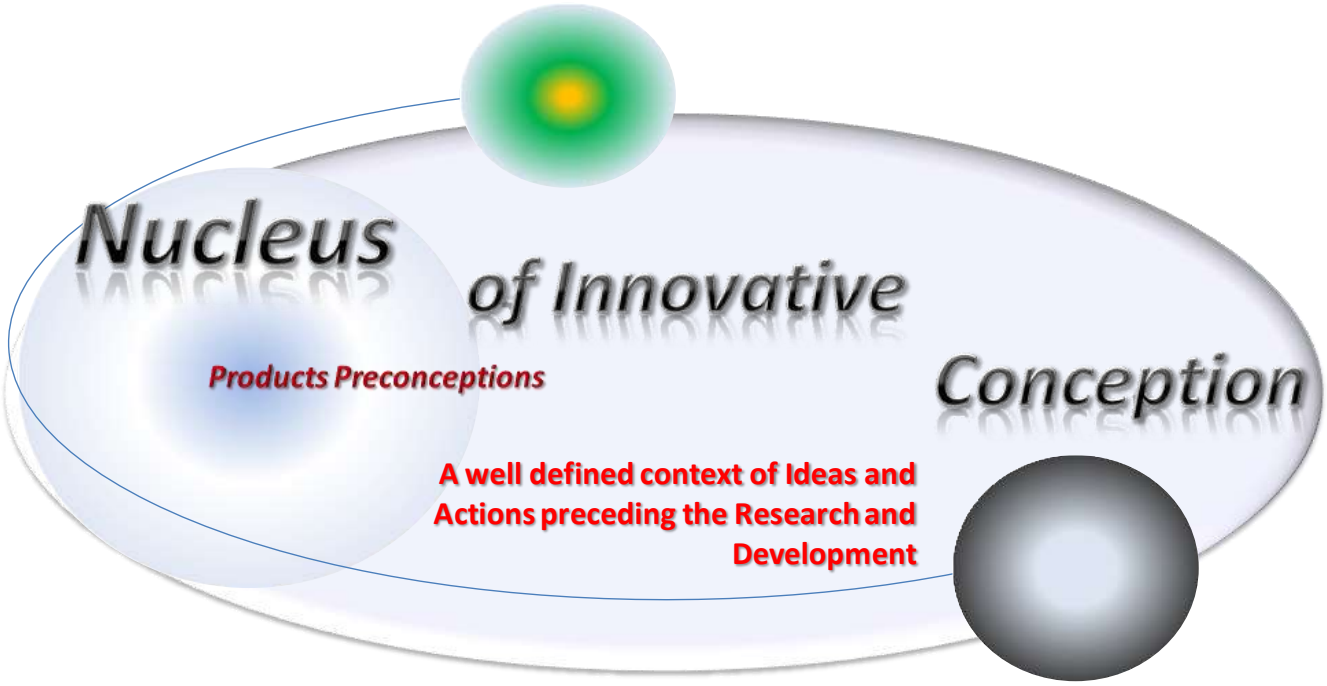
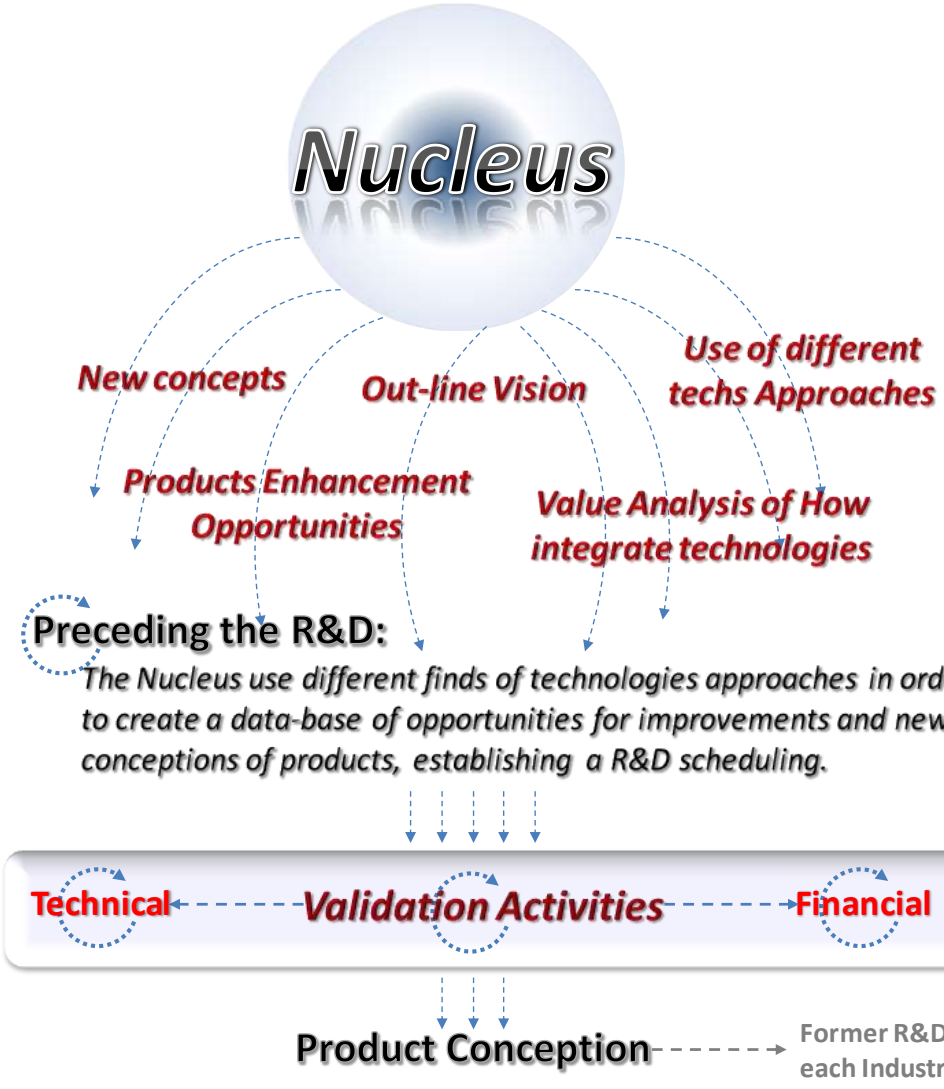

Nucleus
of Innovative
Conception
Products Preconceptions
A well defined context of Ideas and Actions preceding the Research and Development


Nucleus
New concepts
Out-line Vision
Use of different techs Approaches
Products Enhancement Opportunities
Value Analysis of How integrate technologies
Preceding the R&D:
The Nucleus use different finds of technologies approaches in order to create a data-base of opportunities for improvements and new conceptions of products, establishing a R&D scheduling.
Technical
Validation Activities
Financial
Product Conception
Former R&D of each Industries

Abstract

Resume:

The article presents a scope of denominated Nucleus of Innovative Conceptions: an organization that provides new proposals of technologies, creating and establishing new approaches for analysis. That it is means the Nucleus elaborating innovative ideas of products, preceding the former Research and Development stages of each specific industries and research centers.

