American Journal of Engineering and Applied Sciences

Original Research Paper

The Quality of Transport and Environmental Protection, Part I

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Article history
Received: 06-07-2017
Revised: 14-07-2017
Accepted: 8-09-2017

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Abstract: The today main challenge to protect the environment through the development of new and more efficient transportation systems is presented. The absolutely necessary goods distribution and human transfers are polluting and damaging the environment and new solution should be envisaged; the conflicting strategies to adopt new types of environment friendly transportation while maintaining operative the more economically convenient, but largely polluting, already existing machines are discussed and compared. Shipment is an activity that is occurring since the existence of man who felt the need to find ways for him and his goods transportation. Physical human body limits have led to the discovery of a variety of systems for a continuous transportation evolution. This work analyzes the new environment friendly technologies that have been recently developed or that could be further implemented in the next near future. In view of the constantly improvement of the quality of transportation to be carried out, the transportation sector has various aspects that need to be investigated. Passenger comfort, flexible design, maximum interior space, safety and greater range are main features that improve transportation efficiency while making these technologies more familiar and accepted by consumers. Avoiding any excessive generalization, the three major transportation interacting branches, namely, infrastructures, vehicles and management have been reviewed. Such a complex system needed the application of an evolutionary design approach considering renewable energy sources for Hydrogen production as well as electric or internal combustion engines. The overall transportation network and related terminals have been involved as infrastructures, while all aspects of design, construction, operation diagnostics and traffic interactions have been considered for the vehicles. Finally, the management of the engineering responsibilities chain to ensure quality, safety and environmental impact of the transportation systems has been assessed.

Keywords: Transportation Quality, Modern Transportation, Environmental Friendly Transportation, Sustainable Transportation, Flexible Transportation, Transportation Hydrogen Technologies, Electric Based Transportation, Bus

Introduction

Transportation refers to the movement from one place to another of persons and goods, signals or information. Its etymology comes from the Latin verb "Transportare", namely, to carry beyond from "trans" (meaning beyond) and portare (meaning to carry).

Transportation is an activity that is occurring since the existence of mankind. Physical limits of the human body for long distances that could be travelled

on ground and the quantity of goods that could be transported, have led, over the time, to the discovery of a variety of new ways and new transportation systems (Petrescu, 2012).

One of the today main challenges is to protect the environment through the development of new and more efficient transportation systems (Apicella *et al*., 2010; Aversa *et al*., 2017). Goods distribution and human transfers have being absolutely necessary at all times; nevertheless, they are polluting and damaging the environment (Aversa *et al*., 2017a; 2017b; 2017c; 2017d; 2017e; 2016a; 2016b; 2016c; 2016d; 2016e; 2016f; 2016g; 2016h; 2016i; 2016j; 2016k; 2016l; 2016m; 2016n; 2016o).

Humanity is struggling between the technological tests of implementation of new types of environment friendly transportation and the need to maintain operative the more economically convenient but largely polluting already existing technologies, which remain the one more familiar to customers.

Transportation is an activity that is occurring since the existence of man. Shipments are born with the man who felt the need to find ways for him and his goods transportation. Physical human body limits have led to the discovery of a variety of ways and new transportation systems (Aversa *et al*., 2016 a-o; 2017 a-i).

Passenger comfort, flexible design, maximum interior space and greater range are the principal and main features that allow transportation efficiency to growth but, at the same time could allow these technologies to become more familiar and accepted by consumer.

By simplifying, but avoiding any excessive generalization, the three major transportation branches, namely, infrastructures, vehicles and management should be considered and discussed.

The overall transportation network and terminals has considered as infrastructures, while all aspects of design, construction and operation diagnostics, traffic and management have been presented for vehicles. Finally, the engineering responsibilities chain to ensure quality, safety and environmental impact of the transportation systems management has been discussed.

Transportation infrastructure comprises all transport network formed by roads, highways, railways, waterways, flight tracks, pipelines, etc. and terminals such are airports, railway stations, bus stations, ports, etc).

For vehicles we meant cars, trains, ships, etc. and all the related aspects of design, construction and operation of vehicle diagnostics and traffic management.

The management of the transport, conversely, is the responsibility of the transport engineering and of the engineering of the systems and of the networks of transport, which has as its final objective the optimization of the entire transportation systems, the increase in the transport safety, the environment protection, practically, the improvement of the quality standard for the transport performed.

This work is aimed to analyze the new environment friendly technologies that have been recently developed or that could be further implemented in the next future especially in view of the constantly improvement of the quality requested for the transportation galaxy. The complex transportation system has various critical aspects and features that need to be parallelly considered and implemented by applying an evolutionary design approach (Aversa *et al*., 2016a).

Energetic Efficiency

Development and diversification of road vehicles and other media, especially in the automotive sector, together with the evolution of thermal engines, in particular those with internal combustion (which can still be considered the most compact, robust, independent, reliable, powerful and dynamic machines) has forced to faster development of new devices, mechanisms and assemblies components that were improved but that still do not have solved the pollution and environment damaging (Barrett and Odum, 2000; EU Bulletin, 1996; 2001; 2004; 2005).

The problem of engine very low energetic yield, which is a huge nuisance due to the very high power and fuel consumption, is principally related to the mechanics and cycle time coverage. These issues have been greatly improved and regulated in the past 20-30 years through the development and introduction of new mechanisms of distribution, which besides the higher yields and optimal functioning, are free from noise, vibration, which are associated to lower fuel consumption that can be reached when the engine speed has increased from about 5000-6000 to about 30000 [rpm].

Better performance can be also achieved by increasing the mechanical efficiency of the main engine mechanisms and the distribution systems, up to values that allow maximum saving of fuels (Mahalingam and Ramesh Bapu, 2013; Petrescu, 2012).

Today, all internal combustion engines (but also those with external combustion that are still used) operate at the highest standards, with reduced amounts of fuels while remaining at very low levels of vibration and noise and with emissions extremely low, which respond to the current highly restrictive regulations (EU Council Directive, 2015). Road transport, which is contributing for about about 20% of the EU's carbon dioxide total emissions, is the main contributor to greenhouse gas. Even if these emissions decreased by 3.3% in 2012, they are 20% higher than in 1990. It can be stated that transport is the only sector where greenhouse gas emissions are still increasing.

Both crude oil reserve and current energy production capability of mankind are limited. Nevertheless, until the implementation of new energy sources will become real in replacing fossil fuels, the first alternative solution for

the actual energy and fuels requirements is even "to reduce fuel consumption of a motor vehicle", conversely, we shall burn oil, gas and derived biofuels (this is why they had to be carried out in some countries such as Brazil, United States, Germany, etc) and, later on, burn Hydrogen extracted from the water (Anderson, 1984; Petrescu *et al*., 2016a; 2016b; 2016c).

Hydrogen, the single proton core element of life that can be obtained theoretically through different chemical or nuclear reactions, although abundant in the universe, in our galaxy and in our system the solar, it is very little present on Earth. However, although not present, it can today be extract from water in huge amounts and its extraction energy efficiency has become even acceptable and its combustion with Oxygen releases thermal power and water so that it does not pollute the atmosphere as hydrocarbons alcohols, vegetable oils, or other biofuels do. However, Hydrogen, if to be used as a liquid fuel, needs to be first compressed and liquefied after its production by electrolysis or chemistry, then it should be transported by special surface vehicles or pipelines and then it has to be stowed. Even if locally produced and used in place, no environmental or energetic advantages can be envisaged for the production of Hydrogen from hydrocarbons even in the case that it was chemically produced at very low cost. However, the devices required for the storage are not ready to be effective. The Hydrogen, therefore, would be the ideal fuel if it could be burned without storage just immediately after extraction from water.

