



Leonardo Helicopters

## EASA Rotorcraft and VTOL Safety Symposium 2022

# Is modularity an enabler for eVTOLs, or are eVTOLs enabling modularity?

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Luca Medici – Aircraft System Integration

European Rotors 2022

9th November 2022



Electronics



Helicopters



Aircraft



Cyber &  
Security



Space



Unmanned  
Systems



Aerostructures

# Is modularity an enabler for eVTOLs, or are eVTOLs enabling modularity?

## A bit of background and history on Conventional Architectures

*Piasecki HRP Rescuer*



*AW101*



*Vought-Sikorsky VS-300*



*Boeing CH-47  
Chinook*



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## Is modularity an enabler for eVTOLs, or are eVTOLs enabling modularity?

Modularity in Helicopters has usually been tested / experienced in:

AVIONICS

MATERIALS

ENGINES

SENSORS

SYSTEMS or COMPONENTS



# Is modularity an enabler for eVTOLS, or are eVTOLS enabling modularity?

## Modularity in Helicopters: some examples



*AW Family*



*Bell UH-1Y Venom and AH-1Z Viper*



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# Is modularity an enabler for eVTOLs, or are eVTOLs enabling modularity?

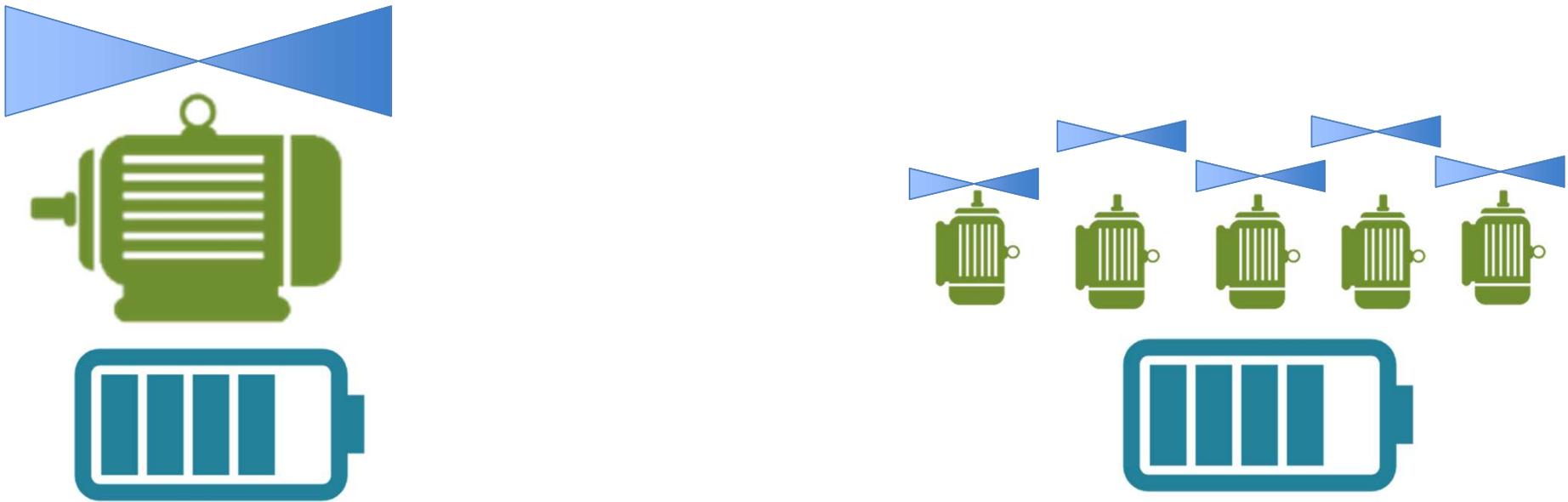
**Modularity in Helicopters:  
some considerations**



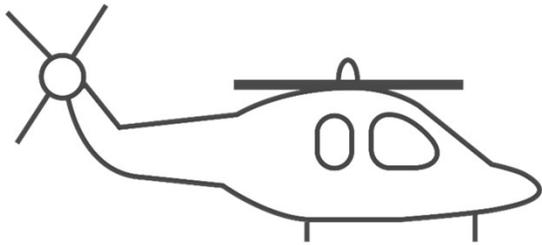
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## Is modularity an enabler for eVTOLs, or are eVTOLs enabling modularity?

