Aircraft Incident at Joensuu airport, Finland on 11 April 1997

Micro-summary: This Douglas DC-9-83 (MD-83) overran the runway landing on an icy runway.

Event Date: 1997-04-11 at 0154 local

Investigative Body: Finland Accident Investigation Board (AIB), Finland

Investigative Body's Web Site: http://www.onnettomuustutkinta.fi/

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FINLAND

Incident Investigation Report

B 5/1997 L

Translation of the Finnish original report

Aircraft Incident at Joensuu airport, Finland on 11 April 1997

TC-INC
DC-9-83 (MD-83)

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ABBREVIATIONS

ABBREVIATIONS

ACC	Area Control Center
AIB	Accident Investigation Board
ADF	Automatic Direction Finding equipment
AGL	Above Ground Level
APU	Auxiliary Power Unit
ATC	Air Traffic Control
ATS	Autothrottle System
CAA	Civil Aviation Admistration (Finland), Flight Safety Authority
cm	centimeter
CPL	Commercial Pilot's Licence
CRM	Crew Resource Management
CVR	Cockpit Voice Recorder
DGCA	Directorate General of Civil Aviation (Turkey)
DME	Distance Measuring Equipment
EPR	Engine Pressure Ratio
FIR	Flight Information Region
FCOM	Flight Crew Operating Manual
FL	Flight Level
FOM	Flight Operations Manual
ft	feet (1 ft = 0,3048 m)
h	hour(s)
hPa	hectopascal
ICAO	International Civil Aviation Organization
ILS	Instrument Landing System
kg	kilogram(s)
kt	knot(s) (1,852 km/h)
lb	pound(s) (0,4536 kg)
LOFT	Line-Oriented Flight Training
m	meter(s)
mm	millimeters(s)
METAR	Aviation Routine Weather Report
MHz	Megahertz
min	minute(s)
NDB	Non-Directional radio Beacon
nm	nautical mile(s) (1,852 km)
OFP	Operational Flight Plan
PAPI	Precision Approach Path Indicator
p/n	part number
psi	pound(s) per square inch
QNH	Corrected mean sea level pressure
REC	Regional Emergency Center
RWY	Runway

s	second(s)
SAR	Search And Rescue
s/n	serial number
TAF	Terminal Aerodrome Forecast
UFDR	Universal Flight Data Recorder
UTC	Co-ordinated universal time
VHF	Very High Frequency
VOR	VHF Omnidirectional Radio range

SYNOPSIS

On Friday 11 April, 1997 at 01.54 local time an aircraft incident took place at Joensuu airport in which a Douglas DC-9-83 (MD-83) aircraft, registered TC-INC, owned by lrish Aerospace Finance Ltd. and operated by Turkish lntersun Sunways Havacilik A.S. overran the runway. There were 167 passengers and six crewmembers on board. The flight number was SWW 1022.

The Accident lnvestigation Board (AIB), Finland appointed on 11 April, 1997 an investigation commission. Airline pilot (ret.) Mr Lars Westermarck was appointed investigator-in-charge. Chief air accident investigator Mr Seppo Hämäläinen from the AIB, and airline pilot (ret.) Mr Jussi Haila were appointed members of the commission. The commission consuited lnspection supervisor (ret.) Mr Pertti Nenonen as technical expert on the MD-83.

The investigation was based on the Finnish Legislation, International Civil Aviation Organization (ICAO) Annex 13 and the Council of European Union Directive 94/56/EC.

Mr Hämäläinen was notified of the incident at 02.20 on 11 April, 1997. He arrived in Joensuu airport at 10.00 and Nenonen at 13.00. Haila arrived in Joensuu airport on Saturday April 12 at 13.00.

The hearing of the captain and the first officer was held on 11 and 12 April, 1997. Some additional questions were made to the first officer on 22 May, 1997 in writing and verbally.

The commission had the Universal Flight Data Recorder (UFDR) removed from the aircraft. The data of the UFDR was read out by SAS Flight Analysis in Copenhagen, Denmark.

The Directorate General of Civil Aviation (DGCA), Turkey was notified of this incident and the investigation on 11 April, 1997. The DGCA, Turkey appointed on 15 April, 1997 Mr Haydar Yalcin as an accredited representative for the investigation. The DGCA, Turkey also appointed Intersun Sunways' delegates Mr Pertti Laine and Mr Bernie Forward as advisors to the accredited representative.

Intersun Sunways went into bankruptcy and ceased operations in October 1997.

The commission sent the draft of this aircraft incident report to the DGCA, Turkey for comments according to ICAO Annex 13 on 16 June, 1998. No comments were received within 60 days, but telefaxes dated 18 and 28 August, 1998 sent by the accredited represantative of DGCA, Turkey are enclosed in Appendix 2. The training records mentioned in the telefax dated 28 August were received by the investigation commission on 17 September, 1998 by mail. The letter had been stamped in Ankara on 1 September, 1998. All the requested documents were not included and the captains training documents were in Turkish as well as a part of the documents concerning the copilot.

1 FACTUAL INFORMATION

1.1 History of the flight

1.1.1 Flight preparation and flight from Antalya to Jyväskylä

On 9 April, 1997 the captain had flown Antalya-Kajaani-Kokkola-Antalya. The flight departed at 06.00 local time (03.00 UTC, 06.00 Finnish time) and arrived in Antalya at 18.00 (local times are used in this report exept for the weather reports). The captain told in the hearing that he had spent 10 April at home resting. The first officer told in the hearing that he had spent 9 and 10 April at home resting and preparing for the flight.

On 10 April, 1997 the first officer checked in for duty at 18.00 and the captain at 18.10. The scheduled departure time was at 19.30. The intention was to fly from Antalya, Turkey to Jyväskylä, Finland, flight SWW 1021 and from Jyväskylä via Joensuu back to Antalya, flight SWW 1022. After flight preparations the pilots boarded the aircraft at 18.20 and started the preflight checks. The captain decided that he would be the piloting pilot from Antalya to Joensuu and the first officer from Joensuu to Antalya.

lntersun Sunways had received the computer based operationai flight pian (OFP) for the flight at 10.31. According to the OFP the fuel required for the flight Antalya-Jyväskylä was 38.800 Ib (17.600 kg). The flight crew did not make any corrections to the fuel calculations but the captain decided to take 42.000 Ib (19.051 kg). The calculated trip fuel was 30.100 Ib (13.653 kg) and the flight time 4 hours 27 minutes. The flight pian for this flight was filed at 10.33. Two alternate airports, Helsinki-Vantaa and Joensuu, were filed for the flight from Antalya to Jyväskylä. Helsinki-Vantaa was not included in the weather documentation given to the pilots. Joensuu airport was normally closed between 22.30 and 05.30 and was opened exceptionally at 01.00 on request by Intersun Sunways for flight SWW 1022.

Flight SWW 1021 departed from Antalya at 19.40 with a crew of two pilots, four cabin attendants and 148 passengers on board. The flight landed in Jyväskylä at 00.02.

1.1.2 Intermediate landing in Jyväskylä

Ali passengers disembarked in Jyväskylä. The aircraft was refuelled by 10.500 Ib (4.763 kg). The block fuel was 20.800 lb (9.435 kg). According to the company OFP calculation, the required block fuel from Jyväskylä to Joensuu was 13.100 Ib (5.942 kg) with Helsinki-Vantaa as an alternate. The reason for taking the extra fuel was not noted in the OFP. The preflight check and refuelling were performed by a Finnair station mechanic.

The handling agent, Finnair, provided the pilots with valid aerodrome forecasts (TAF) and latest actual weather reports (METAR) from Joensuu and Helsinki-Vantaa. They also received the Joensuu runway conditions report (SNOWTAM) dated 10 April at14.30. According to the report the braking action had been good. The pilots did not

request for a more actual runway condition report although rain and snow had been forecasted for all airports in Tampere Flight Information Region (FIR). After Joensuu airport was closed at 22.30 it had been snowing and the runway had been covered with 20 mm of wet snow and slush.

Finnair provided a computer based loadsheet and balance chart, but the pilots made the official loadsheet and balance chart for the flight. This was a company procedure. The take-off mass of the aircraft was 134.400 lb (60.964 kg) which was 11.400 lb (4.970 kg) less than the max. allowed for runway 30 in the prevailing conditions.

The pilots and the mechanic noticed the need for de-icing. After the 167 passengers had boarded the mechanic performed the de-icing of the aircraft.

After engine start-up the aircraft taxied out to runway 30. Engine anti-icing was switched on just prior to take-off.

1.1.3 Flight Jyväskylä-Joensuu

1.1.3.1 Departure and cruise

Flight SWW 1022 departed from Jyväskylä at 01.29. Airfoil anti-icing was switched on when the aircraft was climbing through 1000 ft and off at Flight Level (FL) 100. Engine anti-icing was switched off at the same time.

Air Traffic Controi (ATC) had cleared the flight to FL 230 but during climb the pilots requested to maintain FL 190, which was approved by Tampere Control (ACC). During climb the left engine generator failed. The pilots told in the hearing that the abnormal check list had been consulted according to the Flight Crew Operation Manual (FCOM). The Auxiliary Power Unit (APU) was started and connected to feed the left generator electrical circuit.

When the aircraft was at 70-80 nautical miles (nm) from JNS-VOR/DME the pilots requested descent and Tampere Control cleared SWW 1022 to FL70. When the aircraft was descending through FL 120 and the distance to Joensuu was about 40 nm, Tampere Control cleared the flight to contact Joensuu aerodrome control tower (TWR).

1.1.3.2 Initial approach

The Joensuu TWR air traffic controller had started an extra duty period for the flight SWW 1022 on 11 April, 1997 at 00.40. The airport maintenance personnel started their duty period at 01.00 by measuring the braking action. The runway was covered by 20 mm of snow and slush and the braking action was 32/32/32. After the runway had been swept the measured braking action was 52/51/50 at 01.42. According to the Aeronauticai Information Publication for Finland a braking action of 40 or over is good.

The controller cleared SWW 1022 to the JOE-locator and to descend to 2000 ft, transition level 60, QNH 990, wind 130 degrees 7 knots, maximum 9 knots, visibility

10 km, light snow, clouds 3/8 800 ft, 7/8 1600 ft, temperature -1˚ C; dewpoint -1˚ C. The controller continued:*"Runway 10 in use if you accept"* SWW 1022 acknowledged the clearance direct to JOE beacon 2000 ft, the QNH 990 and reported that they had copied the weather information. The controller accepted the read back and reported runway conditions: *"a little slush and snow on the runway, braking action 52/51/50"* SWW 1022 acknowledged the braking action. It remained unclear to the traffic controller, which runway the pilots intended to use. He then asked if SWW 1022 was joining the JNS-VOR 10 nm DME arc a for straight-in approach to runway 10. The pilots told that they were on the 10 DME arc. The controller asked the aircraft to report 10 nm, which SWW 1022 acknow-edged.

