سازمان هواپیمایی کشوری

CAO.IRI

دفتر بررسی سوانح و حوادث

گزارش نهایی بررسی سانحه در فرودگاه بندر ماهشهر

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مدل هواپیما:	Boeing MD.83
علامت ثبت :	EP-CPZ
شرکت بهره بردار:	هواپیمایی کاسپین

Date of Issue: 01 Sep 2020

بسمه تعالی

موضوع: گزارش نهایی سانحه هواپیمای MD83 شرکت هواپیمایی کاسپین در فرودگاه بندر ماهشهر

با احترام؛ درپی وقوع سانحه مورخ ۱۳۹۸/۱۱/۰۷هواپیمای MD83 شرکت هواپیمایی کاسپین به هنگام فرود در فرودگاه بندر ماهشهر، اقدامات لازم جهت بررسی سانحه برابر با آئین نامه بررسی سوانح و حوادث هوائی مصوب هیئت محترم دولت انجام شده و براساس الزام ضمیمه شماره ۱۳ پیمان شیکاگو ، بدینوسیله خلاصه ای از گزارش سانحه به زبان فارسی و همچنین گزارش نهایی بررسی سانحه به زبان انگلیسی جهت اهداف پیشگیرانه و ارتقای ایمنی پروازها بطور عمومی در تارنمای سازمان منتشر شود.

شرح مختصر سانحه:

پرواز برنامه ریزی تجاری شماره ۶۹۳۶ مورخ ۱۳۹۸/۱۱/۰۷ شرکت هواپیمایی کاسپین با هواپیمای بوئینگ MD83 به علامت ثبت EP-CPZ ، در ساعت ۰۶:۳۵ به وقت محلی از تهران به فرودگاه ماهشهر برنامه ریزی شده بود. پس از انجام هماهنگی های پرواز ، این هواپیما با ۱۳۶ مسافر و ۸ خدمه پروازی در ساعت ۰۶:۴۲ دقیقه به وقت محلی از باند ۲۹ چپ فرودگاه مهرآباد به پرواز درآمده و پس از حدود ۵۰ دقیقه پرواز و اوج گری تا ارتفاع ۳۲ هزار پایی ، آماده فرود در باند ۱۳ فرودگاه ماهشهر می شود. در این زمان هدایت پرواز به عهده خلبان بوده و پس از فرود در ساعت ۰۷:۳۶ به وقت محلی هواپیما از انتهای باند خارج شده و پس از برخورد با فنس حفاظتی از محیط فرودگاه خارج و در ابتدای بلوار اصلی ماهشهر به بندر امام خمینی(ره) در فاصله حدود ۱۰۰ متری باند متوقف شده است. تمامی ۱۴۴ سرنشین هواپیما در سلامت کامل از هواپیما تخلیه شده و با اعلام وقوع سانحه از سوی واحد برج فرودگاه، تیم های امدادی در اسرع وقت در محل حادثه حضور یافته و اقدامات مقتضی صورت پذیرفته است. فقط به دو نفرسرنشین آسیب اندکی وارد شده که نیازمند به اقدامات پزشکی خاصی نبوده اند.

یافته های سانحه:

پس از انجام تحقیقات متعدد و تحلیل اطلاعات بدست آمده و بازخوانی دستگاههای ثبت وضبط اطلاعات پروازی هواپیما در تهران ، یافته های ذیل در نتیجه گیری سانحه مشاهده شده که در انتها منجر به خطای خلبان پرواز مبنی بر فرود نامناسب در باند فرودگاه شده است:

- تغییر در برنامه پروازی خدمه پروازی توسط شرکت کاسپین در آخرین ساعات قبل از Pick Up بوجود آمده و اطلاع رسانی غیرموثر در خصوص تغییرات اعمال شده در برنامه پروازی و تغییر مقصد در انتها موجب تاخیر کمک خلبان در واحد دیسپچ شده و خدمه پروازی توجیه کافی قبل از پرواز نداشته اند.

- پذیرش مخاطره در خصوص حمل سوخت بیشتر توسط خلبان و دیسپچر بر خلاف سیاست شرکت انجام پذیرفته که خود باعث زیاد شدن سرعت لازم برای فرود شده است.
- سامانه پایش اطلاعات پروازهای شرکت هواپیمایی کاسپین (FDM) موفق به شناسایی رفتار مخاطره آمیز خلبان در خلال پروازها نگردیده است.
- توافق نامه بین مرکز کنترل فضای کشور و فرودگاه اهواز در خصوص پروازهای ورودی به فرودگاه ماهشهر اجرا نشده و علاوه بر خبردار نشدن فرودگاه اهواز از پرواز فوق ، کنترلر مرکز کنترل فضای کشور ، پرواز را در ارتفاعی بالاتر از ارتفاع توافق شده(حداقل مسیر) تحویل فرودگاه ماهشهر داده است. مدیریت ضعیف ترافیک هوایی توسط کنترلر رادار مرکز کنترل پرواز مشهود است.
- پس از رسیدن پرواز به نزدیکی فرودگاه ، خلبان طرح ورودی پیشنهادی برای باند ۳۱ از طریق GODMO 1E را نپذیرفته و تصمیم برای فرود در باند ۱۳ از طریق GODMO 1F گرفته که همزمانی شرایط باد پشت (Tailwind) برای هواپیما ، سرعت ملزوم اضافی باتوجه به وزن آن و ارتفاع زیاد باعث گردیده تا سرعت فرود از مقدار تعیین شده ۱۳۵ نات به ۱۷۱ نات افزایش یافته که باعث از دست رفتن دو سوم طول باند می گردد.
- ضعف مدیریت کابین خلبانان (CRM) و رعایت نشدن رویه عملیاتی هواپیما(SOP) در مرحله آخر پرواز باعث شده که انصراف از فرود انجام نشده و در انتها عملیات فرود نامتعارف با چرخ جلو بر روی باند انجام شود که در انتها بدلیل کم آوردن طول باند ، هواپیما دچار سانحه شده است.
- محصور بودن فرودگاه ما بین یک جاده و خطوط انتقال برق صنایع پتروشیمی باعث رعایت نشدن مفاد آیین نامه دولت درخصوص احداث، توسعه، بهره برداری و مدیریت فرودگاه های غیرنظامی شده است.

باتوجه به اینکه وجود عامل انسانی خطای خلبان مبنی بر تصمیم گیری های مخاطره آمیز برای فرود نامتعارف در باند فرودگاه ماهشهر بعنوان علت اصلی وقوع سانحه شناخته شده است ، با توجه به رهنمون مقام عالی وزارت راه و شهرسازی بمنظور انجام اقدامات پیشگیرانه ، شرکت هواپیمایی کاسپین همکاری خود را با خلبان با سن ۶۴ سال به اتمام رسانده و آموزشهای لازم را جهت بازگشت کمک خلبان به فعالیت پروازی مجدد انجام نمود.

امید است تا با انجام پیشنهادات ایمنی مندرج در انتهای گزارش بررسی سانحه توسط نهادهای ذیربط ، از وقوع سوانح و حوادث مشابه پیشگیری گردد.

THE ISLAMIC REPUBLIC OF IRAN
CIVIL AVIATION ORGANIZATION

The Islamic Republic of Iran

Civil Aviation Organization

Aircraft Accident Investigation Board

Final Report

Basic Information

State File Number: A981107 EPCPZ

Type of occurrence: Accident

Date of occurrence: Jan. 27, 2020

Place of occurrence: Bandar Mahshahr Airport, the Islamic Republic of Iran

Aircraft Model: MD83

Registration: EP-CPZ

Operator: Caspian Airlines

Issue date: Sep 01, 2020

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Mehrabad International Airport Tehran/Iran PBO: 13445-1795

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In the name of God

Foreword

The Civil Aviation Organization, in accordance with international requirements and national regulations of the Islamic Republic of Iran, is in charge of monitoring the proper implementation of the regulations and standards of flights in the "Civil Aviation Industry" of the country. In order to identify the sources of threats to flight safety, and enhance its level based on the Regulations on the Investigation of an Accident in Civil Aviation Accidents, adopted in 2011 by the government and the International standards of the International Civil Aviation Organization (ICAO) Annex 13, the Aircraft Accident Investigation Board (AAIB) institutes the investigation of the civil aircraft accidents/incidents. After the determination of the Causes and the Contributing Factors, it will issue Safety Recommendations in order to meet and maintain the flight standards and enhance their safety for preventing the same accidents or similar events in future.

According to Aircraft Accident Investigation regulation of the Islamic Republic of Iran, accident investigation shall be used for the prevention of similar occurrences and should be conducted without prejudice to any judicial or administrative action that may be taken to determine blame or liability.

Based on Annex 13 to the Convention on International Civil Aviation, Chapter 3, Paragraph 3.1, and Chapter 5, Paragraph 5.4.1, the following is stipulated and recommended:

"The sole objective of the investigation of an incident or accident shall be the prevention of incidents and accidents. It is not the purpose of this activity to apportion blame or liability."

Consequently, the use of this report for any purpose other than the prevention of future accidents could lead to erroneous interpretations.

Following the accident of MD.83, EP-CPZ operated by Caspian Airlines on Jan. 27, 2020, the accident investigator in charge was appointed by the President of the Civil Aviation Organization of Iran. Having coordinated with the concerned authorities, he arrived at the accident site with a team of relevant experts and began gathering the required information. Under Annex 13 to the Chicago Convention, the notification was sent to the ICAO and the National Transportation Safety Board (NTSB) of the U.S. as the State of Manufacture and Design. Related accredited Representative was introduced by NTSB to cooperate during the investigation.