The possibility of Nucleus establishing new concepts of technological products it is originally realized through the opportunity to integrate some of most representative technologies approaches, segmented over all different industries and markets.

The Nucleus preceding the former R&D considering the following reasons:

(i) **A specific Industry or Research Center does not normally considering an out-line vision of others markets and knowledge fields, potentially causing a lack of technical integration**;

(ii) **The possibility of integrating the diversity technological approaches represents great opportunities of products enhancement, cost reduction and new conceptions**;

(iii) **Based on the broad possibilities of technical integration, the Nucleus conceptualizes new proposals in terms of a technology re-contextualized.**

Therefore, the Nucleus operating this knowledge construing a constant database, considering for that a diversity of technical approaches in terms to add value in new products or actual products to be improvement.

Author: Paulo G B Cordaro, Nucleus owner (e-mail: research@nucleus-innovative-conception.com)

Table of Content

Nucleus of Innovative Conception

Elaborated by **Paulo Gustavo Borba Cordaro**.
Engineer and Researcher (mastering degree) specialized in innovative proposals.

1 Nucleus Overview

This chapter present the following contents:

- Nucleus explanation
- Nucleus definitions and approaches
- Nucleus proposing

Explanation

The idea of denominate an organization oriented to conceptualize technological products, based on the variety knowledge fields around the actual technologic scenario or context, originated from the same term used to define a R&D, the center. Therefore, the conception of center, middle, zero point, nucleus and others similar substantives that has been correlated with the definition of where the ideas or conceptions came from; considering for that, the join of all resources necessary in order to bring to society new technologies and conceptual products.

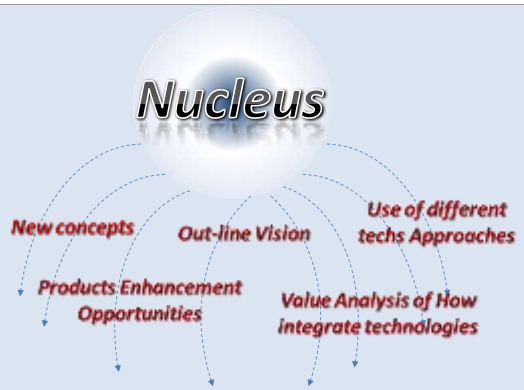
However, the Nucleus could not be in conflict with a R&D center, being a competitor; and so, it should be the organization that allows the R&D activities in order to obtain an integration well oriented related to the relevant objectives, costs and deadlines of a project; establishing the Nucleus as a partner of this challenger to produce technologies.

Based on, the Nucleus is an organization that produces conceptual ideas of products or technical approaches, allowing the variety of R&Ds follows at the constitution and enablement of future products and technological definitions.

For this reason the Nucleus precedes the R&D activities, supplying it with relevant ideas of products, regarding the capability of integrate opportunities of already established technologies.

Nucleus is a provider of research constituted by an innovating process, originated by the simple idea of perform cross-reference information about variety of state-of-arts already established that allows dazzle new possibilities of products based on cost reduction and efficient increase.