1.1.3.3. Final approach and landing

When SWW 1022 was at a distance of 5 nm from runway 10, the controller reported to *"1021* " that the visibility had deteriorated to 6 km. SWW 1022 reported passing JOE. The controller cleared *"1021"* to land on runway 10 and gave the actual wind 120 degrees 8 knots. SWW 1022 did not acknowiedge the landing clearance properly, the first officer only said: *"Roger, 10, 1022"* The traffic controller accepted it.

The pilots got the high intensity approach, runway and PAPI (presicion approach path indicator) lights in sight from a distance of 2.5 nm. The PAPI lights were used for approach path information. All lights were on at 100% intensity and the brightness disturbed the pilots, but the first officer did not know the radio telephone phrase for dimming the lights. He asked the controller to *"put fights... reduce lights"* The controller dimmed the lights to 10% intensity. The approach was made in dark night conditions.

The captain disengaged autopilot at 600 ft above ground level (AGL) and the engine auto throttle system (ATS) at 100 ft and increased engine thrust slightly. The aircraft passed the runway 10 permanently displaced threshold at about 70 ft with a speed of 144 knots (kt). The height was 20 ft and the speed 11 kt above the values given in the FCOM. The aircraft touched down at a distance of 260 m from the normal touchdown point, 560 m from the threshold and with a speed of 136 kt. There was 1440 m of runway remaining. The spoilers did not deploy on touchdown and remained retracted during the landing roll.

The captain applied the brakes lightly 4 seconds (s) after touchdown. The right brake pedal was depressed fully for the first time 22 s after touchdown and the left pedal 27 s after touchdown. The first officer told that he had depressed his brake pedals fully when 100 m of the runway was remaining and the speed was about 70 kt.

The captain applied engine reverse thrust in both engines, but only low thrust settings were used. The left engine reached the value of 1.2 EPR 17 s and the right 25 s after touchdown. The highest reverse thrust settings in the engines were 1.4 EPR in the left engine and 1.2 EPR in the right when the aircraft passed the end of the runway.

(EPR = Engine Pressure Ratio, used to indicate indirectly the engine thrust)

Figure 1. TC-INC 50 m beyond the end of the runway.

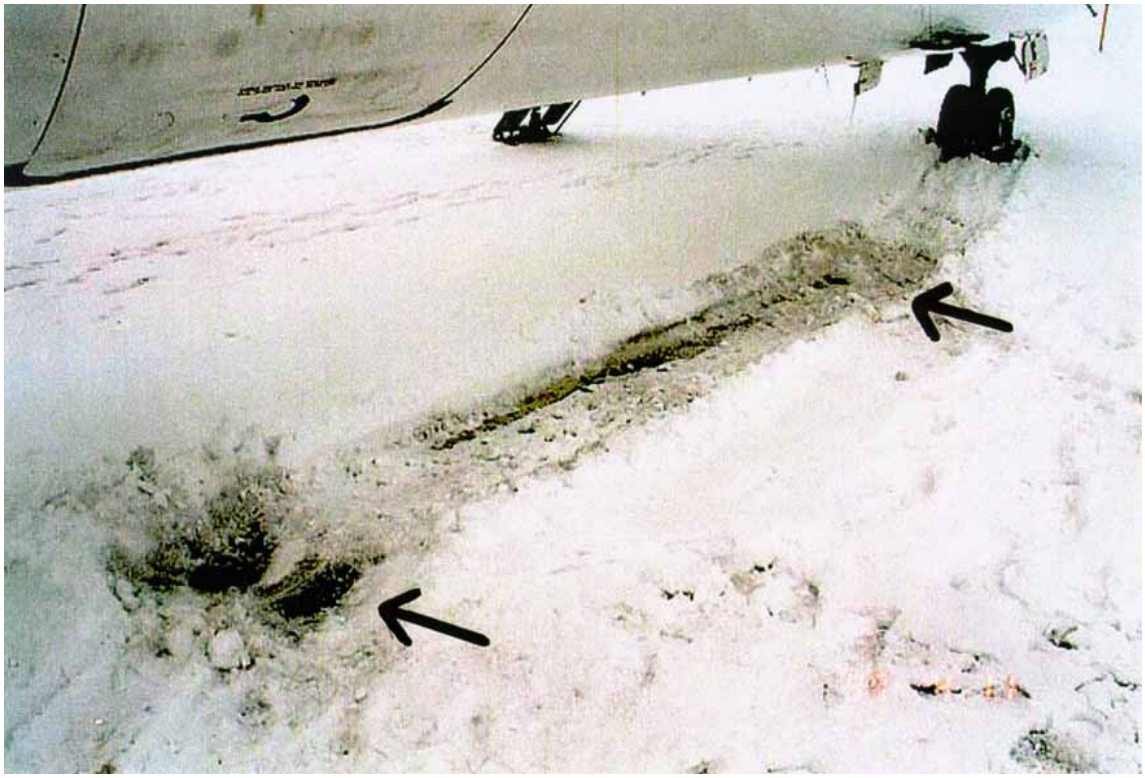

Figure 2. Stopping points on nosewheel track outside the runway.

The aircraft stopped at 40 m after the end of the runway and the reverser buckets were stowed in 5 s. About 20 s later the captain attempted to taxi the aircraft and increased the engine thrust to nearly take-off thrust settings three times. The aircraft moved three times almost straight ahead for 20 m and came to a final stop at 60 m beyond the end of the runway on a gravel surface covered by 15-20 cm of hard snow, right of the second approach light row for runway 28 on a heading of 094˚. The direction of runway 10 is 102˚. The attempt to turn and taxi back to the runway was unsuccessful due to skidding of the nose wheel. Flight SWW 1022 had landed at 01.54.

The captain did not make any announcement to explain the situation for the passengers, neither did the Finnish speaking cabin attendant. The travel guide, who was on the flight as passenger, announced about half an hour after the incident that the aircraft was unable to turn around and that they had to wait for a mechanic. Later on she told that they were waiting for the buses. The travel guide was on her first flight in these duties and she had no training for working as a crewmember although she had to perform some stewardess duties. The passengers disembarked the aircraft through the forward exit. The first passengers were transported to the terminal 1 h 20 min after the incident and the last passengers 20 min later. The luggage was also unloaded within this time. The captain kept the engines and the APU running for 1 h and 45 min after the landing. The APU alone could have delivered enough electrical power for the aircraft and pneumatic pressure for the airconditioning system. The parking brake was not used at all and was not set when the crew left the aircraft. No wheelchocks were used. After the passengers had left a Finnair mechanic boarded the aircraft. The captain demanded that he should perform a "Day check", check the landing gears and tow the aircraft to the runway. The mechanic refused.

The cockpit crew did not tell the mechanic anything about a pulled cockpit voice recorder (CVR) circuit breaker. The captain shut down the engines and the APU.

1.2 Injuries to persons

There were 167 passengers and six crew members on board. One passenger was slightly injured, when she fell down just after leaving the aircraft.

1.3 Damage to the aircraft

There was no damage to the aircraft.

1.4 Other damage

There was no other damage.

1.5 Personnel information

1.5.1 Captain

Captain:	male, 54 years (born 1943)
Licences:	airline transport pilot's licence 1989, renewed 26 November, 1996, valid until 25 November, 1997
Ratings:	multi-engine land 20 April, 1977, CAT II 13 April, 1993
Type ratings:	C-47, DC-9, B-737.400, DC-9-83 (MD-83)
Last line check:	9 April, 1997
Medical certificate:	class one, renewed 5 March, 1997, no restrictions
Rest period before the incident flight:	approximately 24 hours

Flight experience	**All types**	**MD-83**
Last 24 hours	5 h 10 min	5 h 10 min
Last 30 days	84 h	84 h
Last 90 days	162 h	162 h
Total experience	13201 h	2011 h

The captain got his basic flight training in the Turkish Air Force Aviation School and flew in the Turkish Air Force as a fighter pilot, flight instructor and one year as a transport pilot. During this time he flew 2500 h.

The captain told in the hearing that from 1977 to 1986 he had flown 4500 h agricultural flights with Piper-Pawnee aircraft and had been employed by the Turkish Hava Yollari (THY) airline from 1986 to 1995. He had flown DC-9 and B-737 aircraft as copilot and from 1989 as captain. Intersun Sunways hired the captain in 1995. The captain got the MD-83 type-rating on 7 April, 1995 and flew as a captain since April 1995.

The annual recurrent ground and simulator training had been given by Intersun Sunways' instructors and check pilots.

1.5.2 First Officer

First officer:	male, 38 years (born 1958)
Licences:	commercial pilot's licence 1995, renewed 22 November, 1996, valid until 21 November, 1997
Ratings:	single engine land 5 December, 1995, multi engine land 12 December, 1995
Type ratings:	DC-9-83 (MD-83)
Last line check:	18 March, 1997
Medical certificate:	class 1, renewed 18 December, 1996, no restrictions
Rest period before incident flight:	approximately two days

Flight experience	**All types**	**MD-83**
Last 24 hours	5 h 10 min	5 h 10 min
Last 30 days	73 h	73 h
Last 90 days	146 h	146 h
Total experience	6150 h	975 h

The first officer got his basic flight training in the Turkish Air Force Aviation School and flew in the Turkish Air Force as a fighter pilot, flight instructor and helicopter pilot for 5226 h. He also flew 13 h as a transport pilot.

The first officer told that he had participated in Commercial Pilot Licence (CPL) training arranged by the DGCA in November 1995. The investigation commission has requested the training program and the test resuits from the DGCA. The accredited representative has not provided the commission with these documents.

He participated in the MD-83 type training given by Intersun Sunways from December 1995 to March 1996. The theoretical training was given in Turkey and the simulator training in Finland by Intersun Sunways' instructors. The first officer told in the hearing that he had a training flight with MD-83 on 15 January, 1996 in Antalya including five landings. He participated in the en-route flight training from 5 February to 23 March, 1996. The first officer passed two route check flights and got the MD-83 type rating at the end of the training period. He started as first officer on 30 March, 1996. The type rating in his licence was signed 8 May, 1996. According to the representative of DGCA

Turkey the first officer had a temporary rating because it takes six weeks to get a rating from the DGCA in Ankara for a pilot stationed in Antalya.

The annual recurrent ground and simulator training was given by lntersun Sunways' instructors and check pilots.

1.5.3 Cabin crew

There were four flight attendants who had been quallfied for their duties by lntersun Sunways. One flight aftendant was a native Finn. According to the copies of the certificates all were valld.

1.6. Aircraft information

The aircraft was a twin-engine commercial jet aircraft with a 167 passenger seat configuration.

Nationality and registration:	Turkish, TC-INC
Owner:	Irish Aerospace Finance Ltd.
Operator:	lntersun Sunways Havacilik A.S.
Manufacturer:	McDonnell Douglas Corporation, USA
Type and model:	Douglas DC-9-83 (MD-83)
Serial number:	49792
Year of manufacture:	1989
Engines:	
Manufacturer:	Pratt & Whitney Ltd, USA
Type:	JT 8D-219
Fuel:	JET-A-1

1.7. Meteorological information

The pilots received the following weather information in Antalya before departure. The times used in the weather documentation are in Co-ordinated Universal Time (UTC, the local times in Turkey and Finland were UTC+3h): Aerodrome forecast (TAF) 15-24 for Jyväskylä, Oulu and Tampere-Pirkkala airports, TAF 18-12 for Tampere-Pirkkala airport, significant weather chart for Europe and upper wind charts FL 240, 300 and 340. They also received the weather reports (METAR) from Jyväskylä and Joensuu airports at 14.50, Oulu airport at 15.25 and Tampere-Pirkkala at 15.20.