Abbreviations:

AAIB	Aircraft Accident Investigation Board
ACC	Area Control Centre
AD	Aerodrome
AFISO	Aerodrome Flight Information Service Officer
AIP	Aeronautical Information Publications
APP	Approach
ASDA	Accelerate Stop Distance Available
ATC	Air Traffic Control
ATPL	Air Transport Pilot License
ATS	Air Traffic Services
ATZ	Aerodrome Traffic Zone
AWZ	Ahwaz
BTN	Between
CAO	Civil Aviation Organization (IR of Iran)
CAVOK	Ceiling And Visibility OK
CPL	Commercial Pilot License
CRM	Crew Resources Management
CTR	Control Zone
FDA	Flight Data Analysis of Airline
IAF	Initial Approach Fix
IAS	Indicated Air Speed
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
LDA	Landing Distance Available
LMT	Local Mean Time
LH	Left Hand
LMT	Local Mean Time
L o C	Letter of Coordination
MAH	Mahshahr
MET	Meteorological
METAR	Meteorological Aerodrome Report (current weather at an airport)
NOTAM	Notice to Airman
NSC	No Significant Cloud
NTSB	National Transport Safety Board
NW	North West
OIAM	ICAO Location Indicator for Bandar Mahshahr Airport
OLS	Obstacle Limitation Surface
PF	Pilot Flying
PM	Pilot Monitoring
QAR	Quick Access Recorder
RDR	Radar
RH	Right Hand
RWY	Runway
SE	South East
SOP	Standard Operating Procedure

SSCVR	Solid State Cockpit Voice Recorder
SSFDR	Solid State Flight Data Recorder
SWY	Stopway
TODA	Takeoff Distance Available
TORA	Takeoff Run Available
TRN	Tehran
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VSI	Vertical Speed Indicated

Synopsis:

On Jan. 27, 2020, at about 04:06 UTC, Caspian Airlines (CPN), Flight No.6936, an MD83, ran off the end of runway 13 after landing at Bandar Mahshahr Airport, Khuzestan province. The aircraft lost some distance from the runway and exited from the runway end, rolled through a non-paved area and airport perimeter fence, passed a shallow canal then onto an adjacent roadway, where it struck concrete median strip before coming to a stop. Emergency evacuation was called. The copilot and one of the passengers received minor injuries. A bus which was moving on the road highway stopped before reaching the aircraft and blocked the road to prevent more consequences of the accident. The aircraft was substantially damaged.

The investigation was conducted with CAO. IRI Aircraft Accident Investigation Board (AAIB) as the State of Occurrence. The Iran AAIB determined that the probable cause of this accident was the pilots' failure to adhere to the airline Standard Operating Procedure (SOP), which resulted in a runway overrun.
General information on the accident is:

Airlines: Caspian Airlines

Flight number: CPN.6936

Flight route: Tehran Mehrabad Airport-Mahshahr Airport, I.R of Iran

Aircraft Model: DC-9-83m (MD.83)

Registration: EP-CPZ

Date of Occurrence: January 27, 2020

Time of scheduled flight: 06:35 Local Time

Actual takeoff time: 06:42 Local Time

Time of accident: 07:36 Local Time

Place of Occurrence: Mahshahr Airport

Geographical Position: N30 32 46, E 49 09 45

Flight type: Scheduled Passenger Flight

Injuries to Persons: One crew member and one passenger sustained minor injury.

Damage to Aircraft: Destroyed

1. FACTUAL INFORMATION:

1.1. History of the flight:

On Jan. 27, 2020, at 03:12 UTC Caspian Airlines (CPN) Flight 6936, an MD83, EP-CPZ took off from Mehrabad International Airport and climbed to FL320 as final cruising level.
At about 03:45:37 UTC, the aircraft was flying according to the flight plan route on Airway B417 at an assigned FL320.
Due to another traffic departing flight, an A320, IRA356 from Abadan Airport (OIAA) to destination Mashhad International Airport (OIMM), the ACC controller issued direct routing to the flight CPN 6936 position GODMO.

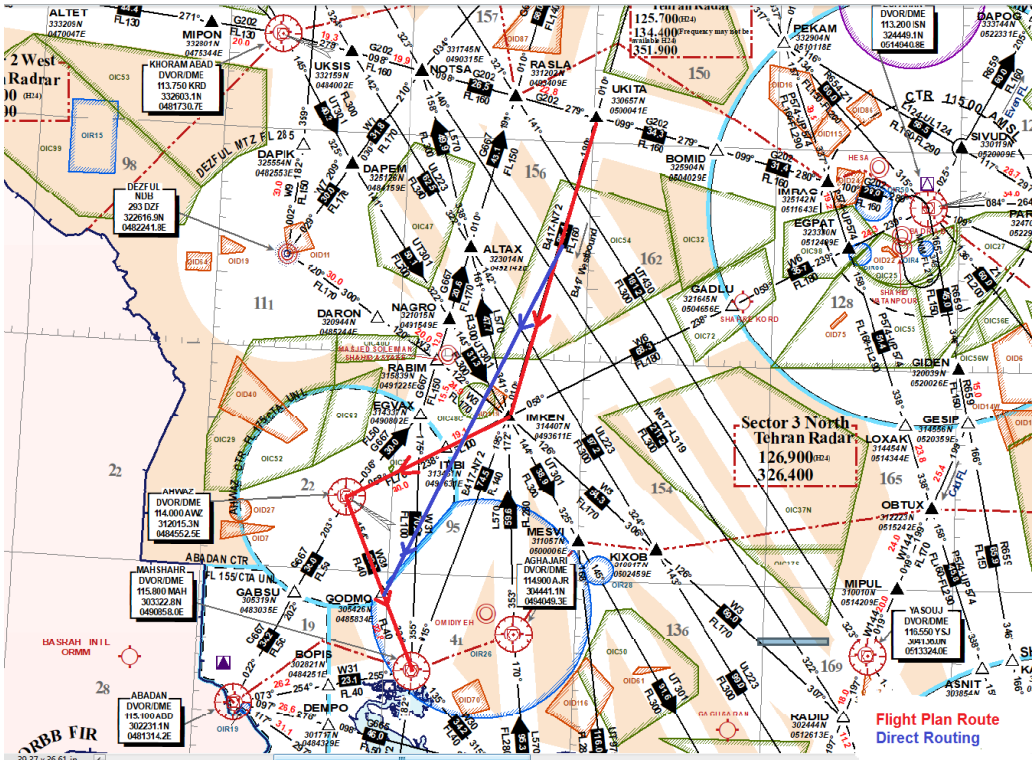


Figure 1- Enroute chart

At 03:49:34 UTC, CPN6936 requested descent clearance, so the flight was cleared to FL100.

At 03:52:30 UTC, the pilot called Mahshahr AFISO and reported position 50 nm inbound GODMO and estimated time over GODMO at 03:59 UTC.

At 03:52:51 UTC, Mahshahr AFISO reported necessary information as below:
"RWY active is 31; wind is now 280/08kts, CAVOK, temperature +06, DP 04 and QNH 1023, expected VOR approach RWY 31 via GODMO 1E ARRIVAL"
At 03:53: 33 UTC, the pilot requested RWY 13 and Mahshahr AFISO performed VOR/DME approach RWY 13, via GODMO 1F arrival.

At 03:59:39 UTC, the pilot reported, "*we are approaching position GODMO in contact with destination Mahshahr.*"

At 04:00:41UTC, the pilot reported his position "GODMO" to Mahshahr AFISO.
At 04:02:46 UTC, the pilot reported leaving of IAF and received landing clearance for RWY13.

Finally, at 04:06:11 UTC, the aircraft landed on RWY 13, passed two-thirds of RWY length and ran off the end of runway13 after landing at Mahshahr Airport at 04:06 UTC, Khuzestan province.
The accident flight was being operated on an Instrument Flight Rules (IFR) flight plan in a Visual Meteorological Condition (VMC)

Figure 2- Accident site

The main door of the accident aircraft was opened in emergency condition, but the slide skid did not operate automatically. The cabin floor was just too close to the ground (grass surface) due to the impact of the nose and main landing gears strut which were broken after the runway overrun.
The evacuation was performed from the main door, and all 136 passengers and 8 crew members disembarked.

1.2. Injuries to persons:

No serious injuries and or fatalities were reported.

Injuries	Crew	Passengers	Others
Fatal	0	0	0
Serious	0	0	0
Minor/None	8	136	

1.3. Damage to aircraft:

The total damage was assessed as irreparable and destroyed. The damage is listed below:

- The structures of the two wings, and the tail cone of the aircraft were completely damaged;
- The Nose Landing Gear and two Main Landing Gears were completely broken and became out of service;
- The Radome was completely damaged;
- The E&E Bay compartment was completely lost;
- The APU became out of service;
- The cargo bay was completely damaged; and
- FOD on the two engines is suspected.

1.4. Other Damage:

Airport perimeter fence, adjacent roadway surface and a concrete median strip, and a lamp post were damaged by the impact of aircraft while overrunning.

1.5. Personnel information:

Flying Pilot (PF) / Pilot in Command:

Male, 64 years old, of Iranian Nationality

Airline Transport Pilot License, ATPL (A) 039333 issued by Iran CAO

Type rating: DC9 80/MD88/ MD90/IR valid until Sep. 30, 2020

Proficiency check validity: Mar. 30, 2020

Medical examination validity: Mar. 08, 2020

Total flying time experience: 18,430 hours

Current type experience as captain: 7,759 hours

Last 90 Days Flight Time: 180;

Current type flying 7840 hours.

The base training of the pilot was performed in Iran Navy on type of F27 aircraft. He had flight experience in Kish Airlines with F50 and MD fleets up to January 24, 2019 with a total time of 17953, and then was transferred to Caspian Airlines as a captain of MD aircraft.

Some un-stabilized approaches at different airports were reported about his experience.

Pilot Monitoring (PM):

Male, 28 years old, of Iranian Nationality;

Commercial Pilot License (CPL) No. 388754, issued by Iran CAO;

Type rating: DC9 80/MD88/ MD90/IR valid until Jul. 31, 2020;

Proficiency check validity: Jun. 09, 2020;

Medical examination validity: Oct. 10, 2020;

Total flying time experience: 300 hours;

Current type experience as copilot: 124 hours;

Last 90 Days Flight Time: 150.

