KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA

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Aircraft Serious Incident Investigation Report

Akademi Penerbang Indonesia Banyuwangi

Cessna 172 SP; PK-APA

Banyuwangi Airport

Republic of Indonesia

14 June 2024

2024

This Short Summary Report is published by the *Komite Nasional Keselamatan Transportasi* (KNKT), Transportation Building, 3rd Floor, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the investigation carried out by the KNKT in accordance with Annex 13 to the Convention on International Civil Aviation, the Indonesian Aviation Act (UU No. 1/2009) and Government Regulation (PP No. 62/2013).

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Jakarta, 6 December 2024
KOMITE NASIONAL
KESELAMATAN TRANSPORTASI
CHAIRMAN

SOERJANTO TJAHJONO

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ABBREVIATIONS AND DEFINITIONS

A/C	:	Aircraft
AFH	:	Airplane Flying Handbook
AOA	:	Angle of Attack
API	:	*Akademi Penerbang Indonesia*
ARFFS	:	Aerodrome Rescue and Fire Fighting Service
DGCA	:	Directorate General of Civil Aviation
DGH	:	Dual General Handling
FAA	:	Federal Aviation Administration
IAS	:	Indicated Air Speed
KNKT	:	*Komite Nasional Keselamatan Transportasi*
L/G	:	Landing Gear
LT	:	Local Time
NormAcc	:	Normal Acceleration
T/O	:	Take Off
TCO	:	Training Course Outline

SYNOPSIS

On 14 June 2024, a Cessna 172 SP aircraft, registered PK-APA, operated by Akademi Penerbang Indonesia (API) Banyuwangi, for a solo training exercise in the training area near Banyuwangi Airport (WADY), East Java as part of private pilot certification course. The planned exercise for the student pilot at the training area was to exercise descending turn, climbing turn and slow flight turn maneuvers, including the procedure for departure and arrival.

Prior to the departure, the student pilot performed the aircraft's pre-flight check and did not find any aircraft system malfunction.

At 0808 LT, the aircraft departed in daylight condition from Banyuwangi using Runway 26 and proceeded to the Panggang Bay training area. The aircraft reached the training area and started the training exercise.

At 0850 LT, the aircraft finished the exercise and flew back to Banyuwangi. The aircraft was instructed by Banyuwangi Tower controller to fly overhead of the airport and join the left traffic pattern of Runway 08.

At 0903 LT, the aircraft joined the final of Runway 08 at altitude of 450 feet with recorded IAS of 73 knots. The student pilot then reported to the Banyuwangi Tower controller of the aircraft position. The Banyuwangi Tower controller then issued landing clearance to the student pilot with additional information that the surface wind direction was 120° with velocity of 6 knots.

At 09:04:39 LT, the aircraft touched down and during the touchdown, the student pilot felt that the main wheels and nose wheel contacted the runway almost at the same time (three-point landing). The aircraft then bounced four times with the nose wheel made contact first on each touchdown. The nose landing gear was damaged, and propeller blades struck the runway.

The aircraft then stopped on the runway, and the student pilot declared a distress message to the Banyuwangi Tower controller.

The Banyuwangi Tower controller then instructed the other aircraft on final to make a go around. The Aerodrome Rescue and Fire Fighting Service (ARFFS) then was informed and evacuated the student pilot.

The aircraft was substantially damaged. No injuries were reported.

The occurrence highlighted the late round out (flare) manoeuvre during landing and absence of bouncing recovery manoeuvre.

At the time of issuing this report, the *Komite Nasional Keselamatan Transportasi* had not been informed of any safety actions resulting from this occurrence.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 14 June 2024, a Cessna 172 SP aircraft, registered PK-APA, operated by *Akademi Penerbang Indonesia* (API) Banyuwangi, for a solo training exercise in the training area near Banyuwangi Airport (WADY)[1], East Java as part of private pilot certification course. The planned exercise for the student pilot at the training area was to exercise descending turn, climbing turn and slow flight turn maneuvers, including the procedure for departure and arrival.

