FLYABILITY

SAFE DRONES FOR INACCESSIBLE PLACES

How to Conduct Drone Inspections in High Risk Environments—Part 1 of 2

Thursday, November 5 2020

04:00 PM - 05:00 PM CEST

10:00 AM - 11:00 AM EST

MODERATOR

Zacc Dukowitz

Content Marketing Manager

—Flyability—

PANELISTS

Danny Landry

Unmanned Operations Manager

—Premium Inspection & Testing—

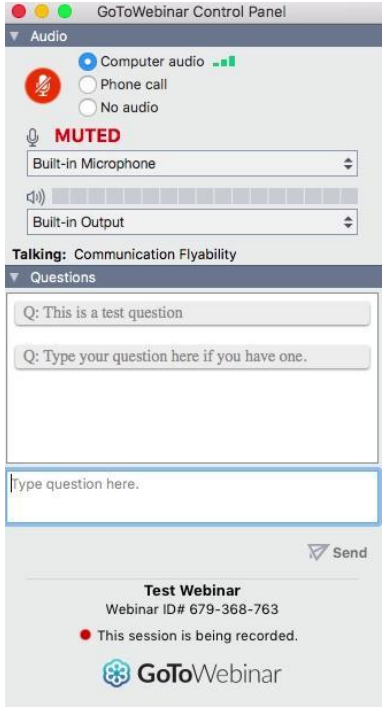
Charles Rey

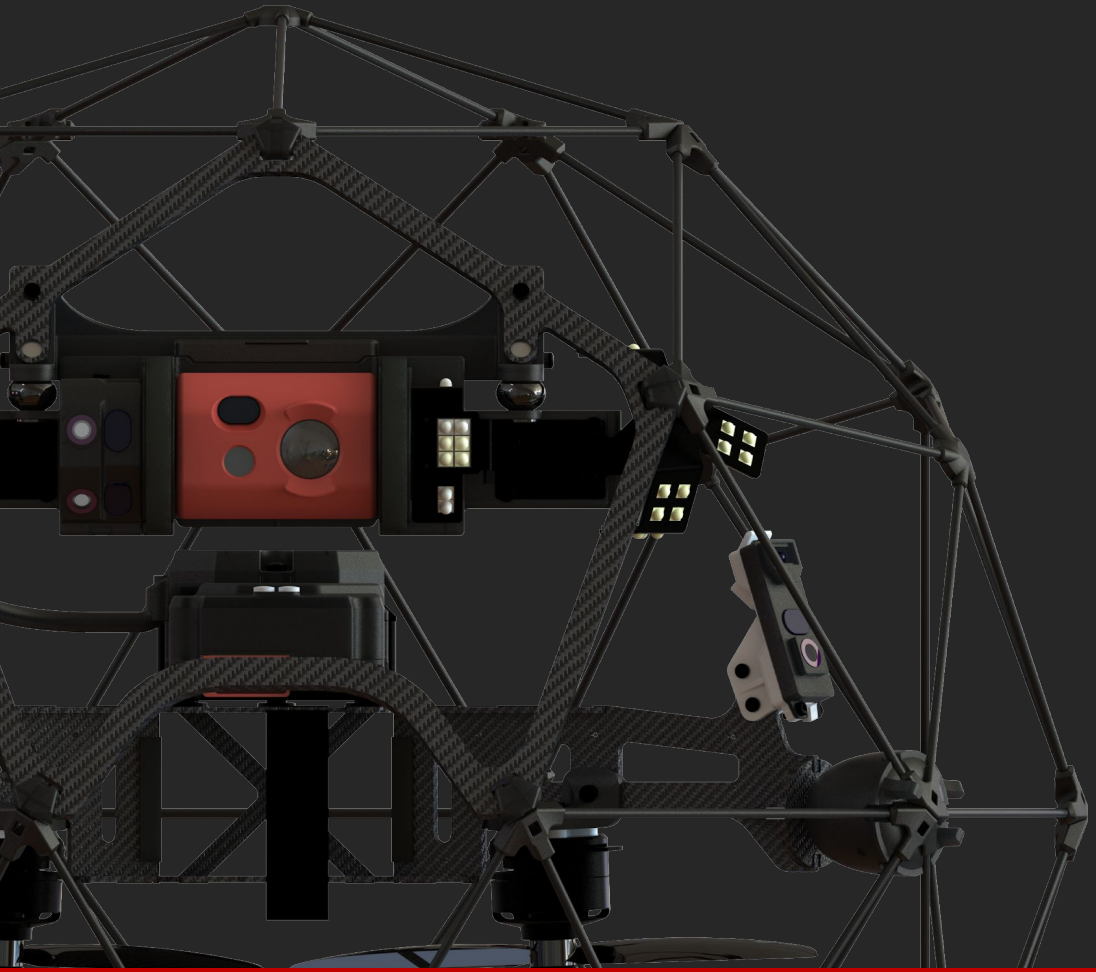
Training Manager

—Flyability—

WEBINAR ENGAGEMENT

Ask questions during the webinar.





REPLAY

The recording of this webinar will be sent to you afterward.

AGENDA

1 5’ Introduction

2 15’ Danny Landry, Premium Inspection & Testing

High Risk Missions—Operating Near Water Hazards and a Hydrocarbon Atmosphere

3 15’ Charles Rey, Flyability

High Risk Missions—Operating in a Mine and a Decommissioned Nuclear Power Plant

4 25’ Panel Discussion/Q&A

High Risk Missions—Operating Near Water Hazards and a Hydrocarbon Atmosphere

Danny Landry
Unmanned Operations Manager

PREMIUM
INSPECTION & TESTING GROUP

High Risk Environments – Water Hazards

- Internal Furnace
  - Unique design with many hazards present
    - Water
    - Dust
    - Air Draft
  - Step 1:
    - Ensure the atmosphere is clear of hydrocarbons
    - Install locks and tags & receive the proper permitting
  - Step 2:
    - Ensure that the pilot selected is competent and comfortable operating in the environment
    - Communication to the asset owner:
      - If the drone goes into the water, will someone be able to recover? if not->
      - Will the drone harm the process equipment if it remains in place? If not->
      - Do not proceed with the mission.

