

Summary

While taxiing in at KEWR aerodrome, on 31st December 2021, the A330-303 aircraft (TC-JOK, MSN: 1642) hit its winglet to the rudder of a United Airlines E170-100SE (N633RW, MSN: 54) aircraft which is being operated by Republic Airways. Flight crew weren't aware of the incident until ATC stated that they may have had an incident and advised to check the aircraft.

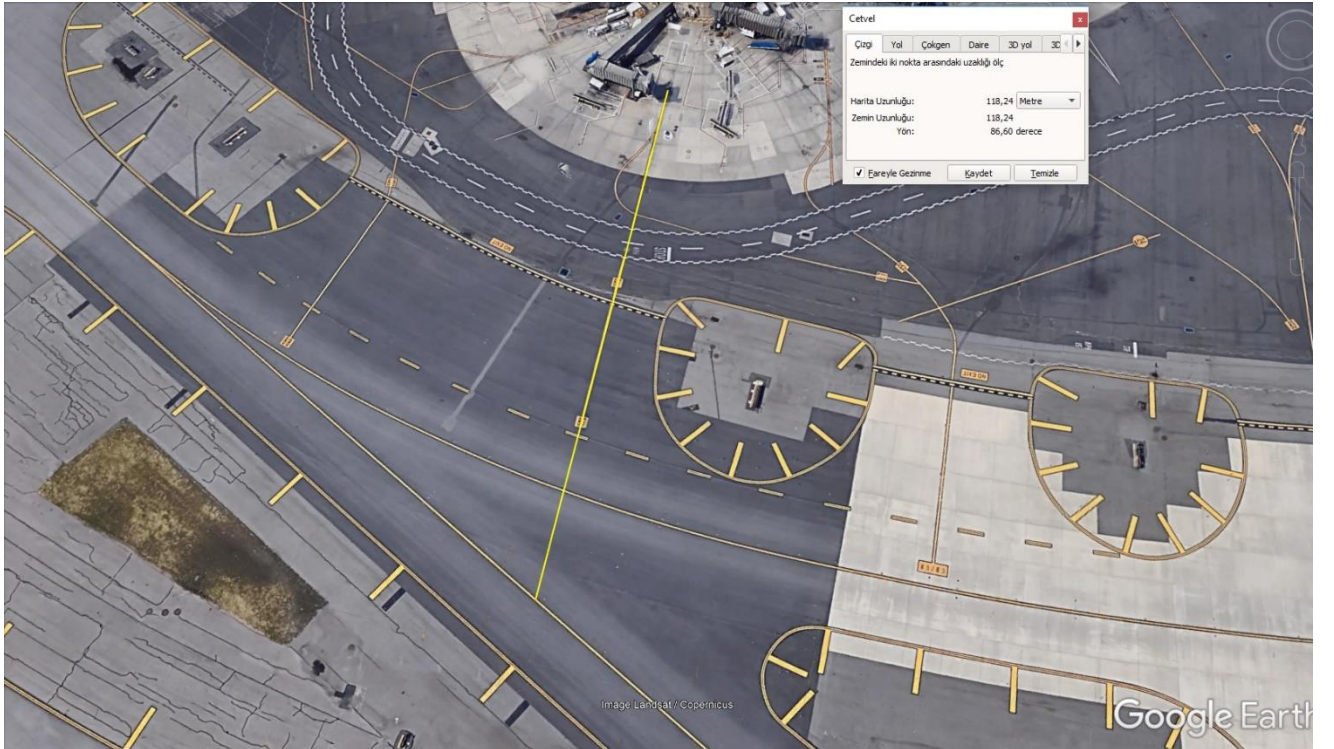
Factual Information

- **Weather (Event time 03:37Z)**
 - **KEWR 310251Z** 16005KT 6SM BR BKN008 OVC012 09/08 A2995 RMK AO2 SLP140 BKN008 V SCT T00940078 53003=
 - **KEWR 310351Z** 17005KT 5SM BR BKN007 OVC012 09/08 A2994 RMK AO2 RAB33E50 SLP139 P0000 T00890078=
- **Crew Composition:** CM1(PF, CI) / CM2(PM/Third occupant seat, P3) / CM3(PM, P4)
- **Approach Type:** Precision (ILS Rwy 04R)

