the importance of standardized and consistent application of procedures is widely recognized as important risk mitigation.

Larger operators have also improved flight crew training and qualification (including crew resource management [CRM] and threat and error management [TEM] knowledge, skills, and procedures). The large jet-transport operators tend to have more substantial infrastructure for implementing safety enhancements. Examples include the infrastructure for

- safety data monitoring and analysis.
- access to and distribution of information for pilots.
- training and flight crew procedures that is tailored to the operator.
- access to information about new types of operations that provide safety and efficiency improvements.

Error management

Flight crew error is cited as a primary factor in most accidents and incidents. In many cases, the human operator is blamed for making the error; in some countries the human operator is assigned criminal responsibility. While the issue of personal responsibility for the consequences of one's actions is important and relevant, it also is important to understand why the individual or crew made the error(s). In aviation, with very rare exceptions, pilots do not intend to make errors, especially errors with safety consequences. To improve safety through understanding of human error, it may be more useful to address errors as *symptoms* rather than *causes* of accidents.


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The importance of managing errors becomes obvious when it is recognized that errors are a normal byproduct of human behavior and cannot be prevented completely as noted by J.T. Reason, in his *Human Error,* 1990 work. Reason identifies that layers of defense must be breached before an accident occurs; similarly, layers of defense can be applied to manage errors. These layers of defense can be implemented for the latent errors (e.g., organizational factors) as well as individual factors.

Threat and error management training

Clearly, pilots provide an important layer of defense with respect to errors. Some of the lessons learned about errors and their management as shown by R. Amalberti, in "The Paradoxes of Almost Totally Safe Transportation Systems," Safety Science (37:109-126), 2001, are summarized below as they apply to pilots:

- Experienced pilots make just as many errors as less-experienced pilots, except for absolute beginners.
- Experienced/expert pilots make different types of errors than less-experienced pilots. As expertise increases, more routine errors but fewer knowledge-based errors are made.
- The number of errors made tends to decrease in more-demanding situations (because of cognitive control), but the recovery rate from errors also tends to decrease (because of lack of resources for detection and recovery).
- Some 75% to 85% of errors are detected, with a higher detection rate for routine errors.
- Expert pilots tend to disregard errors that have no consequences for the tasks under way. In fact, detection and recovery from errors are considered to be a true manifestation of expertise.

It seems clear that experienced pilots have developed skills for performing error management tasks. Therefore, flight crew training, procedures, and operations can directly support these tasks.

In addition to training for avoiding, detecting, and recovering from errors, LOSA data have identified the importance of also managing threats. A threat is defined as anything that requires a crewmember's time, attention, or action beyond the tasks of a "pristine flight," where a pristine flight is a normal flight that requires no crew effort to change anything from the original plan, through the execution of flying from departure to destination.

These external threats (weather, maintenance, passenger problems, operational pressures, distractions/interruptions, air traffic control errors—language/communications problems—etc.) are not pilot errors but come from external sources and increase the potential for error, if not managed properly. Analysis has shown that accident/incident crews typically do not recognize all the threats, or their severity. Crews are most vulnerable to making errors when they acquire several threats and have employed no strategies to manage them. A more detailed discussion of TEM, which is an important defense strategy to address errors through flight crew training, can be found in D. Gunther, et al., "Threat and Error Management Training" in the Proceedings of the International Symposium on Aviation Psychology, Columbus, Ohio, April 2001.

Procedural noncompliance

Another important safety enhancement that supports error management is the use of standard operating procedures (SOPs). Procedural noncompliance is the failure to follow established procedures. It is generally deliberate (and often well-meaning). An example of procedural noncompliance is continuing on with a landing even when weather minima requirements have not been met.

Procedural noncompliance is a prevalent type of error (more than 50% of the errors, in one study) among larger and smaller operators. This may be a particular concern for smaller operators where the procedures may not be tailored for the operation or where the culture of the company does not foster this. Many larger operators emphasize following SOPs as one way to address safety vulnerabilities, including the situation that commonly occurs when flightcrew members do not fly together often. In comparison, smaller operators may have pilots who fly with each other on a more frequent basis. This familiarity may make the following of SOPs seem less important. Procedural noncompliance has the potential to introduce significant safety vulnerability because it

- takes away an important layer of defense (i.e., the operations manual), which is intended to ensure predictable and safe working practices. Procedures are often put in place because of the lack of other possibilities such as equipment design, hardware, and avoidance of the problems;
- can occur when the individual does not know or understand the procedures or rules. This lack of understanding may be risky in itself;
- can take people into new or unpracticed situations, in which the person is more likely to make an error.

Patrick T.W. Hudson, in "Bending the Rules in the Air," 1999, identifies five main types of procedural noncompliance that cause problems for organizations. These five types are discussed below, with their applicability to flight operations.

- ***Unintentional procedural noncompliance***. This may occur for several reasons, but one important situation is when pilots do not know or understand the procedures. This may be particularly relevant to new or less-experienced pilots or when completing tasks that require adherence to a large number of rules or procedures. For a smaller operator, it is important to avoid such unintentional deviation from formal procedures.
- ***Routine procedural noncompliance.*** This occurs when deviations from the procedures are perceived to involve little risk and are accepted as the normal way of doing the job. For example, "I know what they taught you in training, but this is the way we really do it." In this case, not following the procedure has become the group *norm.* Accepting these norms in a smaller operator is a tacit endorsement of procedural deviation.
- ***Situational procedural noncompliance.*** This occurs as a result of factors that make it difficult for the pilot to comply. Factors such as time pressure, lack of supervision, unavailability of equipment, and insufficient staff have implications for this type of procedural noncompliance. An example may be when an operator improvises because the equipment specified in the procedure is not available or the paperwork is not complete.
- ***Optimizing procedural noncompliance.*** This category of procedural noncompliance is related to the nature of the job or the task itself. It may involve ways of improving things. This is more common when pilots view the procedures as overly restrictive, out of date, or inappropriate.
- ***Exceptional procedural noncompliance.*** These procedural deviations are rare and tend to happen only in very unusual circumstances, such as an emergency or equipment failure. This is especially challenging because there are cases where the pilot saved the situation by not following the procedures, especially when a novel situation occurs for which the procedures were not designed.

What should be done about procedural noncompliance? Forbidding it is ineffective. An initial step is to recognize its importance and understand it, and find out where and why it is occurring. Then, remove the reasons for it. For example—modify the procedure, change the culture and mindset (easier said than done!), emphasize the reasons for compliance, and allow flexibility within the procedures to manage situations as necessary. These steps can be quite difficult, but they are important.

Challenges for smaller operators

Smaller operators have the potential to improve safety using the same concepts as larger operators. The lack of infrastructure may sometimes make it more difficult, but the concepts are still valid. Some challenges that have been identified based on anecdotal data from smaller operators follows:

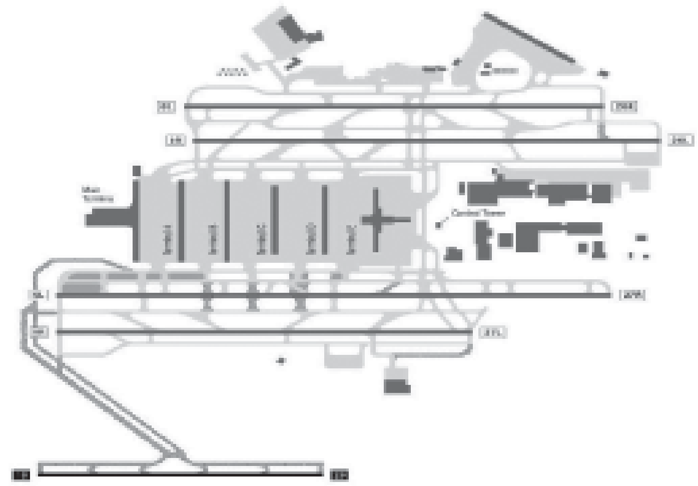


Figure 1: Simultaneous RNAV departures.

- Training—Many smaller operators outsource their training, and while the training meets or exceeds the standards, there are differences. For example, during the simulator training, the pilots may be from different operators. Thus it is hard to have training that is tailored to a specific operator's requirements, and it makes SOPs difficult.
- Operating as a flight crew: crew pairing can be a challenge (this is true for larger operators as well, but there are more options available. For example, in smaller operators, pilots don't have the option of avoiding people with whom they do not wish to fly).
- Procedures—Callouts are not always spelled out or practiced. The procedures themselves often do not come from the airplane manufacturer.
- Automation training is not as extensive, and procedures for using automation are not sufficiently detailed. Since operation of automation has been identified as an area of safety vulnerability for larger operators, and since this is an area where onboard equipage is increasing for all aircraft, increased attention is warranted.
- Pilot roles—Who does what is not always spelled out, e.g., during an engine failure.
- Crew resource management—Threat and error management training may not be included as part of training. For TEM training, the instructor should teach for the intended audience. If the course is too esoteric or targeted to a different audience, it will not be effectively learned.
- Mindset—There may be resistance to implementing some of these ideas, especially ones clearly brought from the large air carrier community. They may be viewed as unnecessary or inappropriate.

Airspace system evolution

Civil aviation is experiencing an unprecedented period with economic, safety, security, and operational challenges, together with technology opportunities. The fleet capability is evolving, and there is a significant increase in the presence of regional aircraft. There is potential for introduction of large numbers of very light jets, and varieties of technologies are becoming available (and in many cases, are already installed) for flight deck applications. Many operators (large and small) are now operating all "glass flight deck" airplanes, with advanced avionics and navigation capability. This is increasingly true for smaller aircraft as these technologies become more affordable and widely available.