High Risk Environments – Water Hazards

- Step 3:
  - Operate the drone in a conservative manner
  - Use a tether to control the aircraft and get it out if needed
  - Allow the first few flights for intel gathering before focusing on inspection data collection
- Step 4:
  - Debrief – review learnings and areas of improvement
  - Calculate ROI
    - How much were you able to save using this method?
      - Reduction in cleaning costs/breathing air

The Solution – In Action

The Solution – In Action

The Solution – In Action

High Risk Environments – Hydrocarbon Atmosphere

- Internal flare stack inspection
- Hazards
  - Hydrocarbons present that need to be mitigated
  - Step 1:
    - Work with the safety/industrial hygiene dept.
      - Is a MOC needed?
      - Is mitigation even possible?
  - Step 2:
    - Cleaning and clearing the vessel of hydrocarbons
    - Depending on the vessel – putting the vessel under a nitrogen purge
  - Step 3:
    - Gas testing at multiple points to ensure LEL is at acceptable level (per MOC)
    - Proper permitting based on facility requirements

High Risk Environments – Hydrocarbon Atmosphere

- Step 4:
  - Energize the aircraft & complete the mission
- Step 5:
  - Debrief – review learnings and areas of improvement
  - Calculate ROI
    - How much were you able to save using this method?
      - Reduction in cleaning costs/breathing air
- Additional best practices
  - Ask for a waiver from the customer for damage to the aircraft as you may have to close off the vessel to maintain the purge
  - Try to avoid charging of batteries on sites where there are hydrocarbon risks
  - Prepare for the worst and do not take chances
  - Operate conservatively