About 0059 UTC[2] (0659 LT), prior to the exercise, the student pilot attended a morning briefing by the flight instructor in charge at the API flight operation office. The briefing highlighted the weather conditions, including the possibility of canceling the flight or returning to base if the weather deteriorates. After the briefing, the student pilot performed aircraft's pre-flight check and did not find any aircraft system malfunction.

At 0808 LT, in daylight conditions the aircraft departed from Banyuwangi using Runway 26 and proceed to the Panggang Bay training area. About 0817 LT, the aircraft reached the training area at altitude of 1,000 feet[3].

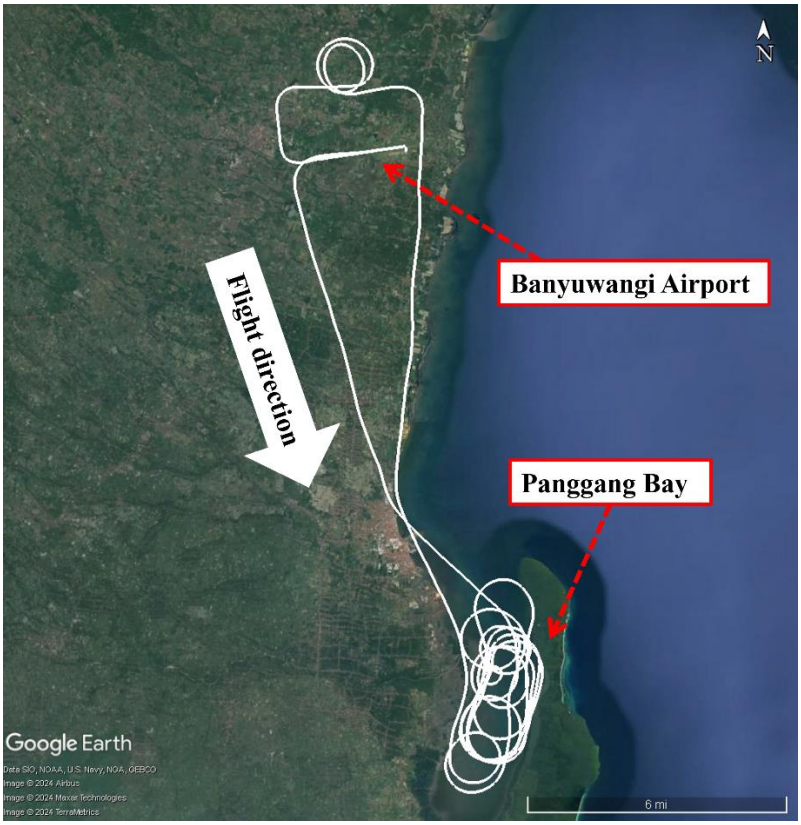

Figure 1: The aircraft flight path

[1] Banyuwangi airport (WADY), Banyuwangi, East Java will be named as Banyuwangi for the purpose of this report

[2] The 24-hours clock in Universal Time Coordinated (UTC) is used in this report to describe the local time as specific events occurred. Local time is UTC+7 hours.

[3] The flight data record in this report is based on the Garmin G1000 flight data logging record.

At 0850 LT, the aircraft finished the exercise and flew back to Banyuwangi. The aircraft was instructed by Banyuwangi Tower controller to fly overhead of the airport and join the left downwind of Runway 08 at altitude of 2,000 feet.

At 08:56 LT, the Banyuwangi Tower controller instructed the student pilot to make orbit on left downwind for traffic separation and to descend to altitude of 1,500 feet.

At 08:58 LT, the Banyuwangi Tower controller instructed the student pilot to make another orbit on left downwind and to descend to circuit altitude. About one minute later, the student pilot reported that the orbit had been completed. The Banyuwangi Tower controller then instructed the student pilot to continue the approach and to report on the left base leg of Runway 08.