Finding and Synopsis

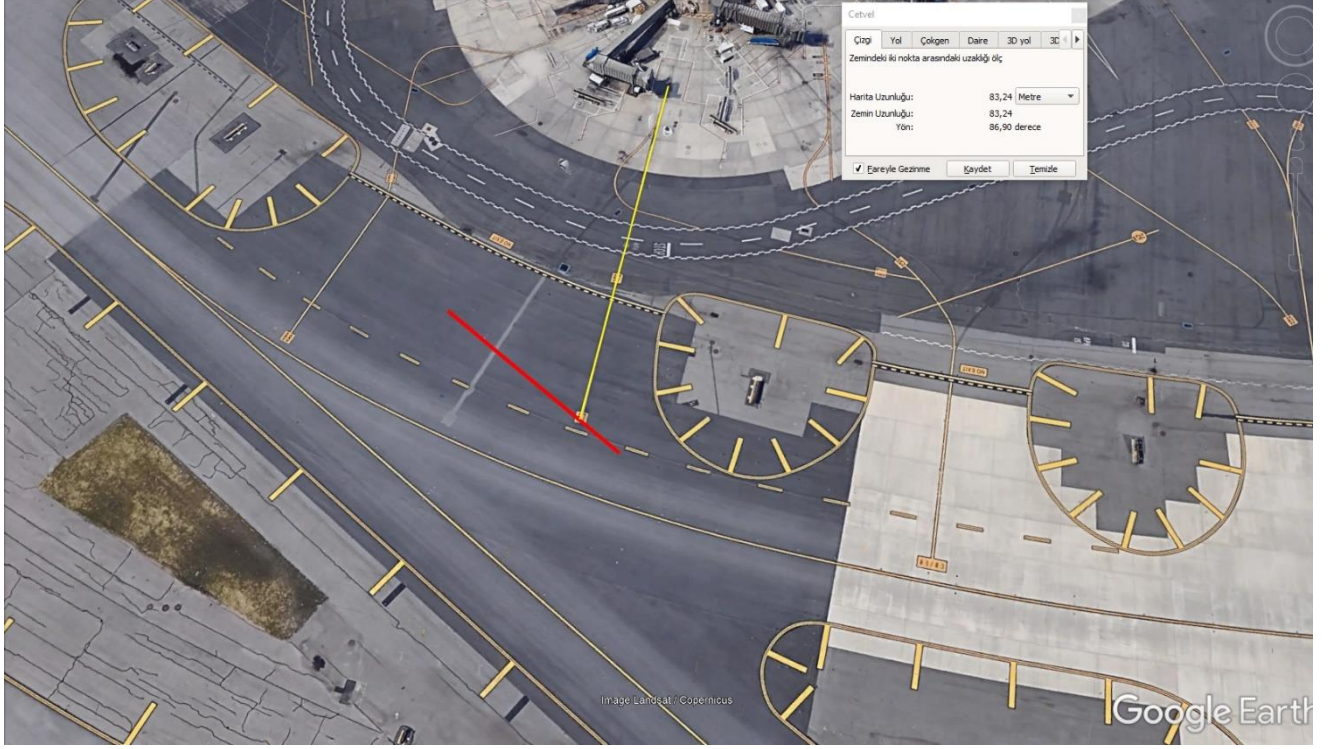
Wingspan of A330-303 aircraft is 60.3 m. Length of E170 aircraft is 29.90 m. The distance between center line of A taxiway and nose position at gate 87 is approximately 118.24 m. The gap between wing tip of an A330 aircraft on A taxiway and tail of an E170 aircraft fully parked at gate 87 is calculated as:

$$118.24 \text{ m} - ((60.30 \text{ m} / 2) + 29.90 \text{ m}) = 58.19 \text{ m}$$



The actual distance is expected to be shorter because of the angle between the taxiway center line and stand entry guidance line. The red line on the figure below depicts the trace of wing tip of A330 aircraft when it is exactly on center line of A taxiway. The distance between nose position at gate and wing tip trace is 83.24 m. The gap can be calculated as:

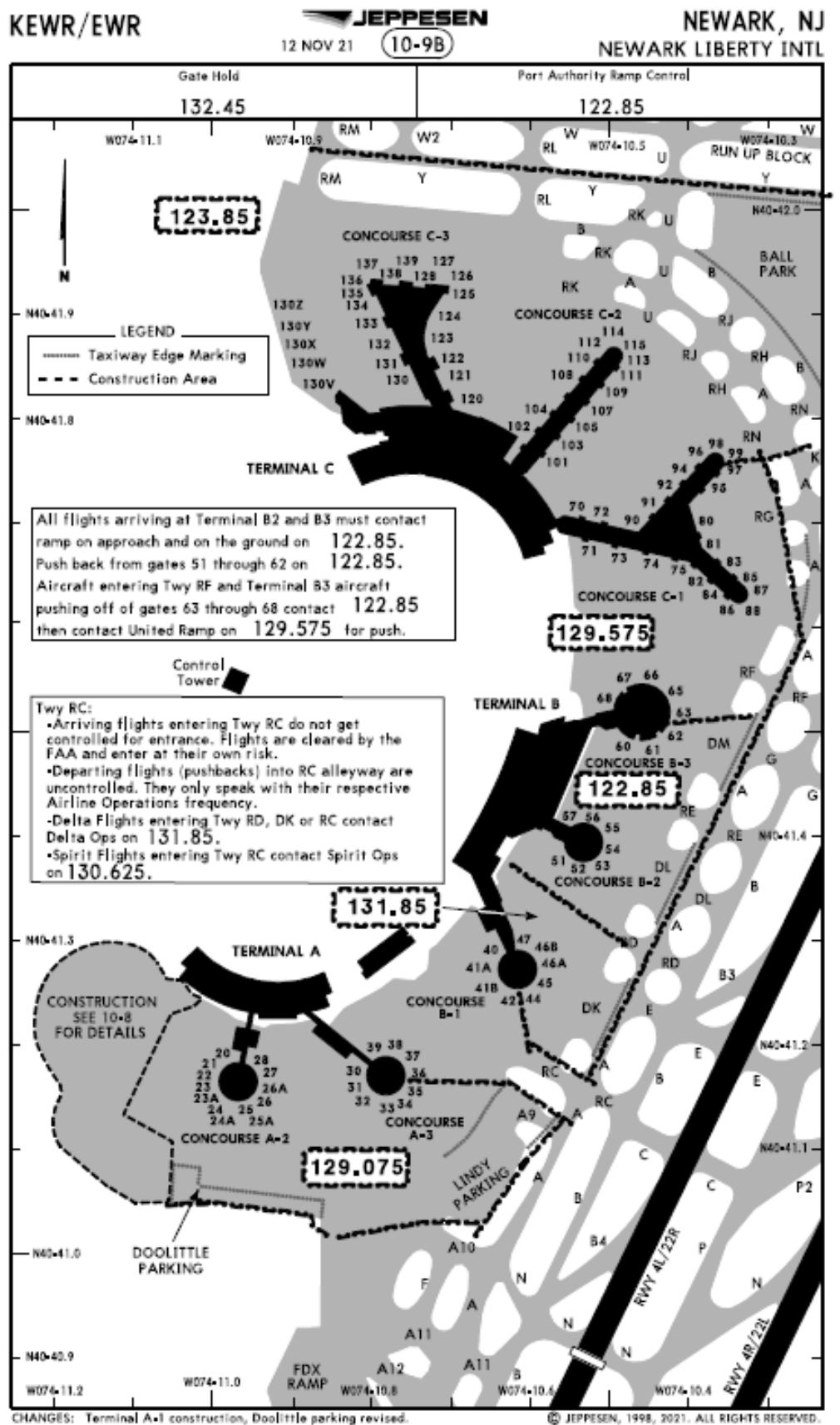
$$83.24 \text{ m} - 29.90 \text{ m} = 53.34 \text{ m}$$



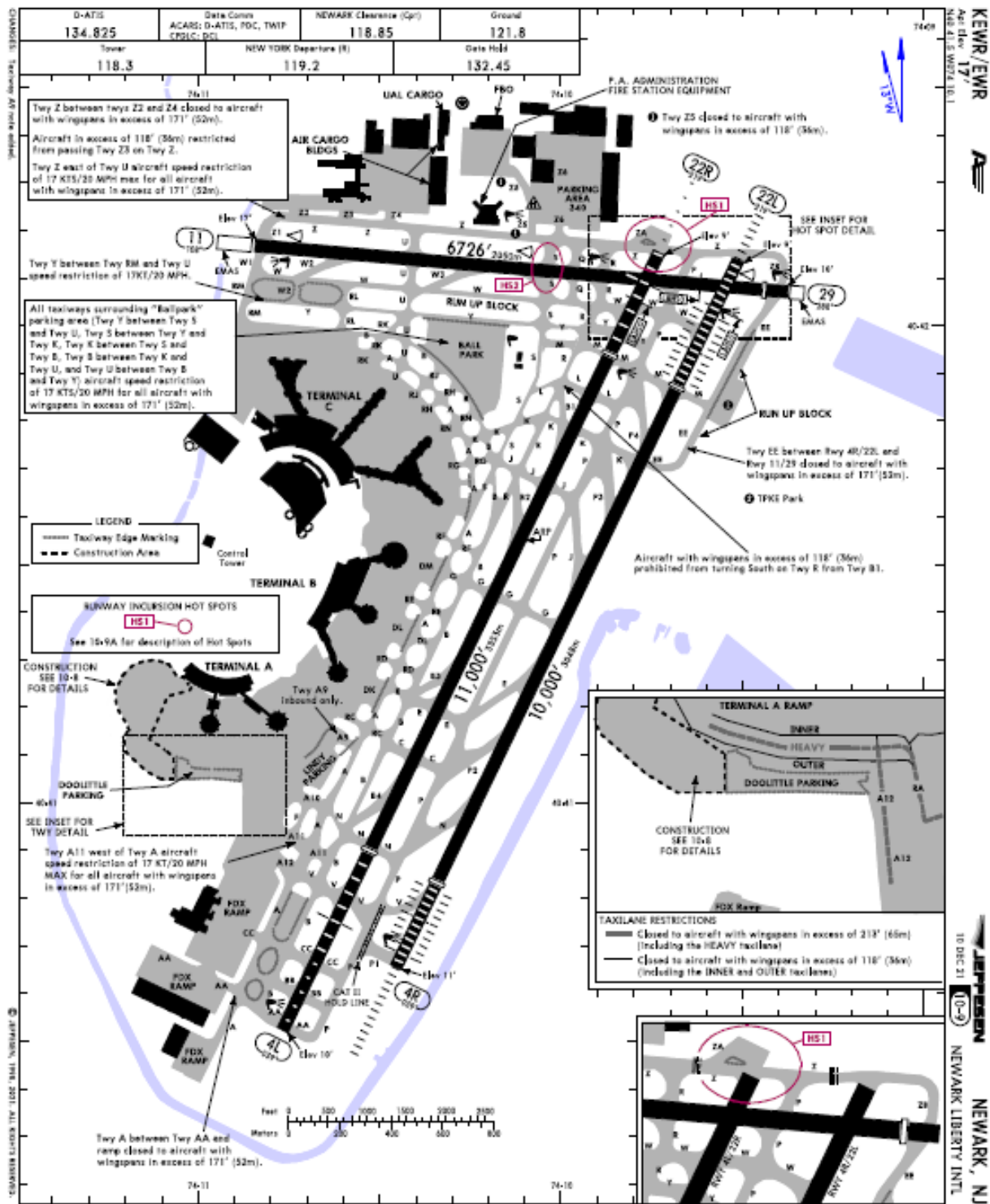
Civil twilight on the day of incident was between 06:49 and 17:09 LMT. The wing tip strike occurred at 22:37 LMT.