Experience has shown that technologies bring operational issues that may not have been anticipated. An example of this occurred during the introduction of advanced automation in large air carrier operations, as shown by both C.E. Billings' *Aviation Automation: The Search for a Human-Centered Approach*, 1997 and the FAA's "The Human Factors Team Report on the Interfaces Between Flightcrews and Modern Flight Deck Systems," July 1996. If smaller operators do not learn the lessons of the larger operators when advanced technology and automation were introduced, they may experience the same safety vulnerabilities. This is especially true, considering differences in flight crew training and experience levels.

There are several new operational concepts being implemented as well. These include increased use of RNAV, airborne self-separation, and closely spaced parallel runway operations, among others. All of these advances in operations and technology have great promise, but human performance considerations will be important to achieve the benefits while minimizing the risks.

RNAV departures from multiple runways

Recent experience in implementing RNAV departure procedures at a large U.S. airport illustrates the importance of addressing error management and the associated layers of mitigation, and how it may differ for smaller operators. This particular airport (Figure 1) has four parallel runways in sets of two pairs. The RNAV departure procedures were implemented so that two aircraft could depart simultaneously from one of the runways in each of the "pairs." This implementation is showing significant operational benefits (e.g., reduced time and fuel) and safety benefits (e.g., reduced workload and communication requirements).

However, a very small number of errors has occurred where the pilots had the incorrect runway in their flight management system (FMS), although they took off on the correct runway. For example, the correct runway was 9L and the pilot had 8R programmed in the FMS. The aircraft took off on 9L but the aircraft turned toward the first waypoint for the departure procedure from 8R. This raises the potential for a conflict if there is an aircraft departing from 8R.

Although very few errors have occurred during a very large number of operations, the potential severity of consequences make it important to address. The operation has been changed so that the takeoff clearance gives the aircraft headings to the first waypoint of the RNAV departure procedure, to ensure that the correct procedure is being followed.

Other mitigations are being developed to provide layers of defense so that operations can resume to using RNAV off the runway, rather than being vectored as they are now. These mitigations recognize that it is impossible to prevent all errors, although preventing as many errors as possible is important. Examples of recommendations that provide multiple layers of defense against the errors include

1. Provide enhanced pilot training/familiarity/awareness. This may be done through one or more of the items below:

• ***Implement a SID (Standard Instrument Departure) Ops departure page*** to address general RNAV issues related to simultaneous RNAV departures from multiple runways.

• ***Publish a safety alert notice or local notice to airmen*** (this is intended to provide the information to non-airline operators).

• ***Pilot bulletins from the operator or the pilot unions.***

2. Give the pilots the best chance of loading the correct runway in the FMS at the gate (although they need to be aware that they may be assigned a different runway based on air traffic needs). This may be done through ATIS (Automatic Terminal Information Service), PDC (Pre Departure Clearance)/Departure Clearance, a matrix on the SID Ops page, or a combination of these methods.

• ***ATIS*** should provide information to flight crews on which runways are in use.

• ***PDC***—This may be a useful tool to provide information about the expected runway; however, there is some concern about the possible misperception by the pilots that this represents a final runway assignment as opposed to a "best guess." In addition, many operators do not use PDC.

3. Detect and correct the error of having a different runway in the FMS from the one assigned:

• ***Flight crew procedures***—Provide procedural means for verifying that the correct runway is entered into the FMS, e.g., have a performance-based checklist that directs pilots to detect and correct FMS errors through challenge-response. Many of the larger operators are implementing this into checklists. Other operators do not have a formal means of implementing this mitigation into checklists.

• ***ATC RNAV procedure verification***—Just prior to transferring communication to the tower, ATC will ask for FMS runway and first waypoint. If the pilot responds incorrectly, it is expected that ATC will correct them. This is intended to actively ensure that flight crews have loaded the correct procedure and runway.

• ***Runway signage to remind pilots to verify runway in the FMS***—Signage may be more helpful for non-air-carrier flight crews.

4. Conduct an ongoing review of in-service experience during the initial implementation of the departure procedures. This review of in-service experience should involve multiple areas of expertise, including flight operations, air traffic operations, flight crew and air traffic training, human factors, avionics, procedure design, and other areas as needed.

This is not a complete list, but the items illustrate some of the layers of error mitigation. They also illustrate that smaller operators may need different mechanisms for informing their pilots or for accessing information about important operational and safety issues for a particular operation.

Larger operators have employed many safety improvements, many of which address human performance concerns. These improvements provide layers of defense for human errors and for threats and are an important part of the safety net that has led to the excellent safety record that exists today. Widespread application of these improvements to smaller operators has the potential to improve overall safety. This may be especially important, given the acceleration of the introduction of new technologies and the potential changes to aircraft fleets and operations. ◆

Explaining Rotor Seizure Effects

The author defines some of the secondary damage effects seen in gas turbine engine failures where a significant degree of rotor seizure has taken place. Rotor seizure in this context is a deceleration rate effect producing torque loads on the powerplant components of large transport engines.

By Al T. Weaver (MO4465), Southern California Safety Institute

(This article was adapted, with permission, from the author's presentation entitled Rotor Seizure Effects*, presented at the ISASI 2005 seminar held at Fort Worth, Tex., September 12-15, which carried the theme "Investigating New Frontiers of Safety." The full presentation including cited references index is on the ISASI website at www.isasi.org.—Editor)*

Rotor seizure effects refer to the permanent distortions in the engine/pylon system related to the torsional effects brought about by rapid stopping of a gas turbine engine while combined with a significant amount of rotor imbalance.

The gas turbine engine develops normal torque loads on its rotor components, including the drive shafts, by virtue of accelerations and decelerations between the driving force (turbine) and the loading force (compressor). Aerodynamic reaction torque loads are produced on the stationary airfoil components (compressor stators) by virtue of their turning or aerodynamic lift forces. The forces on the engine static parts are then transmitted to the mount structure of the pylon.

In the case of internal engine failures within the engine, abnormal torque loads may be developed in combination with rotor imbalance, leading to distortion or failure of parts within the load path. In its simplest form, to visualize the results of abnormal seizure loads, one typically thinks of twisted drive shafts (a rotor component) and/or sheared mounting bolts (a pylon component). However, in modern gas turbine engines abnormal torque loads have been anticipated and large margins applied to the designs to minimize either a shaft failure or a mount fracture due to torsion-induced loading.

Incident history associated with the failure within gas turbine engines is largely devoid of complete engine seizures (sudden stoppages) or mount failures associated with only torsion loading. However, this history does contain incidents of intermittent very high torsion loading as well as mount failures allowing the engine to be released. A clarification and explanation is then given. The inertial energy contained within the rotor system of the gas turbine under flight conditions (ram air in the inlet) is such that bearing failures are overcome with friction creating molten metal, thus reducing the friction to well below any force capable of stopping a rotor with ram air still trying to windmill the compressor/turbine. The meshing or tangling of broken blades and stator vanes as well as initial frictional forces between blades and cases under extreme imbalance loading produces a more pronounced level of torsion loading on the system.

The torsion produced by the tangling of blades (a rotor component) and stator vanes (a stationary component) is typically short-lived with both of these parts fracturing early in the event, thus significantly reducing the seizure torque to a slightly depressed windmill condition—albeit after landing the rotor may not be able to be turned by hand (and thus reported seized).

At the same time, the initial rubbing of large fan blade tips against their casing material may bring about a significant component of torsion loading. The seizure loading in itself is typically not enough to fracture mounting components unless it is combined with very high imbalance forces at the same time. Such combinations have occurred in the case of some partial disk fractures, leaving the rotor structure with a rotating imbalance force to superimpose imbalance loading with torsion loading.

An example of such is shown in Figure 1. Torsion-caused distortion is evident on the holes in the conical-shaped drive hub for the fan system.

At the same time as the torsion is producing distortions within the rotor system, the same loads are being driven through the case structure to the engine mounts. In this case, the mounts are behind the source of the tangling and friction-induced torsion.

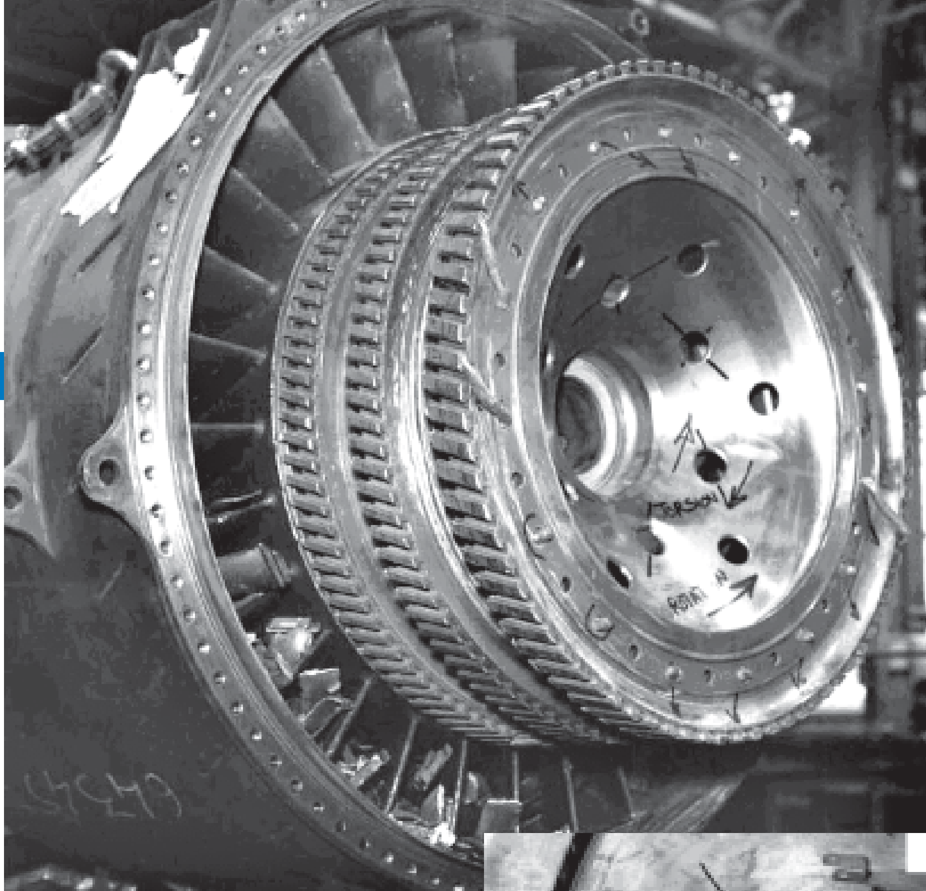
Figure 2 is the associated stationary load path distress for the event shown in Figure 1.