A wide low pressure area prevailed in Finland. Surface and upper winds were light. A weak occlusion front moving east caused occasional snow and rain showers in Tampere FIR. The cloud base was low but good enough for operations. The ground temperatures were around O˚C. There was light icing in clouds.

The weather at Joensuu airport on 11 April, local time:

-at 00.50: wind 120 degrees 7 kt, variable 100-160 degrees 5-11 kt, visibility 6 km, light snow, clouds 2/8 1300 ft, 8/8 1700 ft, temperature -1˚C, dewpoint -1˚C, QNH 991 hPa.

-at 01.50: wind 120 degrees 7 kt, variable 100-150 degrees 4-11 kt, visibility 8 km, light snow, clouds 4/8 900 ft, 7/8 1600 ft, temperature -1˚C, dewpoint -1˚C, QNH 990 hPa.

-at 0250: wind 120 degrees 7 kt, variable 090-150 degrees 4-12 kt, visibility 6 km, light snow, clouds 6/8 700 ft, 8/8 4000 ft, temperature -1˚C, dewpoint -1˚C, QNH 990 hPa.

Sunrise at 05.52 local time.

1.8 Aids to navigation

Two approach beacons, VOR-DME, ILS for runway 28, high intensity approach and runway and PAPI lights for both runways were operational at Joensuu airport.

The aircraft had ADF, VOR-DME, ILS and Omega equipment. The crew had Jeppesen Route Manuals in their use.

1.9 Communications

The radio communications were listened to from the recording of Joensuu TWR. The first officer acted as monitoring pilot and handled the radio communications.

Joensuu TWR radio communications transcript is enclosed in the Appendix 1.

1.10 Airport information

The Joensuu airport is administrated by the Civil Aviation Administration. The airport is normally closed during night time but can be opened on request. On 11 April, 1997 the airport had been opened at 01.00 for Intersun Sunways' flight SWW 1022.

The main runway 10/28 is 2500 m long and 52 m wide. Due to high terrain in the approach sector the threshold for RWY 10 was permanently displaced by 500 m. The available runway length for landing on RWY 10 was 2000 m. The whole runway length 2500 m was available for landing on RWY 28. The slope of RWY 10 is 0.40 downhill.

The coordinates of Joensuu airport reference point are 62˚ 39' 31"N, 029˚ 37' 39"E and the elevation is 399 ft (122 m).

The airport maintenance personnel had swept the runway clear of the wet snow and slush just before the arrival of SWW 1022. After the sweeping the braking action, measured by Skiddometer 12 min before the landing, was 52/51/50. The person who performed the braking action measurement told in the hearing that due to the falling snow there was a 1-3 mm thick layer of slush on the runway. At this time the runway surface temperature in the west end was +1.5°C and in the east end +0.9°C. When the braking action was measured 14 min after the unsuccessful landing there was 3 mm of slush on the runway and the braking action 42/43/44.

1.11 Flight recorders

The aircraft was equipped with a Sundstrand Universal Digital Flight Data Recorder (UFDR, p/n 980-4100-DXUN, s/n 9767). The recorder runs when at least one fuel lever is on and the parking brake is released. The UFDR had functioned properly. The data of the UFDR was read out by SAS Flight Analysis in Copenhagen, Denmark.

The aircraft was equipped with a Sundstrand Cockpit Voice Recorder (CVR) which provided a continuous four channel recording for 30 minutes when the aircraft electrical power was on. To save the recording the electrical power must be disconnected by pulling the CVR circuit breaker. The captain told in the hearing about 18 h after the incident that he had pulled the CVR circuit breaker about 10 min after the aircraft had stopped. The electrical power of the CVR had been on for more than 30 min and the recording of the cockpit conversations during approach and landing had been erased. About 12 h after the incident the operations advisor and an Intersun Sunways mechanic went out to the aircraft. The mechanic prepared the aircraft for the overnight stay at the site.

No verbal or wriften information was given to the Finnair technical personnel about the pulled circuit breaker.

1.12 Description of the incident site and aircraft inspection

1.12.1 General description of the incident site

The tire marks were clearly visibie on the slush covered runway surface and also outside the runway. The aircraft had stopped three times before the final stop. The first stop was at 40 m from the runway end and the final stop at 60 m from the runway end on a gravel surface covered by 15-20 cm of hard snow. The only obstructions in the area were the runway 28 approach lights. The ground was frozen and bore the aircraft. See figures 1 and 2.

1.12.2 Outside inspection of the aircraft

There was no visible damage to the aircraft after the incident. Small quantities of sand, pebbies and snow were found on the wings.

1.12.3 Cockpit

Jeppesen approach charts for Joensuu NDB VOR/DME RWY 10 were on the control columns. The speed marks were set according to the take-off and landing speed booklet for 132.000 lb (59.875 kg) landing weight.

The insurance certificate was not found on board the aircraft in Joensuu.

1.13 Medical information

One hour after the landing the pilots were subjected to an Alcometer/breathanalyzer test by the police. The resuits of both pilots were negative. No other medical tests were made.

Both pilots had a class 1 medical certificate with no limitations.

1.14. Fire

There was no fire. The landing fuel in Joensuu was about 16.800 lb (7.600 kg).

1.15 Survival aspects

1.15.1 Notifications of the incident

When the aircraft had overrun the runway the air traffic controller should have followed the Joensuu airport alarm order. He neither alarmed the airport rescue unit nor the Regional Emergency Center (REC). He only informed the Tampere ACC about the incident.

A Finnair traffic officer called the REC 20 minutes after the landing incident and requested police to the site. The police arrived 40 min later.

1.15.2 Rescue organization

According to the Finnish Aviation Regulation AGA M3-2 the minimum rescue crew during MD-83 operations was three persons and two fire trucks. During the time of the incident there were three maintenance persons on duty at Joensuu airport. They handied the rescue duty, the runway maintenance and the loading and unloading of Intersun Sunways'aircraft.

1.15.3 Survivai aspects

The aircraft was not damaged. No strong deacceleration forces occured during landing roll. As there was no fire the most dangerous phase was when the passengers moved to the buss in darkness without guidance from the aircrew on the runway extention which was covered by 15-20 cm of hard snow. The engines of the aircraft were still running when the passengers disembarked.

1.16 Tests and research

1.16.1 General

Intersun Sunways requested technical assistance from Finnair to tow the aircraft back to the runway and to inspect the aircraft for possibie damage.

The aircraft was towed to the apron and an inspection of the aircraft was made according to the manufacturer's maintenance manual. Part A of the hard landing check in accordance with maintenance order MM 05-51-04 was performed. No structurai damage was found in the aircraft.

The inspection focused on the landing gear structure and the functioning of the brake, anti-skid and spoiler systems. The engines were checked with a boroscope.

1.16.2 Inspection of the aircraft

The aircraft was lifted up on jacks and the landing gear assemblies were checked and tested. The brakes and anti-skid system were found to be in working order.

The functioning of the autospoiler actuator was not tested because the captain had told the inspection personnel several times that the spoiler/speedbrake handle had automatically moved back to the extended position on touchdown.

The functioning of the spoiler system was tested manually by pulling the spoiler/speedbrake handle back several times. The spoiler system operated normally.

After the technical inspections were completed the lntersun Sunways' operations advisor and the Finnair technical inspector tested the functioning of the autospoiler system, wheel brakes and engine reverses and also made an aborted take-off. All systems operated normally.

1.16.3 Flight Data Recorder information

The Universal Digital Flight Data Recorder (UFDR) had a significant role in the investigation. The UFDR was intact and had functioned properly. Using the recorded data it was possible to determine that the flight had been normal until final approach. The case relevant data from approach to final stop and the shut down of engines was analysed in order to find out the causes of the incident. The UFDR recorded until the engines were shut down 1 h 45 min after the landing because the parking brake was not used. The UFDR data from the previous landing in Jyväskylä was analysed for comparison.

A graph of the most relevant parameters in the final phase of the flight (engine EPRs, wheel brake pressures and spoiler panel angles) are showen in figure 4. Factors contributing to the incident can be found in the graph.

1.16.4 Inspection of the PAPI lights

Joensuu airport Precision Approach Path lndicator (PAPI) system for RWY 10 was inspected on 11 April, 1997. The lights were found to function electrically properly and the glasses were clear and unbroken.

The PAPI glidepath indication lights were checked weekly according to the directions of the Civil Aviation Administration (CAA). The lights had been checked earlier in the week. According to the CAA directions the indication angies of the lights must be cheeked every third month. The angles had been checked in the beginning of the year 1997.

1.16.5 Inspection of the Skiddometer friction tester

The Skiddometer friction tester BV-11 consists of a trailer which is towed by car at a speed of 65 km/h and a measuring and recorder unit, MI-9. A printout shows the measuring results.

The investigator requested the personnel to check the Skiddometer used in Joensuu. The airport electrician checked the torque transducer of the friction tester at 4.30 on 11 April. He found that the measuring element was in working order but the recorder advised to zero the measuring hub. The signal voltage of the hub was a little out of test tolerance, but inside the measuring unit tolerance. The voltage difference had no effect to the friction measurement because the equipment is auto-zeroing inside measuring tolerance. The difference was possibly caused by a temperature change because the tester had been taken into a garage a short time before the measurement was done.

After zeroing the measuring hub, the functioning of the friction tester was checked with a calibration weight.The test resuit was 18. According to the callbration marking it should have been 20±1. According to instructions the friction tester must be checked weekly with the calibration weight. According to instructions, a calibration of the friction tester by an inspector should be performed, when the transfer elements are changed, but this was not done. The friction tester must be serviced and calibrated once a year. The service had been carried out in the summer of 1996 and calibrated on 23 September, 1996.

The friction testers tire pressures were measured on 12 April, 1997. The pressure in the left supporting tire was 160 kPa and 110 kPa in the right. The specified value is 170 kPa. The specified friction wheel tire pressure is 700 kPa, but the measured pressure was 550 kPa. According to the insructions the tire pressures should be checked weekly. On 14 April, 1997 some tests were made with lower tire pressures than specified. The friction tester gave somewhat lower friction coefficients with the lower tire pressures measured on 11 April. It seems that these lower tire pressures did not significantly influence the measuring results.

No failure or malfunction was found in the friction tester that could have caused an error greater than 10 %, when the breaking action measurements were made before and after the landing of SWW 1022. The personnel aiso tested the runway friction after the

measurement by using the car brakes and foot testing. These tests supported the Skiddometer results.

1.17 Organizational and management information

1.17.1 Airline

Intersun Sunways Havacilik A.S. was a charter airline based in Antalya, Turkey. The airline was an affiliated part of the Turkish Tursem group which had travel agencies in severai countries, e.g. "Kymppimatkat" in Finland. Intersun Sunways begun its operations in April 1995 with three MD-83 aircraft and got the fourth in 1996.