According to flight tracking applications United Airlines aircraft fully parked to gate 87 at 22:45 LMT, after the incident.

Flight crew stated in their written reports, also verbally when interviewed, that they landed at runway 04R, under wet surface condition, vacated runway via P4, crossed parallel runway via L and contacted Ground Control for further taxi instructions. Then they were cleared to taxi on S and A taxiways respectively. The flight data acquired from the aircraft matches the statements of the crew. They also stated that CM2 contacted Ramp Control, by third radio (VHF3), initially on 129.575 MHz, then directed to 123.850 MHz, then finally to 122.850 Mhz. They were then cleared to gate 63 via DM taxiway. Crew were monitoring Ground Control on first radio (VHF1) at all times. There wasn't any information relayed to flight crew about the traffic which was short of parking position along their route. The crew declared that they slowed down and checked twice if there is enough space between two aircrafts. The chart below depicts the parking positions and responsibility areas of each frequency.



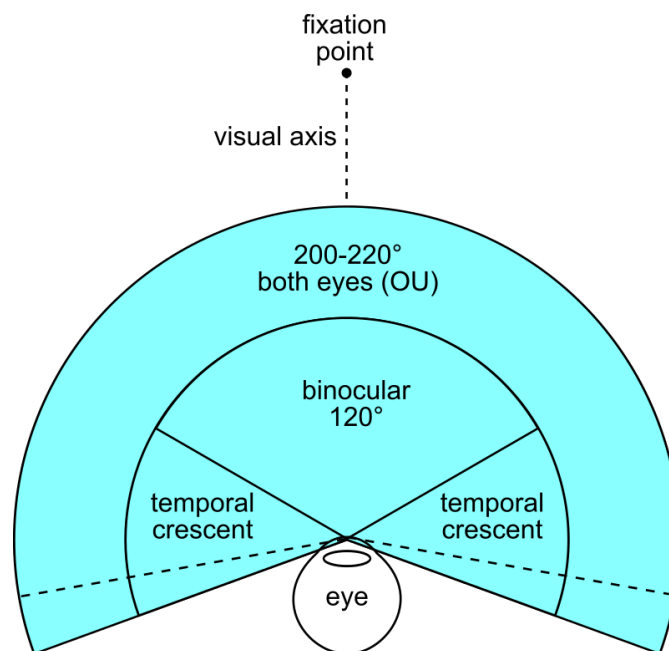
The chart below is the airport information chart which crew used for ground navigation.