Caution must be taken in reading distortion patterns or buckling in engine parts. If the engine has impacted the ground, some bending of the engine may occur resulting in similar-appearing buckling or distortions. It is important to establish if the distortions are uniformly in the same direction (typically 45 degrees offset to the torsion) as significant asymmetry may only confirm bending loading.

With the introduction of the high-bypass-ratio engines, the significance of the fan and its large drive turbine is important. The mount system for the engine is typically, but not always, behind the fan (front mount) and aft of the turbine (rear mount). The large diameter of these blade tips significantly influence the torsion loading when major imbalance loadings due to failures occur in the rotor system. The engine design has typically provided for large margins against the rotor shaft system showing signs of excessive seizure forces in these engines.

However, there have been events where the case structure immediately behind the

Al Weaver *is a Senior Fellow Emeritus having retired from Pratt & Whitney after a long career in promoting flight safety initiatives and expertise in accident investigation. He currently teaches the gas turbine investigators course for the Southern California Safety Institute.*



ABOVE: Figure 1. Torsion loading effects on rotor. RIGHT: Figure 2. Torsion buckling in an engine case.

fan blade tips has been fractured due to a combination of imbalance and intermittent seizure loading. This has the effect of significantly altering the load path between the engine and the pylon.

In addition, there have been cases where uncontained damage to the engine has severed or partially severed the engine load path between the engine mounts, allowing a combination of bending (engine sag under its own weight) and torsion to be applied to engine nacelle and pylon structures, which were typically free of significant torsion effects.

Consider the effect of either a burner rupture or an uncontained large circumferential tear in an engine turbine case. In a burner rupture, the engine will sag on the drive shafts producing significant torsion loading by virtue of turbine blades being driven into their surrounding cases. In some events, this rotor distortion cannot normally be reacted out to the case structure in the immediate vicinity of the aft section of a ruptured burner case. This then drives the rotor loads through the turbine inlet nozzle guide vanes, which may not be firmly bolted into place, due to their need to resist thermal expansion. This in turn often leads to more severe rubbing of the turbine blades on the surrounding structure and seizure loading, which may not be totally reacted out through to the mount structures.

In other events, a circumferential uncontained separation may occur in the turbine section, effectively isolating the aft turbine mounting structure from reacting all of the torsion seizure loads generated ahead of the split in the cases that are associated with rubbing and tangling of blades and nozzle vanes. This abnormal load shift may result in significant twisting of the engine and its associated nacelle system ahead of the circumferentially split case. Where the circumferential uncontained separation

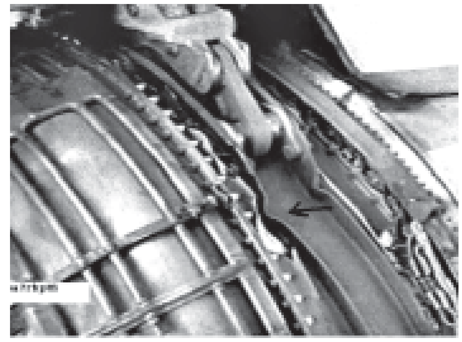


Figure 3. Local mount-load distortion to case.

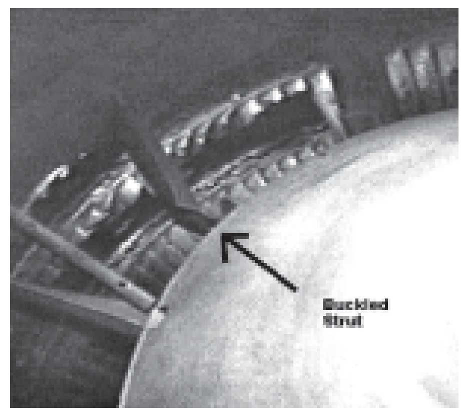


Figure 4. Buckled strut in turbine support.

is only partial, but yet extensive (greater than 90 degrees), the portion of torsion loading that does reach the rear mounts may be distorted to the point where significant "punch loads" are reacted back to the case structure by the local mount structure. Such loads are evident in Figure 3.

These punch loads may result in local collapsing of the turbine-bearing support struts or buckling of the diaphragm between the bearing and these support struts, resulting in further seizure loading to the turbine blade tips in this area. (See Figure 4.)

The further signatures of seizure loading may be due to the clocking of the engine nacelle structure that is attached to the engine cases via a non-slipping friction joint (for sealing purposes). This clocking attempts to follow the clocking in the engine cases ahead of a significant split in an en-

The accident/incident investigator needs to be concerned with the possible cascading effect of rotor seizure that may lead to a threat to continued safe flight and landing.

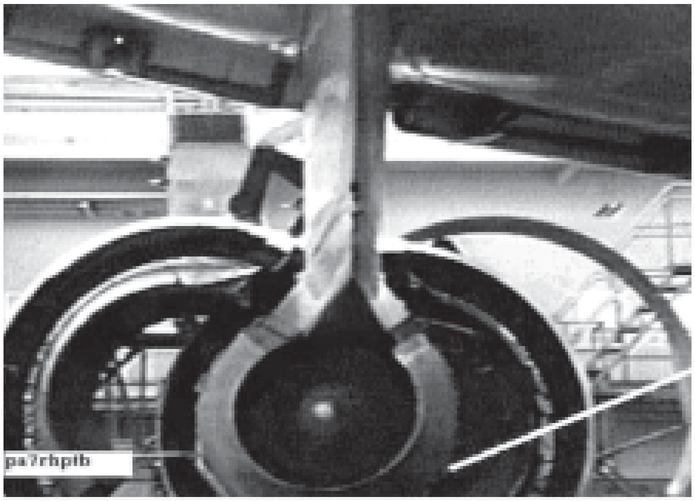


Figure 5. Clocking of engine nacelle due to seizure.

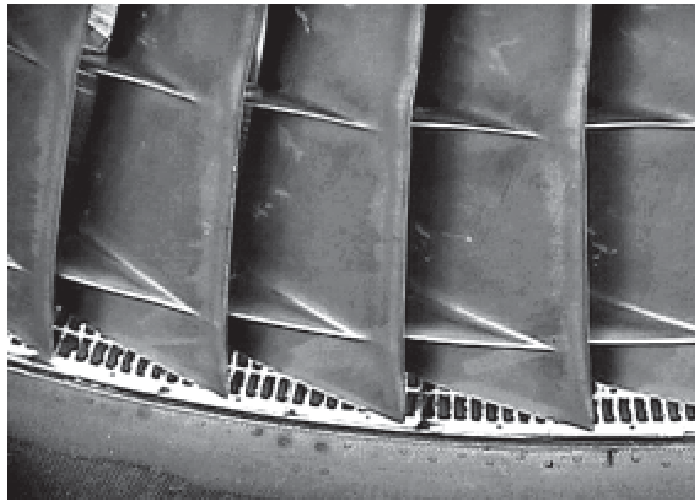
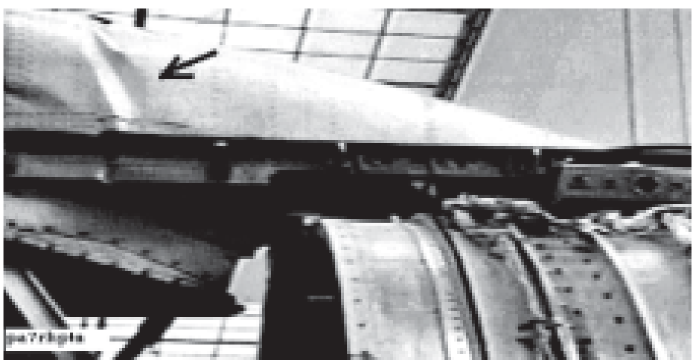
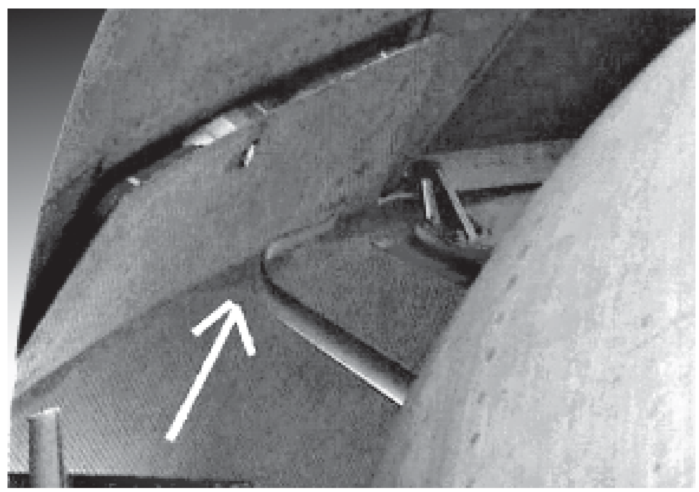


Figure 7. Fan blade tips seized into fan case.