The company had three departments: flight operations, technical department and ground operations. All departments worked under the corporate board and the accountable director. Chief pilot, training manager, flight safety manager, performance and documentation manager, cabin crew manager, chief stewardess, crew planning manager and chief dispatcher worked under the flight operations director. The company had also hired a former Finnair executive as a flight operations advisor, member of the executive board as well as training and line captain (in this report referred to as the "operations advisor").

There were 20 captains and 20 first officers on 16 Feb, 1996. The company pilots were mostly former Turkish Air Force pilots.

The company used Finnair simulators for transition and recurrent training. Intersun Sunways training captains acted as instructors and check pilots.

Intersun Sunways used a Flight Operations Manual (FOM) composed by Flygrestanda Ab Sweden. The same manual was used by the Swedish affiliated airline Sunways Ab. Intersun Sunways used as aeroplane flight manual for MD-83 the manufacturers FCOM. Training manual dated 1.1.1997 had been prepared in accordance with the provisions contained in the JAR-OPS 1 (Joint Aviation Requirements).

The quallty manager and the engineering and maintenance manager worked under the technical director who had the responsibility for company aircraft maintenance. Intersun Sunways had its own licensed inspectors and mechanics. Daily inspections, A-checks and minor repairs were performed by the company. Transit checks and daily inspections were performed by the company's own mechanics in Antalya or Dalaman. Elsewhere the transit checks were usually performed by the pilots. An expanded daily check was performed once a week. More extensive checks were performed by foreign maintenance shops. Antalya was the company maintenance base.

Finnair was Intersun Sunways' handling agent in Joensuu. The line inspection agreement between the companies, required by the Finnish Flight Safety Authority, had expired on 31 March, 1997. Anyhow a Finnair mechanic was at Joensuu airport on 11 April ready to perform the transit check and possible de-icing of SWW 1022. The Finnair Aircraft Maintenance sent on 17 April, 1997 a notice to all domestic airports informing

that the line inspection agreement had expired and no service should be performed by Finnair mechanics on Intersun Sunways' aircraft.

A new agreement on line inspection was signed in May 1997 between Intersun Sunways and Finnair. The agreement states that it was effective from 1 April, 1997, but the signing date in the document was missing.

lntersun Sunways went into bankruptcy and ceased operations in October 1997.

2 ANALYSIS

2.1 The runway requirement

According to the MD-83 Flight Crew Operating Manual (FCOM) the calculation of landing distance is based on the following assumptions:

-Height over runway threshold is 50 feet (15 m), and speed 1.3 times stall speed and touchdown point 1000 feet (300 m) from threshold.

-Nosewheel is lowered down to the runway 1.0 s after main landing gear touchdown

-Spoiler panel deployment begins 0.25 s and the spoiler panels are fully open 0.8 s after main landing gear touchdown

-Braking with wheelbrakes is initiated 0.25 s and full braking is applied 1.5 s after main landing gear touchdown

If the runway is wet or more than 25 % of its surface is contaminated by ice, snow or slush, engine thrust reversing shall aiso be initiated so that 1.3 EPR reverse thrust is achieved 6.0 s after main landing gear touchdown. Reduction of reverse thrust shall be started when the speed has decreased to 80 kt so that the reverse thrust is on idle after 60 kt. Under emergency conditions, maximum reverse thrust may be used to a complete stop.

The figure below shows, how the runway requirement is defined.

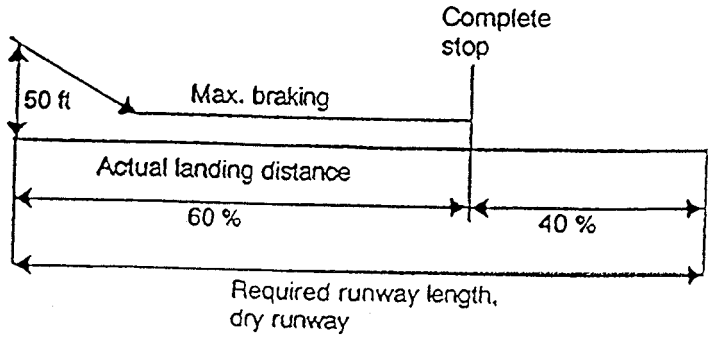

Figure 3. The runway requirement

The effect of the reverse thrust is not taken into account when calculating the runway requirement when the runway is dry. Only 60 % of the required runway length is used to stop the aircraft with maximum braking and the remaining 40 % is a safety margin required by aviation regulations. If the runway is wet or contaminated by ice, snow, slush or standing water, the safety margin requirement may be less than 40 % but according to JAR regulations it must be at least 15%.

The available length of runway RWY 10 in Joensuu was 2000 m. The runway was covered by 1-3 mm of slush after the sweeping, which was compieted 12 min before SWW 1022 landed. A runway is considered wet when the surface is covered by water up to a maximum of 3 mm. lt is also considered wet if the equivalent water content of the slush or snow layer is 3 mm or less.

The height of SWW 1022 over runway threshold was about 70 feet and the speed 144 kt. The height was 20 ft and the speed 11 kt above the values given in the FCOM. The aircraft touched down at a distance of 260 m from the normal touchdown point, 560 m from the threshold and with a speed of 136 kt. The correct threshold and touchdown speed was 133 kt according to the FCOM. The manufacturer of MD-83 aircraft supplied the investigation commission with the following landing performance calculations based on FCOM, UFDR data and actual conditions at the time of the incident:

-The actual landing distance was 1229 m. The landing flare (in air) takes 300 m, the landing roll on ground 929 m. The actual landing distance was 61.5 % of the available runway length and the safety margin was 38.5 % (771 m).

-Had the aircraft touched down with a speed of 133 kt, 560 m after the threshold, had the spoilers deployed, had wheel brakes and engine reverses been used according to FCOM directions, the aircraft would have stopped 511 m before the runway end.

-Had the aircraft touched down with a speed of 133 kt, 560 m after the threshold, had the spoilers not deployed but had the wheel brakes and engine reverses been used according to the FCOM, the aircraft would have stopped 264 m before the runway end.

-Had the aircraft touched down with a speed of 136 kt, 560 m after the threshold, had the spoilers deployed, and had the wheel brakes and engine reverses been used in the way the pilots did, the aircraft would have stopped 380 m before the runway end.

-As the aircraft touched down with a speed of 136 kt, 560 m after the threshold, the spoilers did not deploy, the wheel brakes and engine reverses were used in the way the UFDR recorded, the stopping distance was 1481 m. The distance from the touchdown point to the runway end was 1440 m, so the aircraft overrun the runway.

The friction coefficient for a wet runway is determined to be 50 % of dry runway friction coefficient. The braking action values measured in Joensuu after the unsuccessful landing were 42/43/44. These values are very close to the assumed braking action for a wet runway.

2.2 Human factors

2.2.1 General

Various human factors proved to be significant when analysing the final approach and the unsuccessful landing. Among these were crew background and crew composition,

the decision making process of the captain, flight procedures in use and learned practices, the alertness of the crew and the company culture.

2.2.2 Errors during the approach and landing

The captain acted as piloting pilot and the first officer as monitoring pilot during the approach and landing. The latter also handled the radio communications and read the check lists. During the NDB VOR/DME approach to runway 10 the captain used the autopilot coupled to the VOR radial and adjusted the rate of descent by using the vertical speed wheel of the autopilot. The ATS controlled the airspeed according to the selected speed bug setting. The captain disengaged the autopilot at about 600 ft AGL and continued flying the aircraft manually. At 2.5 nm from threshold the pilots got the high intensity approach, runway and PAPI-lights in sight. All lights were on at 100% intensity. lt is possibie that the first officer had not completed the *before landing* check list at this time. Arming of the spoilers was the third item on the check list. According to lntersun Sunways' procedure the monitoring pilot reads "Spoilers ARM" from the check list and and the pilot in the left seat lifts the spoiler/speedbrake handle to the ARMED position. The pilot in the right seat confirms that the autospoilers are armed.

On 22 May,1997 the commission interviewed the first officer. Some questions about the flight operations and the incident in Joensuu were asked in writing and verbally. After the interview the chief pilot of lntersun Sunways read and approved the written answers given by the first officer. Some of the questions asked and answers given regarding the spoiler system are listed below:

Q. Sunways'procedure to arm spoilers?

A. Monitoring pilot reads the check list and piloting pilot conflrms and monitoring pilot arms the spoilers. There are no lights to check before arming. Landing gear must be down before arming the spoilers.

Q. The pilots action if autospoiler does not work?

A. "No spoilers", monitoring pilot takes the spoilers manually.

The arming of the autospoilers according to the FCOM landing expanded procedures:

Annunciator Lights..... CHECK

Check annunciator panel and observe ligths are normal for conditions. Observe RUDDER TRAVEL UNRESTRICTED light and AUTO SPOILER DO NOT USE light is off.

NOTES

If RUDDER TRAVEL UNRESTRICTED light remains off at speeds below 165 knots (Model 83), refer to Section 3, FLIGHT CONTROLS - RUDDER RESTRICTED DURING LANDING.

If AUTO SPOILER DO NOT USE light is on, do not arm automatic spoilers. Refer to Section 3, FLIGHT CONTROLS - AUTOSPOILER DO NOT USE LIGHT ON OR UNABLE TO ARM AUTOSPOILERS.

Spoiler Lever.....ARM

NOTE

Do not arm spoiler lever until landing gear has been extended. This will preclude possible in flight deployment due to errant ground shift signal.

Observe AUTO SPOILER DO NOT USE light is off. Lift spoiler lever, observe lever remains up when released and red armed placard is visible at the base of lever.

The *"before landing"* check list used by Intersun Sunways differed from the FCOM *"landing"* check list. Annunciator lights check item, which contains the *"autospoiler do not use "* light check, had been moved after the item *"spoilers...arm"* in the Intersun Sunways' check list. The first officer did not know that the *"auto spoiler do not use"* light should be checked before arming the autospoiler. According to the *"before landing"* check list the CM1 (left pilot) arms the autospoiler. The first officer stated that the monitoring pilot arms the autospoiler.

The spoiler operation according to the FCOM landing roll expanded procedures:

When main gear is on runway, PNF (pilot not flying) observe spoiler lever moves aft to EXTposition.

NOTES

For auto deployment of inboard (ground) spoilers, throttles must be at idle. If throttles are above idle at touchdown, outboard and inboard flight spoilers may deploy and retract.

If spoiler lever does not move aft or does not remain at EXT position, PNF call "No spoilers" PF (pilot flying) move lever aft to full extend position and up to latched position.

The first officer stated that the monitoring pilot (PNF) calls out "No spoilers" and moves the spoiler lever manually to extend position if the autospoiler operation fails.

Several items in the normal check lists used by the company differed from the FCOM check lists. E.g. transfer of the annunciator panel check after the spoiler arming endangers flight safety.

These exampies clearly show that the Intersun Sunways' procedures and training were not at an adequate level.