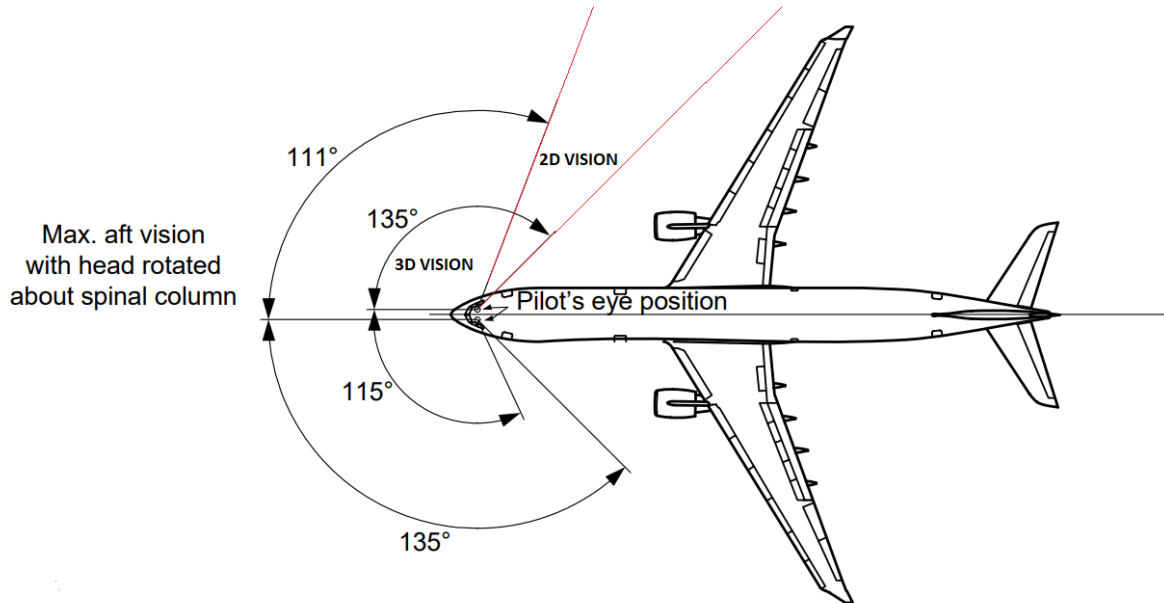
According to CVR recording, Tower controller cleared the crew to cross runway, gave taxi instruction and then instructed to monitor ground frequency. CM1 was very cautious, kept requesting assistance from other crew members. CM2 sounded more confident than CM3 when directing CM1. While on A taxiway CM2 contacted ramp control initially on 129.575 MHz. United Ramp controller stated that the correct frequency for their parking stand, which is 63, is 122.850 MHz. CM2 misunderstood and read back as 123.850 MHz. While ramp controller was correcting the frequency

CM2 changed it. He could then get the correct frequency from next controller. Aircraft was approaching the United E170 and other two crew members were talking about that aircraft while CM2 was talking to ramp controllers. CM1 first asked if it is safe to cross behind the aircraft, then stated that he thinks it seems safe. After asking confirmation 3 more times from CM3 they crossed behind the aircraft. When parking to their gate tower controller called the crew to say keep his frequency. Later, CM2 called Ramp controller and got the question if they had any incident. After telling that they didn't have any incident ramp controller declared that someone from port authority will call them. Tower controller called again and requested the crew to go to ground frequency and told that they may have touched the aircraft. Until this call there was communication of Tower frequency (landing / take off / line up clearances etc.) on VHF1. Ramp controller was contacted on VHF3, but VHF2 was never used. When on ground frequency, controller stated again that they may have touched another aircraft and requested to check for any damage then call them back on the phone number he gave.

Various studies state that, the field of vision in humans is approximately 190 degrees (95 degrees to both sides) horizontally. 3D vision is achieved in the area where both eyes are able to see and it expands up to approximately 60 degrees to both sides. This makes total of 120 degrees area of 3D vision. The remaining peripheral on each side have only 2D vision. 3D vision area is depicted as binocular at the figure below.



The figure below is from a document named *A330 Flight Deck and Systems Briefing for Pilots*, which was published by Airbus Company. Although it is stated that it must not be used as an official reference, it gives a good idea about field of view of a pilot from the cockpit. The figure is modified to show areas of 3D and 2D visions.



Field of view may be expanded by bending towards side window but most probably wing tip will remain in 2D vision area.