Electrical VTOL challenge has been the game changer for configurations



## Helicopters and eVTOLs: a short comparison



**Thermal Engine + Rotors/Blades + Fuel**

### **LIFT**

Single Propulsion System (engine)  
+ 1 / 2 big rotors > complex system

Optimal solution for short/medium distances  
For bigger distances > tiltrotors and compound

Mechanic and Dynamic tuning (Propulsion + Lift)



**Electrical Motors with propellers + Batteries**  
**Green Technology (Zero CO<sub>2</sub> emissions)**

### **LIFT**

Multiple electrical motors + batteries  
+ multiple Propellers/small rotors

Less complex systems with smaller and  
distributed multilifting, but what about their  
current autonomy?

Mechanically decoupled



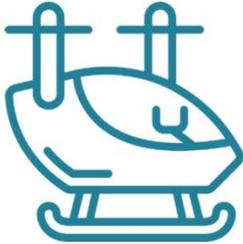
# Is modularity an enabler for eVTOLs, or are eVTOLs enabling modularity?

<https://evtol.news/aircraft>



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## Modularity for eVTOLs



### MODULARITY IN COMPONENTS:

Distributed multilifting system  
Batteries > Green Technology

### MODULARITY IN PROPULSION:

Multiple Approaches > propulsion and lift «decoupled»

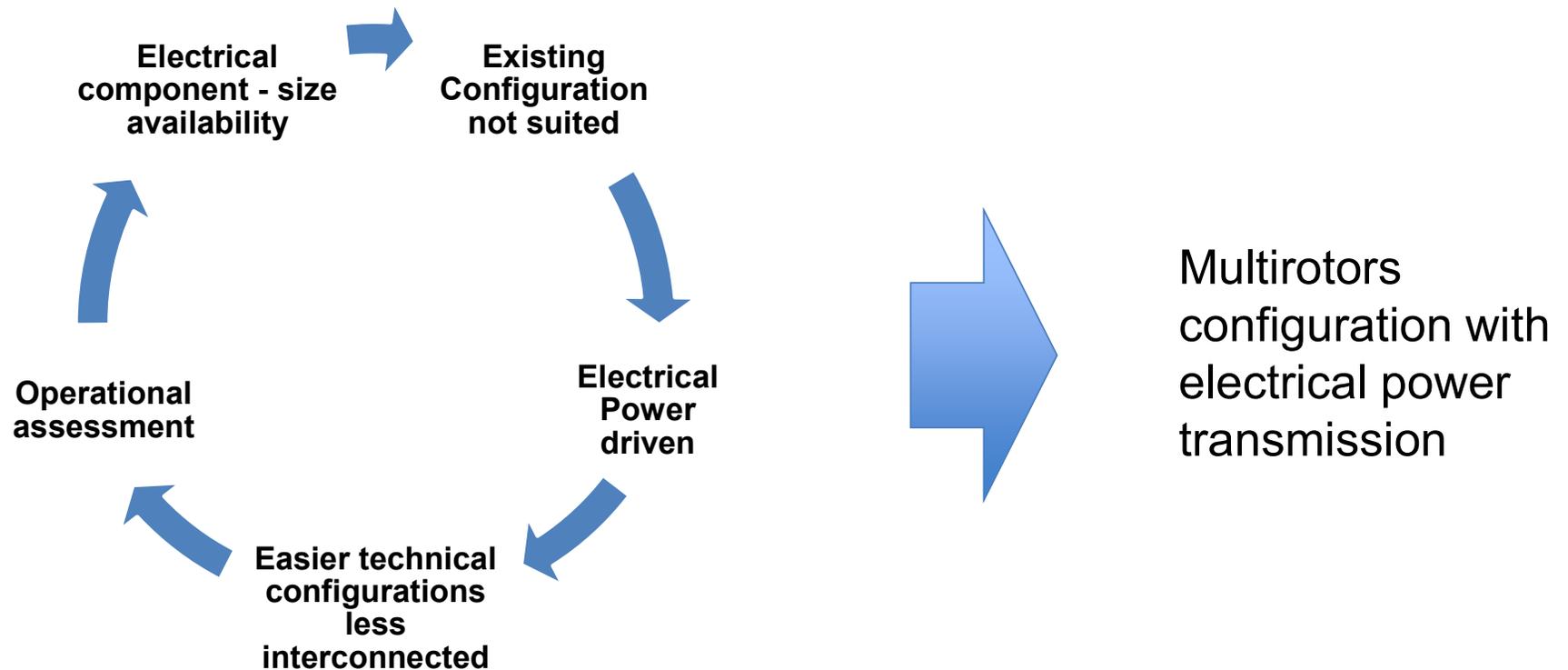
### MODULARITY IN CONFIGURATION:

Fixed wings and Propellers/Rotors



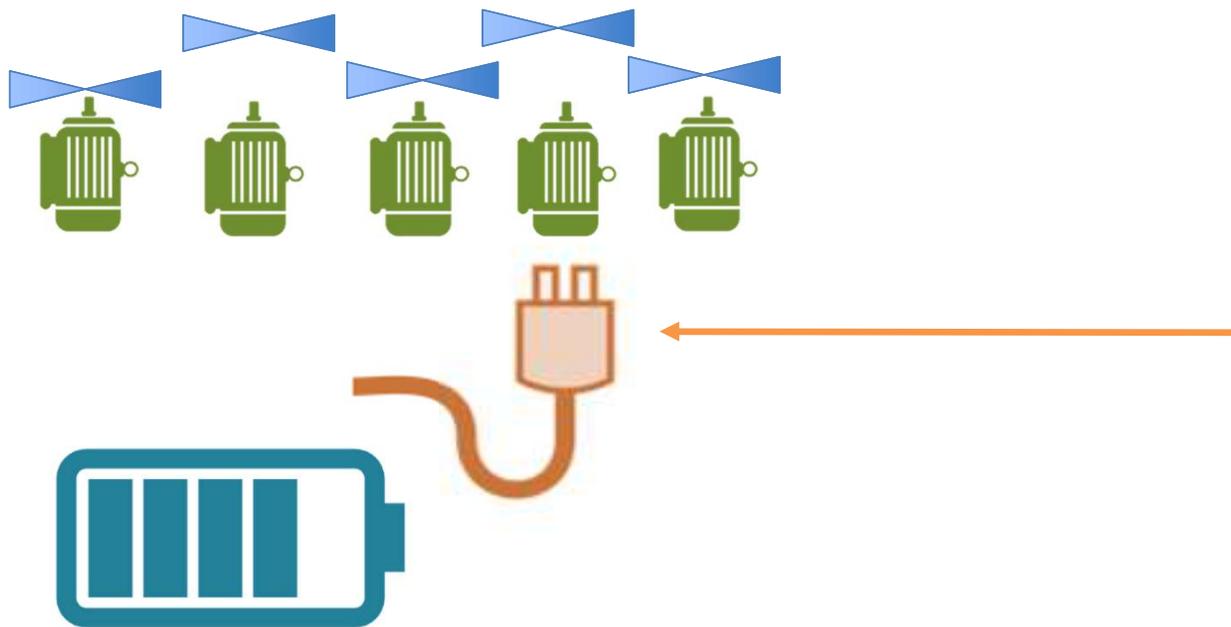
# Is modularity an enabler for eVTOLS, or are eVTOLS enabling modularity?