The bright approach lights and the snowfall in the beam of the aircraft landing lights may have disturbed the cockpit crew co-operation. The first officer tried to request dimming

of the high intensity lights but he did not know the correct phraseology in English, which delayed the dimming of the high intensity lights. He had also not acknowledged the landing clearance correctly. The investigation commission assumes that the cockpit work was disturbed, the reading of the check list interrupted and the autospoiler was not armed. The first officer did not monitor that the spoiler lever moved aft to EXT position at touchdown. The captain did not confirm that the check list was completed and that the ground spoilers deployed at touchdown.

According to the captain's statement he disengaged the ATS at 30-40 ft and reduced the engine thrust to idle at 10-20 ft. According to UFDR data the ATS was disengaged at 100 ft and the engine thrust was increased slightly. Due to the thrust increment the threshold height was 20 feet (7 m) and the speed 11 kt above the values given in FCOM. The touchdown was 260 m from the normal touchdown point, 560 m after the threshold. The FCOM recommends that ATS is used until touchdown. When ATS is used there is no need to adjust the engine thrust manually during approach and landing as the ATS starts to reduce thrust to idle at 50 ft.

According to Intersun Sunways operations advisor it is only a recommendation to touch down 300 m after the runway threshold.

According to the aircraft manufacturers FCOM all landing performance calculations are based on a touchdown point 300 m (1000 ft) from the runway threshold.

The pilots claimed in the hearings after the incident that the spoiler/speedbrake lever had moved fully back as it normally does as the ground spoilers deploy at touchdown. According to the UFDR data and a passenger observation the spoilers did not deploy at touchdown. The spoilers had worked normally as flight spoilers until touchdown (figure 4) and also as ground spoilers on the previous landing in Jyväskylä. The aircraft manufacturer does not know of any case in the history of DC-9/MD-80 when the spoiler/speedbrake lever would have moved back to EXT position without ground spoiler deployment.

The captain was not fully aware of his operational environment and the importance of factors affecting a safe landing. Normally those runways which give the best safety margins should be used (FOM 4.1.10). In this case the 2500 m long and ILS equipped runway 28 would have given a better safety margin even if maximum allowed tailwind component of 10 kt had been taken into account. The captain told the investigation commission and in his report to the DGCA, Turkey that "a *little snow and slush on the runway"* reported by the ATC had no effect on the deceleration of the aircraft. The commission is of the opinion that the captain did not know the definition of wet runway and its effect on operations. The captain did not reallze the significance of the landing weight, the thin layer of slush on the runway and the available runway length when he applied only light wheelbraking and low reverse thrust setting after touchdown. It is also possibie that he, because of insuffient training, did not know how the anti-skid system operated and had never learned the correct braking technique for winter operations. According to FCOM the normal braking technique when there is slush on the runway is that immediately after nosewheel touchdown, brake pressure is applied smoothly and

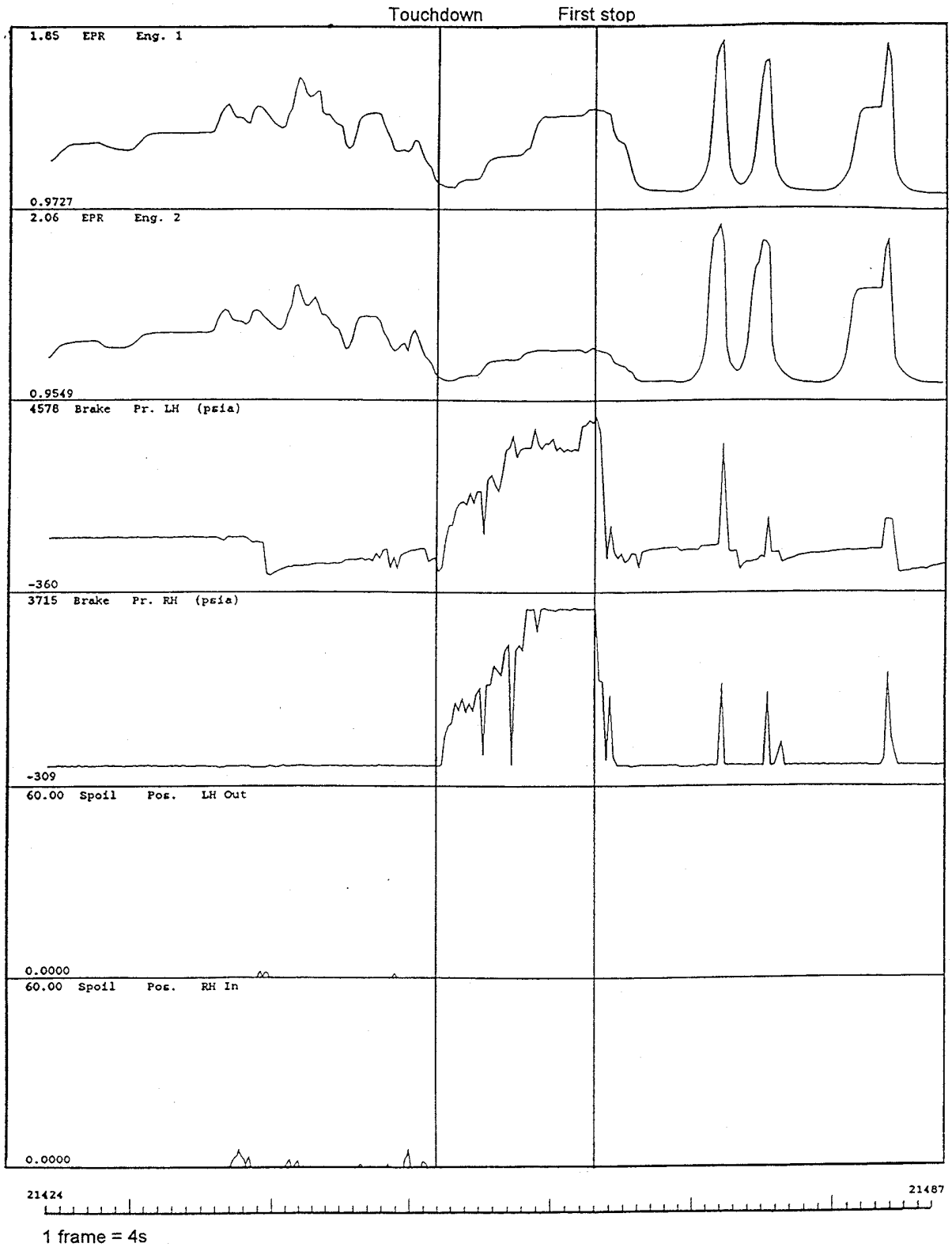

Figure 4. EPR, Brake pressure and spoiler panel position during landing in Joensuu

symmetrically with maximum pedal pressure and held until a safe stop is assured. The anti-skid system will modulate the brake pressure for each individual wheel to give maximum braking efficiency for the existing runway conditions.

ln his written report after the incident and in the hearing the captain told the investigation commission that he had increased the pressure on brake pedals three times and from 100 kt he used maximum pedal pressure. This can be confirmed from the UFDR data. ln the hearing the first officer told that he had depressed his brake pedals to increase the braking efficiency when 100 m of runway was remaining.

According to the UFDR data the engine reverse thrust settings during the landing roll were 1.10-1.25 EPR in the left and 1.10-1.22 EPR in the right engine untii a speed of 65 kt, whichafter the settings were 1.24-1.41 EPR and 1.22-1.23 EPR. According to the FCOM reverse thrust of 1.3 EPR should be used on a wet runway. Under emergency conditions, maximum reverse thrust may be used to a complete stop. The captain told the commission and also in his report to the DGCA, Turkey that he applied a reverse thrust of 1.5 EPR after touchdown, increased it to 2.0 EPR and finally used the maximum reverse thrust setting. UFDR data and the captain's statement disagree.

When the aircraft stopped 40 m beyond the end of the runway the captain was under high stress and it seems that his only intention was to get the aircraft back to the runway. He probably thought that he could taxi around the first approach light installation, but in the 15-20 cm hard snow cover the nosewheel was skidding and the aircraft did not turn. During the three attempts to taxi, the following high EPR values were recorded by the UFDR:

Left engine:	1.719	Right engine:	1.896
	1.622		1.802
	1.702		1.817

When high engine thrust is used in these conditions it is possible that the engines may be damaged by foreign objects.

When taxiing in these conditions it is difficult to estimate the behaviour of the aircraft. E.g. if the aircraft hits energized approach lights causing a fuel leak the danger of fire is evident.

Some parameters recorded by the UFDR during landing and landing roll can be seen in figure 4. Stopping points on nosewheel track outside the runway can be seen in figure 2.

The pilots denied having used high engine thrust and having tried to taxi the aircraft after the first stop. The passengers and airport maintenance personnel, however, confirmed in their written statements that the engine thrust was increased three times after the initial stop. Also the radiotelephony communication between the pilots and the controller confirms the captains intention to taxi the aircraft back to the runway.

The captain's ability to manage the situation was reduced. He did not personally inform the passengers of the incident nor did he use his crew in a proper manner for informing of the passengers. According to the Finnish speaking passengers the first announ-

cement was made by the travel guide about half an hour after landing. The travel guide was not a crew member. No one of the crew members made announcements although one of them was a native Finn. According to the passengers' statements the cabin attendants stayed most of the time behind curtains and the information given to the passengers was not adequate.

Weather conditions made a strong impression on the captain. He told in the hearing about a heavy snowfall during the approach and the snow in the beam of the landing lights. ln his report to the DGCA, Turkey he mentioned the snowfall and also told how the severe winter conditions continued after the incident. lt seems that he was unfamiliar with winter conditions although he had flown to Finland regularly for two winter seasons. The captain reported that the runway surface temperature was +4°C.The operations advisor also stated that the runway surface temperature had been +4°C.

During the last 12 hours before the incident there had been snow showers in Joensuu and the temperature had varied from -1°C to +1°C. At 01.45 the built-in runway surface temperature measuring system indicated +1.5°C for the west end and +0.9°C for the east end. The weather conditions in Joensuu were typical for the season: visibility 6 km in light snow and temperature -1°C.

2.2.3 Lack of monitoring

When going through the errors made during the final approach and landing it can be seen that in many phases the monitoring pilot's role would have been central. It is obvious that the piloting pilot was acting at the upper limits of his capacity and that he had no capacity left for deallng with check list work or manual spoiler extension when the spoilers did not deploy automatically. The transition from autopilot to manual flying in the final stage of an approach is always a demanding task in a nonprecision approach when the weather conditions are close to the minimum. The investigation commission is of the opinion that if the flight crew is poorly orientated in the operational environment, as it was in this case, the situation demands all the capacity of the piloting pilot and the role of the monitoring pilot becomes highly emphasized. The first officer worked with the check list carelessly and did not make sure that the autospoiler was armed. When the aircraft touched down the first officer did not monitor deployment of the spoilers, nor did he draw the captains aftention to performing manual spoiler extension. As described in section 2.2.2, the first officer did not have a clear picture of cockpit team work, his duties as monitoring pilot and the operation of the spoiler system. The first officer had a remark of poor check list work in his recurrent training records.