If we use an electric motor instead of the classic one used for hydrogen, energy consumption would be about 10 times more efficient. Moreover, let assume that we want to cut more nuisances, produced by a heat engine that operates with hydrocarbons and convert this engine to hydrogen. Considering that the energy required for the liquefaction and storage of hydrogen is more than 10 times higher, the passage of a single engine to hydrogen would involve the use of 10 hydrocarbons motors only for the liquefaction and storage of the amount of Hydrogen needed to run a single engine. Therefore, the really global pollution was increased by a factor of about 10 times.

In order to overcome this impasse we could consider renewable clean energy sources, (wind, sun, water fall, etc) to store the Hydrogen. In this case we could really reach the objective of elimination of global pollution by passing on fuel hydrogen. However, we still have to argue on the real energy economy since the energy used to obtain a full of hydrogen, there would have been fed directly at least ten motor vehicles equipped with electric motors.

On the other hand, as long as the more we get electricity and thermal energy by burning of hydrocarbons and the electric motors of the cars are supplied with electric batteries charged from a socket, the losses resulting and pollution of the environment are much higher than if we have used fossil fuels directly on cars equipped with heat engines classic or modern. Today there is only a single variant of the electric motor auto convenient, namely that at which the electrical accumulator is loaded directly from the solar radiation sensor from the photovoltaic cells distributed directly on the automobile (Petrescu and Petrescu, 2003). The problem in which we stood seems to have no solution for time, so the idea of the use of hydrogen stored it can be said that has failed, for the time being, hydrogen being implemented more to buses, i.e. where can be built more easily a special base for bottling of hydrogen and of the supply to the buses (Grunwald, 1980; Petrescu and Petrescu, 2003).

Even so it would be better that hydrogen to be entered first on all the buses in circulation which comply with the condition that the energy used for the storage of hydrogen to be obtained directly from renewable sources, because the current consuming from the public network for each engine past we use hydrogen ten other engines on hydrocarbons to generate the current that it stores the hydrogen (it is well known that on the planet of electrical energy is still obtain and from the hydrocarbons, in percentage raised by about 40%), (Heywood, 1988).

Otherwise, if we loosen water directly in the hydrogen and oxygen and we will immediately send the hydrogen for their combustion directly into an engine, or in a specialized burner (burning full making it in cells) the implementation of hydrogen as a fuel would be one of great successful. Here experiments have come very far, because of the slight separation of water in her components using the ultraviolet some or in the mini cellular honeycomb type using nanotechnologies (Naima and Liazid, 2013; Mirsayar *et al*., 2017).

Magnetic motors (combined and with the electromagnetic) are only at the beginning, but they offer us a happy perspective especially in the aviation industry. At first they will not be able to be used in direct actuation of the transmission, but will generate electrical current that will fill the accumulator from which it will actually power the engine (probably an electric motor).

A great relaxation was the introduction of hybrid cars, in particular with the burning of hydrogen in the cells (fuel cells), but even although already used on a large scale in Asia, Europe and the Americas over 10 years, method is today only a drop in the "Ocean" cars on hydrocarbons (Karikalan *et al*., 2013; Aversa *et al*., 2016a; 2016b; 2016c; Ronney *et al*., 1994).

Hybrid cars have helped them very much to the production of a real change, but their percentage planetary drive is still very small compared with conventional cars which already reached to a park in circulation which has exceeded from more time, one billion (Sethusundaram *et al*., 2013; Zahari *et al*., 2013).

For the time being, in addition to the hydrocarbon reserves existing, it is announced the discovery of new supply, in particular gases which although are more difficult to extract, have the advantage of exist in very large quantities. In this way we will be able to extend the life of the "old Otto" and that of "Santa Claus Diesel" (Amoresano *et al*., 2013; Leet *et al*., 2004).

The shale gas has represented a real bubble of oxygen for the Blue Planet and for the heat engines. With them was able to diminish again the fossil fuel price, after decades of the energetic crisis and the price increases on the barrel of oil (De Falco *et al*., 2013).

Even so it will be still need engineers and researchers, in order to improve the thermal engines used (the power group), the transmissions of power together with the train of the driving and even the motor vehicle in its assembly. Reduce fuel consumption for a given type of vehicle, for one hundred miles travelled, has occurred in constantly from 1980 and up to the present and will continue to do so in the future (Sapate and Tikekar, 2013).

Even if it will grow hybrids and cars with electric motors, let us not forget that they must be loaded with electric current which in general is obtained through the combustion of fossil, mainly in the oil and natural gas in proportion the current planetary of about 40%. People burn petroleum (oil) in large thermal centrals, to keep warm, have hot water and electricity for domestic consumption, street, industrial, commercial, etc. and part of this energy we will spend it additional on (auto)vehicles with electric motors, but global energy issue does not be solved and the crisis even deepens. It so happened when we forced electrified rail for trains, when i generalized reminding the subway, consuming suddenly more electric current product especially from oil; oil consumption has sharply increased and the price or had to take a giant leap.

The appearance of the worst of this (which seems to have gone unnoticed by the great governments of the contemporary world) is that pollution and consumption due to the additional combustion of petroleum, petroleum products and natural gas in the energy centrals of the world, they have grown very much and very suddenly, due to the increased consumption of electricity obtained in large part from the combustion of classic who are on the verge of extinction (the oil reserve of the earth could actually exhausted in the next 50-60 years if go on like this, as for the time being the new energies implemented, renewable energy sources and sustainable only if carried out for around 25% of the overall production efficiency, approximately 40% being still performed by the new biofuels, from biomass, of nuclear energy obtained by both fission and hydroelectric plants). For the time being wind energy, the solar, the obtained from the tide, from the waves of the seas and oceans of the thermal springs, chemical, or by various other routes, just touches now for around 20% of the worldwide production of energy (including the electric one). Probably generalize suddenly and electrical cars (although we are not ready yet for this), we will make a new blow the reserves of oil and natural gas so that instead of being to their life make such reserves at 100-200 years we will brief them at 30-40 years.

Fortunately (lately) has been developed very much biofuels, biomass and nuclear energy (so far that based on the reaction of nuclear fission).

They together and with hydropower, have managed to produce about 40% of energy actually consumed globally.

Alternative sources will take them by themselves a major unsuspected manipulation, but we wait for the energy provided by them to be much more consistency in the global percentage, in order to be able to us to rely on them in real mode (otherwise, we risk that all these alternative energies to remain just a sort of "fairy tale" in which it has invested so much with fewer results). Alternative sources were almost non-existent until the year 2010, when they started to develop very much (Ganapathi and Robinson, 2013).

Until when will be ready the new nuclear plants on fusion, mankind is obliged to ensure the energy resources necessary for the future it, in particular by sustainable energy renewable, cheap, clean, friendly.

As long as the renewable and sustainable will not be at least 80-90% of worldwide output energy, there is no point to replace today more other thermal engines of vehicles with electric motors.