ABOVE: Figure 6. Pylon buckling and fractured nacelle hinges due to seizure loading. RIGHT: Figure 8. Buckled rod and partially deployed reverser door.

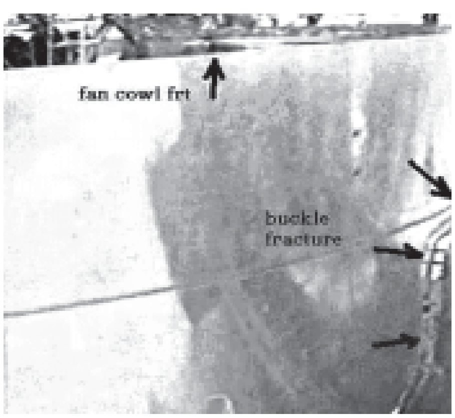


Figure 9. Buckled fan cowl due to seizure loading.

gine (either burner rupture or caused by a turbine uncontainment) followed by rotor seizure loading. (See Figure 5.)

Once clocking of the nacelle begins, the nacelle drives torsion type loads into its own mount lugs typically attached to a pylon. These loads have been seen to be of a magnitude sufficient to fracture the nacelle attachments at these points, deform the pylon in buckling, deform the nacelle structures in buckling, and/or to deform the reverser blocker doors. (See Figures 6, 7, 8, and 9.)

The result of pylon buckling is distortion to the pylon, in this case, sufficient to drive a vertical load into either the inlet cowl or the engine fan case sufficient to create additional seizure loading at the fan blade tips due to severe rubbing. (See Figure 7.)

Note: The preceding examples are not all from the same incident, nor are they meant to convey an expected result following a rotor seizure event. They are intended only to show possible signatures that rotor seizure of a high magnitude has taken place. The accident/incident investigator needs to be concerned with the possible cascading effect of rotor seizure that may lead to a threat to continued safe flight and landing. ◆

Benefits of Individual ISASI Membership

About You

You are an air safety professional. You may work for an airline, a manufacturer, a government, the military, an operator, or on your own. But you are a person who is dedicated to improvement of aviation safety and you joined ISASI with the expectation of enhancing the achievement of that goal.

About ISASI

ISASI is the only organization specifically for the air safety investigator. Our motto is "Air Safety Through Investigation." We are a growing, dynamic organization with a full range of membership.

Why Join? Lots of reasons—activities, education, services, and networking

• The yearly ISASI seminar has become a focal point for aviation safety professionals throughout the world. Attendance has steadily grown and the presentations are state of the art and meaningful. The 2004 seminar was held in Gold Coast, Queensland, Australia, and the 2005 seminar was held in Fort Worth, Tex.

• The new *Reachout seminar program* was instituted to provide low-cost, subject-oriented seminars in regions of the world with higher accident rates. Since the first *Reachout* held in Prague, Czech Republic, in May 2001, there have been 15 Reachout seminars, some of which were held in Lebanon, Chile, India, Sri Lanka, Tanzania, and Costa Rica. All have been an unqualified success in attendance and content. These mini-seminars provide our corporate members an opportunity to directly affect safety in those areas where it will have the greatest return.

• The ISASI publication, *FORUM*, is a first-class magazine, published in color four times a year. Its editorial content emphasizes accident investigations findings, investigative techniques and experiences, regulatory issues, industry accident prevention developments, and member involvement and information. Each issue also features one of our corporate members in a full back-page "Who's Who" article.

• The annual seminar-published *Proceedings* are provided to individual members at no cost on line.

• Individual members have access to past ISASI publications, our library, and accident database.

• ISASI now has an easily accessible website, www.isasi.org, with an extensive "Members Only" information section and a limited general public area.

• Our corporate and individual members are a large and diverse group working in all facets of the industry worldwide. This presents a unique opportunity for personal and on-line networking.

ISASI is the place for those dedicated to improving aircraft accident investigation and aviation safety.

PREAPPLICATION FOR INDIVIDUAL MEMBERSHIP

(Cut and mail to the address below or otherwise contact ISASI to receive a full membership application.)

PLEASE PRINT

Name (last, first) ______________________________

Date of birth ______________________________

Home address ______________________________

City ______________________________

State, district, or province ______________________________

Country ______________________________

Postal zip/zone ______________________________

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Citizen of (country) ______________________________

E-mail address (optional) ______________________________

I AM INTERESTED IN APPLYING FOR SOCIETY MEMBERSHIP IN THE MARKED MEMBERSHIP CLASSIFICATION. PLEASE FORWARD TO ME A FULL MEMBERSHIP APPLICATION.

❑ **Member**—A professional membership class requiring at least 5 years' active experience as an air safety investigator.
❑ **Associate Member**—A professional membership class for air safety investigators who do not yet fulfill the requirements for member.
❑ **Affiliate Member**—A public, non-professional membership class for persons who support ISASI's goals and objectives.
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Your title or position: ______________________________

Dates: from ______________ to ______________

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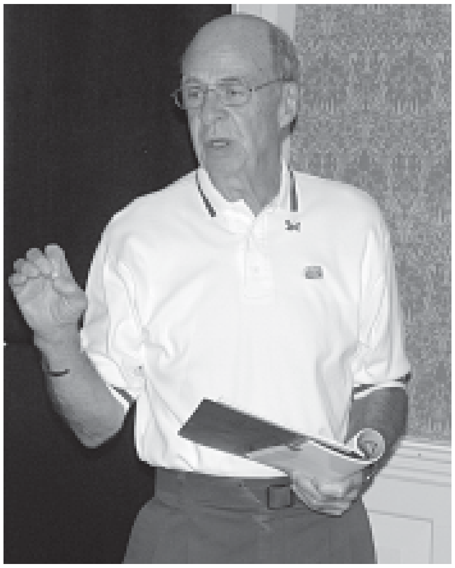
International Council Meets in Fort Worth



PHOTOS: E. MARTINEZ

Tom McCarthy reports on creation of the 2006 budget.

(*Adapted from minutes and notes of the Sept. 11, 2005, International Council meeting. The full minutes can be found on the ISASI website.—Editor*)

The ISASI International Council, at its Sept. 11, 2005, general meeting held in Fort Worth, Tex., in conjunction with ISASI 2005, reviewed and discussed a wide range of topics from the 2006 budget, growth of the Latin American Society, annual seminars through 2011, bylaw changes, Kapustin Memorial Scholarship eligibility changes, establishment of a new recognition award, and the Reachout program goals.

The submitted 2006 budget, which reflects a negative cash flow of $4,790, received unanimous approval. This is against the 2004 yearend audit that shows a "yearend net assets/fund balance of $147,191." The sharp balance increase from 2003 is credited to the highly successful ISASI 2004 held in Australia. The Council will review the 2006 budget at its spring meeting in May 2006 and make any necessary adjustments.

A briefing by Horacio Larrosa of the Latin American Region Society (LARSASI) followed in which he outlined past and planned activities for the Society, which included election of new officers and a seminar on maintenance management. He noted that the Society conducted a meeting a year from 1999 through 2001, but then a lapse occurred. The maintenance seminar was developed to help reactivate the group. Membership totals 27, of which 24 are in good standing and eligible to vote in the upcoming election.

He also reported that owing to the economic situation of the region, LARSASI's finances are not doing well. The Society has very limited corporate sponsorship with little hope of improvement because of the general non-interest toward the industry. The group has less than US$500 in the bank. The financial situation is complicated by the fact that all of LARSASI funds are in a U.S.-based bank account, and there is no practical way to get to the money in Latin America. Significant monthly bank fees diminish the account balance. Latin American laws and banking practices make it difficult, if not impossible, to establish a bank account in the name of an organization without significant government involvement, so the logical alternative is to establish a personal checking account. That, however, creates problems with accountability and accessibility by the Society.

The Council agreed to assist in the restructuring of the account and to make a grant of US$1,600 to the LARSASI account pending resolution of how the finances might be restructured. Until that determination is made, the US$1,600 will remain in the ISASI account but be available to LARSASI.

Seminar Planning

Barbara Dunn reported preparations for ISASI 2006 in Cancun are proceeding nicely. She announced that the dress code for the seminar, including the reception and banquet, will be "tropical casual." Dates for the seminar are September 11-14, and the theme is "Incidents to Accidents—Breaking the

Tom McCarthy raises an issue. Responding are, left to right, Frank Del Gandio, Richard Stone, and Barbara Dunn.

Horacio Larrosa, facing camera, discusses the activities of LARSASI. Looking on, from left to right, are B. Dunn, M. Saint-Germain, and Ron Schleede.

Chain." Tutorials are planned on SMS and accident investigation management.

Michael Toft (AAIB Singapore) also reported on preparations for ISASI 2007. Seminar planners are identifying the right hotel for the seminar and are expecting 250-300 attendees. They are hoping for good participation from developing nations. No theme has yet been determined, and the target date is the last week in August.