Definition and Approaches applied

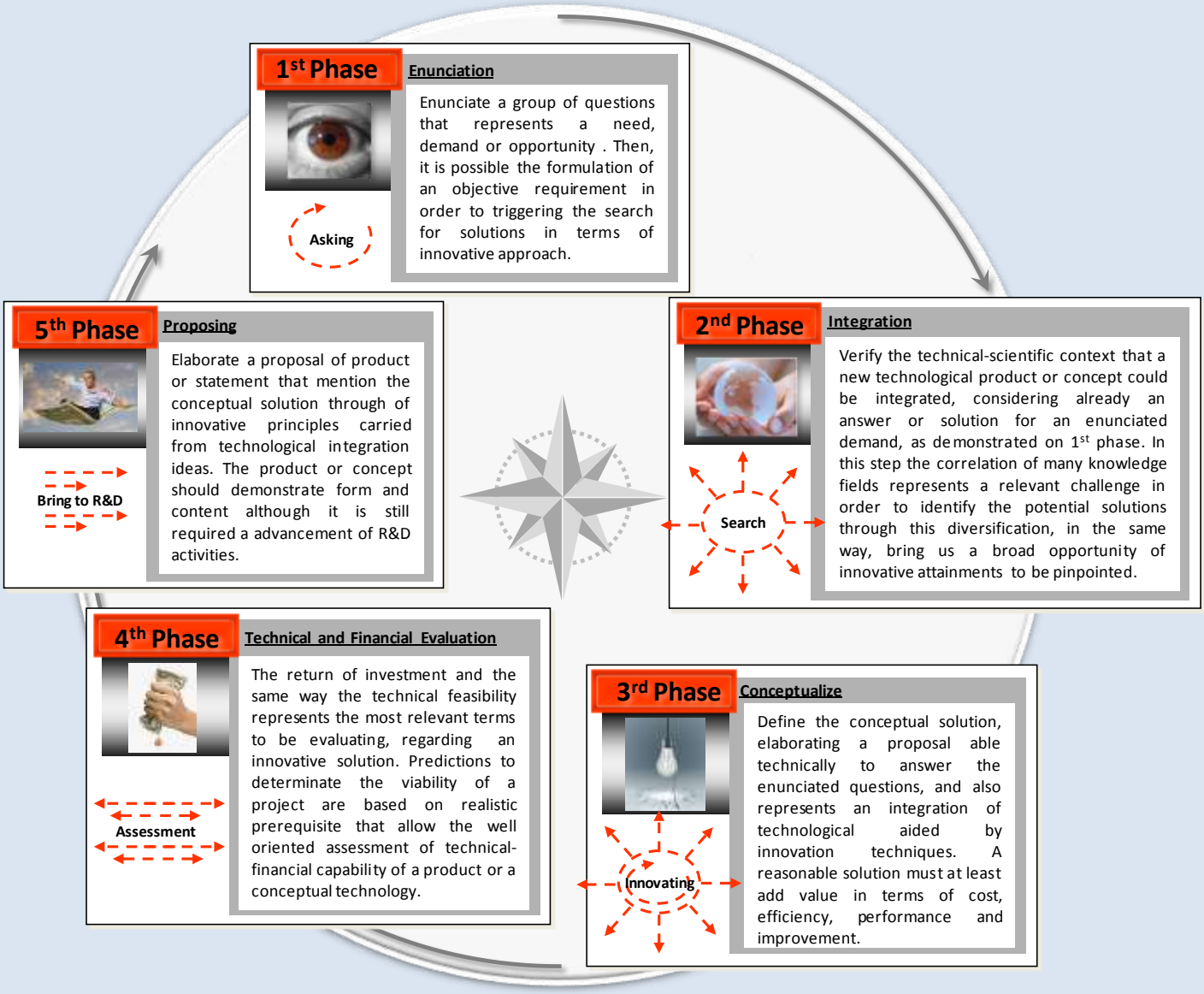


The Nucleus functionality has based on its creative capacity, oriented to determine technologies opportunities. For that, the Nucleus utilizes a serial of techniques in order to establish an innovative process that allows determining the prepositions of new technologies to be conceptualize.

Therefore, to reach this primary objective the Nucleus use a throughout understanding of actual technologies in order to identify new possibilities of a product or technological conception. In addition, the major definition of Nucleus related to a single principle, that it is considering an innovation process as the key element

to lead toward conceptualizes products or technical approaches, as previous alternative of former R&D activities.

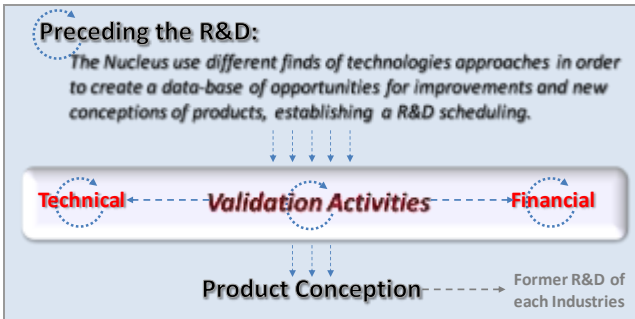
Although the innovation term is difficult to be precisely defined, the Nucleus has been applying this fuzzy idea in order to complete itself definition, considering essentially five activities or phases for innovation of a process that provides the Nucleus ability to formulate questions that will represent an enunciate related to technologic demand or needs. Thus, the Nucleus approach has defined in the following diagram that demonstrates the related phases of innovation.



Based on, **the Nucleus definition is mapping a specific knowledge field to understand the actual technological situation and formulate opportunities in order to increase this state of art, adding new products or new technologic approaches, regarding a thorough and broad inter-correlation with others knowledge fields, integrating solutions previously unknown.**

The following chapter already demonstrating some technologies areas mapped in order to presents new products and technological approaches. This proposals represents a Nucleus storage of opportunities related to technological improvements of specifics state of arts that could be considering stagnant in terms of a relevant increase (e.g. cost reduce and performance enhancement). Therefore, considering the Nucleus principle related to assessing the possible integration, aligning innovative correlation of separate knowledge fields, there are proposed interesting conceptual ideas of new products to be evaluating by R&D centers.

Proposing



Even that the Nucleus proposals could be considering as relevant technological opportunities, there are necessaries technical and financial evaluations in order to determine the project viability. Thus, the Nucleus presents a variety of projects, that should be well evaluated (technically and financially), regarding basics principles of assessment and appraisal.

Therefore, **the proposing projects of Nucleus represent the definition of a product conception and an investment request, simultaneously**.

The basic principles of assessment, regards the definition of theoretical validation that it has accomplished with an itinerary calculation sequence, respecting a well oriented technical verification in terms of feasibility and reliability. In addition, the financial appraisal has based on the return of investment rate, considering well-established assumptions and premises of cost, amount invested, period of return and gains opportunities.

Other concept that is extremely relevant in terms of proposing and demonstrating new technological opportunities, regarding to Value Engineering method. This methodology drive to function definition related to cost involved into a project, for example. The Nucleus applying this method, because it has demonstrated as a valuable way to establish the measurement of gains related to new technological proposals.

Based on, the following list represents the most relevant products already conceptualized. The list demonstrating a summary of each technologies opportunities, established as a product and the value of this opportunity enabled as a measurable function. In addition, the detail of a specific product project there is demonstrating on sequence chapters.

Product Conception – title	Knowledge Field	Principle of Innovation – **add value function**	Reference
Airfoil lift force improvement section	**Aeronautic / Aerodynamic**	Redefinition of aerodynamic adjustment based on the establishment of second flow inside of wing – Cost reduction of air-operations by the decrease of volume of fuel needs or increase the weight loaded or increase the cruise velocity	Other Article
Product Conception – title	Knowledge Field	Principle of Innovation – **add value function**	Reference
Airfoil trailing edge drag force reduction component	**Aeronautic / Aerodynamic**	Air-performance Improvement – Decreasing of Drag effects and Increasing the cruise Velocity	Other Article
Product Conception – title	Knowledge Field	Principle of Innovation – **add value function**	Reference
Engine based on fluid flow due to vortex establishment by forced pressure variance	**Automobilist**	New arrangement for efficiency enhancement of engine – New Alignment of high power, high rotation and low fuel consuming, based on at engine functionality by burning fluids into vortex movements, and less moving components.	**Next page**
Product Conception – title	Knowledge Field	Principle of Innovation – **add value function**	Reference
Brake system based on kinetic energy dispersal by fluids at contrary movement	**Automobilist**	New brake system without wear and maintenance between components – Energy Dispersed by fluids flow located into pistons opposed to the wheels rotation, dispensing components of contacts	Other Article
Product Conception – title	Knowledge Field	Principle of Innovation – **add value function**	Reference
Gearshift system based on a coupling of parallel shafts by a non-concentric rotation	**Automobilist**	New gearshift system with a variety of velocity adjustment aligned with reduced dimension – A simplest system of rotational velocity adjustment based on pulleys coupled by a shaft non-concentric and with settable coupling position	Other Article
Product Conception – title	Knowledge Field	Principle of Innovation – **add value function**	Reference
Actuator and sensor for the electromechanical conversion due to a pantograph shape	**Electro mechanical / Robotic / MEMS**	New electromechanical conversion device – Applicable as actuator and sensor, simultaneously for the electromechanical conversion, affording a reversing of electric and mechanical energy by the establishment of electromagnetic flux inverted	Other Article