At the left base leg of Runway 08, the aircraft was at altitude of 850 feet with recorded Indicated Air Speed (IAS) of 80 knots.

At 0902 LT, the student pilot reported to the Banyuwangi Tower controller that the aircraft was on the left base leg of Runway 08 and was instructed to report when the aircraft on final.

At 0903 LT, the aircraft joined the final of Runway 08 at altitude of 450 feet with recorded IAS of 73 knots. The student pilot then reported to the Banyuwangi Tower controller of the aircraft position. The Banyuwangi Tower controller then issued landing clearance to the student pilot with additional information that the surface wind direction was 120° with velocity of 6 knots.

At 09:04:26 LT, the aircraft passed the runway threshold at altitude of 96 feet with recorded IAS of 70 knots, engine RPM of 1,700 RPM and pitch angle of -2.7° (aircraft in nose down attitude). Thereafter, the pitch angle was increased and fluctuated between 0° up to 6°, the engine RPM was continuously reduced.

At 09:04:39 LT, the aircraft touched down at recorded altitude of 41 feet, normal acceleration[4] of 0.64 G, the IAS was 48 knots, engine RPM was 990 RPM and pitch angle was 5.5° (aircraft in a level attitude)[5]. During the touchdown, the student pilot felt that the main wheels and nose wheel contacted the runway almost at the same time (three-point landing). The aircraft then bounced four times with the nose wheel made contact first on each touchdown.

The normal acceleration on the last touchdown was 1.36 G. The nose landing gear was damaged, and propeller blades struck the runway. The aircraft then stopped on the runway, and the student pilot declared a distress message to the Banyuwangi Tower controller.

The Banyuwangi Tower controller then instructed the other aircraft on final to make a go around. The Aerodrome Rescue and Fire Fighting Service (ARFFS) then was informed and evacuated the student pilot.

The aircraft was substantially damaged. No injuries were reported.

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[4] The Normal Acceleration (NormAcc) recorded value need to be added by 1 for the understanding.

[5] Based on the GPS flight data logging record, when the aircraft stopped at the apron before the flight, the recorded pitch angle was 5°.

1.2 Damage to Aircraft

The aircraft was minor damaged. The details of the damage are as follows:

a. Both propeller tips were bent.
b. The nose landing gear assembly were damaged.
c. The engine exhaust muffler was dented.
d. The front lower skin and engine cowling were dented.

Figure 2: The aircraft condition after landing

Figure 3: Damaged propeller blades

1.3 Personnel Information

The student pilot was 19 years old, joined the flying school in June 2023, and held a valid Student Pilot License. The student pilot held second class medical certificate valid until May 2025. The student pilot accumulated 31 hours dual flight and 8 hours solo flight.

The training records indicated that the student pilot had multiple remarks related to the late flare during landing. In addition, the investigation was unable to find any evidence that the student pilot had bounce recovery exercise prior to the occurrence flight.

1.4 Organizational and Management Information

Akademi Penerbang Indonesia (API) Banyuwangi held valid certificate of approval for pilot school issued by the Directorate General of Civil Aviation (DGCA). The API Banyuwangi was authorized to operate 34 single engine aircraft and two multi engine aircraft for flight training purposes, including the Cessna 172 SP aircraft registered PK-APA.

1.4.1 Training Syllabus

The training syllabus for private pilot certification courses was included in the API Banyuwangi Training Course Outline (TCO). According to the TCO, prior to solo flight exercise, a student pilot must complete ten stages of dual flight[6] exercises which consist of Dual General Handling (DGH) 01 until DGH 10.

