

DeepStar presentation UT drone for offshore inspection



TerraDrone

2022/11/9



■ Current Issues

- UT(Ultrasonic Testing) inspections at offshore platform contains certain risk of safety and have less efficiency due to the harsh environments and unique difficulties.

■ Technical Solution and the Benefits

- Replace manual inspections with inspections executed by a “UT drone”.
 - No Risk of Working at heights.
 - Reduction of Working in confined spaces.
 - Prevention of downtime due to rope access, installation of scaffolding and conventional inspection.

■ How we can make it happen

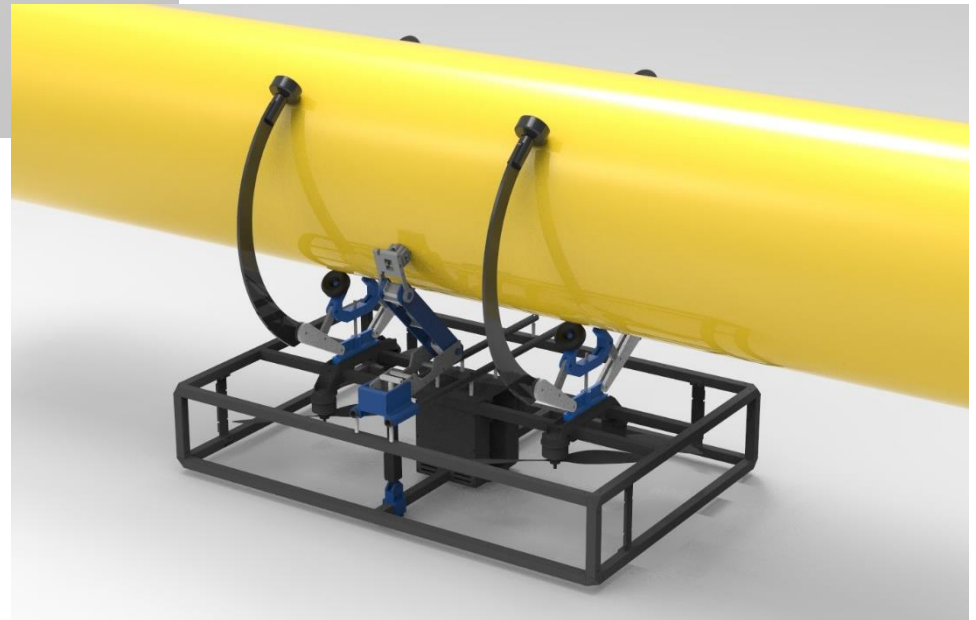
- Making the drone suitable for harsh outdoor environments.(Water and Wind resistance)
- Developing a versatile robot arm mounted on the UAV, suitable for different sensors (UT and Visual).
- Developing a versatile clamping/gripping mechanism for various structures like pipes.
- Data can be managed on a Cloud platform. Data can also be used together with 3d model or LiDAR data.