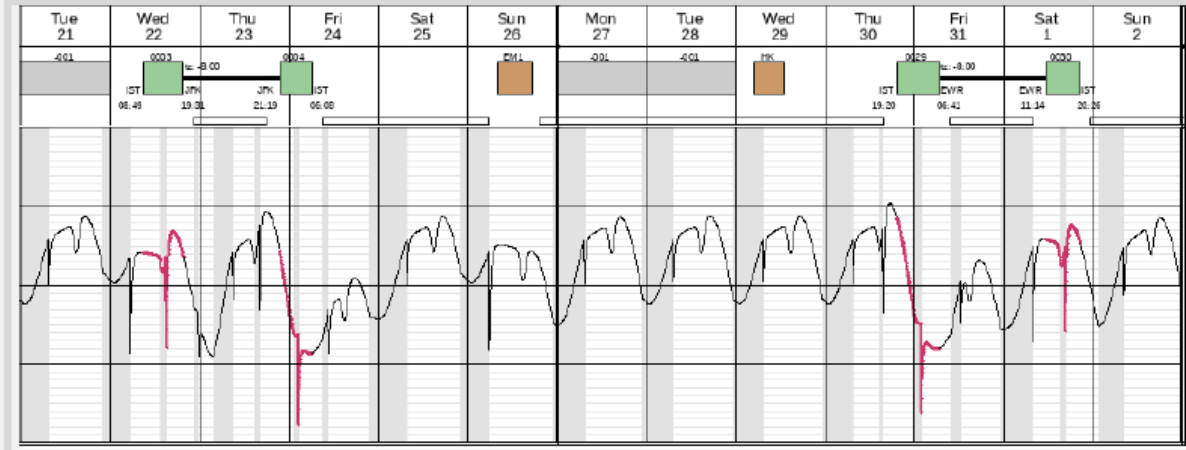
Fatigue Analysis

The alertness level of the crew was analyzed by Fatigue Risk Management department. According to their evaluation any fatigue risk was not identified in terms of work load. Below are the duty details and cumulative alertness graphs of both flight crew. First graph is for CM1, second one is for CM2 and third one is for CM3. Detailed analysis forms are attached to assessment on AQD system.

3. UÇUŞ GÖREV DETAYLARI / FLIGHT DUTY DETAILS

UÇUŞ TARİHİ/ TK NO/ G. BAŞLANGIÇ (UTC) FLIGHT DATE / FLIGHT NUMBER / DUTY START (UTC)	30.12.2021 / TK29 / 17:45		
TOPLAM SEKTÖR SAYISI (22 – 30.12.2021) TOTAL NUMBER OF SECTOR FLOWN	4	UÇUŞ GÖREV SÜRESİ / LİMİT FLIGHT DUTY TIME (FDT) / LIMIT	: 12:56 / 17:00
TOPLAM GÖREV SAYISI (22 – 30.12.2021) TOTAL NUMBER OF DUTY FLOWN	4 - 100%	SON 7 GÜN TOPLAM BLOCK SÜRESİ TOTAL BLOCK TIME IN LAST 7 DAY (B7)	: 20:33
TOPLAM GEÇ BİTEN GÖREV SAYISI TOTAL NUMBER OF LATE FINISH DUTIES	0 - 0%	SON 7 GÜN TOPLAM GÖREV SÜRESİ / LİMİT TOTAL DUTY TIME IN LAST 7 DAY (D7) / LIMIT	: 23:26 / 60
TOPLAM GECE GÖREVSİ SAYISI TOTAL NUMBER OF NIGHT DUTIES	2 - 50%	SON 14 GÜN TOPLAM GÖREV SÜRESİ / LİMİT TOTAL DUTY TIME IN LAST 14 DAY (D14) / LIMIT	: 54:27 / 110
TOPLAM ERKEN BAŞLAYAN GÖREV SAYISI TOTAL NUMBER OF EARLY START DUTIES	0 - 0%	SON 28 GÜN TOPLAM UÇUŞ SÜRESİ / LİMİT TOTAL BLOCK HOUR IN LAST 28 DAY (B28) / LIMIT	: 75:47 / 100
TOPLAM GÜN İÇİ GÖREV SAYISI TOTAL NUMBER OF DAYLIGHT DUTIES	2 - 50%	SON 28 GÜN TOPLAM GÖREV SÜRESİ / LİMİT TOTAL DUTY TIME IN LAST 28 DAY (D28) / LIMIT	: 117:28 / 190
KONUUYLA İLGİLİ İSTİRAHAT RAPORU SICKNESS REPORT	YES ☐ NO ☒	KONUUYLA İLGİLİ FGR RAPORU FGR REPORT	YES ☐ NO ☒