The normal landing flight exercise was included on Dual General Handling (DGH) 07 stage along with the other flight exercise as follows:

1. Circuit Procedure:
2. Take-off and initial climb;
3. Normal Circuit;
4. Final approach;
5. Control after landing.

The DGH 07 stage was conducted when the student pilot has accumulated at least six flight hours and the training duration for this stage was at least one hour. Prior to this stage, the normal landing flight exercise could be exercised on every stage and would become pre-flight discussion review prior conducting the flight exercise.

The TCO described that the bounce recovery exercise must be exercised on DGH 08 stage, along with other flight exercise as follows:

1. Circuit Procedure;
2. Low Circuit;
3. Flapless landing;
4. Action after landing
5. Crosswind Take Off and Landing
6. Intro: Emergency

[6] Dual flight means that student pilot flying with a flight instructor.

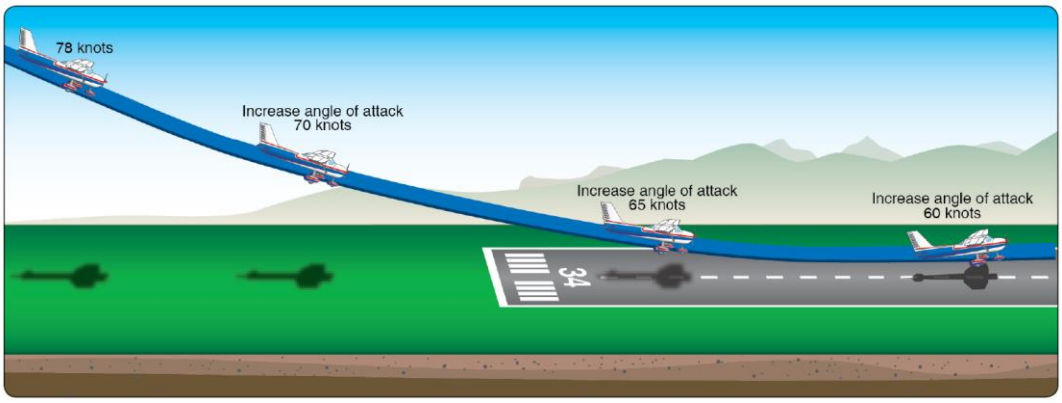
The DGH 08 stage was conducted when the student pilot has accumulated at least seven flight hours and the training duration for this stage was at least one hour.

1.4.2 Flight Instructor Reference Handbook

The TCO provided list of reference handbook that can be used for Flight Instructor as guidance during flight training activities. Each Flight Instructor was not allowed to develop and present training materials with their personal technique and style. The list of reference handbook in the TCO for private pilot certification courses included Airplane Flying Handbook (AFH) developed by Federal Aviation Administration (FAA) of United States of America.

The AFH Chapter 9 contains guidance to perform landings, including:

> ***Stabilized Approach Concept***
>
> *A stabilized approach is one in which the pilot establishes and maintains a constant-angle glide path towards a predetermined point on the landing runway. It is based on the pilot's judgment of certain visual clues and depends on maintaining a constant final descent airspeed and configuration.*
>
> *…*
>
> *Pilots normally establish a stabilized approach before short final. The round out, touchdown, and landing roll are much easier to accomplish when preceded by a stabilized final approach, which reduces the chance of a landing mishap. Therefore, deviations from the desired glide path should be detected and corrected early so that the magnitude of corrections during the later portion of the approach is small. If the approach is very high or very low, it may not be possible to establish a stabilized approach, and the pilot normally executes a go-around. If the airplane is initially low and undershooting the aiming point, the pilot may intercept the desired glide path by increasing pitch attitude and adding power to level off while maintaining the correct airspeed. This may necessitate a substantial increase in power if the aircraft is operating on the backside of the power curve. As the airplane intercepts the desired glide path, the pilot reduces power and pitches down to remain on the glide path. Retracting the flaps to correct for an undershoot creates an unnecessary risk. It may cause a sudden decrease in lift, an excessive sink rate, and an aggravated unstable condition.*
>
> *…*
>
> ***Round Out (Flare)***
>
> *The round out is a slow, smooth transition from a normal approach attitude to a landing attitude, gradually rounding out the flightpath to one that is parallel to and a few inches above the runway. When the airplane approaches 10 to 20 feet above the ground in a normal descent, the round out or flare is started. Back-elevator pressure is gradually applied to slowly increase the pitch attitude and AOA. The AOA is increased at a rate that allows the airplane to continue settling slowly as forward speed decreases. This is a continuous process until the airplane touches down on the ground.*