2 Engine based on fluid flow due to vortex establishment by forced pressure variance

1st Phase: Enunciation	**3rd Phase**: Conceptualize	**5th Phase**: Proposing
2nd Phase: Integration	**4th Phase**: Technical and Financial Evaluation	

1st Phase Enunciating questions

In order to enunciate a new technological proposal, the following questioning is sharing at two steps: the current technological scenario and the elucidation related to technological enhancements possibilities.

- Questioning about Current technological Scenarios:

Why the efficiency is so low in the mechanical engine (cycles Otto and Diesel)?

What is the reason of mechanical engine has a so complex assembling and a high number of components?

How is it possible avoiding the constant maintenance interventions?

Is it viable to obtain an engine with the potency adjustable by automatic or manual control?

How could be possible establishing a simple project to the engines?

- Questioning about technological enhancement:

How is it possible to obtain an enhancement of efficiency at mechanical engine?

How is it possible associating an unique model of quality at engine project without the inconvenient of each thermodynamic cycle?

Is it possible to design an engine with high potency, agile, extremely durable, economic and compact?

The function or objective of a mechanical engine is the movement generation, caused by an energy transformation methodology based on an exothermic chemical reaction. Regarding that, there are many methods to accomplishment of this, considering the Otto, Diesel and jet cycles, for example. Each cycle has specifics recommendations and constrains, causing a miscellaneous of application, depending of each requirements.

Based on, the enunciation of a **conceptual requirement** about this technological proposal represents the following topics:

1. **A new thermodynamic cycle should be presented, in order to provide an increased efficiency;**
   a. **The new proposal represents a new technical approach in terms of mechanical engine development. In addition, the new cycle should concerning all constrains and assumptions involved on actual cycles in use;**
   b. **The integration of all existent cycles it is the key resource, considering the conceptual possibility to design a new cycle;**
2. **The proposal should represent a paradigm breakdown, offering and allowing new parameters of mechanical engine performance;**
3. **The new proposal should bring a mechanical technique based on simplicity, reliability and reduced maintenance requirements.**

The above requirements represent a significant challenge in terms of technologic definition. Based on, the following description of the phases of this innovative proposal will demonstrate the technical alternatives toward answering these requirements.

2nd Phase | Integrating technologies - approaches and definitions

The major principle to evaluating the integration capability of two technologies it is not only related to their specific definition, and so involving there functions as well as the functionally technique. As mentioned above, the engine has the possibility to be classifying based on thermodynamic cycle applied. However, these technologies classification are not significant, in terms of variety of mechanical techniques that allows the combustion conditions, independently of thermodynamic cycle applied. The affirmation it is easily explainable, observing the principal mechanical technique offered in order to obtaining the compression and internal combustion reaction: pistons movement, considering the Otto and Diesel cycles; and blade movement, considering for the jets turbo-jets engines and the steam turbines.

Based on this observation, the technological integration could be determinate by the idea of raising the mechanical techniques available to allowing an enhancement at combustion conditions. In order to establishing a reasonable integration it is relevant to observe the following studies:

Analysis for Integration – establishment of correlation of contents

A | Classification of Integration Capability

Regarding an integration analysis, the basis point to initiate the correlation it is associating two technological approaches, assuming that the both technologies has similar aspects. The principle in order to establishing an integration analysis of two technological approaches it is determinate by the type of classification, considering only two alternatives:

- One technological approach improves the other, establishing the subjacent correlation;
- Both technological approaches were (or could be) integrated in an elevated degree that a third technological approach (no observed before) is created, establishing the union correlation.

Based on, the following analysis consisting:

First type of classification:		Subjacent correlation toward integration
Second type of classification:	✓	Union correlation toward integration

B | Technologies approaches to be Integrated

Introduction of the only two technologies approaches in order to be evaluating, considering their technical functions, advantages and disadvantages.

Pistons Movement	Blades Movement
	
Technical Functions: Compress the fuel-air mixture causing the exothermic reaction, for torque and movement generation.	**Technical Functions:** Absorb, compress and expel fuel-air mixture, allowing an exothermic reaction and thrust generation for jets engines, and transform an exothermic flowing into kinetic energy for steam turbine.

Technical Advantages:	Technical Advantages:
▪ There is a well detained knowledge about components and functionally; ▪ Allow a variety possibilities of applications, regarding the agile, type of fuel and flexibility over project design and production; ▪ Able to be applied to one and more thermodynamic cycles.	▪ A high power production, specific considering a constant performance; ▪ Functional accomplishment by continuous flow; ▪ High and medium efficiency obtained.
Technical Disadvantages: ▪ Complexity of designing and assembling, causing a constant maintenance activities as such as preventive and corrective; ▪ Adjustment capability (e.g. power, fuel consuming) oriented only on design step; ▪ Low efficiency; ▪ Workflow established by phases (two and four-stroke).	**Technical Disadvantages:** ▪ Specific and limited knowledge, considering the design and manufacturing; ▪ Lack of flexibility, regarding the possibilities of applications (limited to aeronautics field) and type of fuels; ▪ Elevated needs of dimension and supply support; ▪ Complexity related to designing, assembling and feasibility, causing several maintenances activities as such as preventive and corrective.

C Similar Aspects in order to allow the enhancement

After the advantages aspects of both technologies, it is necessary observing or defining how their aspects represent an argument of creative perspective. Based on, these arguments are the key elements to allow this enhancement. Then, each advantage and requirements aspects are combine in order to clear the perspective of improvement.
For that, it is necessary a creative and innovative approach, regarding the fuzzy perspective of opportunities. Using the following diagram, the creative perspective has explained.