1.6. Aircraft information:

DC-9-83 (MD-83). MSN; 53464
Registration Mark: EP-CPZ
MTOM: 72574 kg. Maximum Landing Mass: 63276 kg
Type of Engine: TOW, P&W, JT8D-200s
CG: within limits
Fuel used: Jet A1.
The aircraft was owned and operated by the Caspian Airlines.
The aircraft was released from service with a valid Certificate of Airworthiness issued by CAO. IRI.
The review of recent records of aircraft does not show any significant malfunctions.
The aircraft had a valid Certificate of Airworthiness until Feb. 17, 2020.
The Insurance certificate was valid to Jun. 23, 2020.
The last C-check (C04) was finished on Dec 19, 2019.
MEL item: N/A

1.7. Meteorological information:

The available International METAR in Mahshahr ATS unit is as below:
METAR OIAM 270300Z 29008KT 8000 NSC 06/04 Q1022
METAR OIAM 270400Z 28006KT CAVOK 06/04 Q1023
METAR OIAM 270500Z 29006KT 7000 NSC 07/05 Q1023
At the accident time (04:06 UTC), the wind direction was 280 Deg / 06 kt and active runway was RWY 31.

1.8. Aids to navigation:

No problems with any navigational system of the aircraft were reported.
At the time of the accident, airport (DVOR/DME) was in normal operation.

1.9. Communications:

No technical communication problems were reported by the flight crew or the air traffic controllers who handled the accident flight.

Voice Communication Transcript between the Flight Crew and ATS Units

Time	Station	Text/Remarks
03:37:54	CPN6936	TRN Radar good morning CPN 6936 maintain FL320 squawk 1576
03:38:01	ACC	good morning CPN6936 radar contact
03:38:04	CPN6936	CPN6936
03:45:37	ACC	CPN6936 present position cleared direct GODMO
03:45:44	CPN6936	Direct GODMO CPN6936 thank you
03:49:34	CPN6936	Tehran Radar CPN6936 request descend
03:49:42	ACC	CPN6936 descend one hundred (FL.100)
03:49:46	CPN6936	Descend one hundred 6936
03:50:03	CVR	"Descent Checklist" almost was completed
03:52:30	CPN6936	Mahshahr TWR good morning CPN6936 now descending 100 positions 50 DME inbound GODMO. Estimate passing GODMO 03:59
03:52:51	AFISO	CPN 6936 good morning sir, RWY active is 31, wind is now 280° at 08 kt. CAVOK Tem +06 and Dew point 04 QNH1023 and also expected for you VOR approach RWY31 via GODMO 1 E Arrival.
03:53:20	CPN6936	QNH1023 GODMO 1 F RWY active 31 CPN6936 thank you sir
03:53:31	CPN6936	Mahshahr TWR CPN 6936 request RWY 13
03:53:38	AFISO	CPN 6936 Roger sir no objection, report when release by TRN also AWZ and expected for you VOR/DME approach RWY13 via GODMO 1 F arrival
03:53:50	CPN6936	Roger CPN 6936 GODMO 1F RWY 13
03:59:39	CPN6936	Tehran Radar CPN 6936 approaching GODMO
03:59:45	ACC	CPN 6936 Roger would you confirm in contact destination MAH?
03:59:52	CPN6936	Affirm
03:59:53	ACC	Thank you; Frequency change approved, Radar service terminated and no traffic reported below
04:00:02	CPN6936	Roger CPN6936
04:00:25	CPN6936	Mahshahr TWR good morning again CPN6936 descend FL100 released by TRN
04:00:33	AFISO	CPN6936 good morning sir distance to GODMO??

04:00:40	CPN6936	GODMO CPN6936
04:00:42	AFISO	CPN6936 yes sir descend as profile to minimum 2000 ft. for VOR/DME APP RWY 13. Report when leaving IAF and cleared APP
04:00:53	CPN6936	Cleared APP descend as profile 2000 ft. VOR/DME 13 Call you back leaving IAF CPN6936
04:02:46	CPN6936	TWR CPN 6936 leaving IAF
04:02:52	AFISO	Roger CPN6936 cleared to land RWY 13 wind is now 280o at 06 kt
04:03:00	CPN6936	RWY 13 cleared to land CPN6936
04:04:23	CVR	800 تا را کاپیتان می تونید select کنید الان (اوکی ۸۰۰ تا) Captain, you can now select 800 feet (OK 800)
04:04:36	CVR	Auto pilot disengaged
04:04:48	CVR	25 hundred (altitude callout)
04:05:29	CVR P1-P2	سرعت را ‘‘ست کردی؟ ۳۵ ش کن کاپتان. باشه عیب نداره عیب نداره (صدای هشدار) چک لیست! نه تو این را کار نداشته باش هیچ چی بله کاپتان Have you set the speed? Change it to 135 captain OK no problem no problem (*EGPWS warning: Sink rate*) checklist! Nothing, you just leave it Yes captain
04:05:31	CVR	One thousand (altitude callout) sink rate; sink rate; sink rate; sink rate; sink rate; sink rate; sink rate; five hundred (altitude callout) minimums
04:05:47	CVR	Four hundred (altitude callout) sink *rate [pull up warning]; [pull up warning]; [pull up warning]; sink rate; sink rate; sink rate; forty; sink rate; twenty; ten …….*
04:06:57	AFISO	CPN 6936 confirm normal
04:08:01	AFISO	کاسپین ۶۹۳۶ صدای ما را می خونید CPN6936 do you read us?
04:18:13	AFISO	کاسپین ۶۹۳۶ برج CPN6936 Tower

1.10. Aerodrome information:

Owner: Iranian Oil Company
Location: 1 Km NW from Bandar Mahshahr, the southwest of IR Iran
ATS airspace classification: G (Flight Information Service)
ATZ (a circle with radius of 5 NM, upper limit 2000 ft.)
AD elevation: 18 Ft.
Variation: 4 Deg. E
Runway dimensions: 2695x45 M.
Displaced threshold RWY31, 294 Meters.
Slope of runway: 0.02 present
Firefighting category: CAT 6
Some data of Iran AIP are not updated.
The instrument approach procedures and obstacles data have not been reviewed.

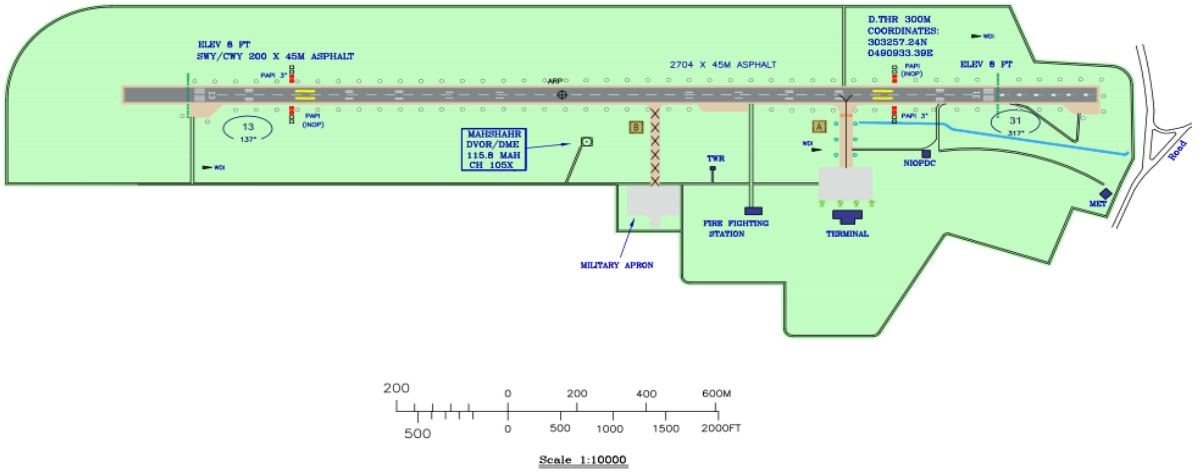


Figure 3- Aerodrome layout

Declared distances based on NOTAM A4119/19 issued on 02 Dec 2019 were:

	TORA	TODA	ASDA	LDA
RWY13	2695	2762	2762	2695
RWY31	2695	2897	2897	2401

The runway is surrounded with a main road from RWY 31 and three rows of high-voltage power lines with a height of 35 to 45 meters. The maximum height of the power line was inserted in Iranian AIP, equal to 197 ft. AGL

According to the investigation carried out, the nearest power line from the RWY 13 threshold in this airport is 30 meters in height and is 1710 meters away from it. In accordance with Annex 14, the RWY strip shall be at least 60 meters away from the runway, and the Standard Arrival Chart Instrument (STAR) for RWY 13 for Mahshahr Airport was approved according to Annex 11 Standards. However, under Iran Aerodromes Bylaw, the standard strip is defined at 360 meters wherein the power line could be considered a non-standard obstacle.

Figure 4- Position of obstacles

1.11. Flight Recorders and Ground Recording Systems (Radar Data):

This aircraft was equipped with SSFDR with P/N; 980-4700-01 S/N; 1149 and SSCVR-120 with P/N; 980-6022-001 S/N; 05760. Both recorders were picked up from relatively undamaged compartment of the aircraft in a good condition and were presented to laboratory for download/analysis. The whole analysis processes of the flight recorders were done in Tehran.

1.11.1 Flight Data Recorder (SSFDR):

The FDR raw data and related data frame of aircraft information were provided to the Iran Aseman laboratory. The whole diagrams and digital Excel file were received accordingly.
The FDR recording time had 19 seconds of time difference with the recorded UTC time of ATS units. Some recorded parameters of FDR were not valid and not used for analysis.