Maybe only can we say that because of the Classic car (with heat engines) in the middle of the energy crisis and not only energy efficiency, of 1970 and until today), the production of cars and motor vehicles has increased in a brisk pace (but natural), instead of going down and they have been placed on the market and used. It was starting at the crisis of the world energy (in the 1970 s) from around 200 million vehicles on the globe, it has reached the figure of approximately 350 million in 1980 (when he declared for the first time the energetic crisis and fuels, the world crisis), in 1990 there were some 500 million vehicles on the globe and in 1997 the number of vehicles registered at world level exceeded the figure of 600 million. In 2010 flows on the entire planet over 800 million vehicles. Already the number of road vehicles in circulation, which has increased by four times during the period of the crisis in 1970 and until 2010, reaching from 200 to 800 mil., reached and one billion. Who could quickly remove from circulation a car park of a billion of motor vehicles and to replace it in its entirety with one electrified? With what money, when the increased efforts of the governments of all countries, can hardly to withdraw from circulation annually about 1% of the fleet of vehicles which exceed 20-30 years when they are in the movement?

Today the ideas and models for the car of the future have multiplied more than ever and grow further on the passing day. We are powerless witnesses to a barrage of new solutions on the engine or transmission of the motor vehicle. Hybrids which promised an immediate problem resolution (which they haven't brought so far) shall vary on a monthly basis.

Perhaps that is not bad to have touched a diversification an extreme. This betrays the technological revolution which we live in directly, but and the fact that we have some problems related to energy, fuels, pollution, etc, still outstanding, who ask for us and our models (patents) up to find some final forms and solutions (Feldman, 2008).

We can hear it more and more frequently of biofuels (Diesel thought first or engine for operation with biodiesel blends, more exactly with the vegetable oil extracted biological of the hazelnuts, but diesel fuel that when indigenous has managed to take the place of the biofuels at that time and then a very low price).

Recently it was born the idea of using seaweed to achieve superior fuel plant. Given the huge amount of algae that we could harvest in the oceans, the variant is really interesting.

The MagLev (Magnetic Levitation) has been working successfully in China and Japan for many years once again demonstrating the superiority of the forces exerted by electromagnetic fields (Petrescu, 2012).

Modes of Transport

The Land Transport

Inland transport is the most common form of transport. People can move through their own forces or with the aid of means of transport that use the manpower, such as bicycle, or may use the traction animal, to draw the carts or other types of linkages. The most widespread and efficient form of inland transport used vehicles fitted with engines supplied with liquid fuel. In Romania the inland transport is represented as follows:

- Transport by rail-railways; total: 11380 km from which the electrified: 3971 km
- Road transport of persons-network of roads: 198817 km, asphalted: 60043 km, unasphalted: 138774 km (statistical year 2003)
- The transport of goods by road-network of roads: 198817 km, asphalted: 60043 km, unasphalted: 138774 km (statistical year 2003)
- Pipeline transportation-network of pipeline transportation: LPG-3508 km; Petroleum-2427 km (statistical year 2004), (Petrescu, 2012)

Transport by Rail

The railway transport is one of the most commonly used modes of transport, taking up in the world the place from the point of view of the volume of the goods transported on the globe. Although the most is cheaper transport on water and only then at the rail, it also has the advantage of a shorter time of loading.

The railway companies have been sustained efforts in development and improvement of rolling stock, as well as in the organization and for the dispatch of the goods in order to reduce the duration of transport and the reduction in the price of transport.

The railway transports have kept the advantages held in relation to other modes of transport:

- Providing a continuous flow of transport that allows a rhythmical supply
- Achieve certain regularities (in terms of transport time) from the point of view of the time of transport, because of the way the organization and independence of the atmospheric conditions
- Achieving a higher integrity of goods during transportation, because the risk of damage is less in comparison with other modes of transport
- Collection much faster the value of goods transported, to ensure that the charge is made when the goods have been handed over and the negotiation of documents shall take place after the dispatch of each railway wagon
- A certain amount of security in respect of the receipt of the goods by the buyer, as companies of rail transport are in large part, state enterprises
- The simplicity of shipment of the goods and the knowledge of the time of tariffs, is allowing the dispatch of the goods, without preliminary preparations and special knowledge of the expenditure still before carrying out the transport (Petrescu, 2012)

Road Transport

Road transport carried out moving in space of the goods and the people with the aid of motor vehicles which are the means of self-propelled transport. That the special features of these means of transport shall be noted that have a large mobility and can be used, depending on the weather on any kind of road. The motor transport, offers the possibility of loading of the goods directly from the point of shipment and download them directly at the point of destination, without the need for transshipments and additional manipulations. The means of transport shall be traveling at high speeds as a result of the commercial speed and simplicity technological operations for loading and unloading. They may prepare quickly and easily in order to carry out the transport, requiring to reduce expenses for this purpose.

The motor transport offers the highest efficiency over short distances (Petrescu, 2012).

Air Transport

Air transport has ceased to be a means of transport luxurious and prohibitive. Today he is the preferred by those who want to move quickly over longer distances or environments and by those who have to carry perishable goods or high value.

For transport of use both joint planes, for passengers and goods and aircraft to the special conditions for the transport of goods.

From a commercial point of view, airplanes can be loaded into the system of line, which implies a scheduled traffic and under the charter flights (irregular racing), racing on the basis of contracts between airlines and various beneficiaries who wish to operate on a determined period the airplanes taken in the rent.

Flight and the landing of the aircraft may only be made on aerodromes civil of societies authorized.

Aerodrome is an area of land or water that is intended to be used for the arrival and departure of the handling of the aircraft ground. The airport is open aerodrome commercial operations.

Air transport carried out moving in space of the goods and the people with the aid of aircraft.

Among the special features of the technical economic of the air transport are (Petrescu *et al*., 2017a; 2017b; 2017c; 2017d; 2017e; 2017f; 2017g; 2017h; 2017i; 2017j):

- The rapidity-is the essential feature of air transport. This is evidenced by the high speed of the aircraft which cannot be matched by any other means of transport (though for the future are preparing trains, extreme speed Maglev; the circulating today with the 350-550 km/h), will operate in the future with 900- 1200 km/h)
- Regularity-is that air transport is carried out after a program precisely at any time of year, both day and night
- The opportunity-refers to the fact that this mode of transport available to all those interested, whenever and wherever it is arranged as termination points, the most modern means of transport

Air transport has revolutionized the transport global, dramatically reducing the time necessary for the journey on the long distances. Trips overseas, which could take weeks or even years, now can be made in a few hours (is designed for the future submarine cables, pipes submarine for the carriage of oil, natural gas, or other liquids, but also tunnels for high-speed train; already on the shorter distances were built so the harness, pipes and underwater tunnels).

The aircraft are vehicles heavier than air, which use the wings to produce load capacity. The aircraft carrying people, goods, mail, etc. plane has revolutionized also and war. Many breakthroughs in aviation, such as the engine with the reaction, have been made by scientists and engineers militaries. The first controlled flight of an airplane took place in 1903 carried out by the Wright Brothers at Kitty Hawk in North Carolina USA. The improvement of technology, flights longer have become possible. The flight of the American pilot Charles Lindbergh across the Atlantic in 1927 has helped to the awakening of the public interest for air travel intercontinental. The technological development was product aircraft, larger, quicker and more sustainable development. The introduction of the engine with a reaction in the 1941 has helped to the inauguration of the aircraft with the reaction in the commercial flights, after the Second World War.

The first flight of a commercial aircraft with reaction in the U.S. took place in 1958 and has been made by a Boeing 707.

Boeing the 747 jumbo jet, which has a capacity of more than 300 seats, has entered into service in 1970. French Supersonic Concorde and began the Service only in 1972.