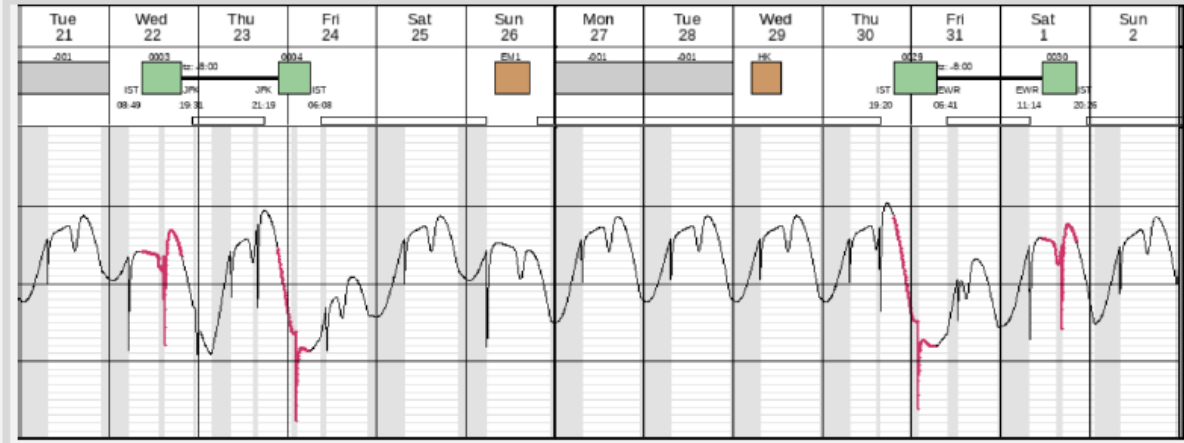
4. KÜMÜLATİF ZİNDELİK GRAFİĞİ / CUMULATIVE ALERTNESS GRAPH



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UÇUŞ TARİHİ/ TK NO/ G. BAŞLANGIÇ (UTC) FLIGHT DATE / FLIGHT NUMBER / DUTY START (UTC)	30.12.2021 / TK29 / 17:45		
TOPLAM SEKTÖR SAYISI (22 – 30.01.2022) TOTAL NUMBER OF SECTOR FLOWN	3	UÇUŞ GÖREV SÜRESİ / LİMİT FLIGHT DUTY TIME (FDT) / LIMIT	: 12:56 / 16:00
TOPLAM GÖREV SAYISI (22 – 30.01.2022) TOTAL NUMBER OF DUTY FLOWN	3 - 100%	SON 7 GÜN TOPLAM BLOCK SÜRESİ TOTAL BLOCK TIME IN LAST 7 DAY (B7)	: 20:33
TOPLAM GEÇ BİTEN GÖREV SAYISI TOTAL NUMBER OF LATE FINISH DUTIES	0 - 0%	SON 7 GÜN TOPLAM GÖREV SÜRESİ / LİMİT TOTAL DUTY TIME IN LAST 7 DAY (D7) / LIMIT	: 23:26 / 60
TOPLAM GECE GÖREVSİ SAYISI TOTAL NUMBER OF NIGHT DUTIES	2 - 67%	SON 14 GÜN TOPLAM GÖREV SÜRESİ / LİMİT TOTAL DUTY TIME IN LAST 14 DAY (D14) / LIMIT	: 54:27 / 110
TOPLAM ERKEN BAŞLAYAN GÖREV SAYISI TOTAL NUMBER OF EARLY START DUTIES	0 - 0%	SON 28 GÜN TOPLAM UÇUŞ SÜRESİ / LİMİT TOTAL BLOCK HOUR IN LAST 28 DAY (B28) / LIMIT	: 75:47 / 100
TOPLAM GÜN İÇİ GÖREV SAYISI TOTAL NUMBER OF DAYLIGHT DUTIES	1 - 33%	SON 28 GÜN TOPLAM GÖREV SÜRESİ / LİMİT TOTAL DUTY TIME IN LAST 28 DAY (D28) / LIMIT	: 117:28 / 190
KONUyla İLGİLİ İSTİRAHAT RAPORU SICKNESS REPORT	YES ☐ NO ☒	KONUyla İLGİLİ FGR RAPORU FGR REPORT	YES ☐ NO ☒