The Solution – In Action

The Solution – In Action

The Solution – In Action

High Risk Missions—Operating in a Mine and a Decommissioned Nuclear Power Plant

Charles Rey
Training Manager

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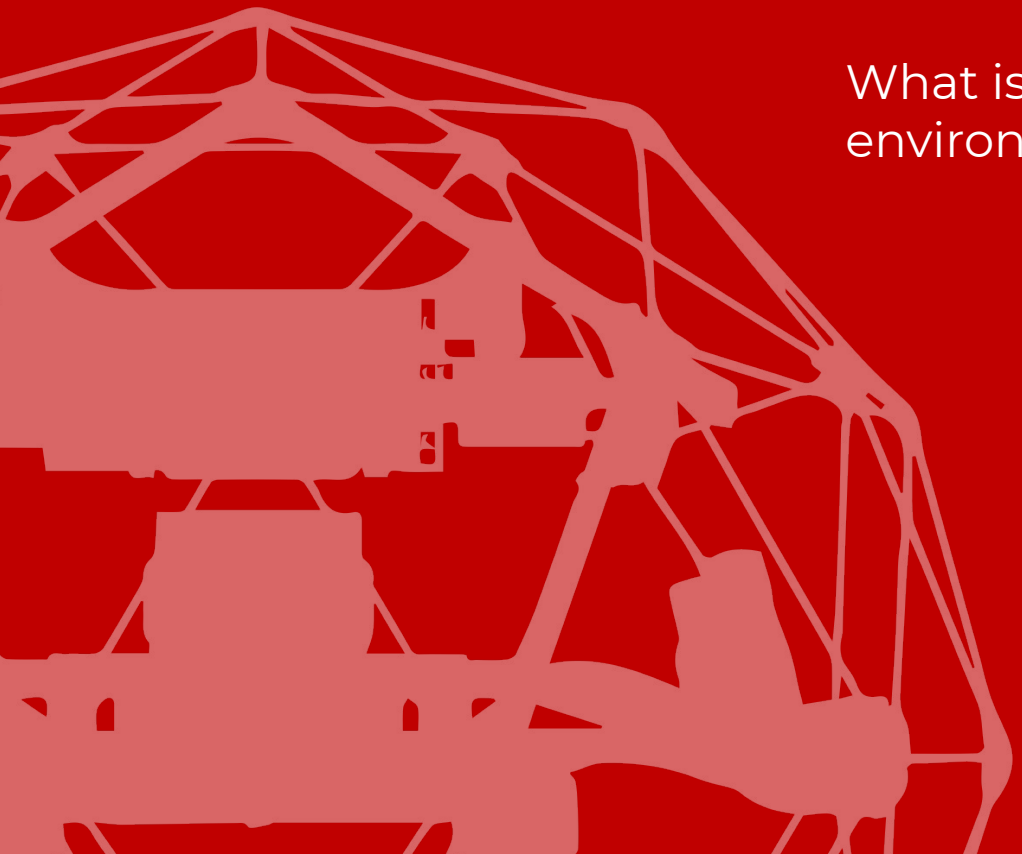


What is considered a dangerous environment?

- At height
- Unsecured ground
- Unstable ground
- Toxic
- Harmful or Irritant
- Corrosive
- Biohazard
- Oxidizing
- Highly inflammable
- Explosive
- Radioactive

The preparation will <u>always</u> be the key to successful inspection

For each inspections, we use 4 Checklists:

- **Weeks before the inspection**
  - Collect and analyse intel and blueprints
  - Understand the expectations
  - Analyze the risks
  - Decide on the flight path
  - .....
- **Day before the inspection**
  - Material check
- **Day of the inspection**
  - Follow the plan establish weeks ago
- **Day after the inspection**
  - Process the data
  - Material Check

Examples

Use Cases
(for today)