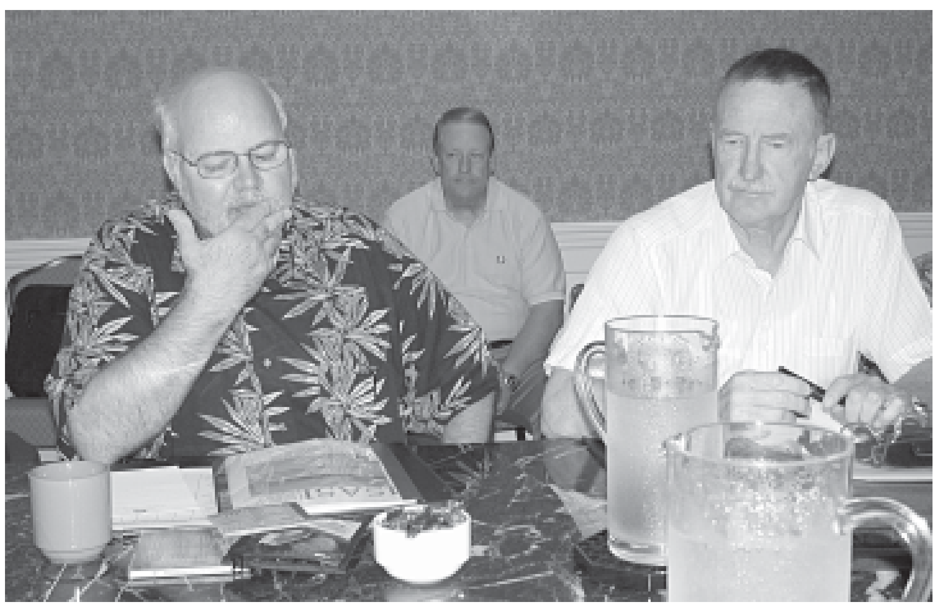
Beyond 2007, Dunn, in her role as ISASI seminar chairperson, reported that the 2008 seminar will likely be in Europe, probably Prague. Japan and Orlando, Fla., have been mentioned as candidate locations for 2009. Ron Chippendale, NZSASI, announced that the Society is interested in hosting the ISASI seminar in 2011, since that will be the 25th anniversary of NZSASI. No venue for ISASI 2010 was discussed.

Bylaw Changes

Darrin Gaines, Bylaws Committee chairman, submitted a written draft of a number of proposed bylaws changes. Due to the volume of information, the Council chose to table any decision on adopting the changes until the spring meeting, to allow time for review. In addition, Council officers will review the description of their offices currently in the bylaws and compare that with what actually occurs in getting the job done. Changes will become part of the spring meeting discussion. Also to be part of the process will be any proposals dealing with a change in the manner by which the National Executive is selected. The purpose of such a change would be to ensure seasoned leadership and to preclude domination of the officers' slate by U.S. representatives. It was noted that since 2006 is an election year for the new ISASI office year of 2007, proposed changes should be reflected in the proposed new bylaws and that a ballot item be sent to the membership for a vote.

Memorial Scholarship

The Council voted to remove the requirement that the awardee of the ISASI Rudy Kapustin Memorial Scholarship be an ISASI student member at the time of application. This action allows any full-time student in an ISASI-recognized education program to submit an application and requisite essay material. The Council also determined that the person(s) selected will be granted a complimentary 1-year membership to ISASI.



Curt Lewis, left, briefs on the final plans for ISASI 2005. Looking on is Toby Carroll, center, and Lindsay Naylor.

The ISASI International Council reviewed and discussed a wide range of topics from the 2006 budget, growth of the Latin American Society, annual seminars through 2011, bylaw changes, Kapustin Memorial Scholarship eligibility changes, establishment of a new recognition award, and the Reachout program goals.

Max Saint-Germain (left) and Ron Schleede listen to a Council briefing.

The action was taken to bolster the number of applications received, which have been few from institutions in the U.S., and for the past several years, none from students attending schools outside of the U.S. Wider dissemination of the scholarship availability will be made via the Internet. Members are being urged to promote the program within schools in their geographic area. Full details are available on the ISASI website.

Recognition Award

The Council established the "Award of Excellence," which will be presented annually to the author of an annual ISASI seminar paper deemed to be worthy of special recognition. Development of the Award was made possible through the generosity of a member who wishes to remain anonymous. He wished to fund an award for the "best" significant paper presented at each year's annual seminar. The Council engaged in considerable discussion on this topic, much of it surrounding how to define "best" relative to meeting the donor's specified criteria, which make some of the technical papers ineligible for consideration. For the 2005 seminar, the Council developed the Award of Excellence plaque. Future seminars may see the plaque accompanied by a small stipend, as the donor's contribution was considerable. Work is under way to further refine the criteria for the award and its presentation details.

Reachout

The highly successful ISASI Reachout program was referred both in "old business" and "new business." The former mention applied to the question Are the program's goals and conduct in conflict, e.g., is Reachout intended to be limited to developing countries or is the focus intended to be broader? Thoughts expressed included that there had been no changes in either the goals of Reachout or the way in which the programs are conducted; that the goal was not to teach accident investigation but rather to explore ways to reduce accident rates in countries with high accident rates; and that no matter the location of the program, Reachout seminars are good for the attending persons and are good exposure for the Society. The outcome of the Council discussion was that a review of the goals of the program and the way it is currently conducted will be made, and a report provided to the spring meeting.

Under new business, the Council discussed the budget line item for Reachout seminars to help determine if there should be a target number of Reachout seminars each year, and whether there was a good planning figure for what a "typical" seminar costs the Society. Typical costs for a seminar are approximately US$2,500 *plus* any travel costs. The discussion ended without a specific resolution on the question of whether to target a particular number of seminars.

National Societies/Councillors

ASASI—Lindsay Naylor invited Council members to attend the 2006 ANZSASI regional seminar in Melbourne (June 2-4, 2006) and the 2007 regional seminar in New Zealand. He further reported that the Society has 150 members, of whom 9 are delinquent for a total of 141 members in good standing

CSASI—Barbara Dunn reported that CSASI has had a net gain in total membership. She reports that CSASI is in good financial shape and is continuing with projects already under way. The Society had a new corporate member, and if that membership is renewed in 2006 the Canadian Society will contribute its corporate rebate to the memorial scholarship account.

ESASI—Ken Smart was not present at the meeting. In his stead, Max Saint-Germain reported that the European Society is recruiting new corporate members, including EASA, and that officers will be elected in 2006. He further reported that Ken Smart has retired from the AAIB and now is on the Board of Directors at British Airways.

The spring meeting dates were set for May 11 and 12. ◆

ISASI 2006 Begins Shaping Activities

Committee members who are preparing for ISASI 2006, which will take place September 11-14 at the Fiesta Americana Grand Coral Beach Hotel, Cancun, Mexico, report that activity planning for the seminar is proceeding well.

The website is expected to be up and running soon, and registration and hotel information as well as details on the companion and social activities and tutorials will be available.

The theme for the 37th annual international seminar is "Incidents to Accidents: Breaking the Chain." The present plan is to present individual papers on current incident and accident investigation experience, techniques, and lessons learned, with particular emphasis on international investigation challenges. In addition, 2 full hours each day will feature recent investigations and new technical developments in incident and accident investigation.

Jim Stewart, Technical Committee chairman, reports that one tutorial will be conducted jointly by the AAIB of the U.K. and Cranfield University. This session will consist of a workshop on investigation management—some of which will be based on a large board game where the "challenges" of running an investigation will be examined through a dynamic, interactive process. The participants will be taken through a simulated investigation during which they will have to deal with and respond to the normal challenges an investigator faces. "Cranfield has run many 'crisis management' and 'investigation management' simulations successfully, and we are confident that the format will work as an excellent training vehicle," Stewart said.

The second tutorial is still being developed, but will include senior ISASI members, airline, and government representatives and will focus on the development and maintenance of an effective corporate safety management system with a particular emphasis on event investigation, risk assessment, and system performance monitoring.

During the plenary session, dedicated accident investigation papers will include two extended papers presented by the TSBC of Canada and the AAAIB of Greece on the investigations into an Air France accident in Toronto and the Helios accident in Athens. Other extended investigative papers are being sought, and information on the final technical program will be posted on the web by the end of April. Additionally, individual papers from around the world will be considered by the seminar papers committee at the end of March.

The Fiesta Americana Coral Beach hotel is one of only four AAA Five Star Diamond Resorts throughout the entire Caribbean. This all-suite luxury resort graces the coastline much as a regal pyramid of some thousand years past. The hotel offers 602 beautifully appointed oceanfront suites featuring front balconies or terraces and a sunken sitting area. Each room is equipped with a 27-inch color satellite television, in-room movie and music channels, refrigerated mini bar, electronic safety deposit box, scales, makeup mirror, hair dryer, iron and ironing board, in-room coffee maker, individual A/C control, two-line telephones, one wireless telephone with personal voice mail and a data port for computers, and AM/FM clock radio. Year-round weather is mild with easterly trade winds sweeping across the peninsula. The temperature range between day and night is usually between 10 and 15 degrees, and the average temperature for the month of September is 89 degrees Fahrenheit.

Barbara Dunn, ISASI 2006 chairperson, says plans for the companions program are complete and will feature two full-day events. The first day the group will tour the ancient and mystical Mayan world represented by Tulum and Xel-Ha. During the day, the guest speaker, an expert in the world of the Mayas, will take companions back in time to the wonderful journey of the Mayas, which began in 1500 BC and ended in 250 AD. Companions will learn how the Mayas came into existence, surviving and flourishing for approximately 2,000 years and then mysteriously disappearing. They will discover how the Mayas built their impressive temples, pyramids, and observatories, all without horses, carts, or even the wheel.