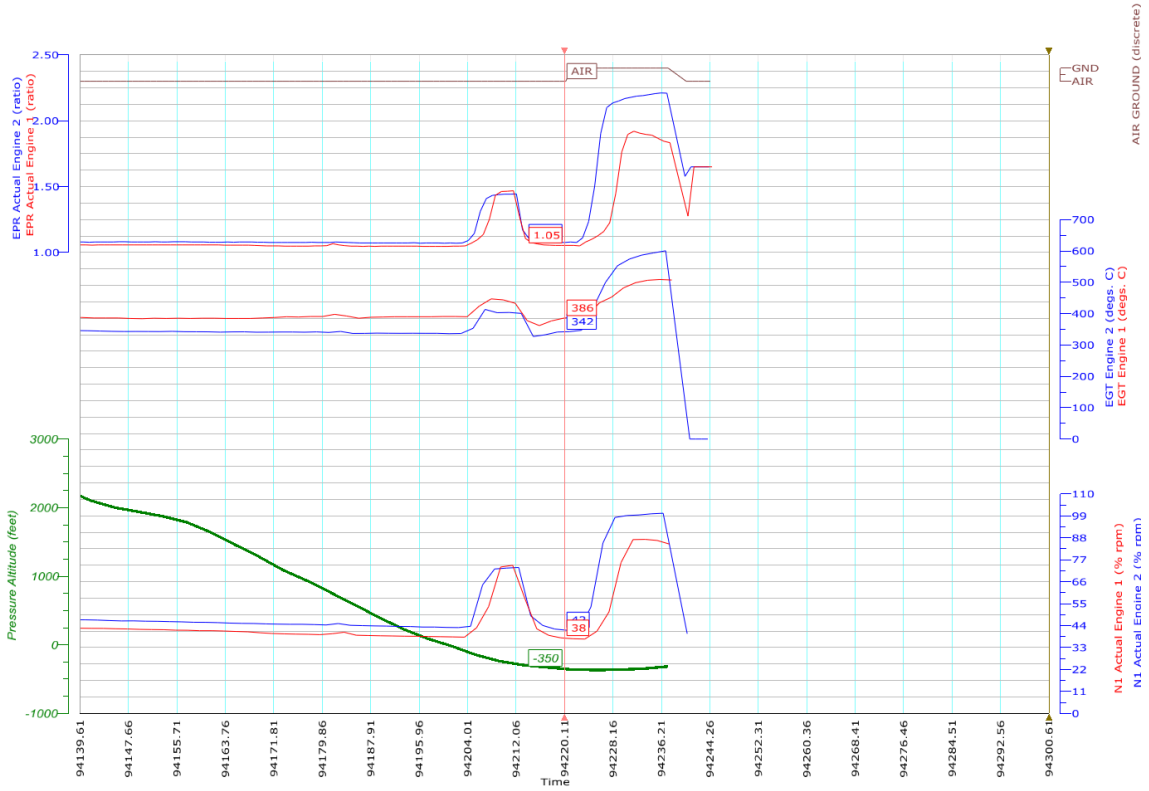


Figure 5- Engine parameters on landing

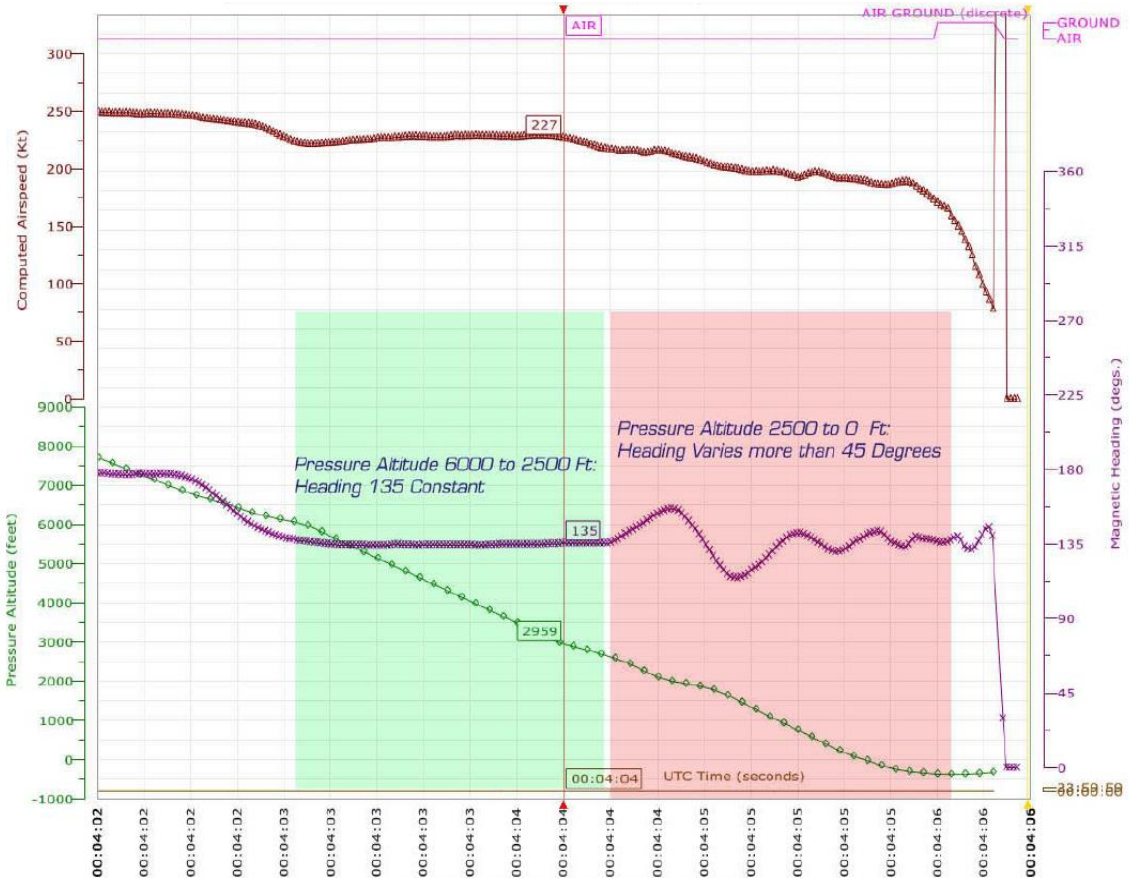


Figure 6- Pressure altitude, heading and airspeed diagram

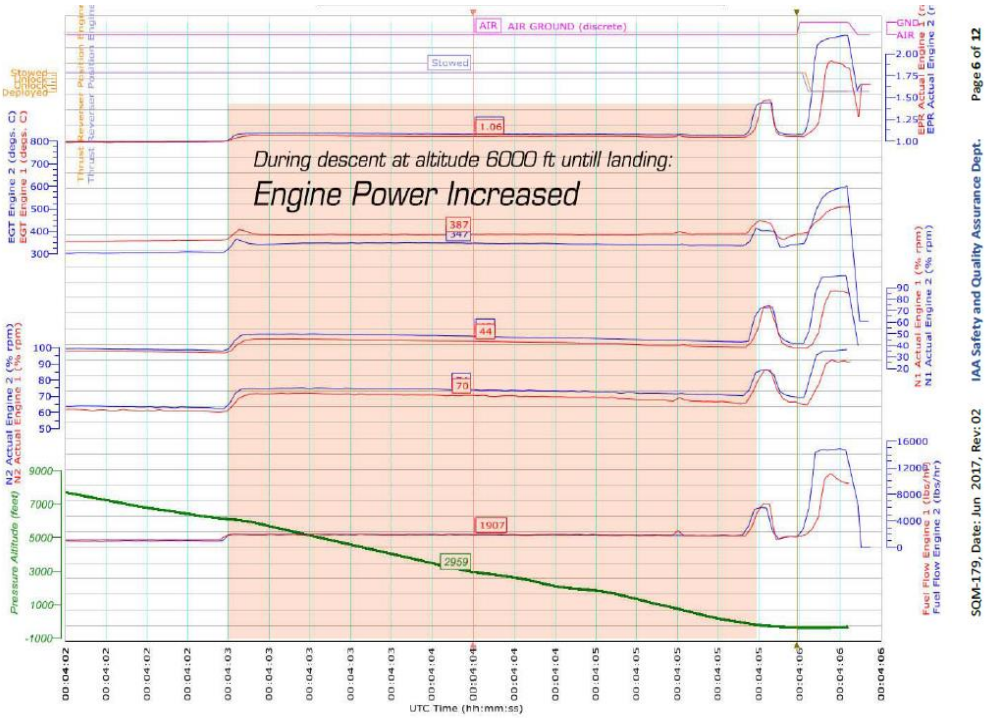


Figure 7- Engine parameters

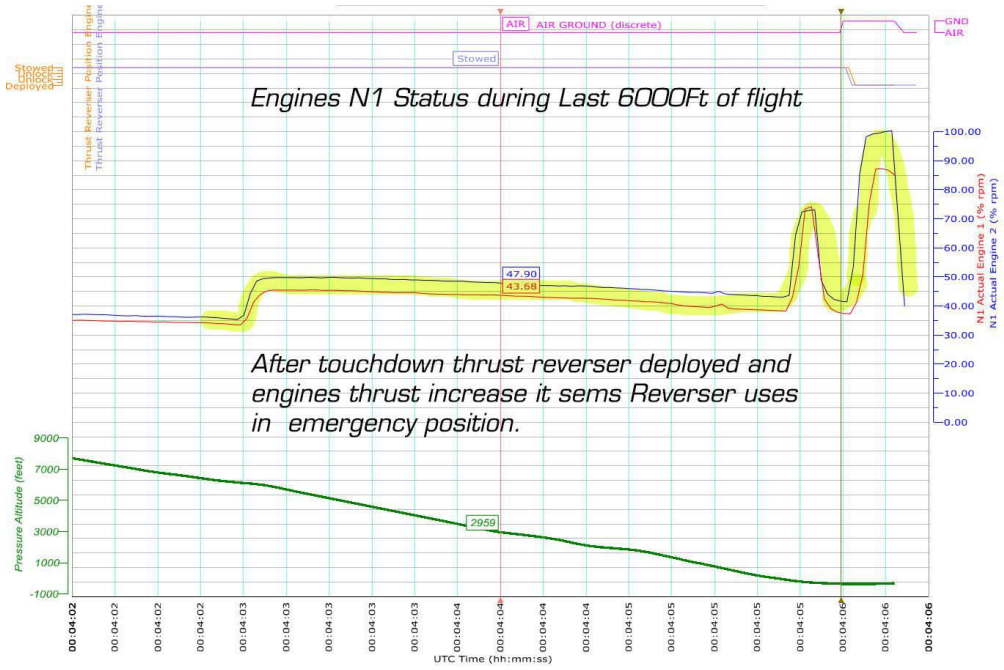


Figure 8- N1 status and thrust reverse parameters

Analysis of data is as below:

Major parameters magnitude at the time of landing:

- Computed airspeed: 171 kt.
- Vertical acceleration Pick to Pick at touch point: 0.87 to 1.22G (*Normalized about -0.04)*
  - N1 Eng.#1: 38
  - N1 Eng.#2: 43
  - EPR Eng#1: 1.05
  - EPR Eng#2: 1.06

Twelve seconds before landing, the engine power had been increased to the extent that EPR of both engines reached about 1.46 for the duration of 5 seconds.