Orepass Blockage

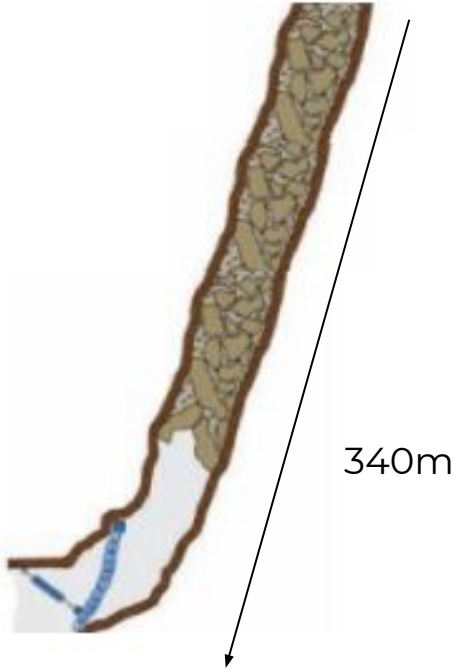
Decommissioned Nuclear Power Plant

Mining Case Study: Orepass Mission

Mining - Ore Pass Hang-Up

Inspection Objectives:

- Identify location of hangup



Intel gathered days/weeks before the mission

- Size and Diameter of the pipe
- Possible position of the pilot
- Distance to the Orepass
- How to oriente the antennas
- What have been tried to unblock the pipe
- List of all potential risk (protruding objects, water, signal loss, dust, gaz, wind, falling rocks…)
- What is the exact purpose of the mission (it should be described in the method statement).
- Plan the flights path, part that will be inspected on each flight, at which % of battery you will fly back……

How can you mitigate these risk

👷 Risks	Mitigation
• Falling rocks	Pilot position
• Sudden release of all hangout	Pilot position
• Shockwave	Pilot position
• Dust cloud	Respiratory masks
• Water splash	Fly close to the ceiling
• Falling rocks	Fly close to the ceiling
• Protruding objects	Always orient your camera
• Battery life	Check flight time and speed
• Signal loss	Assess if Rex is needed

Day of the inspection

- Travel to the inspection site.
- Meet your client and go through the method statement he sent back.
- Prepare your drone.
- Go through the check lists.
- Do a reconnaissance flight (check the risk, flight path, environmental conditions).
- If needed, check the recording of the flight on the tablet or computer.
- Start your inspection following the sequence you have prepared.
- Connect your drone to your computer and check that every flights has been recorded.
- If you are satisfied with the results, the flying part of your inspection is finished
- Pack your Elios.
- Check that you have all your material (using the list of material prepared the day before.)
- You can leave the flight area.

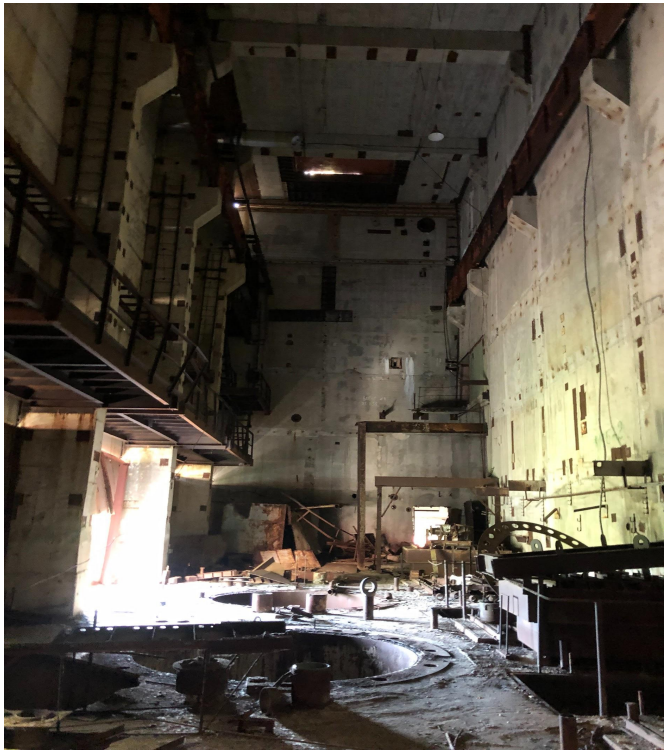
Decommissioned Nuclear Power Plant Case Study: Chernobyl Reactor 5