On tour, a visit will be made to Tulum. The location is an impressive cliff-top archaeological site dating from the Maya Post-Classic period (AD 900-1512) and is one of the most famous landmarks in the Mayan world. It commands spectacular views of the Quintana Roo coast. This will be followed by a visit to Xel-Ha, located 15 minutes away from Tulum, where nature has created incredible caves, inlets, and lagoons. Fish from the Caribbean take refuge in the placid waters of Xel-Ha, where fresh waters from nearby streams mix with the ocean. Snorkelers can mingle with the multicolored, brilliant fish. The park offers all modern amenities and services.

The second-day tour goes directly to downtown Cancun to visit the main avenues—Tulum, Yaxchilán, and Mercado

CORRECTION

Jim Ballough

The October/December issue, page 9, showed the wrong photo of Jim Ballough, FAA Director of Flight Standards Service, who gave the second day's keynote address at ISASI 2005. The correct photo is shown here. ◆

(Market) 28th. Companions will experience life like a resident. Lunch is planned at La Casa de las Margaritas, designed to offer the visitor a rich and varied Mexican experience. The restaurant surrounds the visitor with the sights, sounds, aromas, tastes, and laughter so characteristic of festive Mexico. Following lunch, a fashion show will allow the participants to experience a part of the Mexican identity viewed through its national folk costumes. ◆

Lederer Nominations Sought; Deadline June 30

The ISASI Awards Committee is seeking nominations for the 2006 Jerome F. Lederer Award. For consideration this year, nominations must be received by the end of June.

The purpose of the Jerome F. Lederer Award is to recognize outstanding contributions to technical excellence in accident investigation. The Award is presented each year during ISASI's annual seminar to a recipient who is recognized for positive advancements in the art and science of air safety investigation.

Committee chairman Gale Braden reports, "No new nominations for the Award were received this past year. Usually we get one to three nominations per year. Surely there are some deserving investigators among us. Therefore, I urge you to nominate a person (or persons) whom you believe deserves consideration for this Award."

The nomination process allows any member of ISASI to submit a nomination. The nominee may be an individual, a group of individuals, or an organization. The nominee is not required to be an ISASI member. The nomination may be for a single event, a series of events, or a lifetime of achievement. The ISASI Awards Committee considers such traits as duration and persistence, standing among peers, manner and techniques of operating, and, of course, achievements. Once nominated, a nominee is considered for the next 3 years and then dropped. After an intervening year, the candidate may be nominated for another 3-year period. The nomination letter for the Lederer Award should be limited to a single page.

This Award is one of the most significant honors an accident investigator can receive; therefore, considerable care is given in determining the recipient. ISASI members should thoughtfully review their association with professional investigators and submit a nomination when they identify someone who has been outstanding in increasing the technical quality of accident investigation.

Nominations should be mailed to the ISASI office or directly to the Awards Committee Chairman, Gale Braden, 2413 Brixton Road, Edmond, OK 73034 U.S.A. or e-mailed to galebraden@cox.net. ◆

It's A Small World

What's ISASI's membership? About 1,500 or so? So what's the probability of two of the three customers in a Dexter, Mich., U.S.A., hair salon being full ISASI members? This morning, it was 1.00000. Renee Gregory was in the chair before me and was talking air safety issues with the stylist. I, of course, eavesdropped and eventually joined the conversation. Never-silent Doug. Renee, it was nice to meet you. I wish we'd have had more time. The hair cut was great too.

Doug Hughes
MO4415
Ann Arbor, Mich.

Election Nominations Due April 1

The ISASI Nominating Committee has issued a Call for Nominations for the Executive officer and councillor positions that will be open to election for the 2007-2008 timeframe. The nomination deadline is April 1, 2006. The positions to be filled are president, vice-president, secretary, treasurer, U.S. councillor, and international councillor.

Each potential candidate whose name is submitted to the Nominating Committee must have consented to the submission. The nominator must submit a short biographical sketch of the nominee. Nominees must be at least a full member to be eligible for office within ISASI. Nominations should be sent to the ISASI office, attention Nominating Committee. ◆

ANZSASI Opens Seminar Registration

The 2006 annual seminar of the Australian and New Zealand Societies of Air Safety Investigators will be held June 2-4 at the Hilton on the Park Hotel, Melbourne, Australia. This seminar will be an educational event with emphasis on contemporary regional issues in aircraft accident investigation and prevention. The Asia-Pacific Cabin Safety Working Group is expected to meet on Friday, June 2, and there will be a visit to the Defence Science and Technology Organization at Fisher-men's Bend on the Friday afternoon.

Registration for the seminar can be made in several ways. See the adjacent registration form. Seminar details may be obtained at the seminar website: http://www.asasi.org.

The hotel is located in the second largest Australian city and Victorian state capital.

Melbourne is located in the southeast of Australia and is about 900 kilometers from Sydney and 900 kilometers from Adelaide by road. The hotel is located close to Melbourne city center, shopping, restaurants, and tourist resorts. Standard room (single/double occupancy)—A$190

Australian & New Zealand Societies of Air Safety Investigators Seminar

Friday June 2–Sunday June 4, 2006
HILTON ON THE PARK HOTEL, MELBOURNE, VICTORIA, AUSTRALIA

Name: ______________________ ISASI number: ______________________

Organization: ______________________

Address: ______________________

Telephone (home): ______________________ Telephone (business): ______________________

Telephone (mobile): ______________________

E-mail address: ______________________

Name & title on badge: ______________________

Companion's name on badge: ______________________

Please check appropriate box: Please note, all fees are shown in Australian dollars. Hotel reservations to be made directly to the Hilton on the Park Hotel, on the form provided.

	Registration by April 1, 2006	Registration after April 1, 2006
Full Seminar, Functions, and Friday Visit (Inclusive)		
Member	☐ **$275**	☐ **$350**
Non-member	☐ **$375**	☐ **$450**
ISASI Student Member	☐ **$120**	☐ **$170**
Friday Visit		
Friday visit to DSTO ☐ **Yes** ☐ **No**		
Single-Day *Members* (Includes morning/afternoon tea & lunch)		
Saturday	☐ **$100**	☐ **$125**
Sunday	☐ **$100**	☐ **$125**
Single-Day *Non-members* (Includes morning/afternoon tea & lunch)		
Saturday	☐ **$150**	☐ **$175**
Sunday	☐ **$150**	☐ **$175**
Single-Day *Full-time Student with ID* (Includes morning/afternoon tea & lunch)		
Saturday	☐ **$50**	☐ **$75**
Sunday	☐ **$50**	☐ **$75**
Companion Program		
Member	☐ **$100**	☐ **$150**
Non-Member	☐ **$150**	☐ **$200**

Subtotal: ______________________

Total amount due: ______________________

Special meal requests (vegetarian, halal, vegan, kosher, etc.): ______________________

Credit card type (Visa, MasterCard, Bankcard): ______________________

Credit card number: ______________________ Expiration date: ______________________

Name as it appears on card: ______________________

Signature: ______________________

If paying by credit card, fax to: **Lindsay Naylor** +61 2 6255 4413

If paying by money order or check, please send to: **ASASIPO BOX 588, Civic Square, ACT 2608, Australia**

For assistance, contact: **Paul Mayes** +64 9 256 3402 paul.mayes@airnz.co.nz or

Lindsay Naylor +61 2 6241 2514 lnaylor@spitfire.com.au per night, room only (GST included). Note that full buffet breakfast for Saturday/Sunday is included in seminar registration costs. For additional mornings, seminar breakfast rate is A$20 per person. Hotel reservations are to be made directly with the hotel. A secure reservation form is available at this website: http://www.asasi.org/seminar/rego_hotel.htm.

International visitors will probably enter Australia through either Sydney, Brisbane, or Melbourne International Airports. Melbourne is also served by most major domestic carriers. Visitors can also elect to drive or arrive by train or bus. All visitors to Australia require a valid visa or Electronic Travel Authority (ETA). See the Federal Department of Immigration website for additional information.

Australia: brief facts

Australia is a very large continent, with a climate and geography that varies from snowcapped mountains to tropical rainforests to arid deserts. June is a winter month, and the average temperature is 14° C (58° F).

International visitors are reminded that if driving inland, there can be large distances between towns (fuel, food, water, etc.). If driving, drive on the left side of the road and adhere to local speed limits, which vary between states and are enforced by local police. The wearing of seatbelts is mandatory for all vehicle occupants in all states. The maximum blood alcohol limit while driving, in all states, is 0.05%.

The electrical supply in Australia is 240 volts AC at 50 Hz. A two- or three-pin plug is used. Most large hotels provide 220/110 volt outlets for shavers/dryers, etc. Data comm ports are usually also provided. Australia uses the metric system, thus all speeds, distances, and temperatures are given in metric units.

Australia encompasses three time zones (EST, CST, and WST). If bringing a mobile (cell) phone, it will need to be able to access the 900/1,800 Mhz GSM system or the 800 Mhz CDMA system and have roaming rights between your own phone company and one of the Australian phone companies.

The Australian currency is the Australian dollar. Foreign currency will generally **not** be accepted in shops, restaurants, etc. However, nearly all shops, restaurants, etc., accept popular credit cards and EFTPOS. You are not expected to offer a gratuity. ◆

In Memorium

Paul A Roitsch (Life Member 2959), Greenwich, CT, U.S.A.

Thomas R. Conroy (MO02273) Falls Church, VA, U.S.A.