After nose wheel touchdown the reverse thrust shall be selected even if spoilers do not deploy. According to the first officers statement the monitoring pilot shall call out "Two lights" when the two yellow ENG REVERSE lights come on and "Four lights" when the two blue ENG REVERSE THRUST lights come on. He shall also monitor the EPRindicators for the reverse thrust used.

The investigation commission does not know how much the tasks of the monitoring pilot had been emphasized in the training given by lntersun Sunways. In this case the

monitoring was clearly insufficient. The monitoring pilot did not call the captain's attention to the speed increment after the ATS was disengaged, which led to the late touchdown. He failed to observe that the spoilers did not deploy. He did not monitor closely enough the engine reverse thrust settings used by the piloting pilot. The reversers are most effective at high speed in the landing roll.

Due to poor monitoring and team work, the final approach and landing was, only an unprofessional performance by two individuals.

2.3 Training and proficiency of the flight crew

2.3.1 Flight crew training

Both pilots had received their basic flight training in the Turkish Air Force Aviation School and flew in the TAF about fifteen years as fighter pilots and flight instructors. The captain had flown one year as a transport pilot. After leaving the Turkish Air Force he had flown agricultural flights for nine years. The Turkish airline Turk Hava Yollari (THY) hired the captain in 1986 as copilot. At this time he was 43 years of age. He got his airline transport pilot licence in 1989 and was promoted to captain. The captain told in the hearing that he had retired from THY in 1995 at the age of 52 and was hired by Intersun Sunways. He got his MD-83 type training from lntersun Sunways and commenced flying as captain in April 1995. The theoreticai and flight training were given in Turkey and the simulator training in Finland by lntersun Sunways' instructors.

The first officer told in the hearing that he had served in the Turkish Air Force from 1980 to 1996. He had participated in a commercial pilot's licence training given by the DGCA, Turkey in November 1995. He got his commercial pilot's licence in December 1995. The accredited representative of the DGCA, Turkey has not supplied the training documents and exam results concerning the first officer's commercial pilot training as requested by the investigation commission. The commission only received a list of commercial pilot licence requirements according to JAA (JAR-FCL) regulations but no performance or test results.

2.3.2 Training given to the copilot by lntersun Sunways

The copilot got his MD-83 theoretical type and flight training in Turkey from lntersun Sunways instructors. The simulator type training was given in Finland by the company's own instructor pilot. The annual recurrent ground and simulator training was given by Intersun Sunways' instructors.

According to the type training syllabus the first officer's simulator training should have included ten simulator sessions, but only seven were given. Each simulator session consisted of 4 h of simulator time (2 h as piloting pilot and 2 h as monitoring pilot) and 2 h of briefing time. All simulator training was given during successive days by the same instructor. Working time in the last simulator session had started at 06.30 and finished at 12.30. At 13.00 an 8 h training session by Finnair Training Center had started containing

an introduction to CRM and emergency training (4+4 h). The opinion of the investigation commission is that training is not efficient when it is too intensive and the daily training time exceeds 8 hours.

The first officer got one training flight inciuding five landings with MD-83 in Antalya. He also got 120 h of line training between 15 February, 1996 and 16 March, 1996.

Intersun Sunways had given the first officer only a short introductory training to airline operations, although the operational and safety culture in military flying differs greatly from the ones adopted by international airlines. A pilot who is hired by an international airline has to assimilate and practice a culture which is based on the knowledge of the Civil Aviation Laws and Regulations, operating manuals, the operational environment and readiness to take the responsibility of an airline pilot.

2.3.3 Line-oriented flight training

Line-Oriented Flight Training (LOFT) is a simulator training method which gives crewmembers the opportunity to practice line operations (e.g. maneuvers, operating skills, system operation and the operators procedures) with a full crew in a realistic environment. The crewmembers learn to handle a variety of scripted realtime scenarios which include both routine, abnormal and emergency situations. They also learn and practice cockpit resource management skills, inciuding crew coordination, judgment, decision making and communication skills. The overall objective of LOFT is to improve total flight crew performance in the above mentioned areas.

According to the documentation presented to the commission no LOFT was given by Intersun Sunways in the type training for their new pilots. The LOFT given in the recurrent training included too many abnormal and emergency situations and lost therefore the basic idea of LOFT. When abnormai and emergency situations play too large a role in this kind of training, the normal company procedures are not emphasized enough. A good opportunity to improve the general quality of normal operations is lost. This applies directly to this incident. A normal situation got out of hand due to the lack of proper training and modest skills of the pilots.

2.3.4 Winter operations training

The poor understanding of winter operations among many Intersun Sunways' pilots compelled the Finnish Civil Aviation Admistration, Flight Safety Authority (CAA) to send several requests for action to the DGCA, Turkey.

According to the FCOM intructions the operator is responsibie for evaluating the existing conditions and taking the necessary action to ensure safe operation. It is the operator's responsibility further to have a thorough knowledge of existing and forecasted weather conditions, exercise extreme caution, and adhere to standard operating procedures. The Intersun Sunways' pilots were not familiar enough with the "Cold weather procedures" of the FCOM.

ln the autumn of 1996 lntersun Sunways arranged winter operations training for their pilots at Finnair Training Center in Finland. ln the CBT (computer based training) the pilots train individually at their own computer working stations and after each section of the program questions are asked. lf the answers are correct the pilot may continue to the next section, otherwise he has to review the previous one. Intersun Sunways wanted the training without scoring so their pilots could move on even if the questions were not correctiy answered. This method of application significantly reduces the effectiveness of the training. As the program was presented in English, a good understanding of the language was essential.

2.3.5 The prosessional skills and airmanship of the cockpit crew

Because of the short and inadequate training and poor language proficiency the professional skills of the pilots were modest. This can be seen both in flight pianning and in operations.

The captain decided to take additional fuel on both flights. ln the Operationai Flight Plan (OFP) there were no new calculations or remarks about the reason for the extra fuel. In Joensuu the landing mass was about 7.700 lb (3.500 kg) higher due to the extra fuel.

For the flight Antalya-Jyväskylä the pilots had accepted two inappropriate alternate airports in the ATS flight pian. Joensuu airport was closed at the time when it had been needed as alternate. The pilots did not have any weather information from Helsinki-Vantaa. It seems that they did not know that Joensuu airport was closed between 22.30-01.00. Runway snow clearance at Joensuu airport was completed at 01.42.

ln Jyväskylä the pilots accepted a 10 hours old SNOWTAM-report from Joensuu and did not request a more actual runway condition report. Snow had been forecasted for Joensuu during the evening and night.

According to the FCOM "after engine start" check list, engine anti-ice should be turned on if outside temperature is less than +6°C and visible moisture is present or dewpoint and outside air temperature are within 3°C of each other. The weather in Jyväskylä at 00.50 was: wind 140 degrees 2 kt, visibility 2000 m rain and snow, mist, clouds scattered 200 ft, overcast 600 ft, temperature and dewpoint 0°C, QNH 988 hPa. ln these conditions engine anti-ice should have been used when the engines were running. The ”after start" check list, which should be completed before starting to taxi, contains the item *”Air Foil/ Eng Anti-ice ... SET .. CM1"*. According to the first officers statement the engine anti-ice was switched on just before departure on the runway. This practice is against the FCOM and hazardous to flight safety.

When SWW 1022 approached Joensuu the traffic controller told the pilots *"runway 10 in use, if you accept".* The pilots chose a VOR-DME-approach to RWY 10, where the available runway length was 2000 m. For RWY 28 a full ILS-approach would have been available and the runway length 2500 m. High intensity approach, runway and PAPI lights were available for both runways. The tailwind component for RWY 28 had been 5-7 kt according to the actual weather information. Using RWY 28 would have given a

better safety margin even with the maximum allowed tailwind component of 10 kt. The pilots did not have a realistic idea about the aircraft performance when operating on a 2000 m long runway classified as wet. The captain's way to use wheelbrakes and engine thrust reversers in conditions like those in Joensuu means that a part of the safety margin is used in the landing. Without ground spoiler deployment the safety margin was not enough and the aircraft overran the runway. The captain did not know the effect of a thin snow and slush layer on the runway surface. He told in his report to the DGCA, Turkey that a thin layer of snow and slush had no effect on the braking efficiency.

The captain kept the engines and the APU running for 1 h and 45 min after the landing. The APU alone could have delivered enough electrical power for the aircraft and pneumatic pressure for the airconditioning system. Parking brake was not set nor wheelchocks were used. Also the pressurization outflow valve was left open. Parking and last parking check lists were not compieted properly when the crew left the aircraft.

The operations advisor told that Intersun Sunways had adopted the procedure that pilots should pull the CVR circuit breaker if something exeptional had happened. The purpose of this procedure was to save the CVR recording for a possible investigation. This is a good procedure but it should also include a note in the technical log book and the technical ground personnel should be informed about the pulled circuit breaker. lt is also a good procedure to mark the circuit breaker. These actions were not taken. The CVR data was lost as described in 1.1 1. The data would have been useful in the investigation of the cockpit crew cooperation during the final approach and landing.

2.3.6 The pilots' ability to use the English language

The commission learned during the cockpit crew interview in Joensuu that the pilots' proficiency in the English language was poor. They had considerable difficulties in answering simple questions about operational and technical matters of MD-83. A professional interpreter was not able to communicate with the pilots in English. The hearing could not be carried out untii a Turkish and Finnish speaking person helped to interprete.

On 22 May, 1997 some additional questions were presented to the first officer in writing after the UFDR data had been analyzed by the commission. lt was found out that the ground spoilers had not deployed during the landing roll. During the interview the same questions were also asked verbally and explained. The answers given by the first officer were written down by the commission. lmmediately after the interview the first officer and the Chief pilot of lntersun Sunways read the interview document and approved it. The first officer and the commission members who were present signed the document. The Chief pilot's and the first officer's abilities to use the English language were modest.

According to the first officers route training documents he had difficulties to understand the ATC-clearances given in English. Obviously his poor knowledge of the English language had also been noticed by lntersun Sunways. The company arranged a course in English for the copilot in March 1997.

It is the opinion of the commission that the DGCA, Turkey should ensure that those cockpit crews who fly international operations and/or use manuals in English, have sufficient English language skills to manage normal and abnormal situations encountered during flight operations.

2.3.7 Radiotelephony communications

The radiotelephony communications during approach and landing were not in accordance with correct radiotelephony procedures.

The first officers poor knowledge of English contributed to his difficufty in using correct phraseology in radio communications.