The plan was to build 12 reactors in Chernobyl

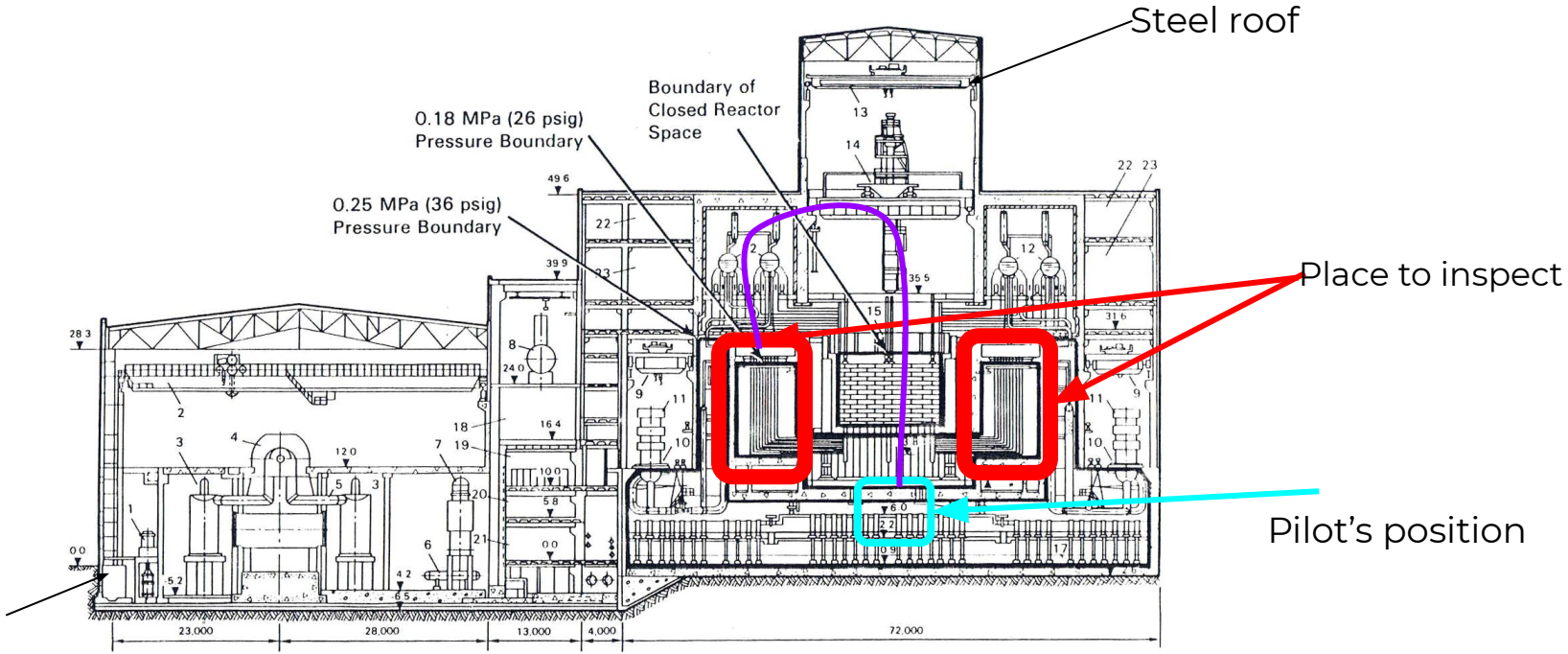
In 1986 reactors 1-4 were “functional”

Reactor 5 was 70% finish when the catastrophe happened on November 1986 and was never finished.

In 2019, a European commission asked for proof that no radioactive material had been left anywhere in Reactor 5.



Information we had before getting on site.