Based on, the combining and arguments analysis:

Requirements	+	Pistons` Advantages	+	Blades` Advantages	=	Arguments
1- A new thermodynamic cycle should be presented, in order to provide an increased efficiency	+	Allow a variety possibilities of applications, regarding the agile, type of fuel and flexibility over project design and production	+	High and medium efficiency obtained	=	**Argument #1**
2- The proposal should represent a paradigm breakdown, offering and allowing new parameters of mechanical engine performance	+	Able to be applied to one and more thermodynamic cycles	+	A high power production, specific considering a constant performance	=	**Argument #2**
3- The new proposal should bring a mechanical technique based on simplicity, reliability and reduced maintenance requirements	+	There is a well detained knowledge about components and functionally	+	Functional accomplishment by continuous flow	=	**Argument #3**

And, the creative perspective description:

Arguments #		Creative Perspective
1	Create a new mechanical technique that allows internal combustion with an elevated degree of carburetor combination (fuel and air).	**The new engine will have two basically stages, composed by a first step without moved parts, representing the function of combustion chamber, and a second step associated with moved parts, representing the torque transferring**. The major creative idea has based on continuous flow establishment, caused by the vortex phenomena associated with a pressure variation along the chamber in consequence of combustion reaction. The torque transfer occurs by the same way in the blade engines: with inclined blades moved by heated continuous flow derivate the combustion chamber.
2	Need a reduced quantity of components and moved parts.	
3	Allow an elevate pressure in combustion chamber in order to potentiate the reaction, and parallel retain the internal temperature.	

The creative perspective drives to the new cycle that has defined as "Engine based on fluid flow due to vortex establishment by forced pressure variance". In the following chapter, the constitution of this new mechanical technique has explained and demonstrated.

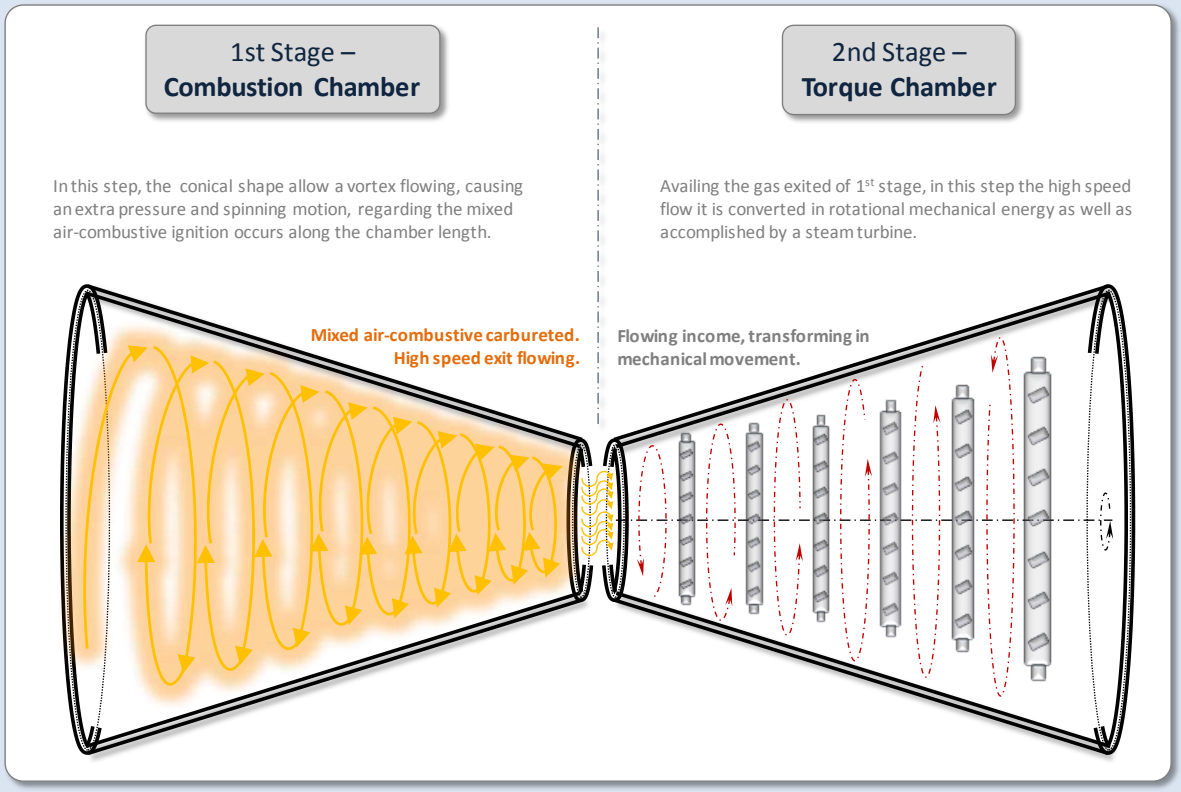
3rd Phase Technological Conceptualizing

The actual technological contexts of engines are targeted to achieve improvements in the current cycles (e.g. Otto and Diesel). Although this being a perfectly and feasible reasons, regarding the huge evolution in this equipments, during the last years, the Nucleus considering the innovative idea to offer a new cycle as another perspective in terms of research due to the possibility to enhance the efficiency, power produced and reduce the complexities of internal components.

Based on, the conception of new cycle as mentioned on chapter 2 represents a creative perspective in terms of innovation. In addition, regarding the integration of mechanical aspects of the main cycles in using, the Nucleus has proposing a conceptualization in order to provide an extreme improvement of efficiency. For that, the new cycle is composed by the majors advantages aspects presented and not concomitant in the currents cycles as such as continuous flow, reduced moved parts and combustion chamber concept by turbulent (vortex) mixed and ignited air-combustive flow. This parameters were initially signalizing in the chapter 2, based the creative perspective developed by the comparison between the mechanical techniques applied in the pistons and blades movements. Than, the new mechanical technique proposed is based in the principle of efficiency enhancement, establishing a possible new thermodynamic cycle that is able to redefine the engine energy transformation.

Based on, the new cycle consist in a mechanical technique extremely simple in terms of components and moved parts; also represent a system with two stages or chambers: combustion and torque. The both have aided by others subsystems also simplest, consisting than in the fully mechanical composition. Otherwise, this simpler objective does not allow an also simplification of results, and so the mentioned enhancement in terms of performance and efficiency (e.g. energy transformation). Therefore, the following diagrams demonstrate the named "**Engine based on flow of burned air-fuel due to establishment of a vortex that occurs by pressure variance, artificially created by injection of different temperature of air mass**" in details.