- The aircraft touched the RWY surface with the nose landing gear first. The nose landing gear touched down about 1695 meters beyond the runway's approach threshold. At the time, the aircraft's computed airspeed was about 171 knots, its heading was 137°, and its vertical acceleration reached about 1.22 Gs.
- No parameter had been allocated for vertical speed in this recorder, but the aircraft passed the last 1000 Ft. altitude during 38 seconds. The rate of descent at the time of landing was calculated at around 1580Ft/Min. (Under the SOP, the Normal rate of descent should be less than 1000 ft./min)
- The parameter recoding of Landing gear Proximity Switch shows that the aircraft ground mode was changed to flight mode after landing for a moment; therefore, bouncing is probable.

Also, related information was checked using the Flight Data Analysis System of the Caspian Airlines, which is as follows:

HDG (170-180)175 GODMO:
ALT 9740ft, SPD 264kts, (VSI) ROD 1390ft/m, Pitch Altitude -1.3, Config flap 11, N1A 37.9, N1B 39.0, EPRA 0.976, EPRB 0.976
HDG (130-140)136 (IAF)V/D RWY 13: ALT 7070ft, SPD(IAS) 248 kts ,VSI -1980ft/m, Pitch Altitude -3.1, Config flap 11, N1A 34.5, N1B 36.7, EPRA 0.978, EPRB 0.975

ALT 6070: SPD 224kts, VSI -1700ft/m, Pitch Altitude -3.1,Config flap 15, Landing gear Down, N1A 41.2, N1B 48.6, EPRA 1.029, EPRB 1.064
ALT 1680: SPD 202kts, VSI -2050ft/m, Pitch Altitude -8.4, Config flap 28, N1A 41.4, N1B 45.7, EPRA 1.035, EPRB 1.058
ALT 930 :SPD 197kts, VSI -2620 ft./m, Pitch Altitude -11.9, Config flap 40 full flaps, N1A 39.6, N1B 44.7 ,EPRA 1.027, EPRB 1.056
ALT 81 (Threshold): SPD 186kts, VSI -1310ft/m, Pitch Altitude -4.9, Config flap 40, N1A 53.5, N1B 64.4, EPRA 1.268, EPRB 1.410
ALT Touchdown: IAS 174 kt., Pitch Altitude -2.7, N1A 37.9, N1B 42.3, EPRA 1.031, EPRB 1.058

1.11.2 Cockpit Voice Recorder (SSCVR):

The CVR downloading was accomplished successfully. The CVR was played back normally, without any difficulty. It contained six separate channels of good-quality audio information, two channels of which contain about two-hour audio files with good quality. This file contains the whole flight of the accident. The findings of the CVR are as follows:

- The situation of the cockpit from engine start until top of descent was normal; no malfunction or warning was detected;
- The captain was pilot flying and copilot was pilot monitoring;
- The pilot had been asked to proceed directly to position "GODMO" at 03:45:37 UTC;
- Descent/approach checklist had been followed but not completely;
- Instead of the VOR approach RWY 31 via GODMO 1 E arrival issued by Mahshahr AFISO, the pilot requested RWY13 GODMO 1 F;
- The cockpit crew had received the first audio EGPWS Sink Rate warning at 04:05:35 UTC;
- After speed setting [V_{ref} +4=135kt.] by both the captain and copilot, upon receiving warning, the copilot ordered the captain to follow the checklist, but the captain answered, "Nothing, you just leave it."
- The landing checklist was missed by the pilots;
- From 04:05:43 UTC, after passing 1000 ft., nine times of sink rate warning, three times pull up warning, a further four times of sink rate warning were heard from the cockpit area microphone channel.

1.11.3 Ground Recording System (radar data):

The radar scope of Tehran ACC recorded playback was analyzed as:

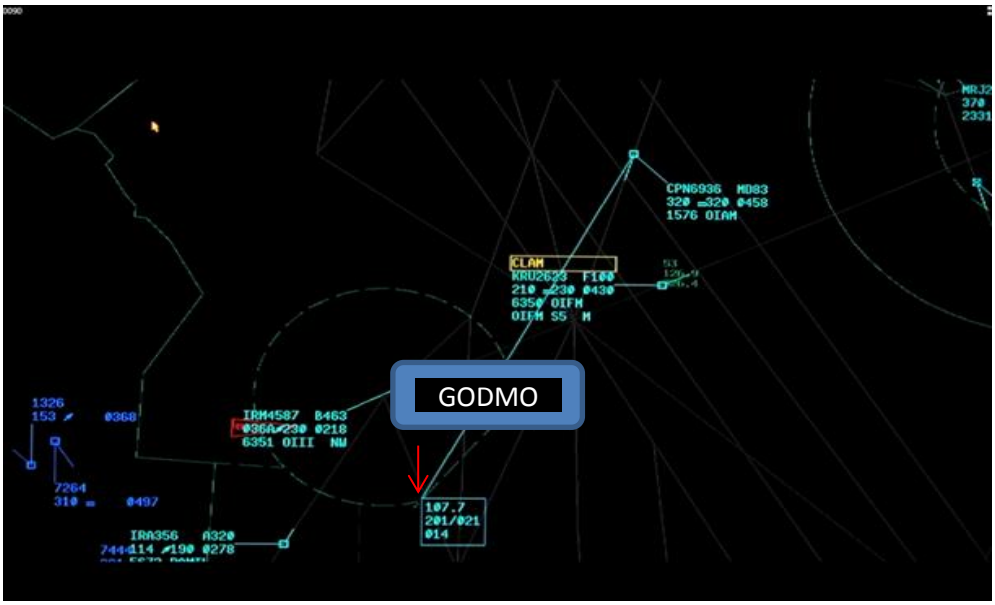


Figure 9- Radar Scope before direct routing

The accident flight was cleared to proceed directly to GODMO because of the departing of an A320, Flight IRA356 from Abadan airport.

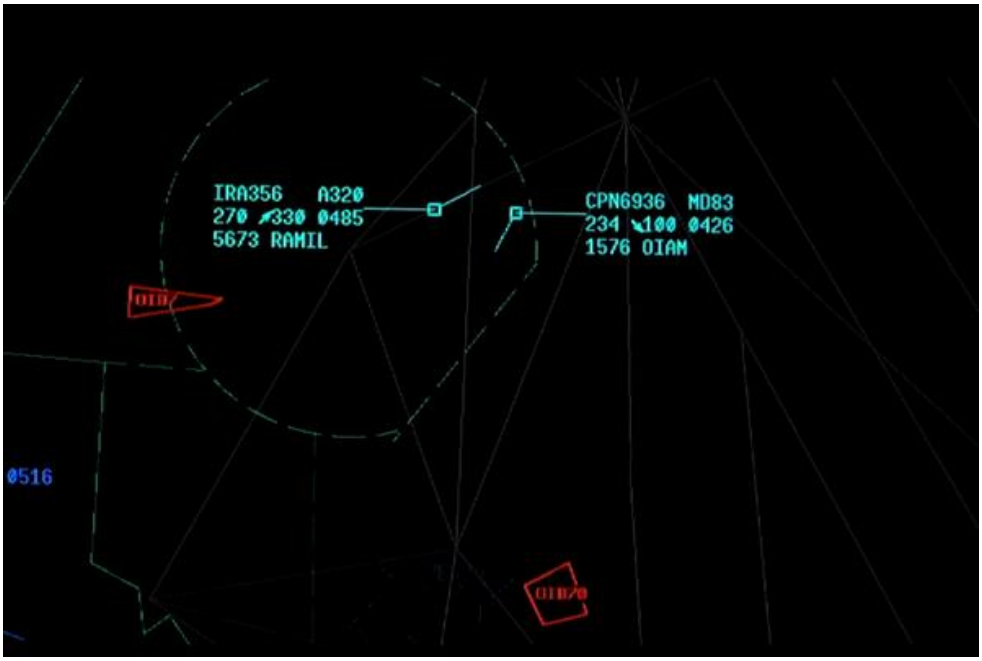


Figure 10- Flight separation

The accident flight had normal separation from A320 while passing FL234.