1 - First-stage condensate pump; 2 - 125/20-t overhead travelling crane; 3 - Separator-steam superheater; 4 - K-500-05/3000 steam turbine; 5 - Condenser; 6 - Additional cooler; 7 - Low-pressure heater; 8 - Deaerator; 9 - 50/10-t overhead travelling crane; 10 - Main circulating pump; 11 - Electric motor of main circulating pump; 12 - Drum separator; 13 - 50/10-t remotely controlled overhead travelling crane; 14 - Refueling mechanism; 15 - RBMK-1000 reactor; 16 - Accident containment vavles; 17 - Bubbler pond; 18 - Pipe aisle; 19 - Modular control board; 20 - Location beneath control board room; 21 - House switchgear locations; 22 - Exhaust ventilation plant locations; 23 - Plenum ventilation plant locations

Risk and mitigation

Risks	Mitigation
Falling objects	Reco flight of each room
Broken access	Having a guide
Radioactivity	Geiger counters
Evacuation route	Remember the way back
Falling objects	No contact with ceiling
Protruding objects	Always orient your camera
Battery life	Check flight time and speed
Signal loss	Co-pilot support

PAST WEBINARS

Thursday, April 9
10:30 AM EST / 04:30 PM CEST

Learn How API and ASME Experts Are Working to Expand Drone Inspection Applications

- Suzanne Lemieux, Manager, Operations Security & Emergency Response Policy at API
- Luis Pulgarin, Project Engineering Advisor at ASME

Tuesday April 14
11:30 AM EST / 05:30 PM CEST

How Country-of-Origin Drone Bans Impact U.S. Companies & Agencies Including Public Safety Agencies Fighting COVID-19

- Jordan Gross, Senior Government Relations Lead at DJI
- Romeo Durscher, Senior Director of Public Safety Integration at DJI

Tuesday, April 21
10:30 A.M. EST / 04:30 PM CEST

3D Modeling with Indoor Drones: Applications and Implications

- Andrew McIntyre, Technical Trainer and mapping expert at Pix4D
- Marc Gandillon, Head of Marketing at Flyability

Wednesday April 22
10:30 AM EST / 04:30 PM CEST

How to Build and Scale a Drone Program at Your Company

- Calvin Rieb, Head of Global Unmanned Systems at Cargill
- James Manni, UAS Program Manager at TVA

Tuesday April 28
10:30 AM EST / 04:30 PM CEST

Drones in Oil & Gas: How Chevron Uses Drones to Improve Safety, Reduce Downtimes, and Save Money

- Mauricio Calva, Non-Destructive Examination Expert at Chevron
- Larry Barnard, Downstream & Chemicals, Manufacturing ~ UAS Governance at Chevron

PAST WEBINARS

Thursday, April 30
11:30 AM EST / 5:30 PM CEST

Indoor 3D Modeling Use Cases: Photogrammetry in Action
- Laurie McBean, Geospatial Data Specialist at UAS, Inc.
- Gregory Spirlet, Professional Services Engineer at Flyability

Thursday, May 14
10:30 AM EST / 4:30 PM CEST

Drones in Power Generation: How Exelon Clearsight Uses Drones to Improve Safety, Reduce Downtimes, and Save Money
- Chris Place, Business Development Manager at Exelon Clearsight
- Marc Gandillon, Head of Marketing at Flyability

Thursday, June 25
10:00 AM EST / 4:00 PM CEST

How to Mitigate Intrinsic Safety
- Danny Landry, Unmanned Operations Manager, Premium Inspection & Testing