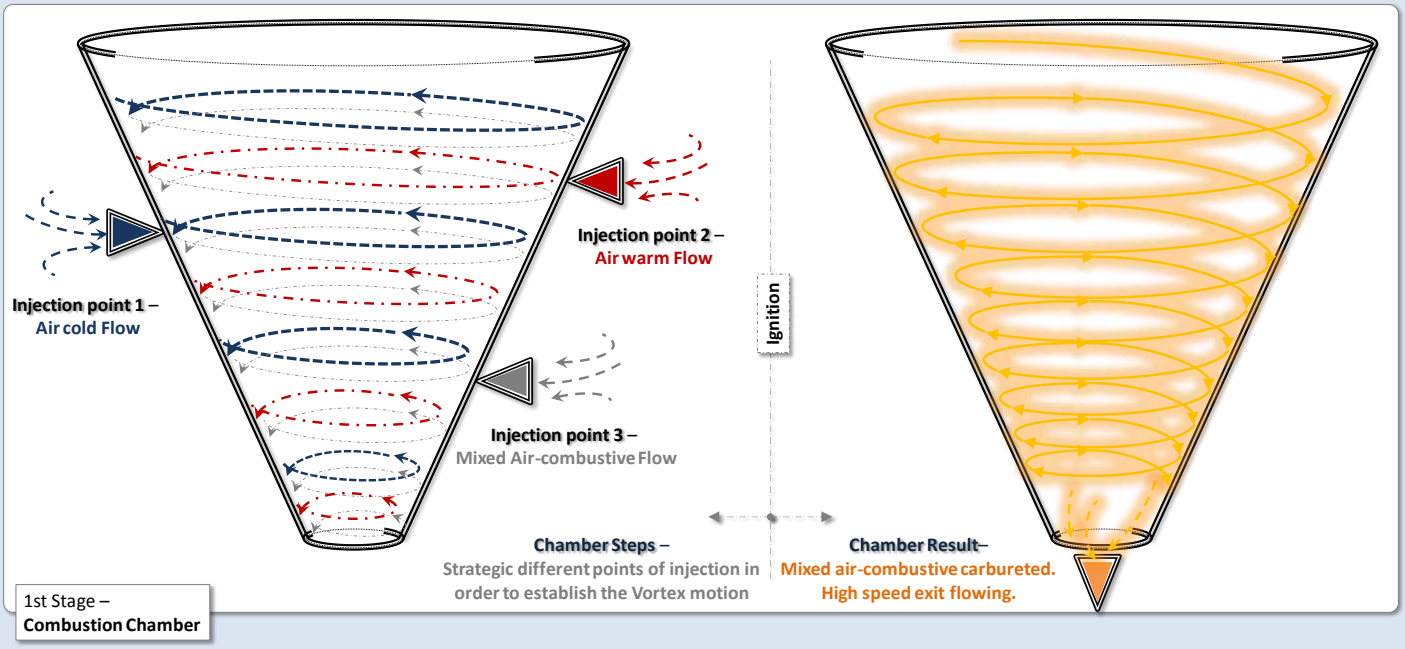
Diagram 1 – the stages presentation of new thermodynamic cycle for mechanical engine:



Although the diagram-1 becomes extremely simplest, it is intuitive to observe the relationship over both stages, regarding the energy transformation steps. Based on, the first stage refers to a situation of combustion occurred in circular motion, that it caused by vortex phenomenon due to the variation of pressure and flowing velocity occuring along the diameter and length of this conical turbulent fluid motion. Then, the second stage refers to capture the faster and powerful fluid motion into blades and shaft combined.

Considering that, the first stage requires that the vortex motion occur, it makes necessary a structure that allow this event, as demonstrated in the diagram-2, as below.

Diagram 2 – the Combustion Chamber definition and result:



In order to obtain the vortex effect that allows an increase over pressure and velocity of fluid flowing, the combustion chamber presents a conical shape with injection points, causing the spinning motion intercalated by mixed air-combustive, cold and warm air injections with the ignition and exothermic reaction. As demonstrated in diagram 2, the chamber steps are visualize (it does not in dimension scale) by different dotted lines as:

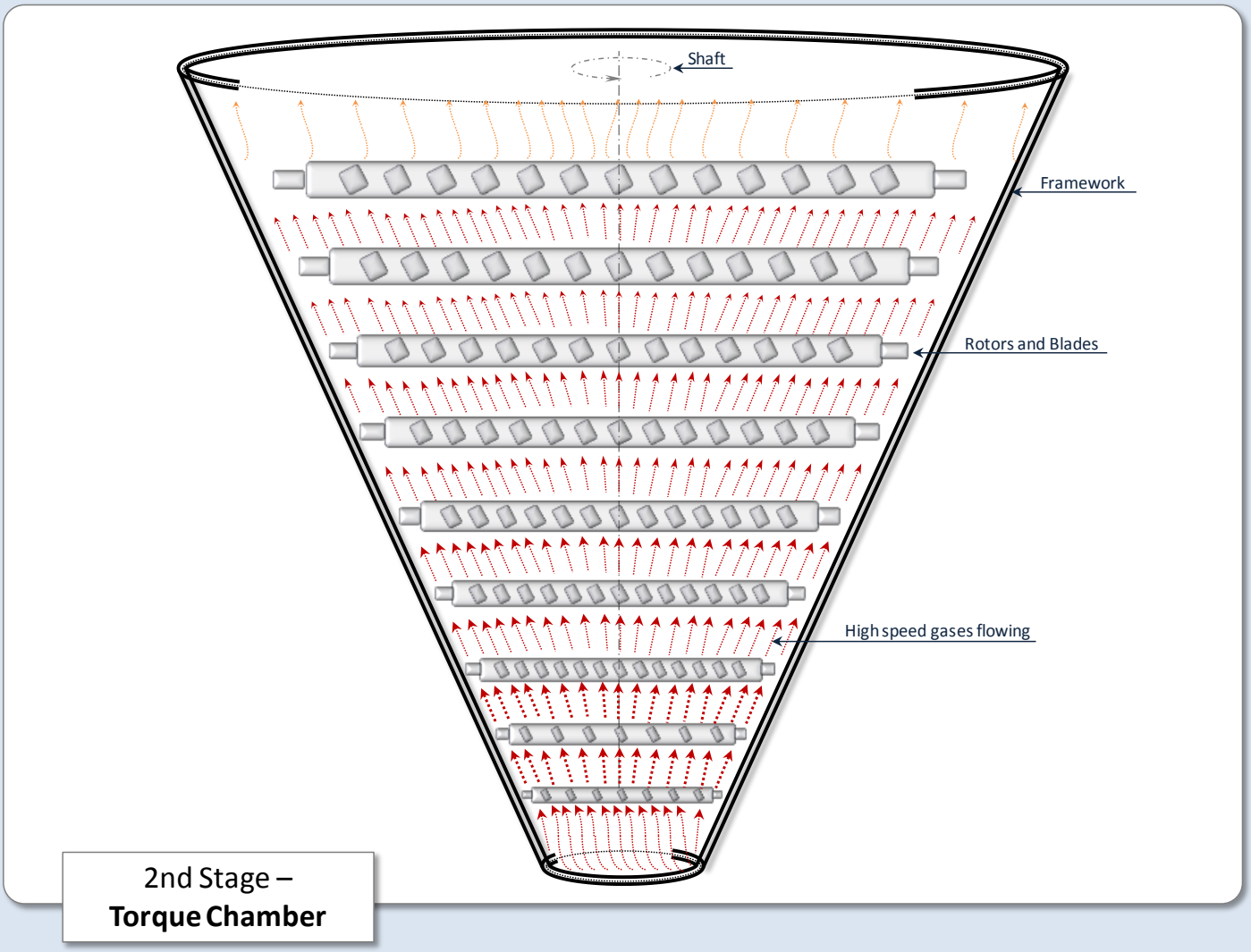
- Air cold injection (→) - in order to establish a gradient of caloric energy, this step consist in provide the reduced part of this variation.
- Air warm injection (→) - Otherwise, the warmed air injection represent the major part of gradient determination.
- Mixed Air-Combustive injection (→) - This mixture injected provides the combustion reaction, establishing the adequate regime (i.e. constantly or part-timely air-fuel equivalence ratio) of engine functionally.