The air traffic controller accepted the wrongly acknowledged approach clearance and some inadequate acknowledgements from SWW 1022. This was against the regulations in the Finnish Manual of Air Traffic Control instructions (LJKK) (based on ANNEX 10 Vol.II, PANS-RAC Doc 4444, Doc 9432-A/925 Manual of Radiotelephony). He also used a wrong call sign (SWW 1021) several times and repeatedly acknowledged messages by just pressing the push-to-talk button,e.g:

TWR: *"Good moming Intersun **1021,** from Joensuu. you are **cleared to JOE,** when ready descent to... "*

SWW 1022: ***Direct to JOE,** when ready descent to...*

According to the published instrument approach prosedure an aircraft approaching Joensuu rwy 10 from Jyväskylä direction has to intercept and follow 10 DME arc from JNS-VOR until turning to final approach from JNS-VOR radial 272°. Because the first officer acknowiedged to fly direct to JOE it remained unclear to the controller which runway the pilots intended to use and he asked:

TWR: ***"1021,** are you joining to 10 DME-arc for straight-in-approach 10?"*

SWW 1022: *"10 DME-arc and we are DME-approach runway 10" (in the reallty it took about 8 minutes before SWW 1022 joined the 10 DME-arc).*

TWR: *"And Intersun **1021,** you are cleared to land runway 10, 120 degrees 8 knots".*

SWW 1022: ***"Roger, 10, 1022".***

SWW 1022: *"022, runway in sight".*

TWR: **(Acknowledged by pressing the push-to-talk button.)**

SWW 1022: *"1022, put the lights ... reduce the lights, please".*

TWR: **(Acknowledged by pressing the push-to-talk button).**

Although SWW 1022 was the only aircraft operating on Joensuu TWR frequency, it is the opinion of the commisssion that correct radiotelephony procedures must be used to avoid misunderstandings and are essential for safe communications.

2.3.8 Shortcomings in the operational documentation and its use

The investigation commission found several deficiencies in the operational documentation of Intersun Sunways and its use. The aircraft Insurance certificate was not found on board the aircraft in Joensuu. Only a special insurance certificate required by the German authorities was found. According to the Intersun Sunways' FOM section 7.1.3. the certificate of insurance should have been included in the aircraft documents. Intersun Sunways provided a copy of this document later upon request of the commission.

The company FOM, FCOM, TM , normai cockpit check lists and training documents were not convergent and all procedures described were not followed in practice, e.g,

- The company did not use *the fueling order* required by FOM 7.2. According to the FOM section 1.2.5 the copilot responsibilities after flight include the handing in of the fueling orders to the company.

- The normai cockpit check lists used by Intersun Sunways differed from the check lists published in the FCOM. (e.g. as shown in section 2.2.2)

- According to the first officers training documentation a line check had been performed in a simulator. The Intersun Sunways' training manuai (TM) states that the line check must always be performed in an aircraft on route, as normal operations and company standards are checked. The first officer got a remark about his work with *the abnormal check lists* during his line check.

The entries in the company flight log (journey log) and technical log were partly wrong and some obvious mistakes were found,e.g,

- some fuel notes in the flight log (journey log) were incorrect and wrong units were used.

- the technical log page 001920 on flight SWW 1022 had been only partly filled in and bypassed but had not been invalidated.

- the flight log reference number noted in the technical log did not correspond to the flight log which had been used on the flight.

- the pilots had not filled in the departure and landing times in the flight log for the flight Antalya- Jyväskylä-Joensuu.

- the page for the flight Jyväskylä-Joensuu in the technical log book had not been filled in. The generator failure and the serious landing incident had not been noted. The captain's signature was also missing.

About 32 h after the incident the Finnair inspector who was in charge for the tests and inspections of the aircraft demanded that the captain should make an entry in the technical log book about the incident. The generator failure was noted later on in the technical log.

The commission is of the opinion that Intersun Sunways flight operations management had failed to provide the pilots with correct and uniform manuals and check lists. The management had also failed to train and oversee the use of operational documentation by the cockpit crews.

2.3.9 CRM training

CRM is the effective utilization of all available resources by the cockpit crew in order to perform a safe and efficient operation. These resources include people (e.g. other crew members, mechanics, air traffic controllers, passengers and even pilots of other aircraft), equipment (e.g. autopilot, navigation and communication equipment, back-up aircraft systems) and other information sources (e.g. established procedures, check lists, aircraft operation manuals, regulations and charts). During the last few decades the need for CRM has become evident because a high percentage of flight crew errors have been related to difficulties with crew coordination, communication skills, leadership, pilot judgment and decision making. The CRM training must be planned and carried out by speciallsts with studies in the behavioral sciences.

During the final approach, landing and after the runway overrun in Joensuu the lack of crew resource management was evident. The FCOM procedures were not followed, judgment and decision making were inadequate and what is most important, the crew team work and cooperation were insufficient.

The insufficient cockpit team work may have originated from the pilots' military background and their poor understanding of the CRM training received. They had got their basic flight training and served for a long time in operations which were based on an independent individual performance in the cockpit; both in the TAF and when the captain was flying agricultural flights. The captain had flown for nine years as an airline pilot with THY. During this period he should have obtained a good understanding of the importance of cockpit team work. However, when under stress the old habits tend to come out and the cockpit team work suffers. A rigid cockpit hierarchy also hampers the first officer from interfering in the captain's flying. The attitudes in the air force often strengthen this behaviour. In this case the investigation commission could not find out the influence of these matters because only Intersun Sunways' own instructors gave simulator and flight training for their pilots. No training or assessment documentation by outside instructors or inspectors nor documentation on checks performed by the DGCA, Turkey was at the commission's disposal.

When an ex-military pilot is in transition to airline operations, he should be given enough properly targeted training. The differences between the military and airline operations should be highlighted. A special emphasis should be laid on cockpit crew cooperation with all personnel invoived in the operations. When training is given for international

operations, cultural differences which the pilots might face at work should be highlighted as well. In this case the first officer had only been given 4 h of introductory CRM training at the time when he got his type rating. The commission does not consider this sufficient for a pilot transitioning from military to airline duty. Intersun Sunways arranged additional CRM training for their pilots in January 1997.

2.4 The Directorate General of Civil Aviation, Turkey

The investigation commission requested on 25 April, 1997 in accordance with ICAO Annex 13 chapter 4 information about the crew and the aircraft involved in the incident from DGCA, Turkey. The information documents were mailed in Ankara on 22 August, 1997 by the accredited representative and received by AIB, Finland on 3 September, 1997. Some of the documents were not dated and/or signed. In spite of repeated requests from the commission the DGCA did not deliver the captain's training records for the time he was employed by THY. The training records should be in possession of the DGCA who oversees the competence and issues the licences of airline pilots' in Turkey.

The poor understanding of winter operations among many Intersun Sunways' pilots compelled the Finnish Civil Aviation Administration, Flight Safety Authority (CAA) to send several requests for action to the DGCA, Turkey.

The DGCA, Turkey failed to properly oversee:

- that Intersun Sunways provided the pilots with correct and uniform manuals and check lists

- that Intersun Sunways trained their pilots according to the company's training manual and that their pilot's proficiency was at a level required for international airline operations

- that the winter operations training given by Intersun Sunways to their pilots was sufficient.

- that Intersun Sunways pilots had sufficient English language skills.

3 FINDINGS AND CONCLUSIONS

3.1 Findings

1. The crew had valid licences and were qualified for the flight.

2. The airworthiness certificate of the aircraft was valid.

3. The insurance certificate was not on board the aircraft in Joensuu but the insurance was valid.

4. For the flight Antalya-Jyväskylä the pilots had accepted two inappropriate alternate airports in the ATS flight plan. Joensuu airport was closed at the time when it had been needed as alternate. The pilots did not have any weather information from Helsinki-Vantaa when planning the flight in Antalya.

5. The pilots accepted a 10 hours old SNOWTAM from Joensuu airport in Jyväskylä. After the reporting time the airport had been closed from 22.30 and was opened on lntersun Sunways' request at 01.00.

6. The pilots did not use the engine anti-icing according to the FCOM instructions when taxiing out in Jyväskylä.

7. After departure from Jyväskylä the left engine generator failed during climb. The APU was started and connected to feed the left generator electrical circuit.

8. At 01.42, 12 min before SWW 1022 landed, the runway had been swept clear of the 20 mm thick layer of wet snow and slush.

9. Joensuu TWR air traffic controller informed SWW 1022 that there was some slush and snow on the runway and that the braking action was 52,51,50. He also mentioned *"light snowing"* when he reported the weather. According to the Finnish Aeronauticai information publication a braking action value of 40 or more is good.

10. The captain chose runway 10 for landing in Joensuu with an available lenght of 2000 m.

11. When the aircraft was passing locator JOE on final approach the air traffic controller said: *"And 1021, visibility is now about 6 km and all high lights are on".*

12. The braking action measured 12 min before the landing was 52/51/50. When the ircraft landed the runway was covered with a 1-3 mm thick layer of slush.

13. The braking action measured 14 min after the landing was 44/43/42 and the runway was covered with 3 mm of slush.

14. The Joensuu airport friction tester should have been calibrated after the transfer elements were changed.

15. PAPI lights were used to determine the aircrafts glide path.

16. The captain disengaged the ATS at 100 feet and increased engine thrust slightly.

17. The aircraft passed the runway 10 permanentally displaced threshold at about 70 ft with a speed of 144 kt. The height was 20 ft and the speed 11 kt above the values given in the FCOM.

18. The aircraft touched down at a distance of 260 m from the normal touchdown point, 560 m from the threshold and with a speed of 136 kt.

19. According to UFDR data and a passenger statement the ground spoilers did not deploy at touchdown and remained retracted during the landing roli.

20. The captain did not use the wheelbrakes and engine thrust reversers during the landing roll in accordance with the FCOM. It is possible that the captain, because of insufficient training, did not know how the anti-skid system operates and had never learned the correct braking technique for wet runway and winter operations.

21. lf the captain had used the wheelbrakes and engine thrust reversers in accordance with the FCOM the aircraft would have stopped 264 m before the runway end even if the ground spoilers had not deployed.

22. The first officer did not, as monitoring pilot, confirm the spoiler deployment nor the reverse thrust settings used by the captain.

23. The aircraft first stopped 40 m beyond the end of the runway on a gravel surface covered with 15-20 cm of hard snow.

24. The UFDR recorded and the passengers stated that 20 s after the first stop, engine thrust was increased three times nearly to take-off thrust settings. The aircraft moved three times almost straight ahead and came to a final stop 60 m beyond the end of the runway.

25. ln the hearing after the incident the pilots denied that they had increased thrust after the stop and also that they had attempted to taxi the aircraft. The wriften statements of the passengers confirm engine thrust increments and the radiotelephony communication between the pilots and the controller also confirms the captains intention to taxi the aircraft back to the runway.

26. The UFDR had functioned properly, and its data had a significant role in the investigation of the incident.

27. The electrical power of the CVR had been on for more than 30 min after the incident and the recording of the cockpit conversations during approach and landing had been erased.

28. The captain kept the engines and APU running for 1 h 45 min after landing.

29. The last passengers disembarked the aircraft 1 h 40 min after landing.

30. The crew did not make any announcements to the passengers after landing, although one of the cabin attendants was a native Finn.

31. A travel guide, who was on the flight as a passenger, made an announcement 30 min after the landing.

32. The aircraft was not damaged. No great deacceleration forces occured during landing roll. As there was no fire the most dangerous phase was when the passengers moved to the buss in darkness without guidance from the aircrew on the runway extention which was covered by 15-20 cm of hard snow. One passenger was slightly injured when she fell down just after leaving the aircraft.