Thursday, July 2
10:30 AM EST / 4:30 PM CEST

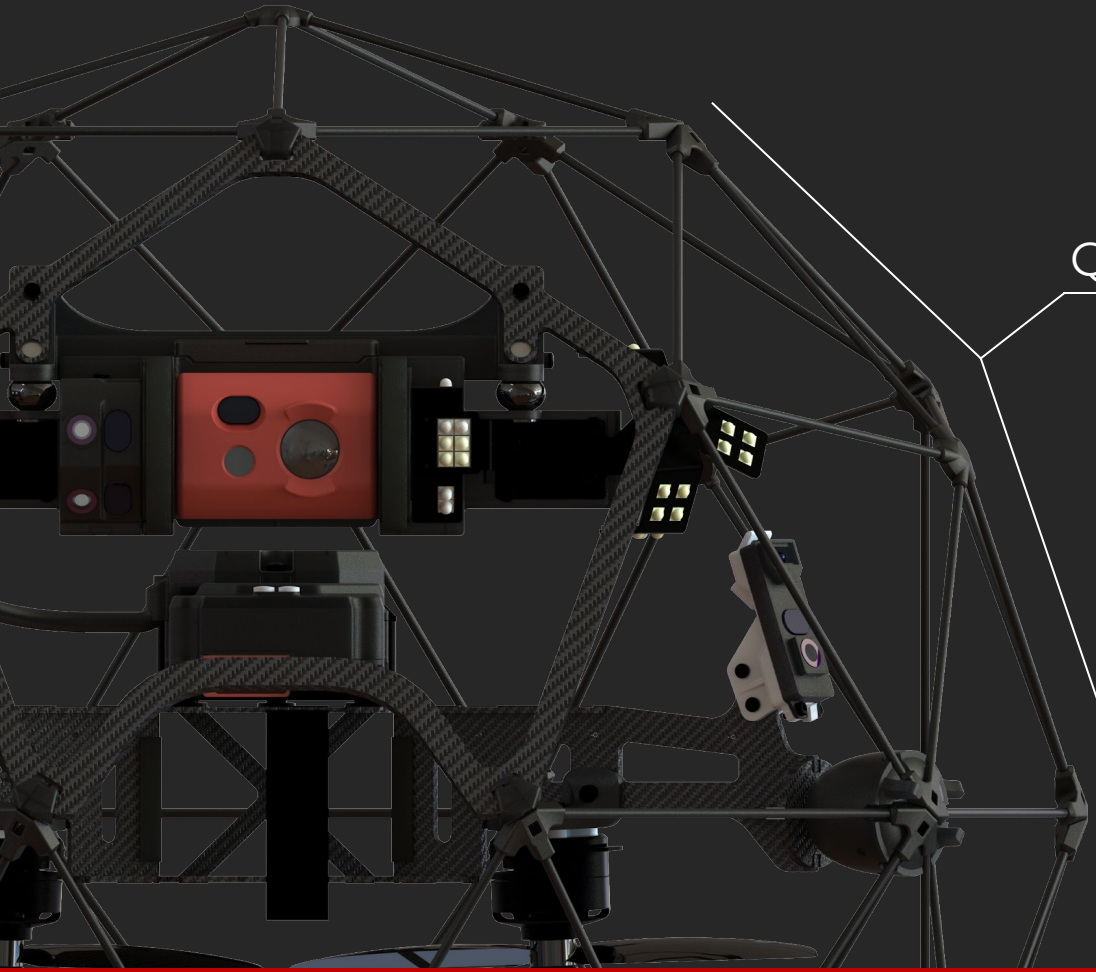
Drones in Marine & Offshore: Improving Safety and Reducing the Costs of Inspections
- Vincent Joly, Digital Solution Manager at Bureau Veritas
- Damien Thiery, Offshore Network Support and New Technologies Manager at Bureau Veritas

Thursday, September 10
10:30 AM EST / 4:30 PM CEST

How to Get the Most Out of Your Drone's Battery Life
- Geroge Burne, COPTRZ
- Ana Gamara, Raptor UAS

Thursday, October 22
10:00 AM EST / 4:00 PM CEST

How to Mitigate Loss of Signal When Conducting Drone Missions
- Mike Vanovermeir, MFE Rentals
- Gregory Spirlet, Flyability



Q&A

Send your follow-up questions to:

Danny Landry, Premium Inspection & Testing—
DLandry@pitinc.com

Charles Rey, Flyability
charles.rey@flyability.com

Junio Palomba, Flyability—
junio.palomba@flyability.com