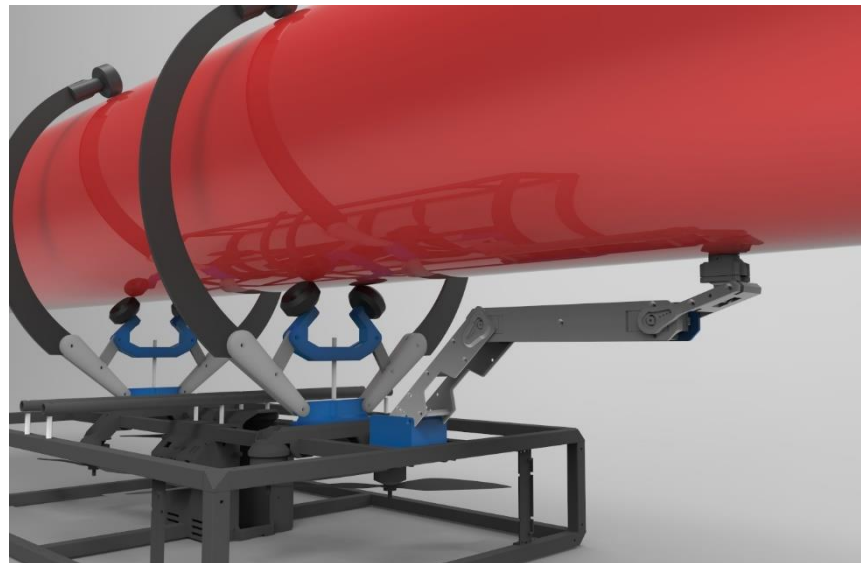
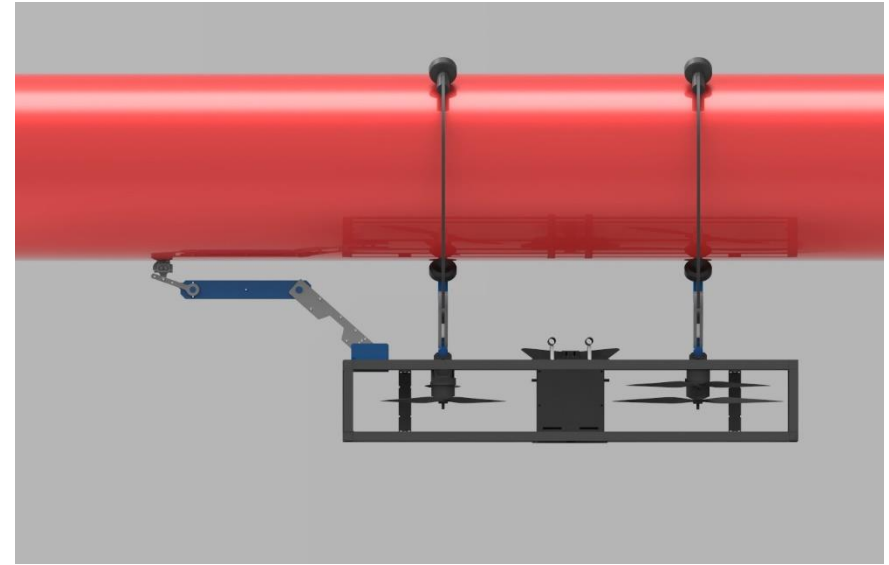