Based on, in second part of diagram 2 the yellows flaming arrows represents the ignition flow along the conical shape, established and guided by vortex formation. The objective of this parallel representation in the diagram 2 results from the conception to obtain a constantly regime or continuous flow as major functionality of engine, eliminating the need of moved parts as well as decreases the internal complexity of components. The use of vortex orientation came from the idea to adapting this phenomenon and their intrinsic benefits as an element of performance and efficiency enhancement of combustion reaction. The reason of this occurs is associated by the fact that the vortex motion it is extremely turbulent and then passive of an interesting variation of pressure and velocity along the flowing, that it is already conical designed during the length.

The use of vortex phenomenon as element of enhancement in terms of combustion formation and turbulence flowing, it is originated from the reason that this phenomenon presents a relative standard of direction fluid motion that allow the establishment of an ideal continuous flow for the new engine accomplishment. Considering that, the vortex spinning motion consist a relevant turbulent flow for the principle of mixture and combustion, consequently due to the existing of a continuous motion already established that aids the air-fuel flowing according the ignition of combustion as a constant processes, free of internal moved components or parts. Based on, the combustion establishment occurs exactly by this spinning flow that it is maintained by the vortex that it is established by energy gradient variation along the conical shaper. In addition, a virtuous cycle which balances the vortex motion existing with the ignition, air-fuel injection and combustion process, co-establishing the both functionality as such an engine working.

The second stage represents the collecting and transforming the kinetic energy, already established in the first stage. The procedure to accomplishing it consisting in use the same workflow of a steam turbine, although the fluid applied is a combustion result powered with an elevated kinetic energy. Based on, the second stage consists in an ensemble with the components typical usage in this type of equipment such as rotors, blades and shaft. Relevant that the second stage has a specific project and design related to allowing the (i) integration of burned gases exited by first stage, and (ii) availing the fully energy from fist stage in order to transforming it in mechanical (rotational) energy. For this reason, the integration between both stages it is essential for the establishment of maximum efficiency of energy available. In the following Diagram-3, a basic demonstration of this functionality it is presented, regarding the definition of second stage, specifically explaining the torque chamber working due to the first stage integration.

Diagram 3 – the Torque Chamber definition:



Based on the new engine presentation, it is relevant to compare the respective functionality over the questions made in the 1st phase of development of this project, remember the following questions:

- Questioning about technological enhancement:

1. **How is it possible to obtain an enhancement of efficiency at mechanical engine?**
2. **How is it possible associating an unique model of quality at engine project without the inconvenient of each cycle?**
3. **Is it possible to design an engine with high potency, agile, extremely durable, economic and compact?**

Considering, after all explanation and proposing of this new technology approach, the following answers seek to determine the adequate responses for this technological challenger.

- Answering about technological enhancement:

1. **It is possible, the establishing a new thermodynamic cycle aligned with a new mechanical technique of functionality, which allows the energy transformation (i.e. chemical, thermo and mechanic) fully integrated in just two stages of working!**
2. **It is possible by using the idea of simplicity that the advantages of each engines functions (piston and blade) are integrated in just one combustion chamber which applying the vortex motion as key element of new engine functionality!**
3. **Yes it is, although the conception and production of an engine that uniting all of this beneficial attributes represents an enormous engineering challenge, the proposal drives innovation and creative perspective due to the establishment of a new thermodynamic cycle within a new mechanical technique, occasioning a paradigm-breakdown compared with the engines and thermodynamics cycles already applied!**

4th Phase | Technical and Financial Evaluation

Chapter`s content:

- Physical principle of gain
- Financial principle of gain
  - Return Parameters
  - Disbursements assess
  - Opportunities of Gain, return rate and period for return

The technical-financial viability study represents the measurement of specifics innovative proprieties presented in the proposal, considering the essential prerogative that these proprieties allow a well-established comparison with actual scenarios of engines technologic. Although being difficult to achieve a comparison of technologies, the idea is accomplish this comparison based on measurable elements, equal defined for the proposal (creative perspectives) and the actual pattern of engines functionality. Therefore, any measurement study (i.e. technical and financial) needs to be established a well-delineated and well-defined model considering this measurable elements or parameters of evaluation.