Helicopters: A helicopter load obtained from a set of paddles rotors and not from the fixed fenders, as do airplanes. Helicopters are used in the cities to carry travelers from the suburban areas at airports. Helicopters also ensure medical evacuation and access to hard-to-reach areas such as oil rigs and mountain.

Helicopters are also important military vehicles. Military forces are used for the carriage of goods, exhaust medical and for battle.

The first raising a helicopter from the ground took place in 1907, when a French helicopter was raised from the ground for a few seconds. However, there was need of several adjustments until the helicopters to become practical. Germany has produced the first practical helicopter in 1936 and the army the U.S. has produced the first helicopter equipped for the fight in 1942. Helicopters have been used for the first time in the military purposes during the Second World War.

Vehicles lighter than air. The flasks and airships are vehicles lighter than air, which is based on the warm air or gas lighter than the air in order to obtain the load capacity.

The flasks are based on air currents for propulsion and are used mostly for recreation or research on the weather high altitude. Airships and zeppelins combine a balloon with gas more easily than the air with airscrews for shipping and handling (Petrescu and Petrescu, 2011; 2012; 2013a; 2013b; 2013c; Petrescu, 2012; 2016).

Shipping

Having regard to the economic progress of the company, in the last decade has registered an increase of world trade, the transport of raw materials required of the industry, agriculture and exchanges of finished products.

On the other hand, the intensification of trade between countries in different geographical areas, the

participation of the countries concerned in this process is a prerequisite for stimulating economic and social progress of each geographical region.

Maritime transport is the responsibility of a vital role in achieving the movement of goods, both from the point of view of quantitatively and that the efficiency, role of the rights conferred by issues such as:

- Cost relatively small, in relation to the high volume of goods which may be transported
- Character of the complex and diversified of trade
- The increasing number of participants from these exchanges

The three essential elements which are the basis of the definition of the maritime transport are the following:

- The goods, characterized by a high volume and a high value
- Vessels, as a means of transport which incorporates a technical level and investment is high
- Ports, that the nodes of the transhipment and equipment of operation within it

In the light of these facts we can affirm that, maritime transport means an economic activity particularly complex, having a national and international level, what must be designed and carried out both according to your needs and to ensure the profitability. The main function of the maritime transport is to provide the link between production and consumption and is characterized by two essential features economic in nature:

- Economic efficiency within the meaning of satisfaction of requirements defined
- Profitability, as an essential condition for an economic activity, which involves costs of transport itself and the costs of the operations related

Both economic efficiency and profitability depend in a decisive way by the three essential elements which are the basis of the definition of the maritime transport and namely: goods, vessels and ports.

The importance of maritime transport has led to the development of a broad international cooperation under the aegis of the United Nations Organization, in order to ensure:

- The safety of human life and vessels at sea
- The avoidance of accidents and the organization of and rescue at sea
- Prevention of pollution of the environment in general and of the marine environment in particular
- The unification of the legislation and methodology in maritime transport
- Providing the goods, of vessels and persons
- The protection of the owners and the owners of the goods
- Establishing, for maritime trade, a legal framework and appropriate economic, fair, durable and the task force on the background of international cooperation, to guarantee the functionality, gender equality in the rights and obligations of the partners (Petrescu, 2012)

Unconventional Technologies of Transport

Transport through unconventional technologies is the use of certain means of transport less polluting what are constructed on the basis of the following techniques: The use of fuels less pollutants, as well as the hydrogen or biogas.

The engine replacement with fuel (Classic) with electric motors (“green”), which operates without noise and are not directly pollutants.

The carriage carried out using unconventional technologies is not yet organized and integrated into the usual networks the transport.

Unconventional technologies have appeared in inland transport services as a necessity to reduce pollution produced by cars and overcrowding roads and towns (due to the increase of the number and the diversification of the types of means of transport). In the road transport can be identified the following types of means of transport of unconventional:

Cars with electric motors are vehicles (relatively) uncontaminated, but for the time being and drawbacks (small amount of stored energy, accumulated), high cost, long battery charge accumulators, production of electricity in the world proportion of about 60-65% still pollution by combustion of fossil fuels (oil, gas, coal) with contamination greater than their combustion in engines thermal and a higher yield low.

Cars with hydrogen are based on the functioning of the reaction of hydrogen and oxygen in the air.

To them in addition to the matter of the large losses of energy production of hydrogen, adds the huge losses of energy used in the storage of hydrogen liquid in tanks.

The energy consumption necessary for an engine with hydrogen is equivalent to the one with which they operate 10-12 conventional engines. And how the energy to continue to a large part of the conventional, it follows that and pollution is that and the yield with 1000% higher. However can be implemented to start engines with hydrogen at the buses which supplies all the include, provided that the energy used for obtaining and storing the hydrogen to be obtained locally, otherwise than by the burning of hydrocarbons, in general unconventional (wind, solar, etc.).

Cars with biogas are similar to those on liquid fuel, the difference being that the motors have been

modified in order to use biogas obtained by fermentation of a mixture of waste water and waste in the agro-food industry.

Liquefied Petroleum Gas (LPG) is another type of gas, used more and more frequently for power supply of the cars owing to the effect of the pollutant extremely low which he manufactures and consumption reduced (the "relatively"-the New because it has been used at the beginning of the cars and in addition the gases are polluting and everything on the way to extinction).

For this reason they started to be used on the ladder more and more biogas and biofuels (US, Brazil, Germany).

Biogas is gas non-fossil, obtained, "now" through various methods.

Biofuels are virtually any matter-green trees which can burn (maize loaf but and all the dried herb, cane, bamboo and rush, grass (dry hay), small trees (which increase soon), the hedges, algae dry, etc.

All of these are used for heat engines with external combustion (Stirling, Watt, turbines, etc.) Another method is to burn the alcohols (including methanol) which adapts to the direct heat engines internal combustion (and in particular those of Otto cycle type), or vegetable oils obtained from sunflower, rape, corn, peanuts, algae, which adapts to the direct heat engines internal combustion (and in particular those of Diesel type).

Maybe we should we specify that Diesel engines initial were constructed by Christian to work with peanut oil and only later have been entered on diesel, because today to be gradually readjust their operation with vegetable oils (Petrescu, 2012).

In the railway transport exists: Maglev (magnetic levitation)-is a train of special construction ("Plutomagnet-train"), moves "on a magnetic base" above a metal itself, not touch it; the magnetic float and the movement of the drive shall be based on the rejection of the magnetic fields of the same sign. Monorail is a train that runs above or below a special metal rails, suspended from above.

- Unconventional naval transport

Use hovercraft (hovercraft, or air cushion vehicle), you can jump on and dried fish in wetlands. Hovercraft is a vehicle moving just touching the ground or water with flexible edges of a "skirts" of rubber. This "circumference" flexible vehicle makes it possible to create an air suspension in hovercraft and surface (water, land) running.

It is also used with great success catamarans, special vessels that support the water on two pillars (two feet) also water-pedalos, but in operation due to the high speeds of displacement catamarans almost floating and barely touch the water easily reducing much of the friction.

Travel by submarine is designed more for military purposes, research and oversee, studying the deep seas and oceans, execution of difficult operations at great depths, leisure, etc. Transport with submarine is aimed more military purposes, research and oversee, for the study of the deep seas and the oceans, the performance of the operations difficult at depths, recreation, etc (Petrescu, 2012).