## Modularity drivers



## Platform Architecture – Modular component

### Further Modular considerations

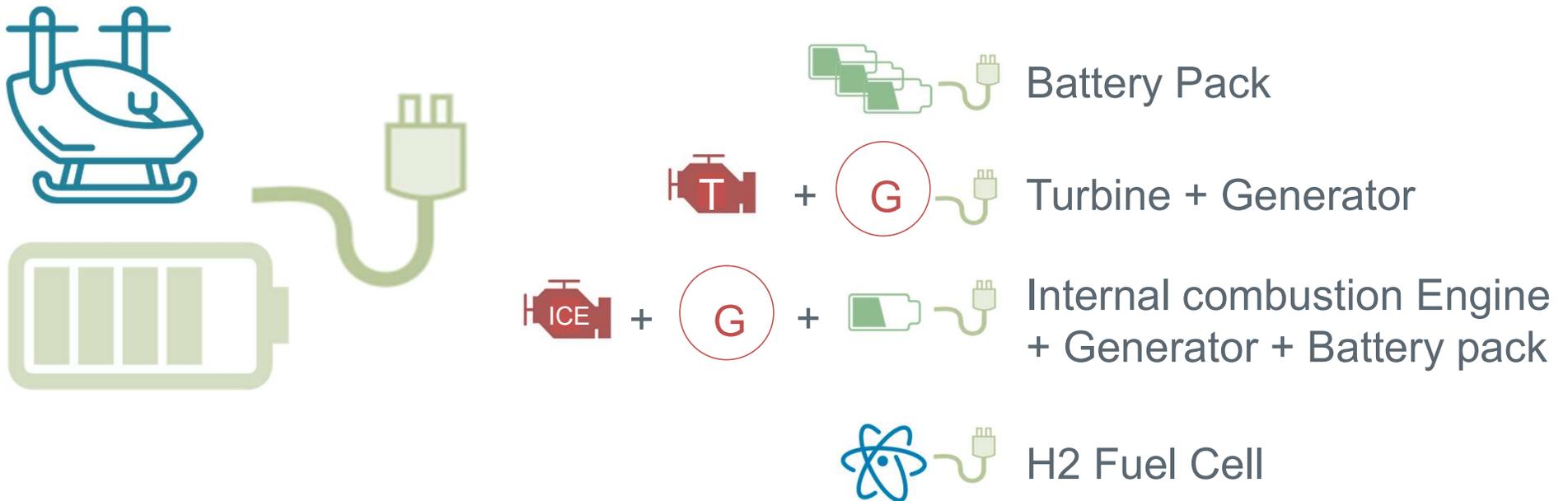


**Here there is a physical split element enabling a further modularity concept**



# Powerplant Architecture – Modular component

The powerplant modularity allows to follow various approaches:



# Vehicle Architecture – Modular approach component and optimization

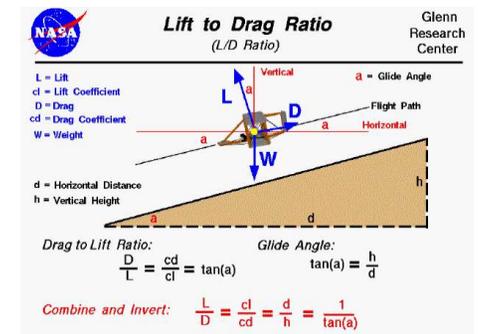
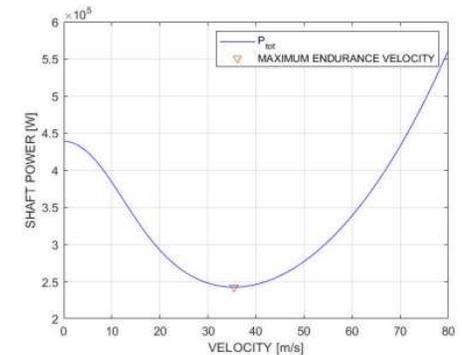
Multirotors

PossibleWing  
contribution

Various option  
for powerplant



Modular enablers  
for development



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## Is modularity an enabler for eVTOLs, or are eVTOLs enabling modularity?

### Recapping

- Modularity offered by the eVTOLs need has pushed creation of New Configurations and Usage to complement Helicopter and Power Lift machines
- Modular lifting systems offered by electrical power distribution systems
- Modular Electrical power generation systems offered by the electrical “decoupling”
- New configuration tailored and driven by operation requirements.





THANK YOU  
FOR YOUR ATTENTION

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