Terra Inspectioneering

DEMO 2/10

Concept - Pipe clamping mechanism





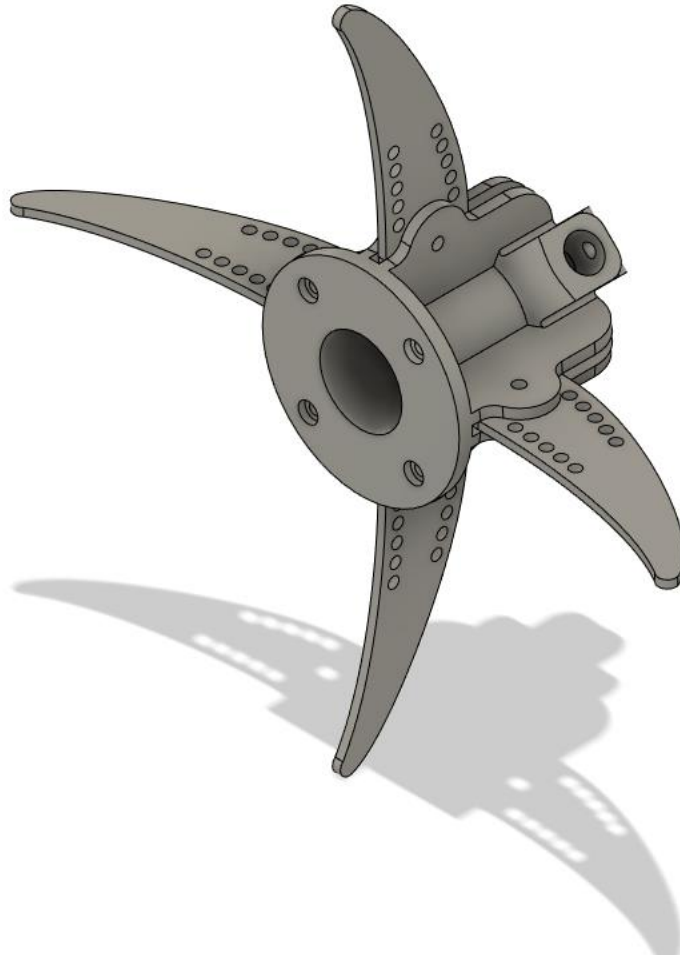
■ Limitation of Drone



- Drone should attach to wall by 3 point = Drone need large flat surface to inspect

- Drone becomes heavy, flight time will be shorter.
→ 15min to 5min
- Drone becomes very big, there are many point drone cannot reach.
→ 500mm*700mm*400mm to 500mm*700mm*800mm