The Special Transportation

Special shipments are unconventional transport whose share has increased substantially in transport and assembly and that are carried out by means different from the classical ones.

A magnetic levitation train, or maglev, is a train that uses strong magnetic fields to secure and advance sustentation while reducing rail frictions. Unlike conventional train, there is no contact with the rail, which reduces the frictional forces and allows the attainment of high speeds (some systems end up to 550 km/h).

Because Maglev trains cannot be used with existing infrastructure, the entire system should be designed from the beginning. Maglev term, in fact, does not refer to the vehicles but also to the interaction between them and the undercarriage. This interaction is very important, every component should be designed concurring to the other in order to create and control the correct magnetic levitation. Maglev different technologies are more or less similar, depending on the manufacturer. World leaders in the field are the German companies Siemens and ThyssenKrupp Transrapid system (Fig. 1 and 2), (Petrescu, 2012).

Innovative transportation concepts have been also introduced in the commercial passengers flight. Passenger comfort, flexible design, maximum interior space, safety and greater range are main features that improve transportation efficiency while making these technologies more familiar and accepted by consumers. On 6 December 2011, a flight test ZA006 (787), powered by motors General Electric GenX, flew 10.710 miles (19.830 km) non-stop, setting a new record for autonomy (mileage without refueling) for aircraft weight class 787, which is between 440,000 pounds (200 t) and 550,000 pounds (250 t), (Fig. 3). This result has been obtained by an intensive use of advanced composite materials for secondary structures and interiors that significantly reduced the weight of the carrier. Quality and comfort are paramount for both pilots (Fig. 4) and passenger (Fig. 5). As can be seen, the quality of modern passenger air transport means "more logistics" in the cockpit (Fig. 4) and more soft (logistic and recreational) for passengers (Fig. 5).

In Fig. 6 can be seen a modern catamaran transport and recreation. Logistics is essential (vital). Figure 7 in can follow a military hovercraft to transport cars and people. The quality of transport here means more speed, passing and penetration power, fast action (quick landing), but it is not lacking modern logistics even if there is no immediate and outside the vessel.

Fig. 1. JR-Maglev (Japan)

Fig. 2. Shanghai Transrapid-Maglev (China)

Fig. 3. Boeing 787-model 2011

Fig. 4. Boeing 787-model 2011-increased quality inside the cabin of pilots

Fig. 5. Boeing 787- model 2011- increased quality and comfort for passengers

Fig. 6. Modern catamaran for transport leisure

Fig. 7. Hovercraft modern for military transport

The Quality of Transport with Urban Buses

Transport comfort and efficiency is one of the objective of this work and it is paramount to better understand the determinants of daily bus mobility in urban areas. In particular, it is necessary to study the extent to which the quality of the bus transport offer determines the intensity of use.

A first step was to develop an indicator describing locally the quality of the accessibility provided by the bus.

From the 1960 s to the present, the place of the automobile in the practice of the city and its influence on its organization has continued to grow until reaching saturation.

Even if exceptions exist, both in France (Paris) and abroad (Zurich) and there are nuances to be made depending on the size of the urban areas (Gallez *et al*., 1997). On average more than 80% of journeys are made by car (Madre and Maffre, 1997).

This share increases further with the range of travel.

The bus was just one of the means to replace the car with another means of public transport in cities and outside them.

The buses are today is more and more modern with seating upholstered convenient properly with air conditioning, automatic transmissions and limiting devices urban pollution, but as long as they are not generalizing buses electrical wiring, or those with hydrogen can't say yet it has been solved the problem to avoid environmental pollution.

A solution that has worked well was the introduction of the trolleybuses (Fig. 8).

Excluding considerations relating to comfort and hospitality, the quality of the public transport supply depends both on the spatial access provided by the network (layout of the lines and stations) and on criteria more commercial such as bus frequency, speed and quality of correspondence.

In summary, it can therefore be considered that the greater the number of urban amenities accessible by bus in a given time from a location, the better the local supply. So, in order to estimate locally this offer we have calculated from a multitude of points the accessible surface in a given time using the transit network (Genre-Grandpierre, 2007).

The Larger the Area, the Higher the Quality

This calculation amounts to considering that all places have the same interest for the user, which would not be the case if a choice of poles had been made upstream and accessibility had been calculated only in the direction of these poles (shops, jobs, schools, etc.).

This method, more classical, which corresponds to the calculation of multi polar nodal accessibility (sum of distances from one point to a set of other points: Cauvin, 1994) has not been retained, estimates the supply of public transport. Indeed, the results differ widely depending on the choice of clusters (Genre-Grandpierre, 2000).

However, this choice is not practically justifiable. Each place that can theoretically has an interest for a user, on what reliable criteria to retain this or that pole? On the other hand, in view of the high density of urban amenities in an intra-urban environment, given the widespread use of the city as a graph, where each city constitutes its city from a choice of places of its own (Dupuy, 1991), the solution of indexing the quality of the public transport supply on the accessible surface in a given time and not on a number of arbitrarily chosen accessible poles, is fully justified.

DOI: 10.3844/ajeassp.2017.738.755

Fig. 8. Trolleybuses

Practically, the quality of the bus offer that synthesizes the potential is defined as the surface actually accessible by bus in 35 min from a place in the middle of the morning.

The duration of 35 min was chosen to make potential a local measure able to capture small variations in the quality of the offer.

A longer duration led to erasing these local variations and another one (duration) too short to take into account only the very local particularities inherent in the configuration of the network. Since the access to the bus network is really only at the station level, the estimate of the quality of the accessibility must, in order to stick to reality, integrate the journey on foot from each place to reach the station the closest.

The duration of 35 min of travel is thus consumed in three steps: a first one which makes it possible to reach on foot the nearest station, a second which corresponds to the waiting time of the bus and a third which is that of the duration of the journey by bus.

The potential was estimated very finely thanks to a specific program developed at the Théma laboratory using a cadastral database on the Bisbus bus network (Thevenin, 2002). The calculations are based on the use of the time tables giving the time of passage of each bus to the various stations (whose respect is very strict in Besançon thanks to a GPS system embedded in the buses and remote control of lights).

This is therefore to take into account the reality of the conditions of circulation integrated in fact by the experience of the carrier in these timetables. They also make it possible to take account of the correspondences between lines. Thus, an average waiting time was allocated to each station as a function of the bus frequency. When there is a connection, the 35 min bus journey can be broken down into: n1 min to reach the nearest station by foot, n2 min to wait for the bus, n3 minutes by bus to join the station of correspondence, n4 minutes waiting to the correspondence, then finally n5 min of bus terminal journey with: n1 + n2 + n3 + n4 + n5 = 35 min.

Knowing the potentials at each point of the starting point, it remains to perform a spatial interpolation in order to extend the discretely calculated information to the entire space studied. The interpolation used is quadratic kriging because of its great adaptation to the local context (Arnaud and Emery, 2000). This phase results in obtaining a map in isolines (Fig. 9), which we then discretized in 5 classes to arrive at the definition of coherent zones that will constitute the different strata of the survey.

If the map of the potential of the bus in Besançon is organized globally from the historic city center (located inside the meander of the Doubs) towards the periphery, it is noted that the different potential areas are discontinuous and that, they have very irregular shapes. This general gradient is due to the configuration of the network which is structured around a set of radial lines that converge at the center. This conventional radiating device is supplemented by a tangential line which ensures the connection between the radials.