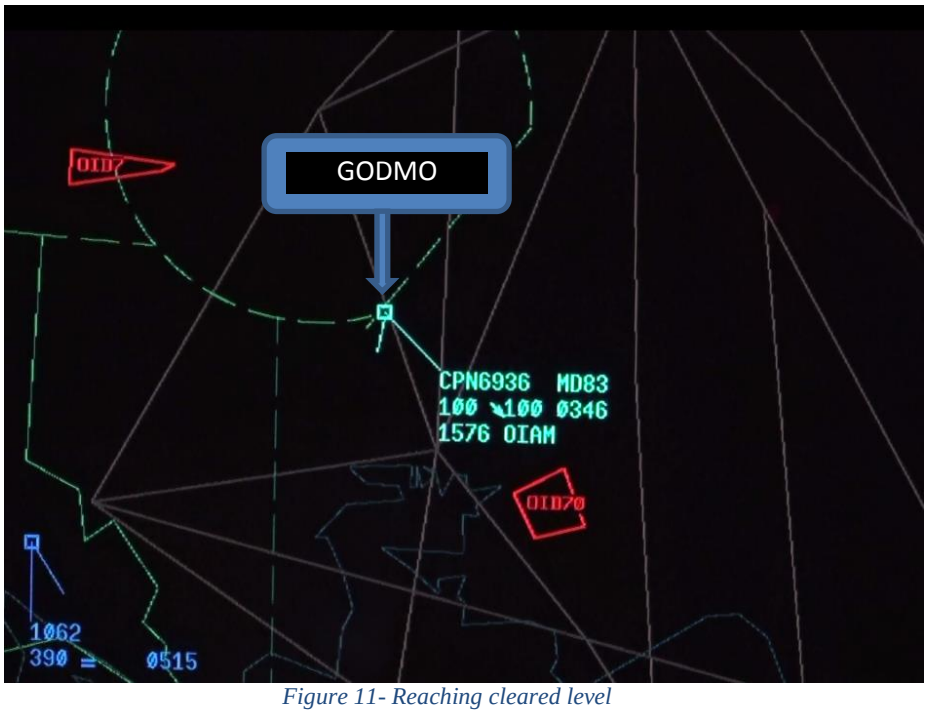


Figure 11- Reaching cleared level

The flight was passing position of GODMO at FL100 in accordance with clearance of THR ACC radar controller.

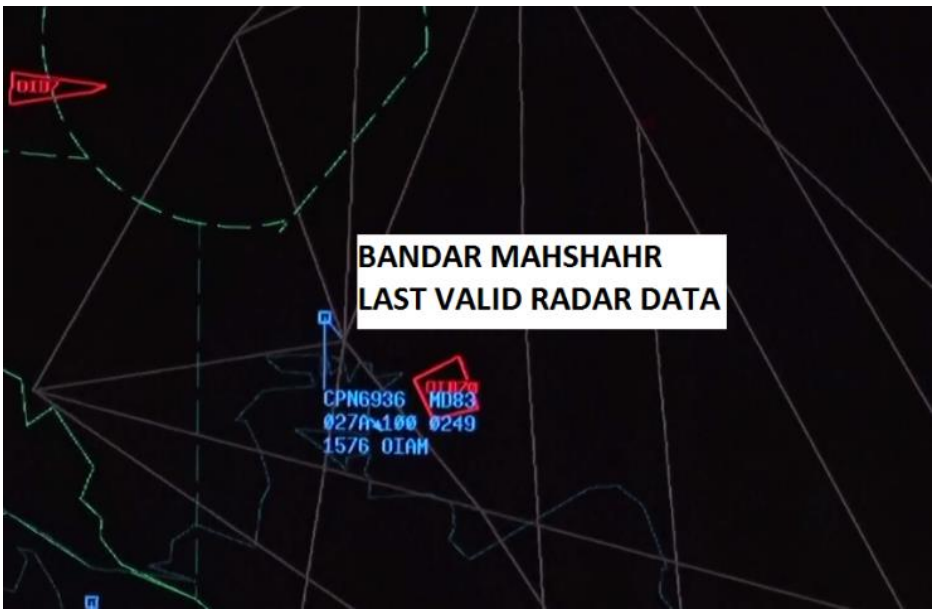


Figure 12- Last valid radar data

Last valid radar data indicates a high ground speed of 249 kt., while passing an altitude of 2700 ft. about 3 miles from threshold RWY 13.

1.12 Wreckage and impact information:

The aircraft came to rest on a magnetic heading of about 120° in the southeast off the airport after aerodrome fencing and stopped on the Abadan to Mahshahr road. Both main landing gears and the nose landing gear were already broken, detached and separated before stopping and resting on the lower fuselage.

Figure 13- Damage to the fuselage nose

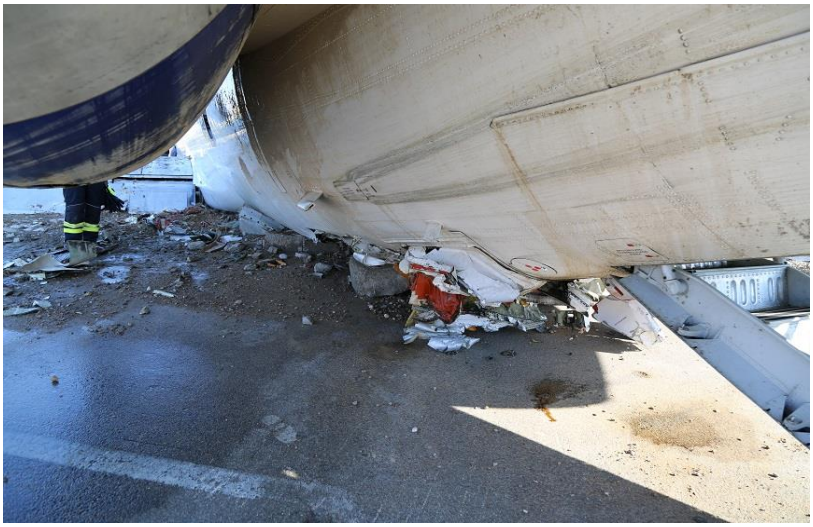


Figure 14- Damage to aft fuselage

The visual inspection made on the aircraft wreckage and the Runway surface, as well as the witnesses' statements, ended in the following results:

Some of the aircraft body like her tail cone, radome and landing gears broke apart, and the aircraft belly and wings and control surfaces deflected in a way that she sustained major irreparable damage.

Aircraft overran the end of the runway and after 67 meters beyond the end of RWY13 (stopway) rolled through a non-paved area and airport perimeter fence, passed a shallow canal then onto an adjacent roadway, where it struck a concrete median strip and a lamp post before coming to a stop, and came to rest on fuselage as a result of passing over the rough surface.

The touchdown occurred about 1695 meters after the threshold of RWY13 with a remaining runway distance of 1000 meters.

Figure 15- CCTV record of airport

Figure 16-Touchdown point

The sign of brake applying was seen on the asphalt surface on the ground at the end of RWY, which shows the pilot's attempt to stop the aircraft by using the brake system.

Figure 17- Braking sign

The aircraft wreckage was moved to the airport parking area for more investigation by Aircraft Accident Investigation Board (AAIB).

1.13 Medical and Pathological Information:

Under Iran AIG regulations, post-accident drug testing was conducted on urine specimens obtained from the captain and copilot; test results were negative. In addition, both pilots' breathing systems were checked by residential police at the accident site immediately, and their alcohol test was negative too.

1.14 Fire:

There was no sign of fire on the aircraft wreckage as a consequence of the accident.

1.15 Survival aspects:

When the aircraft stopped, the emergency evacuation was requested by the flight purser and acknowledged by the captain. All passengers and cabin crew were evacuated from the aircraft safely.

After opening the main door for the purpose of evacuation, the slide skids did not operate automatically and because of the breaking of all landing gears and low height between the ground and the cabin floor, all onboard passengers evacuated the aircraft without any problem with the help of the crew and other passengers.

All passengers and the crew were evacuated via the main door only; however, emergency exit windows were opened by the cabin crew.

The aft door and emergency windows were opened by the cabin crew, but the passengers were evacuated only via the main left door. The related slide skid of the main left door could not be activated.

Figure 18- Disembarking door

1.16 Tests and research:

Aircraft Simulation and Performance Studies were requested, but post-accident flight simulation could not be conducted due to the COVID-19 pandemic.

The Investigation Board's aircraft performance study identified the extra fuel on the aircraft had increased landing speed for 6 kt., which adversely affected losing runway distance.

Performance Analysis

MAHSHAHR RWY 13 length: 8842 ft. (2695m)

- Normal landing distance with this weight: 3865 ft.(1178m)
- tailwind correction: +508 ft. (155m)
- speed above V_{ref}: +2438 ft. (743m)
- 5 tons extra fuel (at least):+250 ft.(76)

Based on the analysis, the minimum required distance for the flight in normal condition was calculated at 2152 m.

1.17 Organizational Information:

1.17.1 The Operator Airlines information:

Caspian Airlines is an Iranian private airline that offers passenger services, including domestic and international flights. The company's corporate office is in Golha Blvd., next to Tehransar Police Station, Karaj Special Road, Tehran, Iran. This Airline operates a fleet of medium aircraft, consisting of MD 82-83 and Boeing 737. The latest Air Operator Certificate(AOC) No. IR-AOC-106 of the airline was issued on Jan. 18, 2020 and was valid till Jan. 19, 2021. The last AOC was not on board the aircraft, but its version of 2016 was available on the cockpit.

1.17.2 The Airport Operator:

The airport belongs to Petroleum Ministry and is operated by the "Persian Gulf" International Industrial Petrochemical Company (IPC).

1.17.3 The ANS Service Provider:

"Hourpad Gostar" company has begun to provide ANS service on Mahshahr and Qeshm Airports and recently received an approval from Iran CAO as an AFIS operator.

There is a Letter of Coordination (L o C) between Tehran ACC and Ahwaz Tower regarding inbound traffic to Mahshahr via AWZ tower area of responsibility whereby the flight should contact the AWZ tower. The AWZ tower shall transfer flights to Mahshahr Airport AFISO when they have been instructed to descend to a minimum safe level of appropriate ATS route (W30 with minimum FL40). If the flight is delegated directly to the Mahshahr Airport, the Ahwaz Airport shall be informed.

1.18 Other Information:

1.18.1 Senior Cabin Crew Statements:

"Aircraft landing was performed in abnormal conditions from the viewpoint of speed and slope while I was hearing all audio warnings like "sink rate and pull up" from the cockpit. After landing, in a short period of time, the aircraft experienced severe and terrible shakes and came to rest. After opening the main door, the related slide skid did not operate

automatically. The cabin floor was just too close to the ground due to the impact of the nose and main landing gears strut, which had been broken after the runway overrun.