- Install small module

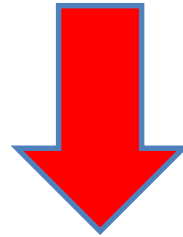




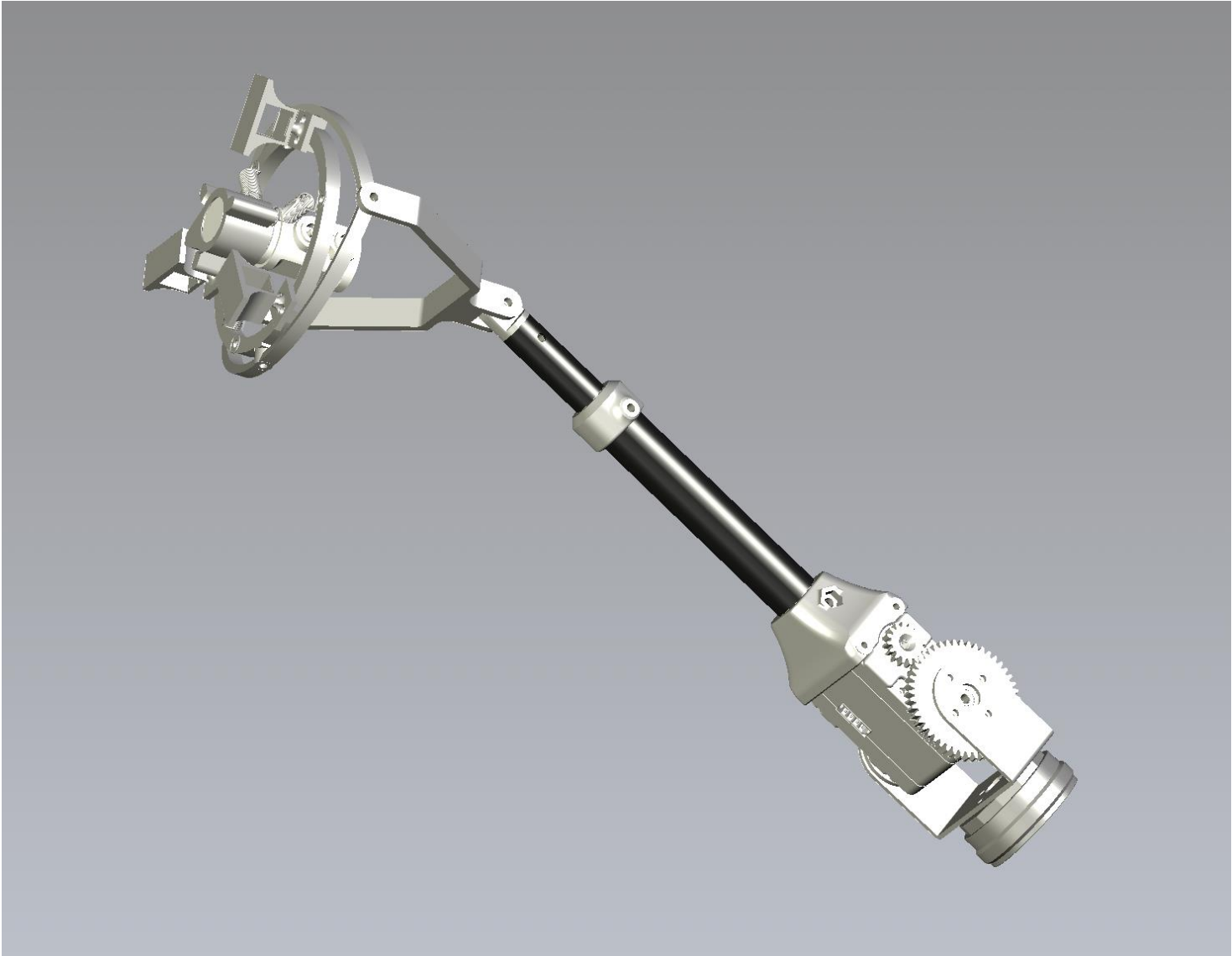