By integrating numerous parameters (access time to the stations, waiting time, connection between lines), the bus potential describes the quality of the bus supply finely and thus appears more heuristic than the more based on the calculation of nodal accessibility. They give only a much smoother and approximate view of supply quality, in particular because the geometric position of the poles chosen as the basis for calculation weighs more in the result than the actual quality of the links between these poles. The most geometrically central points thus appear systematically as the most accessible, even if the access is not of quality (Gutiérrez *et al*., 1998).

In order to collect data on the behavior of mobility able to answer our problem, we relied on the stratification of the space elaborated thanks to the calculation of the potential of use of the bus. The 557 individuals surveyed over the telephone were thus broken down into 4 zones at different potential levels. Practically, the postal addresses in each area were selected using GIS queries.

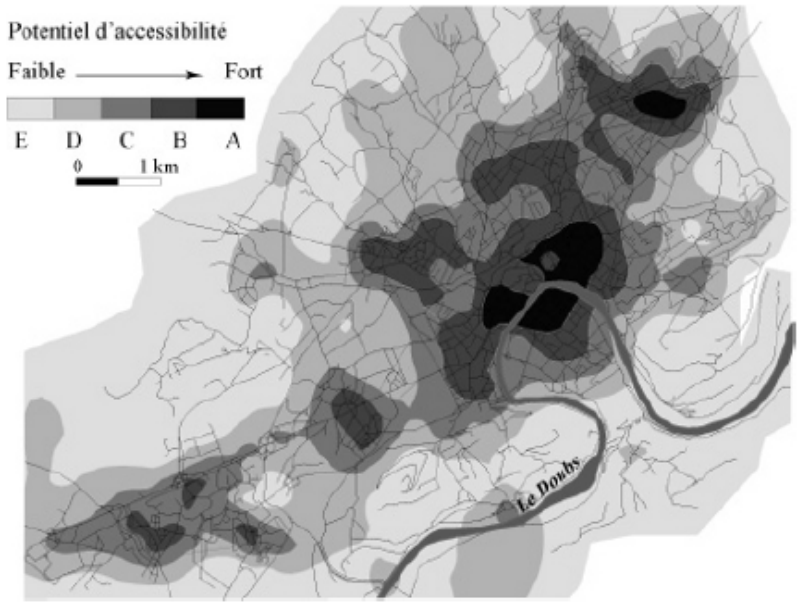

Fig. 9. Phase results in obtaining a map in isolines, which discretized in 5 classes to arrive at the definition of coherent zones that will constitute the different strata of the bus survey

The white pages of France Telecom were then used to find the telephone numbers corresponding to the addresses. A sampling of the numbers (random without delivery) finally makes it possible to reduce the number to make the list of numbers operational, according to an expected number of answers. In addition to the traditional collection of data on the socio-economic characteristics of individuals, the modes used, the reasons and frequency of travel, their estimated duration and the satisfaction with the bus supply, been collected.

They make it possible to exploit fully the full potential of geographic information systems when researching the determinants of bus practice related to the quality of accessibility provided by the network. Thus, all respondents were geo-referenced at home to be able to study their mobility practices, in a given transport supply context. Similarly, all the origins and destinations of the journeys being made by bus or which, according to the respondents reasonably can be (now referred to as another mode), have been computerized. The analysis of these data aims to illuminate, at the finest scale, the modal choice according to the quality of the bus offering proposed to reach the destination considered, whether it was by bus or by a Other mode. These data relate to a "typical week", which makes it possible to avoid the exceptional displacements, which are not representative of the behaviors. However, they retain a high level of description, since a trip made only once a week, but throughout the year, is taken into account. For reasons of cost, the collection took place on the telephone, the investigators locating in direct home, origin and destination of the displacements on plans using in particular the benchmark constituted by the bus stations (Genre-Grandpierre, 2007).

The comparison of the socio-demographic characteristics of the 557 individuals surveyed with those of the mother population of Besançon assures us of the representativeness of our sample. Thus, although the sample is somewhat too feminine and aged and lacking singles, the deviations in the general profile of the population are small enough to allow for statistical inference. Moreover, in order not to bias the results we have ensured not to investigate only the captives of the journeys by bus. The analysis of the motorization of the respondents removes this possibility, since if 21% of them are not motorized (half of them are students or retirees), 50% have more cars in their household and 35.5% one car (26% of households with at least one car per person). It should be noted that the respondents present in each stratum defined on the basis of the level of bus use potential do not have an overly typical socio-demographic profile, knowing that we empirically considered that any deviation of more than 5% to the average profile.

But as I said, not only the quality of transport by bus in the city is essential today but also the lack of nuisances emanating from it.

For that it is still big problems in the organization of the introduction of hydrogen on the buses, it is much easier to pass on to the buses electric.

A reasonable solution is already the trolleybus.

For cases in which disturb the electrical wires and wants a greater maneuverability of buses already occurred buses equipped with electric motors (Fig. 10).

Fig. 10. Electric bus; Manufacturer: Changsha BYD Coach Company, Ltd

The BYD K9 (sometimes just referred to as the BYD ebus or BYD electric bus) is a battery electric bus manufactured by Chinese automaker BYD Auto, powered with its self-developed lithium iron phosphate battery, featuring the longest drive range of 250 km (155 miles) on one single charge under urban road conditions (BYD K9, from Wikipedia). "Mayors to rush to buy them!"

Conclusion

The shipments were absolutely necessary at all times, but still have polluted and damaged the environment. Vehicles, such are cars, trains, ships and others, need to be investigated regarding all aspects of design, construction and operation of vehicle diagnostics, traffic and management. The management of the transport, it is the responsibility of the transport engineering and design engineering systems and networks of transport, which has as its objective to optimize the transportation systems, the increase in the transport safety, environment protection, practically-the quality of the transport performed.

Today the main aim is to protect the environment through the development of modern transport and effective. But as I said, not only the quality of transport by bus in the city is essential today but also the lack of nuisances emanating from it.

For that it is still big problems in the organization of the introduction of hydrogen on the buses, it is much easier to pass on to the buses electric.

A reasonable solution is already the trolleybus.

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Acknowledgment

The work was appreciated by teams of professors from the departments of automobiles from several universities in Romania and Italy. This text was acknowledged and appreciated by Associate Professor Aniello Riccio SECONDA UNIVERSITA' DEGLI STUDI DI NAPOLI Italy, Dr. (Ms.) Shweta Agarwala Senior Research Scientist at Singapore Center for 3D Printing Nanyang Technological University Singapore, whom we thanks and in this way.

Author's Contributions

All the authors contributed equally to prepare, develop and carry out this manuscript.

Ethics

This article is original. Authors declare that are not ethical issues that may arise after the publication of this manuscript.

References

Amoresano, A., V. Avagliano, V. Niola and G. Quaremba, 2013. The assessment of the in-cylinder pressure by means of the morpho-dynamical vibration analysis-methodology and application. IREME J., 7: 999-1006.

Anderson, R.B., 1984. The fischer-tropsch synthesis. Academic Press.

Apicella, A., D. Ianniello and R. Aversa, 2010. Application of nanostructured smart materials in sustainable buildings. Int. J. Sustainable Manufactur., 2: 66-79. DOI: 10.1504/IJSM.2010.031620

Arnaud, M. and X. Emery, 2000. Estimation et interpolation spatiale. Hermès, Paris.