33. Parking and last parking check lists were not completed properly when the crew left the aircraft, e.g. the parking brake was not set nor wheel chocks were used.

34. When an airliner had overrun the runway the Joensuu TWR air traffic controller should have followed the airport alarm order. He did not call neither the airport rescue unit nor the Regionai Emergency Center (REC). He only informed Tampere ACC about the incident.

35. The rescue crew manning at Joensuu airport was in accordance with Finnish Aviation Regulation AGA M3-2.

36. The Finnair traffic officer informed the Regional Emergency Center (REC) about the incident 20 min after the landing and requested police officers to the site. The police arrived about 40 min later.

37. Tampere ACC informed the AIB about the incident at 02.20.

38. The wheelbrakes and the anti-skid system of the aircraft were found to be in working order in the technical inspection after the incident.

39. The operation of the autospoiler actuator was not tested because the captain had told the technical inspector several times that the spoiler/speedbrake lever had moved back to deployed position at touchdown.

40. The functioning of the spoiler system was tested manually by pulling the spoiler/speedbrake handle back several times.

41. After the technical inspections were completed the function of the autospoiler system, wheel brakes and engine thrust reversers were tested in an aborted take-off. All systems operated normally.

42. In the hearing both pilots stated that the spoiler/speedbrake handle had moved back and ground spoilers deployed at touchdown. The captain also stated that the autospoilers had been armed before landing.

43. Several items in the normal check list used by Intersun Sunways differed from the FCOM check lists. E.g. transfer of the annunciator panel check item after the spoiler arming endangered flight safety.

44. It proved in the hearing on 22 May 1997 that the first officer did not have a correct understanding of operation and use of the spoiler system.

45. At about 32 h after the incident the page for the flight Jyväskylä-Joensuu in the technical logbook had not been filled in. The inspector who was in charge for the tests and inspections of the aircraft demanded that the captain should make an entry in the technical log book about the incident. The generator failure was noted in the technical log later on.

46. There were several mistakes in the Intersun Sunways' official documents filled in by the pilots and had not been compieted according to the instructions given in the FOM.

47. The *fueling order* document required by FOM was not used by Intersun Sunways.

48. According to the Intersun Sunways' training program the first officer should have been given ten simulator sessions in the MD-83 type training, but only seven had been given by the company

49. The computer based winter operations training had been given without the essential follow-up scoring.

50. The flight crew training given by Intersun Sunways had been insufficient.

51. The pilots' English skills were modest.

3.2 Probable cause

- The knowledge and skills of the cockpit crew were insufficient for winter operations. The landing technique used by the captain especially the use of wheelbrakes and engine thrust reversers was against the procedures described in the Flight Crew Operations Manual (FCOM). The first officer handled the check list work and monitoring duties poorly

- The flight operations management of Intersun Sunways A.S. failed to ensure the competence of the cockpit crews

- The DGCA, Turkey failed to properly oversee the operations of Intersun Sunways A.S. as a new start-up charter operator.

4 RECOMMENDATIONS

Intersun Sunways went into bankruptcy and ceased operations in October 1997. Therefore, there are no recommendations for the operator.

The DGCA, Turkey

4.1 -should ensure that those cockpit crews who fly international operations and/or use manuals in English, have sufficient language skills to manage normal and abnormal situations encountered during flight operations

4.2 -should more closely monitor that the training given to cockpit crews is in accordance with the operator's training manual requirements

4.3 -should more closely monitor and direct the operations of new start-up operators.

Helsinki, Finland, 1 October 1998

Lars Westermarck

Seppo Hämäläinen

Jussi Haila

Appendix 1
Radio communications on Joensuu TWR frequency 120.9 Mhz

1022 is Intersun Sunways 1022 (SWW 1022)

TWR is Joensuu tower air traffic controller

The **bold** text is against given instructions

From	To	Time(local)	Transmission
1022	TWR	01.42	...tower, good morning, Intersun 1022, passing 105 down to 70, proceeding JNS.
TWR	1022		Good morning Intersun 1021, from Joensuu , you are cleared JOE, when ready descend to 2000 feet. Transition level 60, QNH 990, wind is 130 degrees 7 knots, maximum 9 knots and runway 10 in use, if you accept, No delay. Visibility is about 10 km, light snowing, clouds 3 octas 800 feet, 7 octas 1600 feet, temperature -1, dewpoint -1.
1022	TWR		Direct to JOE, when ready descend to 2000 feet, QNH 990, weather copied, Intersun 1022.
TWR	1022		And runway condition is, there's some slush and snow and braking action is 52, 51, 50.
1022	TWR		52, 51, 50, thank you, 1022.
TWR	1022		1021, are you joining the 10 DME arc for straight-in approach for 10?
1022	TWR		10 DME arc and we are DME approach runway 10.
TWR	1022		Okay, report when joining the DME aa...10 DME.
1022	TWR		Will report join 10 DME, 1022.
TWR	1022		Thank You.
1022	TWR	01.51	Intersun 1022 joining and maintaining 10 DME arc.
TWR	1022		Intersun 1022 you are cleared for straight-in approach runway 10 via...depar...arrival route, report JOE inbound.
1022	TWR		Straight-in VOR approach 10 via...call you JOE
TWR	1022		Roger, check QNH 990.
1022	TWR		990, 1022.
TWR	1022		And 1021, visibility is now about 6 km and all high lights are on.
1022	TWR		Okay, thank you, crossing JOE.
TWR	1022		Roger, report JOE.
1022	TWR		Over JOE, now.
TWR	1022	01.52	And Intersun 1021, you are cleared to land runway 10, 120 degrees 8 knots.
1022	TWR		Roger 10, 1022.
From	**To**	**Time(local)**	**Transmission**
1022	TWR		1022, runway in sight
TWR	1022?		(acknowledgement by pressing push-to-talk button)

1022	TWR		1022, put lights...reduce lights, please!
TWR	1022?		(acknowledgement by pressing push-to-talk button
TWR	1022		..., cleared for backtrack to apron
1022	TWR	01.55	Now, aaa (unreadable) overrun, we can backtrack?
TWR	1022		Yes,taxi via backtrack to apron.
1022	TWR		Thank you.
1022	TWR	01.56	Intersun 1022, now, we are overrun, requesting (unreadable), please.
TWR	1022		Yes, we arrange the mechanic on the...to...look for you.
1022	TWR		We are waiting, sir, we are waiting
TWR	1022		Okay.
1022	TWR	01.58.58	(Unreadable) tower, Intersun 1022, would you please give me latest braking action?
TWR	1022		That was that 50, 51, 52.
1022	TWR		What is the time this 50, 51, 52, the braking action was very bad, to my opinion it was poor.
TWR	1022		Yes, it was measured 10 minutes before your landing.

LIITE 2

REPUBLIC OF TURKEY
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DIRECTORATE GENERAL OF CIVIL AVIATION

Ankara, 18 /08/1998

DGCA: B.11.0.SHG.0.13.04.00/USD-8448
SUBJ: TC-INC Overrun Incident at
Joensuu Airport

Mr.Lars WESTERMARCK
Investigator-in-charge
Accident Investigation Board
Yrjönkatu 36
00100 Helsinki-FINLAND
Fax: +358 9 1825 7811

Ref.: Your letter dated 16 June 1998.

Dear Mr Westermarck,

First of all I would like to thank you for the final draft of the investigation report you have prepared and sent to us per your referenced letter relating to the incident that occurred on 11 April 1997 when an aircraft Mc Donnell Douglas MD-83 with registration marks TC-INC operated by Intersun A.Ş. overran the runway.

Due to the late receipt of the draft report it was not possible to evaluate and submit our comments within the proper time to the Finnish AIB.

But, please be informed that we shall send as soon as possible to you the views and comments of the Turkish side on subject matter.

Best regards,

Haydar YALÇIN
Accredited Rep.
Turkish DGCA

ADDRESS: Bosna Hersek Cad.No:5 06338 Emek-ANKARA TEL:(312) 2126730 FAX:(312) 212 46 84 TLX:44659

REPUBLIC OF TURKEY
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DIRECTORATE GENERAL OF CIVIL AVIATION

Ankara, 28/08/1998

DGCA: B.11.0.SHG.0.13.04.00/USD-8817
SUBJ: TC-INC Overrun Incident at Joensuu Airport

Mr.Lars WESTERMARCK
Investigator-in-charge
Accident Investigation Board
Yrjönkatu 36
00100 Helsinki-FINLAND
Fax: +358 9 1825 7811

Ref.: Our letter, B.11.0.SHG.0.13.04.00/USD-8448, dated 18.08.1998.

Dear Mr Westermarck,

As I have stated in my referenced letter in my capacity, according to ICAO Annex 13, as accredited representative of the State of Registry, I would like to present below our views and comments on some points of your final draft report on the incident that occurred on 11 April 1997 when an aircraft Mc Donnell Douglas MD-83 with registration marks TC-INC operated by Intersun A.Ş. overran the runway:

1. In section "1.5.2" of the report it is stated that the training records of the First Officer and in section "2.3.1" those of the Captain Kumbasar have not been provided despite the request.

   Whereas, such records have been sent over to you earlier by mail. Copies of the training records of the Captain and First Officer are being forwarded to you once again enclosed herewith. You are kindly requested to correct relevant sections of the report accordingly.

2. The fact that no record has been found in the Cockpit Voice Recorder (CVR) as indicated in the section of the report under heading "1.11 Flight Recorders" is attributed to the delay of the pilot-in-command in supplying information on the subject. However, I believe that the inclusion in this section of the point raised below would have an important bearing on the completion of the investigation in every aspect.

ADDRESS: Bosna Hersek Cad.No:5 06338 Emek-ANKARA TEL:(312) 2126730 FAX:(312) 212 46 84 TLX:44659

As set out in Chapter 3 of Annex 13 headed "Protection of Evidence, Custody and Removal of Aircraft", the CVR and other evidences deemed to have an important role in shedding light on the investigation, should have been taken under protection immediately after the incident, responsibility for which is vested with the investigative authority of the country where the incident occurred. The removal of the CVR from the aircraft had not been given prompt attention.

3. In section "1.15.1 of the report headed "Notification of the incident" it is stated: "The Finnair traffic officer informed the REC of the incident **20 minutes after the landing**. The shortening of this notification period is of very great importance in ensuring increased chances for the first aid which would have been required during an emergency evacuation if there were a more serious situation following landing.

I see benefit in mentioning in the report the sufficiency of the facilities available at the airport should a more exigent situation have arisen in this incident.

I take this opportunity to remind you that the purpose of investigations of such incidents is not to find somebody to blame or hold liable but rather to determine the real cause of the incident.

Best regards,

Haydar YALÇIN
Accredited Representative
Turkish DGCA

Encl.: 2 Sets Training Records.

ADDRESS: Bosna Hersek Cad.No:5 06338 Emek-ANKARA TEL:(312) 2126730 FAX:(312) 212 46 84 TLX:44659