…

Late or Rapid Round Out

Starting the round out too late or pulling the elevator control back too rapidly to prevent the airplane from touching down prematurely can impose a significant load on the wings and cause an accelerated stall.

…

If the round out is late and uncorrected, the nose-wheel may strike the runway first, causing the nose to bounce upward. Do not attempt to force the airplane back onto the ground; execute a go-around immediately.

…

Bouncing During Touchdown

When the airplane contacts the ground with a sharp impact as the result of an improper attitude or an excessive rate of sink, it tends to bounce back into the air. Though the airplane's tires and shock struts provide some springing action, the airplane does not bounce like a rubber ball. Instead, it rebounds into the air because the wing's AOA was abruptly increased, producing a sudden addition of lift.

The abrupt change in AOA is the result of inertia instantly forcing the airplane's tail downward when the main wheels contact the ground sharply. The severity of the bounce depends on the airspeed at the moment of contact and the degree to which the AOA or pitch attitude was increased.

Since a bounce occurs when the airplane makes contact with the ground before the proper touchdown attitude is attained, it is almost invariably accompanied by the application of excessive back-elevator pressure. This is usually the result of the pilot realizing too late that the airplane is not in the proper attitude and attempting to establish it just as the second touchdown occurs.

The corrective action for a bounce is the same as for ballooning and similarly depends on its severity. When it is very slight and there is no extreme change in the airplane's pitch attitude, a follow-up landing may be executed by applying sufficient power to cushion the subsequent touchdown and smoothly adjusting the pitch to the proper touchdown attitude.

In the event a very slight bounce is encountered while landing with a crosswind, crosswind correction needs to be maintained while the next touchdown is made. Since the subsequent touchdown is made at a slower airspeed, the upwind wing has to be lowered even further to compensate for drift.

Extreme caution and alertness should be exercised any time a bounce occurs, but particularly when there is a crosswind. Pilots should not release the crosswind correction. When one main wheel of the airplane strikes the runway, the other wheel touches down immediately afterwards, and the wings become level. Then, with no crosswind correction as the airplane bounces, the wind causes the airplane to roll with the wind, thus exposing even more surface to the crosswind and increasing any drift.

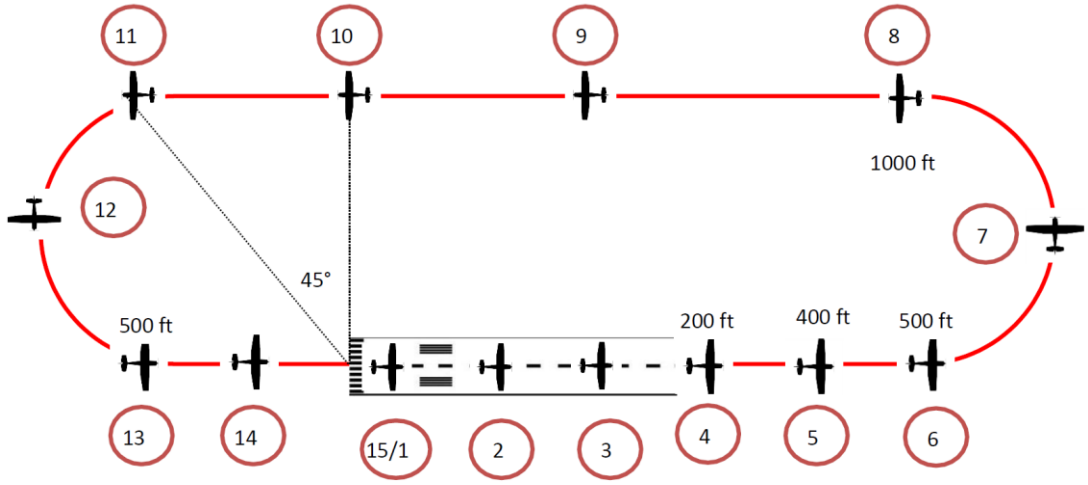
When a bounce is severe, the safest procedure is to execute a go-around immediately. The pilot should not attempt to salvage the landing. Apply full power while simultaneously maintaining directional control and lowering the nose to a safe climb attitude. The go around procedure should be continued even though the airplane may descend and another bounce may be encountered. Landing from a bad bounce should not be attempted, since airspeed diminishes very rapidly in the nose-high attitude, and a stall may occur before a subsequent touchdown can be made.

