Green tuning

From Appropedia

Green tuning refers to the modifying (or tuning) of vehicles (e.g. cars, public transport, boats, aircraft) to use initial or deeper alternative propulsion.

Contents

Types of tuning

Several types of modifications can be performed. These can be general (usable with most vehicles), as well as vehicle-specific. For example, ships can allow additional or other modifications due to their size

(e.g. adding of auxiliary propulsion as sails), while aircraft have usually fewer green tuning options as they require greater amounts of power and may run on engines that cannot be converted to emission-free engines (e.g. jet engines, turbofans, etc).

General tuning

- Hybridization: change to a hybrid electric vehicle. One can use an aftermarket kit [1]for the powertrain or use a hybrid adapter trailer.
- Modifying key engine-selection parameters in the Battery Management System of a hybrid vehicle. Vehicles as mild hybrids have a parameter for the threshold speed on which the vehicle is to switch from electric propulsion to the internal combustion engine. Introducing a higher speed as a parameter can reduce emissions and increase fuel efficiency (although it may increase strain on the battery). [2]
- Pluginization of hybrid or electric vehicles. [3]A plug-in hybrid electric vehicle (PHEV) is a hybrid which has additional battery capacity and the ability to be recharged from an external electrical outlet. A plug-in electric vehicle is basically the same, without an extra internal combustion engine. In addition, modifications are made to the vehicle's control software. The vehicle can be used for short trips of moderate speed without needing the internal combustion engine (ICE) component of the vehicle, thereby saving fuel costs. In this mode of operation the vehicle operates as a pure battery electric vehicle with a weight penalty (the ICE). The long range and additional power of the ICE power train is available when needed.
- Electric vehicle conversion. An electric vehicle conversion is the modification of a conventional internal combustion engine (ICE) driven vehicle to battery electric propulsion, creating a battery electric vehicle. In some cases the vehicle may be built by the converter, or assembled from a kit car. In some countries, the user can choose to buy a converted vehicle of any model in the automaker dealerships only paying the cost of the batteries and motor, with no installation costs (it is called preconversion or previous conversion).
- Modifying the engine to run a alternative fuel. These include natural gas conversion of gasoline-powered cars and Vegetable oil conversion of diesel cars. Cars with Diesel engines can be converted

reasonably cheaply and easily to run on 100% vegetable oil. Vegetable oil is often cheaper and cleaner than petrodiesel, but local laws often levy harsh fines to users who fail to pay fuel taxes when acquiring their fuel outside regular distribution channels. Liquid nitrogen, Hydrogen fuel conversions and Ethanol conversions are other alternative fuel conversions that can be done with internal combustion engines. The first two will eliminate all vehicle emissions, while the third one will only slightly decrease emissions. A more complete list can be found at Comparisation of alternative ICE fuels.

- Replacing the internal combustion engine of a hybrid vehicle with a hydrogen fuel cell to make the vehicle completely emissionless; even in recharging mode.
- Adding a hydrogen fuel cell to a battery electric vehicle to increase its driving range.
- Adding more electric batteries to a battery electric vehicle to increase driving range. Besides placing more batteries, this operation offten requires additional modification of the Battery Management System.[4]

Ship tuning

- Nuclear-propulsion conversions may be done with large ships (e.g. cargo vessels). This may be done through the use of micro nuclear reactors.
- Additional regular sails, kites/royals, turbosails, rotorsails, windmills, wingsails or SkySails's can be added. Some of these (e.g. rotorsails, turbosails) can be easily added; especially as they do not need to be directed towards the wind and convey their power directly to the propeller. If rotorsails or turbosails are chosen, they can be also be fitted with a climate change-mitigating seawater evaporator similar to Stephen Salter's Cloud Seeder (http://news.bbc.co.uk/2/hi/programmes/6354759.stm) .
- Adding energy storage devices as oxyhydrogen generators, which may generate oxyhydrogen from seawater. The seawater may need to be filtered in advance, which may be done by implementing a filter. If a internal combustion engine was installed priorly, it may be perhaps converted to allow allow the running on oxyhydrogen. Besides converting the electrical energy to oxyhydrogen from

rotor/turbosails when no movement is needed (eg when anchored, moored, ...), additional power may also be gathered from on-board PV solar panels, luminescent solar concentrator panels or from grid power (obtained from power plugs when moored at the port).

- Adding hydrofoils or air cavity systems to reduce the energy required to propel the boat; in certain cases allowing the sole use of alternative energy, where this could previously not be achieved.[5] Air cavity systems could be made by cutting out a metal rectangle underneath the boat, while hydrofoils can be placed on older boats by welding them on [6][7].

Aircraft tuning

Aerodynamic improvements

The fuselage can be fitted with several improvements which increases the aerodynamic properties of the aircraft, hereby decreasing the need of generating large amounts of energy to keep it airborne.