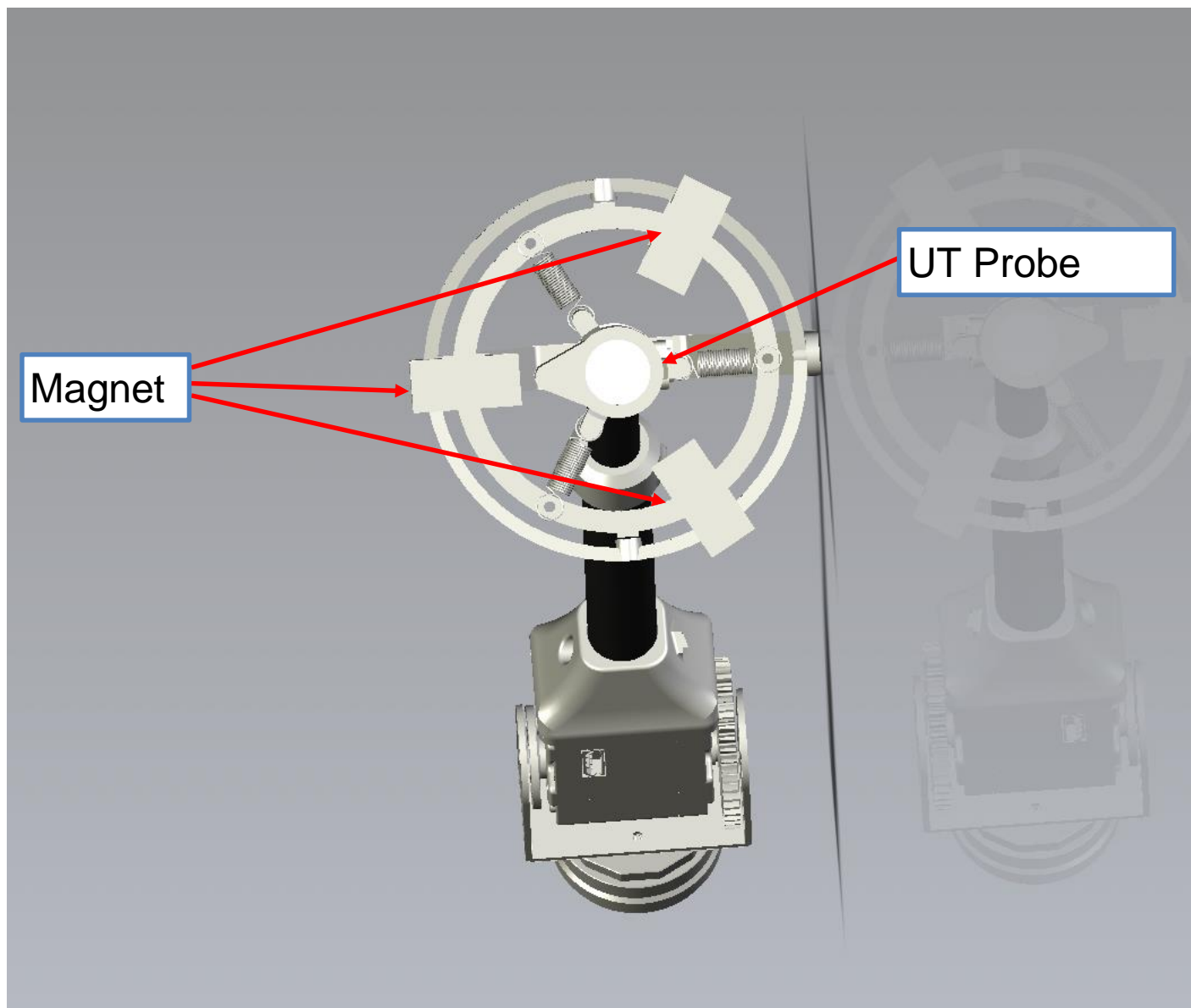


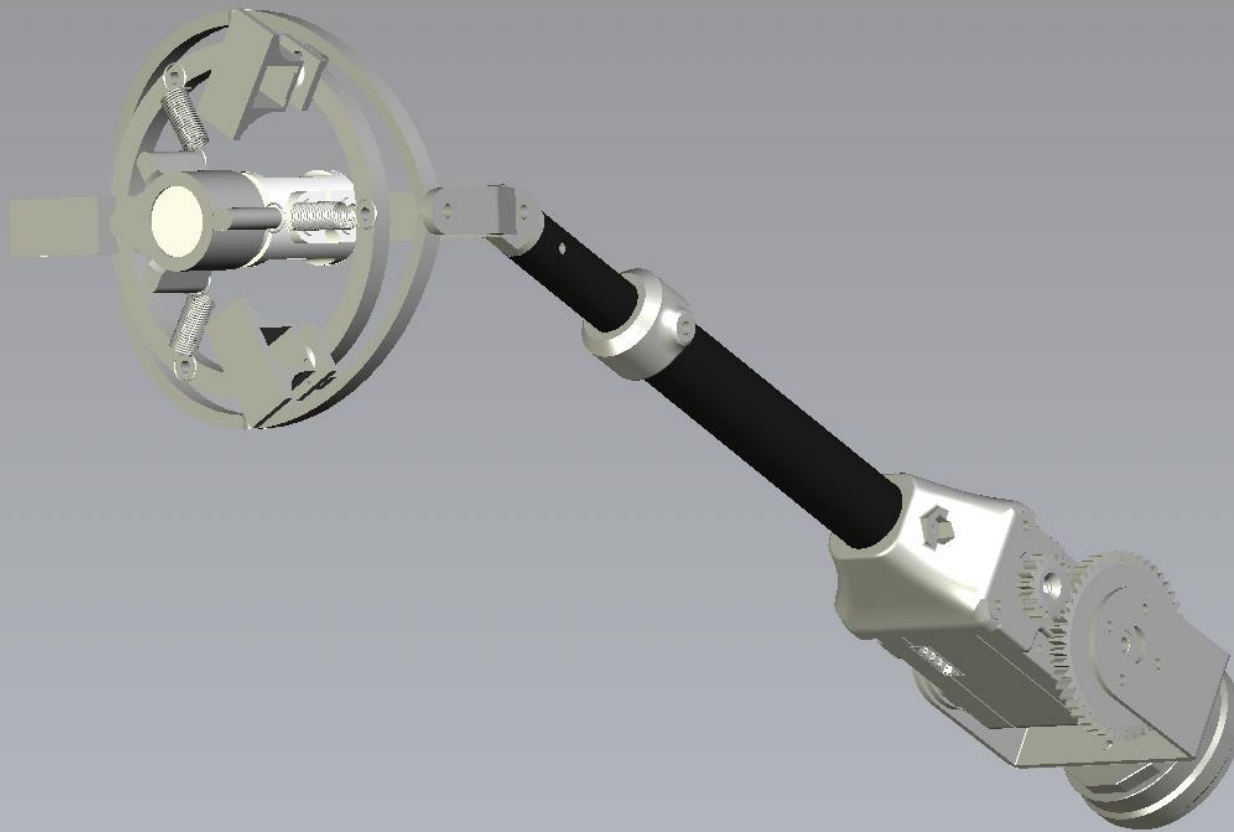
Problem: If wind is strong drone will move from attached point