1.4.3 Student Guidance Handbook

The API Banyuwangi developed Student Guidance Handbook and Safety Procedures which contained a normal landing checklist as follows:

1.	*Airspeed*	*- 65 - 75 KIAS (Flaps UP)*
2.	*Wing Flaps*	*- AS DESIRED*
		(UP - 10° below 110 KIAS
		10° - FULL below 85 KIAS)
3.	*Airspeed*	*- 60 - 70 KIAS (Flaps FULL)*
4.	*Elevator Trim Control*	*- ADJUST*
5.	*Touchdown*	*- MAIN WHEELS FIRST*
6.	*Landing Roll*	*- LOWER NOSEWHEEL GENTLY*
7.	*Braking*	*- MINIMUM REQUIRED*

The Student Guidance Handbook and Safety Procedures also contained the guidance to fly on normal aerodrome circuit pattern as follow:



1. Before Take Off Procedure
   - Mixture rich
   - Flaps 10°
   - Trim T/O Position
   - L/G Light on
2. Engine Instrument check at 40 knots, Rotate at 55 Knots
3. Safe Airborne
   - L/G Up
   - L/G & Taxi Light Off
4. 200 Feet
   - L/G Up
   - T/O Path Check
   - Check speed 75 Knots
5. 400 Feet
   - Flaps Up
   - Trim A/C
   - Check speed 85 Knots
   - Clearing Turn
6. 500 Feet Start Climbing Turn
   - Adjust bank
7. Crosswind Leg
   - Check speed 85 Knots
   - Adjust bank
8. Reaching Altitude 1000 feet
   - Set nose to Cruise
   - Reduce power 2100 RPM
   - Check Speed 90 Knots
9. Downwind Leg
   - Altitude 1000 feet
   - Heading opposite R/W
   - Speed 90 Knot
   - Ignition On
   - Master Switch On
   - Mixture Rich
   - Fuel Selector Both
   - Contact Tower
10. Abeam End Of R/W
    - Timing 30''
    - Reduce Power 1800 RPM
    - Hold nose until speed drop to white arc (85 knots)
    - L/G Down, Flaps 10°
    - Check Speed 80 Knots
    - Open Power 2100 RPM
11. Turning to Base Leg
    - Clearing turn
    - Reduce power 1800 RPM
    - Set nose to descend
    - VSI (-) start turning with normal bank
12. Base Leg
    - Flaps 20°
    - Check speed 75 knots
    - VSI -500 feet/min
    - Contact Tower
13. Final Leg
    - Mixture rich
    - L/G Down, Flaps 30°
    - L/G & Taxi Light On
    - Speed 70 Knots
    - Contact Tower
14. Short Final
    - Decision Altitude
    - Speed 65 knots
    - Check Slope
    - Target Centerline
15. Target Threshold/ Landing
    - Speed 65 Knots
    - Close throttle
    - Flare Out

Figure 4: Guidance on normal aerodrome circuit pattern

The investigation did not find any written guidance for student pilot related to bounce recovery.