After the aircraft came to rest, the evacuation was announced by me after captain's acknowledgment and evacuation from the main door. All 136 passengers, cockpit and cabin crew were evacuated successfully.

Because of fuel leakage from the left tank, I advised all passengers to keep a safe distance from the aircraft; at least 200 m away."

1.18.2 Eyewitnesses:

The AFIS officer said, "The aircraft landed approximately after TWY A" and the security staff working in the terminal said, "The aircraft landed while passing TWY A," which was confirmed by CCTV.

1.19 Useful or Effective Investigation Techniques:

The standard and normal techniques based on ICAO Accident Investigation Manual (DOC.9756) were applied.

2. ANALYSIS:

The following analysis is based on the factual information obtained while conducting the investigation of the accident.

2.1 General:

The pilots were properly certificated and qualified under CAO IRI regulations. No evidence indicates any medical conditions that might have adversely affected their performance during the accident flight.
The accident aircraft was properly certificated and equipped, maintained, and dispatched in accordance with industry practices. No evidence indicates any failure of the aircraft's power plants, structures, or systems that would have affected the aircraft's performance during the accident landing.

2.2 Flight Planning:

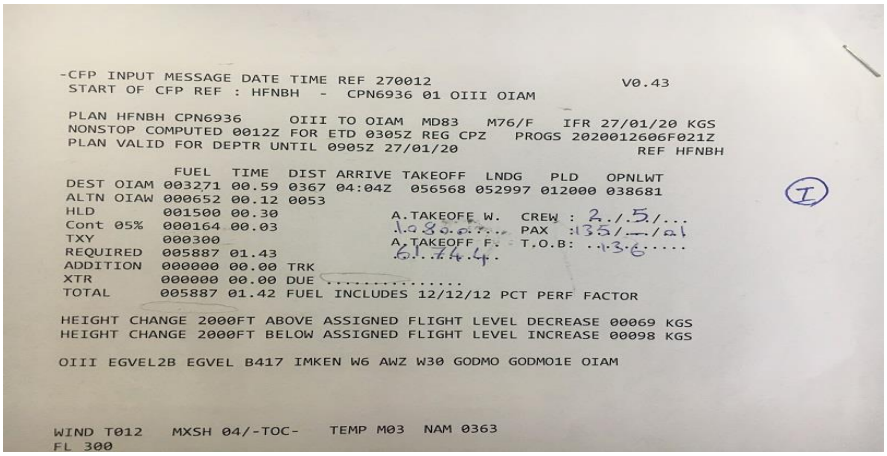
According to Airline scheduling unit, initially, the accident flight crew was set for the flight CPN034 from Mehrabad International Airport (OIII) to Isfahan International Airport (OIFM) on Jan. 27, 2020 at 01:30 UTC (05:00 LMT), the aircraft MD83, EP-CPZ, had been selected for this flight and the crew pickup time was set at 23:50 UTC on Jan. 26, 2020 (03:20 local time on Jan. 27, 2020).

A Boeing 737 Aircraft with registration EP-CAP had been arranged for accident flight no. CPN 6936, on Jan. 27, 2020 at 03:00 UTC, from Mehrabad International Airport (OIII) to Mahshahr Airport (OIAM), but on Jan. 26, 2020 when the aircraft landed at Yazd Airport (OIYY) at 20:25 UTC with flight No. CPN6950, a hydraulic leakage failure was detected during visual inspection on the ground from the spoiler. So, the initial action was taken for maintenance through changing the pertinent component (actuator) by certified technical staff, and then the aircraft B737 departed Yazd Airport (OIYY) for Mehrabad International Airport (OIII) at 22:40 UTC as a positioning flight. When the aircraft landed at Mehrabad International Airport (OIII) at 00:10 UTC Jan. 27, 2020, the aircraft moved to Caspian ramp for the final maintenance test and changing the failed component.
To overcome the prevailing situation because of the technical problem for aircraft B737 EP-CAP, the Airline scheduling unit decided to change the planned program for the crew from CPN0 34 to Isfahan (OIFM) to Flight No. CPN 6936 for the destination of Mahshahr airport (OIAM) with departure time at 03:00 UTC on Jan. 27, 2020. So, the information regarding the changes at the scheduled plan was delivered to the crew via Mobile Short Message System (SMS) without the acknowledgment of the receipt of it by the crew. The message was sent to the flight crew about 150 minutes before the planned pickup time (23:50 UTC) at midnight (local time). According to the above-mentioned message, new pickup time was changed to 01:30 UTC (05:00 LMT) Jan. 27, 2020. Also, the related messages were sent to the crew by the transportation unit.
Unfortunately, the captain did not check out his cell phone since he was sleeping and his cell phone was switched off. He got up as he planned and went on to wait for the crew car before the expected pickup time (23:50 UTC). Then, the captain called the airlines dispatch unit and became aware of the new scheduled time of the pickup and departure time, assuring himself of the final plan.
The captain returned home and waited for the crew car according to the new planned pickup time (01:30 UTC).

The copilot received the new pickup time, and waited for the crew car just before 01:30 UTC, but the driver was waiting for him at the wrong address because it was his first pickup for this copilot. After a few minutes, the driver called the copilot and asked him to come for pickup. Finally, after co-ordination between them, the copilot arrived at the dispatch unit with 25 minutes of delay while the captain was waiting for him.
The pilots reported that they reviewed the weather information and dispatch documents and related NOTAMs, which were received from dispatch and any other items before they left the Mehrabad International Airport (OIII). Dispatch releasing was confirmed by the dispatch personnel. Enough briefing was not performed between the crew due to the copilot's delay, especially on the condition of the destination Airport.

2.3 Flight Preparation:

Based on Airline Operations Manual Part A, Chapter 8.1.14.1 Fuel policy, the pilot-in-command has the final authority to ensure that sufficient fuel is carried to operate the aircraft safely and efficiently in accordance with procedures on each flight. Adequate fuel to cover the requirements of trip, contingency, alternate, reserve and taxi must be loaded prior to departure. Pilot-in-commands will uplift the minimum fuel quantity listed on the Operational Flight Plan (OFP) to achieve the operational requirements.
According to the Dispatch Release Form, the captain had requested a total fuel of about 11,000 kg.
Based on the filled OFP, the total required fuel for the flight was calculated equal to 5887 kg and requesting more fuel should have been noted down by the pilot and acknowledged by the dispatch unit to change related OFP data, but it was not. The aircraft total fuel reached 10800 kg by refueling of 6810 kg at 02: 34 UTC, without mentioning any reason.



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-CFP INPUT MESSAGE DATE TIME REF 270012                          V0.43
 START OF CFP REF : HFNBH  -  CPN6936 01 OIII OIAM

 PLAN HFNBH CPN6936      OIII TO OIAM  MD83   M76/F   IFR 27/01/20 KGS
 NONSTOP COMPUTED 0012Z FOR ETD 0305Z REG CPZ   PROGS 2020012606F021Z
 PLAN VALID FOR DEPTR UNTIL 0905Z 27/01/20                  REF HFNBH

             FUEL  TIME  DIST ARRIVE TAKEOFF  LNDG   PLD   OPNLWT
 DEST OIAM 003271 00.59 0367 04:04Z  056568 052997 012000 038681
 ALTN OIAW 000652 00.12 0053
 HLD       001500 00.30            A.TAKEOFF W.  CREW : 2../.5./...
 Cont 05%  000164 00.03            1.0.8.5.6.7...  PAX  :135/.—./a1
 TXY       000300                  A.TAKEOFF F.  T.O.B: ..1.3.6.....
 REQUIRED  005887 01.43            61.24.4.
 ADDITION  000000 00.00 TRK
 XTR       000000 00.00 DUE .....
 TOTAL     005887 01.42 FUEL INCLUDES 12/12/12 PCT PERF FACTOR

 HEIGHT CHANGE 2000FT ABOVE ASSIGNED FLIGHT LEVEL DECREASE 00069 KGS
 HEIGHT CHANGE 2000FT BELOW ASSIGNED FLIGHT LEVEL INCREASE 00098 KGS