Hank A. Mensink (MO2124) Amsterdam, the Netherlands August 2005

Peterlyn Thomas ((MO3128) Kingston, Australia, June 2005

ISASI CSWG Meets During ISASI 2005

ISASI Cabin Safety Working Group (CSWG) chairperson Joann Matley conducted a group meeting during ISASI 2005 held at Fort Worth, Tex. Attending were Ruthanne Bledsoe, Christopher Dann, Barbara Dunn, Lonny Glover, Toni Ketchell, Joe Jackson, Lee Johnson, Debbie Roland, Juan Sendagorta, Elfi Stoddard, and A. Frank Taylor.

Matley reported that in the past year CSWG has increasingly been used as a resource for gathering information specific to cabin safety. Additionally, a solid line of communication has been forged with "our colleagues at the Asia Pacific Cabin Safety Working Group." She also gave notice of the 2nd European Edition International Aircraft Cabin Safety Symposium to be held June 7-9, 2006, in Prague, Czech Republic. The event will be hosted by the Southern California Safety Institute in cooperation with the Ministry of Transport, Czech Republic.

Barbara Dunn gave a tribute to Peterlyn Thomas who passed away June 10, 2005. She was a pioneer in cabin safety not only in Australia but internationally. Dunn said, "Peterlyn's influence and contribution to cabin safety development within Australian aviation and the international scene ensures her a place in the hearts of those who knew her and great respect from those who have worked and learned from her."

Lonny Glover (American Airlines), Association of Professional Flight Attendants, provided an update on the Group's participation in an Aviation Rulemaking Committee (ARC) specific to crewmember training. The ARC began working on Subparts N and O in 2004. ARC N and O have not been rewritten or reviewed since the 1970s. Glover said, "The ARC was formed so that all stakeholders could be represented during the development (rewrite) of the rule. Labor, industry, and the Federal Aviation Administration (FAA) are working together collaboratively toward increased aviation safety through better and more effective training for flight attendants, pilots, and dispatchers."

The rewrite work includes general improvements in curriculum, performance standards, integration of information, and regulatory requirements. One example of integration of information is the Quality Performance Standards (QPS), which would require a simulated "hidden fire" every 3 years for the fire extinguisher operation performance drill. She explained that the drill would not require a student to chop through a wall, but would detail examples of how

E. MARTINEZ

Cabin Safety Working Group members meeting during ISASI 2005 are, left to right, Elfi Stoddard, Toni Ketchell, Lee Johnson, Joann Matley, Christopher Dann, and Barbara Dunn.

hidden fire may be simulated.

Also in the rewrite work are plans for scenarios used to integrate CRM principles into performance drills and to standardize curriculum requirements of all Part 121 carriers. More emphasis on hands-on training/simulates more actual events—actual bracket drills, for example. It was noted that "integration of the CRM marker into knowledge and performance training for all crewmembers and dispatchers is huge from a human factors standpoint. Performance standards for emergency performance tasks have been around for years for pilots in the form of Practical Tests Standards (PTS) but is groundbreaking for flight attendants."

Christopher Dann, Civil Aviation Inspector, Cabin Safety Standards, Transport Canada, outlined some proposals being put forth, noting that the proposals are a harmonized amalgamation of the existing rules in the FARs, JAR-OPS, and Australian CASRs and result in a total of 14 notices of proposed amendments (NPA). Dann provided the following rulemaking efforts:

Survival Equipment Working Group

- Anticipate that implementing the recommendations from this Group can begin this winter.
- A total of 34 recommendations were made relating to the provision of survival equipment required for land and water survival.

Flight Attendant Requirements

This issue involves incorporating a flight attendant ratio of 1 per 50 passenger seats in addition to our current 1 per 40 passengers. Proposals were presented to the Regulatory Advisory Committee in April 2004. The proposals included the following mitigations:

- Limitation for flight attendant qualification to three airplane types,
- Demonstration of emergency evacuation and ditching procedures,
- Specific training elements for in-charge flight attendants, and
- Requirement for flight attendant at each floor-level exit.

Flight Attendant Duty Times

There is a regulatory process under way to address flight attendant duty time limitations. Proposals originally included both a fatigue risk management system (FRMS) and prescriptive regulations, somewhat based upon the Australian model. This would also have supported the regulatory implementation of Safety Management Systems in Canada. However, there were many questions regarding FRMS from stakeholders, and a decision was made to proceed only with prescriptive rulemaking at this time.

Joe Jackson, Transport Canada, provided a brief discussion concerning the Air France A340 accident on Aug. 2, 2005, at Toronto, Canada. Accident description: The aircraft, on a scheduled passenger flight from Paris, overran Runway 24L on landing. The widebody Airbus jet ran through a fence, into a ravine, and broke into flames. The fuselage was reportedly split into several pieces. Weather at the time of the accident was poor, with a heavy thunderstorm in the immediate vicinity of the airport. Initial reports indicated that all 297 passengers and 13 crewmembers survived, with 14 minor injuries among them.

Ruthanne Bledsoe, an Alaska Air flight attendant, made a request of the Group for additional information regarding techniques for managing and reducing inflight turbulence injuries for crewmembers. ◆

Saudi Arabian Airlines Hosts Reachout No. 15

Saudi Arabian Airlines (SVA) hosted the 15th ISASI Reachout Workshop on

SVA executive and managerial staff attended the closing ceremony. Shown, left to right, are Capt. Mohammed Hersi, Caj Frostell, Capt. Talal Ageel, Jim Stewart, Capt. Fareed Alshingiti, and Capt. Mohammed Malatani.

Aircraft Accident Investigation and Safety Management Systems in Jeddah in November 2005. The Workshop, opened by Capt. Talal Ageel, Vice-President, Flight Operations Department, was held in the facilities of Prince Sultan Aviation Academy (PSAA).

The Safety Management Systems (SMS) module took place over 3working days. It was conducted by Jim Stewart and Caj Frostell. This module contained presentations on the international and national requirements for SMS, statistics and need for data, the safety eras, the SHELL model, the Reason model, the MEDA/PEAT analysis tools, safety management evolution, building a non-punitive reporting program, SMS processes, lessons from the *Challenger* accident, risk management, safety culture, dealing with change, regulating SMS, assessing an SMS program, and some case studies.

The accident investigation module took place over 5 working days. It was conducted by Frostell and David King, Chief Inspector of Accidents, AAIB-U.K. This module contained presentations on ICAO requirements and international obligations, Annex 13, selection and training of investigators, planning and organization to conduct an investigation, procedures and checklists, wreckage recovery, field investigation, accident site management, group organization, flight recorders, technical investigation, operations investigation, off-scene testing, crashworthiness, witness interviewing, pathology, family assistance, avoidance and protection of biohazards exposure, the news media, factual reports and public records, writing the final report, identification of safety deficiencies, making safety recommendations, and several interactive case studies, including the Pan Am Boeing 747 accident at Lockerbie in the United Kingdom.

There were 40 participants, mostly from different departments within SVA. A few participants were from the General Authority of Civil Aviation (GACA). All participants received ISASI certificates for the combined accident investigation and Safety Management Systems workshop. SVA expressed appreciation for the ISASI initiative to bring the Reachout program to Jeddah. ISASI membership forms and corporate membership forms were made available to the participants, although several participants were already ISASI members.

At the end of the Workshop, a festive cake was presented and served in the presence of executive and managerial level participation from Saudi Arabian Airlines. The executive and managerial participants at the closing ceremony included Capt. Talal Ageel (Vice-President-Flight Operations Department), Capt. Fareed Alshingiti (General Manager-Flight Operations Standards and Quality Assurance), and Capt.

Mohammed Hersi (Manager-Technical Quality Assurance). ◆

Latin Society Elects New Officers

Efforts to invigorate the Latin American Region SASI are progressing well and have seen the election of new officers.

Taking office last November were President, Guillermo J. Palacia (Mexico); Vice-President, Eric Mayett (Mexico); Secretary, Claudio P. Pandolfi (Chile); and Treasurer, Horacio A. Larrosa (Argentina). Named as Membership Chairman was Hector Casanova (USA); Technical Division, Augusto De Santis (Argentina); Corporate Membership, Sergio A. Sales (Brazil); and Safety Training, Pedro Avila y Tello (Peru).

In addition, the Junta de Investigaciones de Accidentes de Aviación Civil (JIAAC) of Argentina and LARSASI held a regional seminar focused on Maintenance Resource Management (MRM), with speakers from Argentina and Chile. The seminar was conducted in October in Buenos Aires.

Attending were personnel from the authorities of civil aviation, airlines, aviation accident prevention organizations, armed forces, universities, manufacturers representatives, unions, etc. In all, 63 people attended from the Latin America region. The main program concentrated on "good practices" in maintenance and simple and accessible tools development for MRM programs. The program's aim was to improve maintenance procedures and reduce human factors errors. ◆

The technical speakers for the MRM program included, from left, Patricio Cancino, Héctor Cid, Claudio Pandolfi, Horacio A. Larrosa, and Juan D. Engroba.

RMRC is Revitalized; Elects New Officers

The Rocky Mountain Regional Chapter recently completed an officer election, taking the first steps in revitalizing the long-dormant Chapter. Because of the vast geography of the Chapter, the election included vice-presidents representing the states with active membership. The results of the election are

President:
Gary R. Morphew, Albuquerque, N.M.
Vice-President, Colorado/Wyoming:
Colin Sommer, Broomfield, Colo.
Vice-President, Kansas:
Donald F. Knutson, Wichita, Kans.
Vice-President, New Mexico:
James C. Johnson, Albuquerque, N.M.
Vice-President, Utah:
Richard B. Stone, Bountiful, Utah
Treasurer:
Ira J. Rimson, Albuquerque, N.M.
Secretary:
Tracy G. Dillinger, Albuquerque, N.M.