Solution: We install electric magnet on UT module







altera
INFRASTRUCTURE



■ ABS



Certificate Number **22-5272056-A**
Effective Date 09-MAY-2022
Expiry Date 08-MAY-2023
ABS Port Office Rio de Janeiro
Company's Website <https://www.terra-drone.net/brazil/>

CERTIFICATE OF Recognized Service Supplier

This is to certify that

Terra Drone Brazil

located at

Company's Physical Address

having been audited by ABS and is issued a **one-year provisional approval** pending a satisfactory practical demonstration and reporting of the service listed below.

Remote Inspection Techniques as An Alternative Means for Close-up Survey of Ships and Mobile Offshore Units

Attached Certificate Appendix provides specific scope of approval, authorized personnel, manufacturer authorizations and subcontractors.

It is the responsibility of the Service Supplier to employ, train and qualify persons in the service provided. If the service requires approval from manufacturers, the Service Supplier is responsible to maintain contact with the manufacturer and maintain any service manuals up to date. Where required by the category of service, the Service Supplier shall provide valid evidence that it is authorized or licensed by the equipment manufacturer to service the particular makes and models of equipment for which approval is sought. If approval from the manufacturer is not attained, a surveyor must be present at time of survey to continue work. Alternatively, current written instructions from the flag state are to be obtained to continue work without the surveyor present. Service technicians must present photo identification, evidence of authorizations from manufacturers, as applicable, at the time of service.

The ABS office issuing this certificate is to be kept updated with changes to the management of the company, its employees, equipment and models on the authorization list and any changes made.




Vinicius Martins da Silva Pacheco, Surveyor



Certificate No:
AOSS0000JYT

APPROVAL OF SERVICE SUPPLIERS

This is to certify that

Terra Drone Brasil Servicos de Engenharia Ltda

Rio de Janeiro, Brazil

is granted acceptance for

Survey using remote inspection techniques (RIT) as an alternative means for close-up survey of the structure of ships and mobile offshore units , in accordance with Class Programme DNVGL-CP-0484.

This service supplier certificate will be accepted for use with all rule sets published by DNV.
See the following page(s) for details regarding application.

This Certificate is valid from **2022-06-23** to (inclusive) **2025-06-22**.

This Certificate is issued on **2022-06-23**.

for **DNV**



Phase 1: Analysis phase	<ol style="list-style-type: none">1. Define the inspection requirements of an offshore platform2. Define the environmental impact on UAV operations on offshore installations3. Gap analysis and software integration plan4. Define prioritized feature list
Phase 2: Prototyping phase	<p>Work packages:</p> <ol style="list-style-type: none">1. Making the drone suitable for harsh outdoor environments.2. Developing a versatile robot arm mounted on the UAV.3. Developing a versatile clamping&gripping mechanism for various structures.4. Integration of “Terra 3D inspect” cloud platform. <p>=> Continuous field testing of prototype in real life conditions</p>
Phase 3: Implementation phase	<ol style="list-style-type: none">1. Final design, BOM, productizing plan2. Hardware implementation3. Software implementation4. Operational test5. Operation manual6. Maintenance manual7. Training materials, certification program8. Final report9. Optional CE marking <p>=> CE/FCC certification for the main system is already in place</p>