



HYFLIERS



HYbrid FLying-rolling with-snake-aRm robot for contact inSpection

Automated non-destructive
thickness measurements

Targets oil & gas refineries, but
applicable to chemical plants and
other inspection technologies

Reduce inspection costs and
casualties

Project ID: 779411

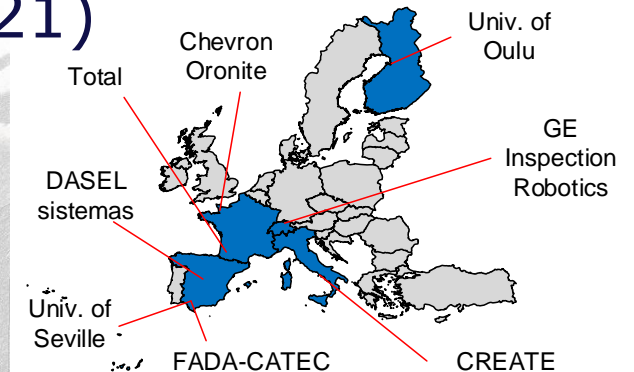
Call: H2020-ICT-25-2016-2017

4 years (2018–2021)

3,9 MEUR

8 partners

5 countries



Ambition/Objectives

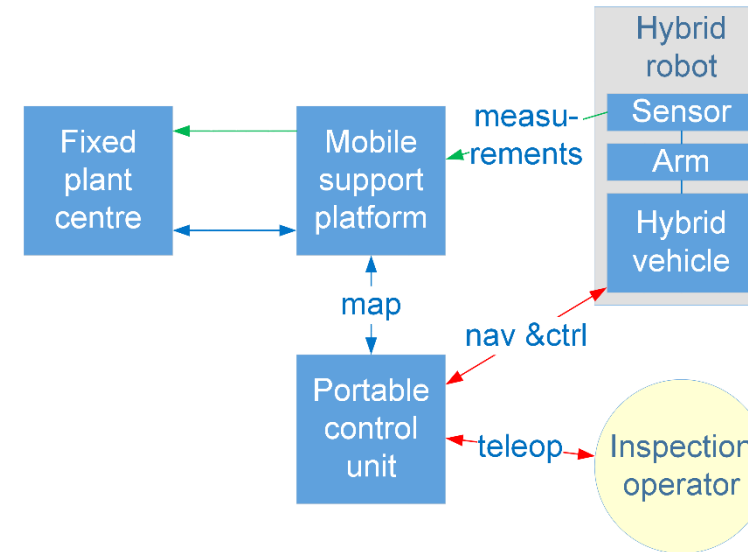
- **Use case:** Oil plant thickness measurements
 - Large number of pipes (**atmospheric and processing elements** → corrosion)
 - Ultrasound thickness measurements: **dangerous & costly** when carried by humans
- **Top Objective:** Exploit a robotic inspection system
 - **Reduce inspection costs** (ladders / scaffold / rope access / cranes to ensure safety of inspectors)
 - **Improve safety** (reduce exposition of inspectors to potentially dangerous working conditions)



Ambition	
World's first industrial integrated robot	Hybrid robot with aerial & ground mobility
Reach sites no other robot can access	Single long-reach, hyper-redundant arm
High accuracy	Inspection platform attached to the pipe
Endurance	Combination of aerial & ground locomotion

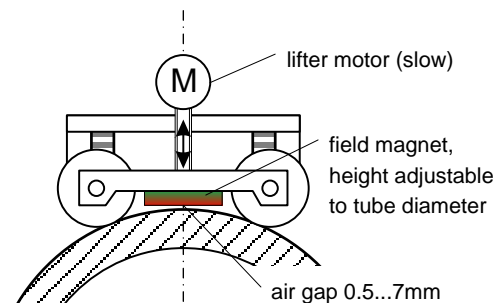
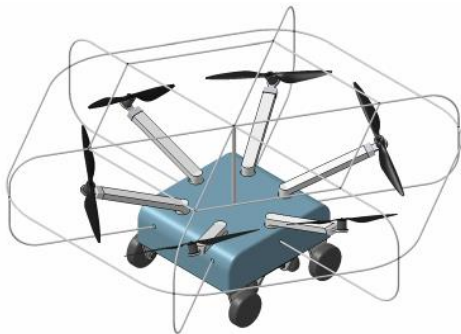
Approach

- **Complete system**, including
 - Hybrid (flying and rolling) robot
 - Robotic snake-arm
 - Miniaturised ultrasonic sensor
 - Mobile operation support platform
 - Navigation support, battery & couplant refill, data communication & processing



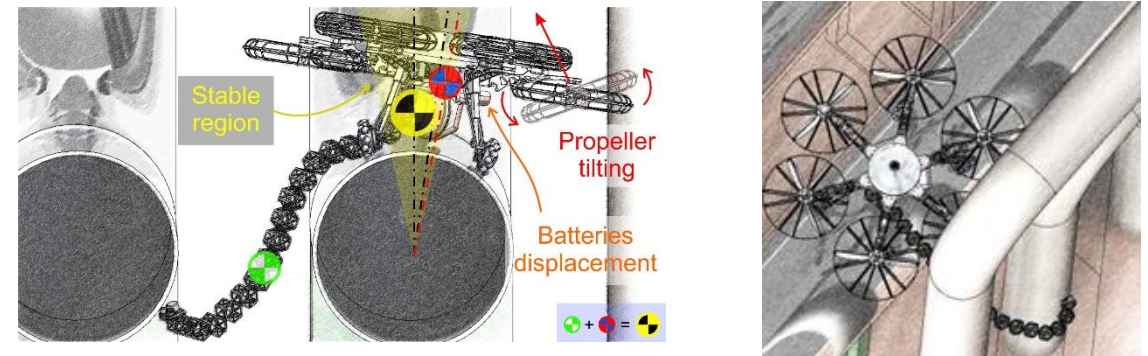
• **Prototype A: Hybrid Mobile Robot**

- Robot moves to bring sensor to inspection site.
- Magnetic attraction (stability on pipe, modulation for landing/take-off)



• **Prototype B: Hybrid Robot with Arm**

- Arm brings sensor to inspection site.
- Stability: propeller tilting, moving system's centre of gravity



Where we will make a change

- HYFLIERS will develop the **world's first industrial integrated robot with hybrid air and ground mobility with a long-reach hyper-redundant manipulator capable of reaching sites where no other robot can access.**
- HYFLIERS targets ultrasonic thickness measurements for oil and gas refineries and chemical plants
- HYFLIERS will generate savings (M€/year) only in the ultrasonic thickness measurement budget of refineries
- Results validated together with two world leading oil and gas companies
- HYFLIERS results could be **applied to many other industries** maintaining **Europe at the forefront of robotic inspection technologies.**