 OIII EGVEL2B EGVEL B417 IMKEN W6 AWZ W30 GODMO GODMO1E OIAM


 WIND T012   MXSH 04/-TOC-   TEMP M03  NAM 0363
 FL 300
```

Additional onboard fuel in accordance with OFP as tankering fuel was introduced on OM as:
Part A 8*.1.14.16 Fuel Transportation (Tankering Fuel)*

To achieve savings by fuel tankering, it is the function of Flight Dispatch to ensure that the achieved effective savings are correct and fuel plan is suitably prepared. Tankering is not normally recommended when:

a) The runway for take-off is wet or contaminated and runway length is marginal, or
b) Landing runway is expected to be contaminated, or
c) The Pilot-in-command believes that due to flight safety (Adverse weather i.e. tailwind, wet Runways and performance degraded i.e. brake reverse inoperative, spoiler inoperative) the landing weight needs to be restricted.

Due to the limitation of Airport Runway length, both the pilot and flight dispatcher accepted the risk of fuel tankering for the flight, which adversely affected the landing speed of the aircraft to increase about 6 kt.

According to the load sheet, the payload was 11769 kg, including the weight of passengers with their hand baggage (135 adult and 1 infant =11350 kg) and 419 kg cargo baggage.
Therefore, with regard to dry operating weight (39175 kg), Actual Zero Fuel Weight was calculated equal to 50944 kg and Actual Takeoff Weight was equal to 61744 kg and Actual Landing Weight with consideration of 3500 kg en-route fuel consumption was calculated equal to 58244 kg, all of which were within the standard limits. (Max takeoff weight is 65000 kg and Max landing weight is 63276 kg).
The Iran AAIB's investigation shows that with regard to the above-mentioned data and destination airport characteristics, including field elevation, temperature and actual pressure, the landing Distance Available (LDA) as 2695 m for RWY13 and 2401 m for RWY31 was suitable for the flight on the day of the accident.

2.4 Flight Execution:

The flight began at 06:42 local time with a 12-minute delay. According to the post-accident interview with the pilots, the evidence from flight recorders and ATS information indicates that the startup, push back and taxi procedures, receipt of ATC clearance, takeoff, following up all checklists, such as the ones required before takeoff and approach checklist procedure were done accordingly, but adherence to the CRM was done partly according to standard criteria and the company's SOP until commencing the top of descent.
The aircraft took off from Mehrabad International Airport at 03:12 UTC and climbed to FL320 as final cruising level. No abnormality or malfunction was reported by the crew during the flight.
At about 03:45:37 UTC, as the aircraft was flying according to the flight plan route on Airway B417 at an assigned FL320, Tehran Radar controller issued instructions to the flight to proceed directly to position GODMO. The ACC controller's statement that was received after the accident indicates that because of the departure flight from Abadan Airport (OIAA) with the call sign of IRA 356 to destination Mashhad International Airport (OIMM) for the purpose of Radar Separation, he issued direct routing to the flight CPN6936. The flight was not informed to Ahwaz tower according to the L o C between ACC and AWZ tower.

At 03:49:34 UTC, CPN 6936 requested descent clearance, so the flight was cleared to FL100.

At 03:50:03 UTC, the pilots performed the Descent/ Approach checklist, but landing data & briefing were not completely done.

At 03:52:30 UTC, the pilot called Mahshahr AFISO and reported position 50 nm inbounds GODMO and estimated time over GODMO at 03:59 UTC.

At 03:52:51 UTC, Mahshahr AFISO reported necessary information as below:
"RWY active is 31; wind is now 280/08kts, CAVOK, temperature +06, DP 04 and QNH 1023, expected VOR approach RWY 31 via GODMO 1E ARRIVAL"

At 03:53:33 UTC, the pilot requested RWY 13 to save time and Mahshahr AFISO approved it to perform VOR/DME Approach RWY13, via GODMO 1F arrival. The pilot made a poor decision to land on RWY 13 with the risk of extra fuel onboard and tailwind condition.

At 03:59: 39 UTC, the pilot reported, "We are approaching position GODMO" and the TRN ACC controller asked; *"Would you confirm in contact with destination Mahshahr*" The pilot told him *"Affirm"*. After that, the controller released the flight CPN 6936 to destination Mahshahr as below:
*"Frequency change approved, Radar service terminated and no reported traffic below"*The minimum safe level of the route on "GODMO" was FL40, but the ACC controller transferred

the flight at FL100 to Mahshahr AFISO, which was against L o C. The flight was not informed to the Ahwaz Airport either.

At 04:00:41 UTC, the pilot reported his position "GODMO" to Mahshahr AFISO. In accordance with radar data and FDR, the flight was then reaching FL100. Afterwards, the flight received the information below:
"CPN 6936 yes sir; descend as profile to MNM 2000 ft. for VOR/DME APP RWY 13, report when leaving IAF and cleared APP"

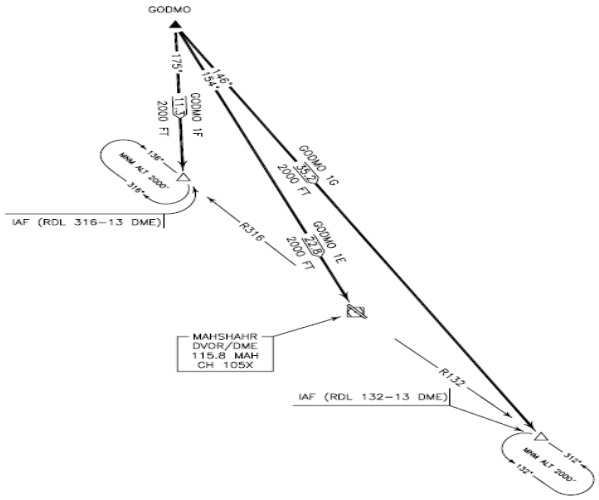

Figure 19- Standard Arrival Chart Instrument (STAR) GODMO 1E/1F/1G

At 04:02:46 UTC, the pilot reported leaving of IAF (FDR data shows the altitude at 6647ft. and computed airspeed 243 kt.) and received landing clearance for RWY13. Meanwhile, the crew prepared the cabin for landing.

At 04:04:35 UTC, the autopilot was disengaged and the aircraft passed 2500 ft. (radio altimeter) with high actual speed 219 kt. Then the captain decided to control altitude & speed by executing "S" turn maneuver several times and continued in visual reference with the ground.

- *Note: with aircraft weight approximately 58 tons (58000 kg), approach speed (target speed) 136kts and V_{ref} 131 kts.*

At 04:05:29 UTC, at altitude 934 ft. the captain asked the copilot to set speed and the copilot called out airspeed 135 knots (target speed) when the FDR was showing IAS 196 kt. After a moment upon receiving EGPWS Sink Rate warning, the copilot warned the pilot to read the landing checklist, but the captain did not accept and accomplished an unstabilized high-speed approach for the purpose of landing. In this situation, the captain as pilot flying should commence go-around, but yet again he continued for landing. Meanwhile, the copilot should advise un-stabilized approach and call out go-around.
The copilot claimed in his statement after the accident that:

"*I wanted to take control of the aircraft and follow missed approach procedure but due to pilot over-confidence to overcome present situation and age gap, I disregarded it.*"

From 1000ft until 10 ft. altitude, sink rate and pull up warnings were recorded in the CVR successively which were heard by the crew (cockpit and senior cabin crew).
Finally, at 04:06:11 UTC, the aircraft landed with high speed (171 kt.); however, the landing speed in landing BUG card was considered at 131 kt. and after passing two-thirds of RWY touched the RWY with the nose landing gear. Full auto thrust reversers and brakes were applied. The aircraft overran the runway, rolled through a non-paved area and airport perimeter fence, passed a shallow canal then onto an adjacent roadway, where it struck a concrete median strip and a lamp post before coming to a stop.

3. CONCLUSIONS:

3.1 Findings:

The findings are listed as significant steps in the accident sequence, but they are not always causal or indicate deficiencies. Some findings point out the conditions that pre-existed the accident sequence, but they are usually essential to the understanding of the occurrence.

- The pilots were properly certificated under Iran CAO regulations. No evidence indicates any medical conditions that might have adversely affected their performance during the accident flight.
- The accident aircraft was properly certificated and was equipped and maintained in accordance with industry practices.
- Aircraft certification was in accordance with CAO IRI regulations.
- The aircraft type selected to perform the flight to destination Bandar Mahshahr was acceptable.
- No evidence indicates any failure of the aircraft's power plants, structure, or systems that would have affected the aircraft's performance during the accident landing.
- Method of communications for data exchange between accident flight crew and scheduling unit was ineffective.
- The captain decided to make a landing on RWY 13 while the wind was reported 280°/08 knots with tailwind condition, while the actual speed was far higher than the recommended approach speed.
- Landing Card Data (Bug Card) was not completed for RWY change as requested by the pilot accordingly.
- The landing checklist was not accomplished by the pilots.
- The aircraft landed with nose landing gear and encountered the bouncing.
- Neither of the pilots followed the company's SOP.
- Poor CRM was detected after commencing descend.
- A long distance, about 2/3 of the runway, had been passed at the time of touchdown.
- Unstabilized approach, including high speed, high sink rate and landing with a tailwind component were identified as the contributing risk factors in the flight, which ended in the RWY overrun.
- The Tehran ACC air traffic controller did not follow L o C between Ahwaz and Tehran Centre regarding inbound traffic to Bandar Mahshahr, while the accident flight was passing Ahwaz CTR.
- ACC radar controller's pre-planning for separation and allocation of flight level for inbound traffic with regard to minimum safe altitude and position from GODMO was poor.
- The height of power line rows in approach area of RWY13 regarding related distance from threshold of RWY 13 is not in accordance with Iran Aerodromes Bylaw.
- The flight data analysis system of Caspian airlines did not detect the pilot's deviation however this issue could also be extended to FDA to Kish Airlines as his previous airline.
- The pilot and flight dispatcher accepted a risk for fuel tankering against the fuel policy mentioned in Caspian operations manuals.

3.2 Probable Causes:

The Aircraft Accident Investigation Board determines that the probable causes of this accident were the pilots' failures below, resulting in a runway overrun:

- Poor decision-making for acceptance of the risk of high-speed landing;
- Un-stabilized approach against the normal flight profile;
- Poor CRM in the cockpit; and
- Poor judgment and not accomplishing go-around while performing an unstabilized approach.

3.3 Contributing Factors:

- Loading of 5 tons of extra fuel, which increased the landing distance required.
- Decision to make a landing on RWY 13 with tailwind.
- Inability of the copilot (PM) to take control of the aircraft and proper action to execute go-around.

4. Safety recommendations:

As a result of this investigation, the following recommendations are issued:

SR No, 981107 CPZ;

To Iran Civil Aviation Organization:

1- Require all operators to provide more guidance and enforce further training for pilots and dispatchers regarding the company's fuel policy and the assumptions affecting landing distance/stopping margin calculations, to include use of aircraft ground deceleration devices, wind conditions and limits, air distance, and safety margins.
2- Submit a formal request to the Cabinet of Ministers of IR. Iran to correct the RWY strip dimension in Iran Aerodromes Bylaw in accordance with Annex 14 to the ICAO convention.
3- Update the information of Mahshahr airport in Iran AIP.

To Caspian Airlines:

4- Perform the Line Operation Safety audit (LOSA) for Flight Crew and Cabin Crew.
5- Correct the Simulator Lesson Plans for flight considering the findings of the accident.
6- Expand and improve the Flight Data Analysis System.
7- Improve communication system between operation department and all crew members about notifying flight planning.

To Mahshahr Airport:

8- Follow Iran CAO aerodrome requirements for ANS, control of obstacles and review Instrument Approach procedures.

To Iran Airports and Air Navigation Company:

9- Provide training guidelines for ATS personnel about the agreed coordination between involved ATS units.