The officers will be starting the formulation of Chapter bylaws and submitting them to the membership for approval. It is planned that each of the locality-based VPs will call an independent meeting of the members nearby, eliminating the need for long-distance travel to hold informative meetings. It was the widespread disbursal of the membership under the prior Chapter organization that led to the inactive status of the Rocky Mountain group. ◆

Who is Where?

Ken Smart has retired from his post as Chief Inspector of Air Accidents, AAIB, United Kingdom, and is now on the Board of Directors at British Airways. He remains as the President of ESASI.

Keith McGuire retired on January 3 with more than 28 service years with the NTSB. He started as an investigator in the Oakland office, later transferred to Los Angeles, and then on to Seattle as the manager of that office. He had been actively involved as an instructor in midair collisions and inflight breakups at the NTSB Academy and doing seminars internationally. During the last 5 years, he initiated and ran the ICAO/NTSB Accident Investigation Workshops in Asia. He continues his 20-year membership with ISASI. He plans to continue his

ISASI ROUNDUP

Continued . . .

interests in aviation safety education, photography, and sports cars.

Ellen Engleman Conners, National Transportation Safety Board member, has asked President Bush to withdraw her nomination for a second term as chairman of the NTSB. She intends to focus on continuing to serve as an aggressive advocate for safety in her role as a member of the Safety Board. She commented: “My decision to focus on my role as a member of the National Transportation Safety Board is based in large part on the opportunity these last 7 months have given me to serve without the additional demands of the chairmanship.”

Kathryn O’Leary Higgins was sworn in on January 3 as a member of the NTSB. Before joining the Board, Higgins was President and CEO of the TATC Consulting firm. Prior to that, she was Vice-President for Public Policy at the National Trust for Historic Preservation (May 1999-January 2004). Her distinguished professional and government career dates to 1969. Among her posts have been Deputy Secretary of the U.S. Department of Labor, Acting Chair of the National Endowment for the Arts, Vice-Chair of the Presidential Commission on U.S. Coast Guard Roles and Missions, Assistant to the U.S. President and Secretary to the Cabinet, and Chief of Staff to the Secretary of Labor.

Stuart Matthews, ISASI member and CEO of Flight Safety Foundation, traveled to London to receive the 2005 Cumberbatch Trophy from the Guild of Air Pilots and Air Navigators during ceremonies held in the Guildhall. The trophy is awarded annually to recognize outstanding contributions to the field of aviation safety. ◆

Embry-Riddle Students Receive ISASI Briefing

William L. McNease, ISASI Chairman of the Government Air Safety Working Group, is updating the Government Air Safety Investigators Group (GASIG) directory. He is also involved in establishing a new students group. In this regard, he spoke to the ISASI student group at Embry-Riddle about accident investigations, aviation safety, and the need for the younger members in the ISASI organization. There were 30 members present at the meeting led by professor Anthony Brickhouse, who is a member of ISASI. ◆

President’s View *(from page 3)*

educational or training functions attended in the preceding 10 years.

Professional Contribution: Authorship of at least five professional articles/papers that have taught advanced subjects relevant to air safety under the sponsorship of public/private educational or training institutions or professional societies.

Essay Submission. A maximum of one typewritten page, summarizing professional accomplishments and contributions to air safety investigation, accident prevention, and ISASI.

Contributions to ISASI: Served successfully in any combination of two or more of the following positions:

(a) Elected/Appointed ISASI International, national/regional society, or chapter office; or major committee assignment, (b) Membership on a seminar committee or working group, (c) *Forum* editor or staff.

(d) Appointed ISASI representative to other professional organization, committees, working groups, etc. Further details are on the applications form.

I encourage those many members of our group who are well-qualified and deserving of the Fellow classification to take the initiative and apply for the coveted membership. ◆

ISASI Information

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ASPA de Mexico
Association of Professional Flight Attendants
Atlantic Southeast Airlines—Delta Connection
Australian Transport Safety Bureau
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Avions de Transport Regional (ATR)
BEA-Bureau D'Enquetes et D'Analyses
Board of Accident Investigation—Sweden
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Bundesstelle fur Flugunfalluntersuchung—BFU
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Centurion, Inc.
China Airlines
Cirrus Design
Civil Aviation Safety Authority Australia
Comair, Inc.
Continental Airlines
Continental Express
COPAC/Colegio Oficial de Pilotos de la Aviacion Comercial
Cranfield Safety & Accident Investigation Centre
DCI/Branch AIRCO
Delta Air Lines, Inc.
Directorate of Aircraft Accident Investigations—Namibia
Directorate of Flight Safety (Canadian Forces)
Directorate of Flying Safety—ADF
Dutch Airline Pilots Association
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Hall & Associates, LLC
Honeywell
Hong Kong Airline Pilots Association
Hong Kong Civil Aviation Department
IFALPA
Independent Pilots Association
Int'l. Assoc. of Mach. & Aerospace Workers
Interstate Aviation Committee
Irish Air Corps
Japan Airlines Domestic Co., LTD
Japanese Aviation Insurance Pool
JetBlue Airways
KLM Royal Dutch Airlines
L-3 Communications Aviation Recorders
Learjet, Inc.
Lockheed Martin Corporation
Lufthansa German Airlines
MyTravel Airways
National Air Traffic Controllers Assn.
National Business Aviation Association
National Transportation Safety Board
NAV Canada
Phoenix International, Inc.
Pratt & Whitney
Qantas Airways Limited
Republic of Singapore Air Force
Rolls-Royce, PLC
Royal Netherlands Air Force
Royal New Zealand Air Force
RTI Group, LLC
Sandia National Laboratories
Saudi Arabian Airlines
SICOFAA/SPS
Sikorsky Aircraft Corporation
Singapore Airlines, Ltd.
SNECMA Moteurs
South African Airways
South African Civil Aviation Authority
Southern California Safety Institute
Southwest Airlines Company
Star Navigation Systems Group, Ltd.
State of Israel
Transport Canada
Transportation Safety Board of Canada
U.K. Civil Aviation Authority
UND Aerospace
University of NSW AVIATION
University of Southern California
Volvo Aero Corporation
WestJet ◆

COPAC: Spanish Professional Pilots Association

(Who's Who is a brief profile of, and prepared by, the represented corporate member organization to enable a more thorough understanding of the organization's role and function.—Editor)

The Spanish Professional Pilots Association (COPAC) is a non-profit pilot national association, with an official status backed by two Spanish national laws: Ley 35/1998 and Real Decreto 1378/2002. COPAC was born in 1998 as a result of many years of combined efforts from pilots' unions and associations looking for a better interaction and understanding among the central administration, the aeronautical authorities, and pilots as a whole, leaving aside the labor aspects of their profession. COPAC is solely financed by its members, who pay a quarterly fixed fee, and a fixed rate is charged for every technical report or expertise required by any organization.

The aims and objectives of COPAC, defined by the laws mentioned above, are to promote the deontology of professional pilots, whatever their branch or specialization; to improve the efficiency of the aviation industry; and to contribute to flight safety in Spain.

Although a relatively young association, COPAC presently has 5,000 active members who are engaged in every piloting facet of aviation. This includes flying for the major Spanish air carriers to flying freighters, commuters, firefighters, banner and towing planes, plague-spraying and other helicopters, medical evacuation jets, corporate turboprops, training biplanes, and search-and-rescue aircraft. Since 1998, in Spain membership in COPAC is required for a pilot to work legally.

To reach its goals, COPAC engages in a number of activities including air navigation, security, helicopter operations and specifics, environment protection, aeronautical medicine, education and training, legal and licenses, and flight safety.

The flight safety area is divided into two branches. One branch oversees all the operational aspects of flight safety and human factors, and the investigation branch is focused on dealing with the reports of incidents and accidents voluntary filled by associates via a website (www.copac.es). The investigation branch also provides expertise for national safety committees, and on a case-by-case basis to the Spanish air accident and incident investigation board (CIAIAC), airlines and transport companies, and individuals or organizations that required such expertise.

The COPAC accident branch is manned by half a dozen permanent investigators, all active pilots, flying for airlines, helicopter, and general aviation companies. On top of that, a number of experts in areas such as cabin safety, aeronautical medicine, and systems engineering are on call for special cases. The branch office is located in Madrid, together with the rest of COPAC offices.

All COPAC investigators are fully trained when they join the organization. Some of them come from the Air Force, were they got their ab initio training and experience as flight safety officers and accident investigators; other experts were former flight safety managers in their respective airlines or companies.

To keep its investigators up-to-date, COPAC sends them periodically to selected NTSB courses in the U.S. Active roles are also taken in national and international safety seminars, such as the first Ibero-American Training and Safety Seminar, which took place in Madrid in June 2003, and the first Seminar for Safety Managers also held in Madrid in February 2005, fully organized by COPAC, with the sponsorship of the Boeing Company.

COPAC investigators have taken part in some of the major accident investigations in recent years in Spain, such as the Binter Mediterráneo CASA CN-235, which crash at the Málaga Airport in August 2001 and the Britania Boeing B-757 mishap, which took place in Gerona in September 1999.

Owing to the organization's high professionalism, very good results have been achieved for the national air transport system thanks to the mutual understanding and cooperation between COPAC and CIAIAC. ◆

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