Aversa, R., R.V.V. Petrescu, A. Apicella and F.I.T. Petrescu, 2017a. Nano-diamond hybrid materials for structural biomedical application. Am. J. Biochem. Biotechnol., 13: 34-41. DOI: 10.3844/ajbbsp.2017.34.41

Aversa, R., R.V. Petrescu, B. Akash, R.B. Bucinell and J.M. Corchado *et al*., 2017b. Kinematics and forces to a new model forging manipulator. Am. J. Applied Sci. 14: 60-80. DOI: 10.3844/ajassp.2017.60.80

Aversa, R., R.V. Petrescu, A. Apicella, F.I.T. Petrescu and J.K. Calautit *et al*., 2017c. Something about the V engines design. Am. J. Applied Sci., 14: 34-52. DOI: 10.3844/ajassp.2017.34.52

Aversa, R., D. Parcesepe, R.V.V. Petrescu, F. Berto and G. Chen *et al*., 2017d. Processability of bulk metallic glasses. Am. J. Applied Sci., 14: 294-301. DOI: 10.3844/ajassp.2017.294.301

Aversa, R., R.V.V. Petrescu, B. Akash, R.B. Bucinell and J.M. Corchado *et al*., 2017e. Something about the balancing of thermal motors. Am. J. Eng. Applied Sci., 10: 200-217. DOI: 10.3844/ajeassp.2017.200.217

Aversa, R., F.I.T. Petrescu, R.V. Petrescu and A. Apicella, 2016a. Biomimetic FEA bone modeling for customized hybrid biological prostheses development. Am. J. Applied Sci., 13: 1060-1067. DOI: 10.3844/ajassp.2016.1060.1067

Aversa, R., D. Parcesepe, R.V. Petrescu, G. Chen and F.I.T. Petrescu *et al*., 2016b. Glassy amorphous metal injection molded induced morphological defects. Am. J. Applied Sci., 13: 1476-1482. DOI: 10.3844/ajassp.2016.1476.1482

Aversa, R., R.V. Petrescu, F.I.T. Petrescu and A. Apicella, 2016c. Smart-factory: Optimization and process control of composite centrifuged pipes. Am. J. Applied Sci., 13: 1330-1341. DOI: 10.3844/ajassp.2016.1330.1341

Aversa, R., F. Tamburrino, R.V. Petrescu, F.I.T. Petrescu and M. Artur *et al*., 2016d. Biomechanically inspired shape memory effect machines driven by muscle like acting NiTi alloys. Am. J. Applied Sci., 13: 1264-1271. DOI: 10.3844/ajassp.2016.1264.1271

Aversa, R., E.M. Buzea, R.V. Petrescu, A. Apicella and M. Neacsa *et al*., 2016e. Present a mechatronic system having able to determine the concentration of carotenoids. Am. J. Eng. Applied Sci., 9: 1106-1111. DOI: 10.3844/ajeassp.2016.1106.1111

Aversa, R., R.V. Petrescu, R. Sorrentino, F.I.T. Petrescu and A. Apicella, 2016f. Hybrid ceramo-polymeric nanocomposite for biomimetic scaffolds design and preparation. Am. J. Eng. Applied Sci., 9: 1096-1105. DOI: 10.3844/ajeassp.2016.1096.1105

Aversa, R., V. Perrotta, R.V. Petrescu, C. Misiano and F.I.T. Petrescu *et al*., 2016g. From structural colors to super-hydrophobicity and achromatic transparent protective coatings: Ion plating plasma assisted TiO_2 and SiO_2 Nano-film deposition. Am. J. Eng. Applied Sci., 9: 1037-1045. DOI: 10.3844/ajeassp.2016.1037.1045

Aversa, R., R.V. Petrescu, F.I.T. Petrescu and A. Apicella, 2016h. Biomimetic and evolutionary design driven innovation in sustainable products development. Am. J. Eng. Applied Sci., 9: 1027-1036. DOI: 10.3844/ajeassp.2016.1027.1036

Aversa, R., R.V. Petrescu, A. Apicella and F.I.T. Petrescu, 2016i. Mitochondria are naturally micro robots-a review. Am. J. Eng. Applied Sci., 9: 991-1002. DOI: 10.3844/ajeassp.2016.991.1002

Aversa, R., R.V. Petrescu, A. Apicella and F.I.T. Petrescu, 2016j. We are Addicted to vitamins C and E-A review. Am. J. Eng. Applied Sci., 9: 1003-1018. DOI: 10.3844/ajeassp.2016.1003.1018

Aversa, R., R.V. Petrescu, A. Apicella and F.I.T. Petrescu, 2016k. Physiologic human fluids and swelling behavior of hydrophilic biocompatible hybrid ceramo-polymeric materials. Am. J. Eng. Applied Sci., 9: 962-972. DOI: 10.3844/ajeassp.2016.962.972

Aversa, R., R.V. Petrescu, A. Apicella and F.I.T. Petrescu, 2016l. One can slow down the aging through antioxidants. Am. J. Eng. Applied Sci., 9: 1112-1126. DOI: 10.3844/ajeassp.2016.1112.1126

Aversa, R., R.V. Petrescu, A. Apicella and F.I.T. Petrescu, 2016m. About homeopathy or ≪similia similibus curentur≫. Am. J. Eng. Applied Sci., 9: 1164-1172. DOI: 10.3844/ajeassp.2016.1164.1172

Aversa, R., R.V. Petrescu, A. Apicella and F.I.T. Petrescu, 2016n. The basic elements of life's. Am. J. Eng. Applied Sci., 9: 1189-1197. DOI: 10.3844/ajeassp.2016.1189.1197

Aversa, R., F.I.T. Petrescu, R.V. Petrescu and A. Apicella, 2016o. Flexible stem trabecular prostheses. Am. J. Eng. Applied Sci., 9: 1213-1221. DOI: 10.3844/ajeassp.2016.1213.1221

Barrett, G.W. and E.P. Odum, 2000. The twenty-first century: The world at carrying capacity. Bio. Sci., 50: 363-368. DOI: 10.1641/0006-3568(2000)050[0363:TTFCTW]2.3.CO;2

BYD K9, from Wikipedia, the free encyclopedia.

Cauvin, C., 1994. Accessibilité de système et accessibilité locale. Flux, 10: 39-48.

De Falco, D., G. Di Massa, S. Pagano and S. Strano, 2013. Motorcycle handlebar dynamic response: Theoretical and experimental investigation. IREME J., 7: 795- 801.

Dupuy, G., 1991. L'urbanisme des réseaux, théories et méthodes.

EU Council Directive, 2015. Laying down calculation methods and reporting requirements pursuant to directive 98/70/EC of the European Parliament and of the council relating to the quality of petrol and diesel fuels. Official J. Euro. Union.

EU Bulletin C.O.M., 2005. 446/7, 2005 thematic strategy on air pollution.

EU Bulletin C.O.M., 2004. 160, 2004 Existing Community measures relating to sources of environmental noise.

EU Bulletin, C.O.M., 2001. 245, 2001. The Clean Air for Europe (CAFE) Programme: Towards a thematic strategy for air quality.

EU Bulletin, 1996. (COM(96) 540), 1996 The Green Paper on Future Noise Policy.

Feldman, B., 2008. The hybrid automobile and the Atkinson Cycle. Physics Teacher, 46: 420-420. DOI: 10.1119/1.2981291

Gallez, C., J.P. Orfeuil and R. Polacchini, 1997. L'évolution de la mobilité quotidienne: Croissance ou réduction des disparités? Recherche Transports Sécurité, 56: 27-42.