- Wingtip device can decrease some of the energy required to keep the aircraft airborne.
- Airplanes can also be foreseen with lighter-than-air gases (http://www.damninteresting.com/?p=359) such as helium or hydrogen. These gases may be placed in extra wings, such as with the Bauhaus luftfahrt boxed wing (http://peswiki.com/energy/Directory:Flight) aircraft.
- Boundary layer suction is another technique that can be used to decrease the energy required to keep the aircraft airborne. To implement it to the aircraft, a suction pump is placed and holes are drilled in the fuselage. The pump then sucks air from these holes, improving the flow of air around the aircraft. The technique works, but has traditionally consumed so much power that it was not worth doing. The necessary internal ducting is another problem. Work continues at TU Delft.
- Aircraft may be foreseen with special fuselages which make advantage of the wing-in-ground effect. The aircraft includes airships, helicopters and airplanes.

Reducing energy requirements for auxilliary systems

- As the technical and infrastructural challenges inherent in developing a commercially usable hydrogen-powered aircraft are huge, the implementation of hydrogen as a power source to power the auxiliary systems has been one of the first changes that are being made by aircraft builders. Boing for example has completed several such projects. [8][9]

Engine conversion

- Electric aircraft conversions is one possibility to]eliminate the emissions of aircraft, but reduces the range of the aircraft greatly. This was seen with projects as the E-flight initiative. [10] Photovoltaïc panels could potentially be hooked up to the system so as to recharge the batteries during flight, but this has only proven useful with especially created (very light) aircraft.
- IC engine conversions for aircraft have only received limited attention.
- Replacing the internal combustion engine of an aircraft with a hydrogen fuel cell has been done by several companies. Boeing's Research & Technology Europe (BR&TE) for example has made a civilian aircraft made from a 2-seat Dimona motor glider running on a fuel cell. (called Theator Airplane)". [11][12] Lange Aviation also made a hydrogen-powered airplane with its Antares DLR-H2 airplane.[13] The Russian manufacturer Tupolev also built a prototype hydrogen-powered version of an aircraft; namely the Tu-154 airliner. Named the Tu-155, it made its first flight in 1989.[14]
- For jet engines, Reaction Engines A2 has been proposed to use the thermodynamic properties of liquid hydrogen to achieve very high speed, long distance (antipodal) flight by burning it in a precooled jet engine. Also, Boeing too has plans to build a hydrogen-powered jet [15].

References

1. ↑ Plug-in Hybrid Retrofit Kit (http://www.evworld.com/news.cfm?newsid=21291)
2. ↑ Modifying key parameters in the battery management system (http://www.lusciousgarage.com/services/sections/cat/modifications)
3. ↑ Pluginization of electric vehicles (http://www.greengears.net/about.php)
4. ↑ Adding more electric batteries to BEV (http://www.elektor.com/magazines/2008/january/e-blocks-more-than-100-mpg-from-a-toyota-prius.321726.lynkx)
5. ↑ Air cavity systems (http://www.marinetalk.com/articles-marine-companies/art/Air-Cavity-System-Might-Save-Fuel-DKG00271646TU.html)
6. ↑ http://www.foils.org/motofoil.htm Installing your own hydrofoils]
7. ↑ Installing your own hydrofoils 2 (http://www.foils.org/sailfoil.htm)
8. ↑ Boeing experimenting with hydrogen (http://cordis.europa.eu/data/PROJ_FP5/ACTIONeqDndSESSIONeq112242005919ndDOCeq1266ndTBl
9. ↑ Boeing powering auxiliiary systems of A320 with hydrogen (http://www.autobloggreen.com/2008/02/20/airbus-successfully-tests-fuel-cells-in-civilian-aircraft/)
10. ↑ E-flight initiative (http://www.gizmag.com/go/7695)
11. ↑ Boeing Fuel cell airplane article 1 (http://www.manufacturing.net/article.aspx?id=156880)
12. ↑ Boeing Fuel cell airplane article 2 (http://www.boeing.com/phantom/news/2007/q1/070327e_nr.html)
13. ↑ Lange Aviation Antares DLR-H2 (http://www.fuelcelltoday.com/online/news/articles/2008-05/DLR-research-aircraft-takes-off-using-hydrogen)
14. ↑ Tupolev.ru (http://www.tupolev.ru/English/Show.asp?SectionID=82)
15. ↑ Boeing plans to make hydrogen-powered jet (http://www.seattlepi.com/business/72466_airbus30.shtml)

See also

- Green vehicle
- Alternative ICE fuel generator

- Labor force
- Low-energy vehicle
- Vegetable oil economy
- Vehicle glider (car converter).
- Vocational education

Interwiki links

- Wikipedia:Green tuning

External links

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