2 SAFETY MESSAGES

The aircraft passed the runway threshold with nose down attitude and at level attitude during the touched down. After the touchdown, the aircraft bounced four times with the nose wheel made contact first on each touchdown. The normal acceleration on the last touchdown was 1.36 G. The nose landing gear was damaged, and propeller blades struck the runway.

According to the API Banyuwangi Training Course Outline (TCO) for private pilot certification courses, Airplane Flying Handbook (AFH) developed by Federal Aviation Administration (FAA) of United States of America can be used as training guidance for Flight Instructor. The AFH described that a stabilized approach is one in which the pilot establishes and maintains a constant-angle glide path towards a predetermined point on the landing runway. If the flare is late and uncorrected, the nose-wheel may strike the runway first, causing the nose to bounce upward. The AFH requires pilot to execute a go-around immediately and prohibits pilot to force the aircraft back onto the ground.

The normal landing checklist in the Student Guidance Handbook and Safety Procedures developed by API Banyuwangi describes that main wheels must touched the runway first following with lowering the nose wheel gently. The document also provided guidance to fly on normal aerodrome circuit pattern, which requires student pilot on threshold target to set the aircraft speed at 65 knots, close throttle and to flare.

The information available in the AFH related to the stabilized approach, flare, and bounce recovery were not available in any written guidance for student pilot.

The occurrence flight occurred during solo training exercise as part of private pilot certification courses. According to the training syllabus described in the the API Banyuwangi Training Course Outline (TCO), prior to solo flight, student pilot must exercise normal landing and bounce recovery exercise.

The training records indicated that the student pilot had multiple remarks related to the late flare during landing. In addition, the investigation was unable to find any evidence that the student pilot had conducted bounce recovery exercise prior to the occurrence flight.

The occurrence highlighted the late round out (flare) manoeuvre during landing and absence of bouncing recovery manoeuvre.

Reference for detailed guidance of flare and bouncing recovery is available on the following link:

https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/airplane_handbook

KNKT investigated several occurrences of abnormal runway contact involving flying school which resulted in the nose landing gear damaged. All the occurrences highlighted safety issues of inappropriate landing technique. The investigation reports can be found in the following link:

- KNKT investigation number KNKT.11.03.08.04 involved Cessna 172 aircraft on 7 March 2011

  https://knkt.go.id/Repo/Files/Laporan/Penerbangan/2014/PK-BOB%20Final%20Report.pdf

- KNKT investigation number KNKT.15.05.12.04 involved Liberty XL2 aircraft on 29 May 2015

  https://knkt.go.id/Repo/Files/Laporan/Penerbangan/2015/PK-LLA%20Final%20Report.pdf

- KNKT investigation number KNKT.17.01.02.04 involved Cessna 172 aircraft on 16 January 2017

  https://knkt.go.id/Repo/Files/Laporan/Penerbangan/2017/PK-MUA%20Final%20Report.pdf

- KNKT investigation number KNKT.17.01.05.04 involved PA-28 aircraft on 24 January 2017

  https://knkt.go.id/Repo/Files/Laporan/Penerbangan/2017/PK-PBO%20Final%20Report.pdf

3 SAFETY ACTIONS

In response to the occurrence, Akademi Penerbang Indonesia (API) Banyuwangi has performed several safety actions to address the identified safety issues.

In June 2024, the academy conducted a safety briefing for student pilots focused on stabilized approaches and bouncing recovery (Go Around Procedure) and revised the student guidance handbook to include the bouncing recovery procedure. Additionally, in September 2024, the API Banyuwangi held a socialization session on the bouncing recovery procedure for all flight instructors, providing the FAA Airplane Flying Handbook as a reference for flight instruction.

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