Ganapathi, P. and Y. Robinson, 2013. Experimental investigation on the performance, emission and combustion characteristics of a diesel engine fuelled with polymer oil-ethanol blends. IREME J., 7: 919-924.

Genre-Grandpierre, C., 2007. Qualité de l'offre et usage du transport public en milieu urbain. Euro. J. Geography, Document. DOI : 10.4000/cybergeo.6736

Genre-Grandpierre, C., 2000, Forme et fonctionnement des réseaux de transport: Approche fractale et réflexions sur l'aménagement des villes. PhD Thesis, Université de Franche-Comté.

Grunwald, B., 1980. Teoria, calculul şi construcţia motoarelor pentru autovehicule rutiere. Editura didacticã şi pedagogicã, Bucureşti.

Gutiérrez, J., A. Monzòn and J.M. Pinero, 1998. Accessibility, network efficiency and transport infrastructure planning. Environ. Plann. A, 30: 1337-1350.

Heywood, J.B., 1988. Internal Combustion Engine Fundamentals. 1st Edn., McGraw-Hill, New York, ISBN-10: 0070286388, pp: 184.

Karikalan, L., M. Chandrasekaran and K. Sudhagar, 2013. Comparative studies on vegetable oil usage in ci engines as an alternative to diesel fuel. IREME J., 7: 705-715.

Leet, J.A., S. Simescu, K. Froelund, L.G. Dodge and C.E. Roberts Jr, 2004. Emissions solutions for 2007 and 2010 heavy-duty diesel engines. Proceeding of the SAE World Congress and Exhibition, (WCE' 04), Detroit, Michigan, pp: 1-11.

Madre, J.L. and J. Maffre, 1997. La mobilité des résidants français: Panorama général et evolution. Recherche Trans. Sécurité, 56: 9-26.

Mahalingam, S. and B.R. Ramesh Bapu, 2013. Experimental and emission analysis of rubber seed oil and jatropha oil blends with diesel in compression ignition engine. IREME J., 7: 955-959.

Mirsayar, M.M., V.A. Joneidi, R.V.V. Petrescu, F.I.T. Petrescu and F. Berto, 2017. Extended MTSN criterion for fracture analysis of soda lime glass. Eng. Fracture Mechan., 178: 50-59. DOI: 10.1016/j.engfracmech.2017.04.018

Naima, K. and A. Liazid, 2013. Numerical investigation on combustion behaviors of direct-injection spark ignition engine fueled with CNG-hydrogen blends. IREME J., 7: 652-663.

Petrescu, R.V.V., R. Aversa, A. Apicella, F. Berto and S. Li *et al*., 2016a. Ecosphere protection through green energy. Am. J. Applied Sci., 13: 1027-1032. DOI: 10.3844/ajassp.2016.1027.1032

Petrescu, F.I.T., A. Apicella, R.V.V. Petrescu, S.P. Kozaitis and R.B. Bucinell *et al*., 2016b. Environmental protection through nuclear energy. Am. J. Applied Sci., 13: 941-946.

Petrescu, F.I.T. and J.K. Calautit, 2016c. About nano fusion and dynamic fusion. Am. J. Applied Sci., 13: 261-266.

Petrescu R.V. and F.I. Petrescu, 2013a. Lockheed Martin. 1st Edn., pp: 114.

Petrescu, R.V. and F.I. Petrescu, 2013b. Northrop. CreateSpace, pp: 96.

Petrescu, R.V. and F.I. Petrescu, 2013c. The Aviation History or New Aircraft I Color. 1st Edn., CreateSpace, pp: 292.

Petrescu, F.I. and R.V. Petrescu, 2012. New Aircraft II. 1st Edn., Books On Demand, pp: 138.

Petrescu, F.I. and R.V. Petrescu, 2011. Memories about flight. 1st Edn., CreateSpace, pp: 652.

Petrescu, F.I. and R.V. Petrescu, 2003 Câteva elemente privind îmbunătăţirea designului mecanismului motor. Proceedings of 8th National Symposium on GTD, (NSG' 03), Brasov, pp: 353-358.

Petrescu, R.V., 2012. Calitatea Transporturilor. 1st Edn., CreateSpace, pp: 124.

Petrescu, F.I., 2016. Valorificarea Traditiei Ingineresti Romanesti-I. 1st Edn., Create Space, pp: 152.

Petrescu, F.I., 2012. Teoria Mecanismelor-Curs si Aplicatii. 1st Edn., Create Space, USA, pp: 284.

Petrescu, R.V., R. Aversa, B. Akash, R. Bucinell and J. Corchado *et al*., 2017a. Modern propulsions for aerospace-a review. J. Aircraft Spacecraft Technol.

Petrescu, R.V., R. Aversa, B. Akash, R. Bucinell and J. Corchado *et al*., 2017b. Modern propulsions for aerospace-part II. J. Aircraft Spacecraft Technol.

Petrescu, R.V., R. Aversa, B. Akash, R. Bucinell and J. Corchado *et al*., 2017c. History of aviation-a short review. J. Aircraft Spacecraft Technol.

Petrescu, R.V., R. Aversa, B. Akash, R. Bucinell and J. Corchado *et al*., 2017d. Lockheed martin-a short review. J. Aircraft Spacecraft Technol.

Petrescu, R.V., R. Aversa, B. Akash, J. Corchado and F. Berto *et al*., 2017e. Our universe. J. Aircraft Spacecraft Technol.

Petrescu, R.V., R. Aversa, B. Akash, J. Corchado and F. Berto *et al*., 2017f. What is a UFO? J. Aircraft Spacecraft Technol.

Petrescu, R.V., R. Aversa, B. Akash, J. Corchado and F. Berto *et al*., 2017g. About bell helicopter FCX-001 concept aircraft-a short review. J. Aircraft Spacecraft Technol.

Petrescu, R.V., R. Aversa, B. Akash, J. Corchado and F. Berto *et al*., 2017h. Home at airbus, J. Aircraft Spacecraft Technol.

Petrescu, R.V., R. Aversa, B. Akash, J. Corchado and F. Berto *et al*., 2017i. Airlander. J. Aircraft Spacecraft Technol.

Petrescu, Relly Victoria; Aversa, Raffaella; Akash, Bilal; Corchado, Juan; Berto, Filippo; Apicella, Antonio; Petrescu, Florian Ion Tiberiu; 2017j When Boeing is Dreaming-a review. J. Aircraft Spacecraft Technology.

Ronney, P.D., M. Shoda, S.T. Waida and E.J. Durbin, 1994. Throttleless premixed-charge engines: Concept and experiment. J. Automobile Eng., 208: 13-24.

Sapate, K.D. and A.N. Tikekar, 2013. Engine mapping for improvement in fuel efficiency of two stroke SI engine. IREME, 7: 392-394.

Sethusundaram, P.P., K.P. Arulshri and K. Mylsamy, 2013. Biodiesel blend, fuel properties and its emission characteristics sterculia oil in diesel engine. IREME, 7: 925-929.

Thevenin, T., 2002. Quand l'information géographique se met au service des transports publics urbains, une approche spatio-temporelle appliquée à l'agglomération bisontine. Thèse de doctorat, Université de Franche-Comté.

Zahari, I., M.A. Abras, N.I. Mat Arishad, S.F. Zainal and M.F. Muhamad, 2013. Experimental study to identify common engine part load conditions between Malaysian city driving and NEDC test. IREME, 7: 1152-1158.