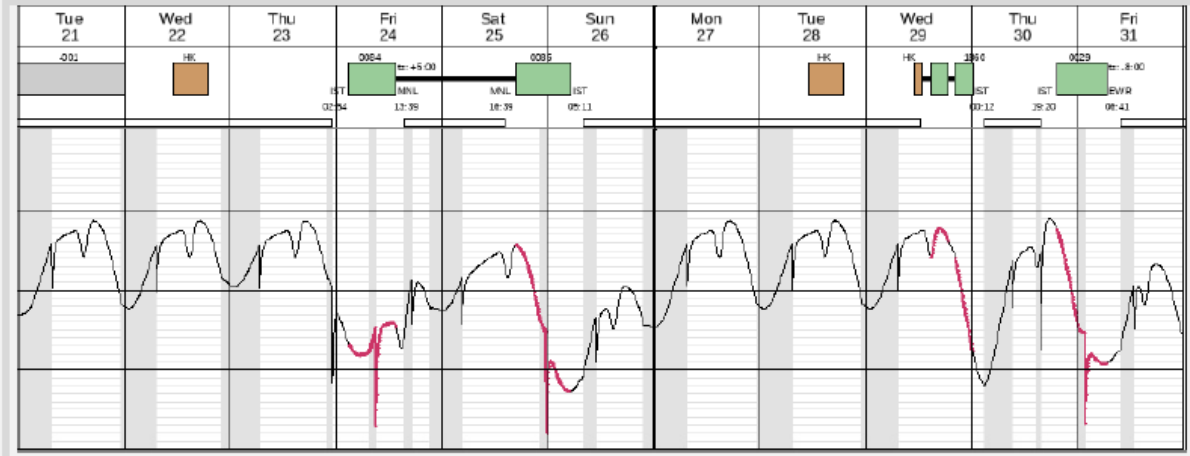
4. KÜMÜLATİF ZİNDELİK GRAFİĞİ / CUMULATIVE ALERTNESS GRAPH



3. UÇUŞ GÖREV DETAYLARI / FLIGHT DUTY DETAILS

UÇUŞ TARİHİ/ TK NO/ G. BAŞLANGIÇ (UTC) FLIGHT DATE / FLIGHT NUMBER / DUTY START (UTC)	30.12.2021 / TK29 / 17:45		
TOPLAM SEKTÖR SAYISI (22 – 30.12.2021) TOTAL NUMBER OF SECTOR FLOWN	5	UÇUŞ GÖREV SÜRESİ / LİMİT FLIGHT DUTY TIME (FDT) / LIMIT	: 12:56 / 17:00
TOPLAM GÖREV SAYISI (22 – 30.12.2021) TOTAL NUMBER OF DUTY FLOWN	4 - 100%	SON 7 GÜN TOPLAM BLOCK SÜRESİ TOTAL BLOCK TIME IN LAST 7 DAY (B7)	: 38:56
TOPLAM GEÇ BİTEN GÖREV SAYISI TOTAL NUMBER OF LATE FINISH DUTIES	1 - 25%	SON 7 GÜN TOPLAM GÖREV SÜRESİ / LİMİT TOTAL DUTY TIME IN LAST 7 DAY (D7) / LIMIT	: 46:33 / 60
TOPLAM GECE GÖREVSİ SAYISI TOTAL NUMBER OF NIGHT DUTIES	3 - 75%	SON 14 GÜN TOPLAM GÖREV SÜRESİ / LİMİT TOTAL DUTY TIME IN LAST 14 DAY (D14) / LIMIT	: 67:48 / 110
TOPLAM ERKEN BAŞLAYAN GÖREV SAYISI TOTAL NUMBER OF EARLY START DUTIES	0 - 0%	SON 28 GÜN TOPLAM UÇUŞ SÜRESİ / LİMİT TOTAL BLOCK HOUR IN LAST 28 DAY (B28) / LIMIT	: 62:15 / 100
TOPLAM GÜN İÇİ GÖREV SAYISI TOTAL NUMBER OF DAYLIGHT DUTIES	0 - 0%	SON 28 GÜN TOPLAM GÖREV SÜRESİ / LİMİT TOTAL DUTY TIME IN LAST 28 DAY (D28) / LIMIT	: 87:54 / 190
KONUyla İLGİLİ İSTİRAHAT RAPORU SICKNESS REPORT	YES ☐ NO ☒	KONUyla İLGİLİ FGR RAPORU FGR REPORT	YES ☐ NO ☒

4. KÜMÜLATİF ZİNDELİK GRAFİĞİ / CUMULATIVE ALERTNESS GRAPH



Results

As a summary, the incident occurred under night and wet surface conditions. Crew were proceeding on the taxiway which they were cleared to. Although initially contacting the Ramp Control which is controlling the aircraft parking to gate 87, no information was given to the crew concerning the essential traffic. Crew monitored both Tower and Ramp control frequencies at the same time in order not to miss any information, but they didn't monitor Ground frequency (it is possible that they forgot to switch frequency). Being aware that the relevant aircraft is short of its parking position, crew was concerned about the wing tip clearance. They slowed down, double checked the clearance and continued taxi. United Airlines E170 aircraft was stopped on stand guide line, its tail just passed taxiway edge markings, not parked yet. Due to geometry and dimensions of A330 aircraft, limited sight capability (2D vision) and night conditions, crew had false perception of being clear of other aircraft.

An aircraft being stationary where it is not expected and not providing any information to following traffic are seen as primary factors causing the incident. The reason of not providing information may be having two different controllers which are controlling two different aircrafts moving on same area. The crew of preceding aircraft may have given information to their ramp controller and the crew of following aircraft may have missed the call because of being on another frequency.

The crew of A330 aircraft would stop the aircraft and ask for assistance if they had any doubt. Wing tip being far back from pilot's point of sight and night condition caused misperception. After checking two times CM3, who has the only possibility to see right wing tip, stated confidently that the wing tip is clear of other aircraft. His statement and tone of his voice removed any doubt.

As a result, communication procedures design of the aerodrome, crew of not fully parked aircraft not giving the information (assuming they did not) and misperception of the crew of taxiing aircraft may be listed as contributing factors to the incident.

Safety Recommendations

For Corporate Safety Department;

- To share the occurrence with all flight crews via a safety bulletin.
- To provide a feedback of the event, including the analysis of the occurrence, to the crew of the relevant flight.
- To share the analysis of the occurrence with training department. If deemed necessary they may assign relevant training to the crew.

For Flight Operations Department;

- To remind crews that they must stop and ask for any available assistance (follow me or wing man) if they are approaching an aircraft which is not on its parking stand and/or if they have any doubt about ground clearance at any time.

For KEWR airport authority;

- To improve communications procedure for ground movements at KEWR airport in order to let ground controller be informed of and inform relevant traffic of any aircraft in an inappropriate/unusual position along its route. Effective information exchange between various ground traffic frequencies (aprons/ground) should be assured for irregularities such as partially parked aircraft or for any location an aircraft may be concerning both ground and apron area of responsibility.