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Design of energy system for light aircraft of hydrogen fuel cell

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Abstract: comply with the development trend of green aviation,This article takes a hydrogen fuel cell powermoving light aircraft to research object,launched the aircraft's energy system programDesign Research.The aircraft is a_species two light aircraft,

Keywords: primarily for beginnersDriving training,Private traffic,photography,aspects of sightseeing.with hydrogen fuelbatteryas an energy source for aircraft to reduce air pollution from private aviation.

1. hydrogen fuel Cell Energy system design method in the scheme design of the energy system,The first has to do with the energy supply chainDesign,,and then determine the required power for Take-off of the aircraft(is the maximum power of the motorratefuelcell selection and calculation of hydrogen storage required after.

1.1 architecture for hydrogen fuel cell energy Systems

The architecture of the hydrogen fuel cell energy supply system is shown in the figure1shows.

Power is supplied mainly by hydrogen fuel cells,The hydrogen gas for the fuel cell is made up ofhydrogen storage tank offers,oxidizer is absorbed from outside air by oxygen lift

for.hydrogen storage tanktypecomposite storage tankcan withstandBaK?MPa)air pressure,has a very high energy density.

Add an extra battery to the energy system(Lithium Battery)canprovide additional power to the energy system,forexample aircraft takeoff and climblcanalso be used as backup batteries for hydrogen fuel cells,in case of emergencyuse, toIncrease the security of the aircraft.

in Figure1,Hydrogen passes throughthe hydrogen pathway with compressed air through theOxygen Path Input fuel cell reaction,generated current passing throughDC/DCConverter power supply for electricalmachines,the battery is connected to theDC/DCConverterThecan be used as an auxiliary battery for fuel cells.In addition the water generated by the reaction can be""to be stored as coolant for the entire energy supply system.

because the required power for different flight states is different,requires a differentPower mode.in cruise flight status,only use fuel cell power,The isavailablefor power supply with lithium battery for supplemental power whenthe fly on..

1.2 required Power

One of the key points of the energy system design is to calculate the aircraft flying in differentrequired power in the line state.

It is very dangerous for aircraft holds to catch fire in flight,Commercial aircraft holdsgenerally located in the lowerpart of the cabin floor,in flight people cannot access and view.

Isbased ontheccar857bar,Such holdsareclevel holds,CThelevel holds the following conditions:

(1)has an approved,Standalone smoke detection or fire detector system,give warning at driver or flight engineer's

work location;

(2)has a that can be manipulated from the cockpit,Anapproved fixed fire extinguishing orSuppress system.

current aircraft smoke detection systems commonly used to detect cargo hold smoke andfire.holdsmoke detection system from hold smoke detectors and controller groupto.Smokedetectors detect smoke in cargohold,Controller received smokeThe smoke alarms from the probe after the aircraft avionics system in the cockpit totheflight crew alarm.Air cargo hold fire severely threatens aircraft and crewsecurity,the flight crew must execute the hold smoke immediately after receiving the smoke warningTheFog emergency procedure,includes releasing cargo fire extinguishing agents and landing as soon as possibleand emergency evacuation of passengers after landing.The effect on the aircraft when thecargo holds fire withouta control is catastrophic..When there is a cargo compartment smoke falsepolice,theflight Crew is unable to enter the cargo hold to confirm that it is a false alarm,onlyhandle in the harshest of cases,execute cargo hold smoke emergency procedure immediately,fromand caused unnecessary fire extinguishing agents to be released,tochange flights and emergency evacuation.and flight crew landing at unfamiliar airport and emergency evacuationall

There may be an unsafe accident.So the cargo compartment smoke false alarm will

(3)volumetric calculation of hydrogen storage tanks

Fuel Cell group usage scenarios based on aircraft flight phases,Application(9)or style([),get the hydrogen mass flow at all stages of the aircraft,table4show.

Large economic loss,can even affect flight security.cargo hold false alarm notonly on security and economic impact of single false alarm,The also behaves as aHigh false alarm rate.diagram1toFAAandNASAstatistics1990~Yearcargo hold smoke warning data,shows from the diagram,different yearfalse alarm rate for copies in90%~100%between,This means most of the goodswarehouse Smoke alarm is false alarm.

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