Based on, the following parameters better represents the physical elements of performance of any engine, considering that the measurement occurs by SI (the French acronym of *Le Système international d'unités*, or International System of Units):

- Torque (unit: Nm) – element that represent the moment of force in the engine shaft.
- Effective Potency (unit: kW) – element that represent the product of an angular velocity and the Torque, measured in the engine shaft.
- Fuel consuming (units: kg/s) – ratio that measurement the mass of fuel need per a period.

The parameters above have been used at large scale as elements of measurement for general engines. Based on, it is possible to pinpoint the technical as well as the financial evaluation as mentioned, considering the establishment of a modeling requirement that will determinate the reasonable matter in order to directing this study.

Physical principle of gain

In order to determinate the correctly modeling, a requirement it is necessary to achieve the physical principle of gain or to indentify the manner that the creative proposals could obtain the desirable enhancement, regarding the general engines functionalities. Then, a correlation with the parameters of performance above-mentioned it is indispensable in order to establish a numerical simplest and well-understandable assessment of the gains foreseen. Therefore, the well-acquaintance approach to accomplishing it consists to apply the concepts of engines` efficiency. That, it is represented by the following formula (internal combustion modeling):

$$N_e = \dot{m}_{ae} . \dot{m}_c . icp . \eta_t . \eta_m . \eta_v$$

- N_e → the effective Potency (or Power)
- $\dot{m}_{ae}$ → mass-flow of air that could have entered into engine, considering the entrance conditions of engine.
- $\dot{m}_c$ → mass-flow of fuel consumed. Relevant mentioning that the mass-flow of fuel it is related to the mass-flow of air (really has been entered to the engine) in terms of combustion reaction, although it is not demonstrated in the formula above, the mass-flow of air ($\dot{m}_a$) it is implicated by the AFR, or air fuel ratio, as below:

$$AFR = \frac{m_c}{m_a} = \frac{\dot{m}_c}{\dot{m}_a}$$, considering AFR = 1: $\dot{m}_c = AFR . m_a = m_a$

- icp → inferior calorific power of fuel, or the quantity of energy produced during a complete combustion of a combustible. The unit of icp is kilojoules per kilogram (KJ/Kg).

- η_t → thermal efficiency: represented by the ratio of the fully calorific power ($\dot{H}_t$) able to be achieved compared than the effective calorific power produced ($\dot{H}_i$).
  The effective calorific power has obtained by the fact that not all energy provided by the mass of fuel has converted (there is not a complete combustion of the combustible) in calorific energy. Therefore, the ratio it is established as:

$$\eta_t = \frac{\dot{H}_i}{\dot{H}_t} = \frac{\dot{m}_i.icp}{\dot{m}_c.icp} = \frac{\dot{m}_i}{\dot{m}_c}$$

- η_m → Mechanical efficiency: defined as the ratio of effective potency (N_e) compared than indicate or theoretical potency (N_t), considering the consequence of attrition or friction of the internal components with contact, losses on fluids-flow or fluids-pressure conduced and any consideration related to mechanical non-performance, as below:

$$\eta_t = \frac{N_e}{N_t} = \frac{\text{Potency or power effective obtained, deriving from a measurement method (i.e. dynamometer) in the shaft}}{\text{Theoretical potency considering the power only produced in the combustion chamber}}$$

- η_v → Volumetric efficiency. Defined as the ratio of mass-flow of air that really has been entered into engine ($\dot{m}_a$) compared than with $\dot{m}_{ae,}$ or:

$$\eta_v = \frac{\dot{m}_a}{\dot{m}_{ae}}$$

Based on the formulas above represented, the gains and the engine's enhancement will be obtained considering the efficiency improvement, allowing the approximation of these ratios for one due to the creative perspectives (i.e. new mechanical technique and new thermodynamic cycle). Otherwise, the effective Potency (N_e) will also implicating in other opportunity for gain, regarding the relation of torque (T), angular velocity (ω) and rotation (n), as below represented:

$$N_e = T \cdot \omega = T \cdot 2\pi \cdot n$$

Therefore, the gains will be assess by the parameters above mentioned, explaining initially by the following formula:

$$N_e = T \cdot 2\pi \cdot n = \dot{m}_{ae} \cdot \dot{m}_c \cdot icp \cdot \eta_t \cdot \eta_m \cdot \eta_v$$

The proposal as already explained represents an introduction of new thermodynamic cycle within a new mechanical technique related to internal combustion engines. The creative perspective it has based on the unification of the advantages of the actual mechanics techniques of engines already established as such as the pistons and blades movements. The major objective of the value-analysis of this two technologies it is related to integrating them in another technologic, able it to provide a physical work with efficiency enhanced.

Based on, the challenge refers to obtaining a “better world” deriving of current design, technologies and functionalities of engines. Therefore, a new engine with the simplest two stages it is proposing that the internal combustion occurs in a chamber with vortex flux creation in order to establish a relationship of flow-velocity and flow-pressure in terms of increase the mixture and ignition processes, allowing an improvement in the thermal efficiency. The second stage is design based in the steam turbine, using blades to collect the kinetic energy in terms of torque-shaft, establishing the

increases of mechanical and volumetric efficiencies.

In terms to achieve a well-defined comparison of the actual technological engines` context, the above-demonstrated efficiencies represent the relevant elements of influences related to performance parameters (i.e. Torque, effective Potency and fuel consuming). Based on, the values of $\dot{m}_{ae}$, $\dot{m}_c$, and icp will be considering as a constant (k), redefining the formula above as:

$$N_e = T \cdot 2\pi \cdot n = \underbrace{\dot{m}_{ae} \cdot \dot{m}_c \cdot icp}_{\hookrightarrow k} \cdot \eta_t \cdot \eta_m \cdot \eta_v$$

Obtaining the final formula for technical and financial evaluation:

$$N_e = T \cdot 2\pi \cdot n = k \cdot \eta_t \cdot \eta_m \cdot \eta_v$$

Thus, using the comparison of the behavior pattern of the thermodynamic cycles (deriving of piston and blade techniques), the following table demonstrating the variation of efficiency assigned of each technologic:

Table-1: *Variety of Engines (thermodynamics cycles and mechanical-tecniques*

	η_t	η_m	η_v
***Internal Combustion Engines* (Piston Movement)**	26%~34%	75%~90%	75%~90%
***Steam Turbines* (Blade Movement)**	65%~90%	85%~95%	90%~95%
***Jet Engines* (Blade Movement)**	65%~90%	85%~95%	60%~75%

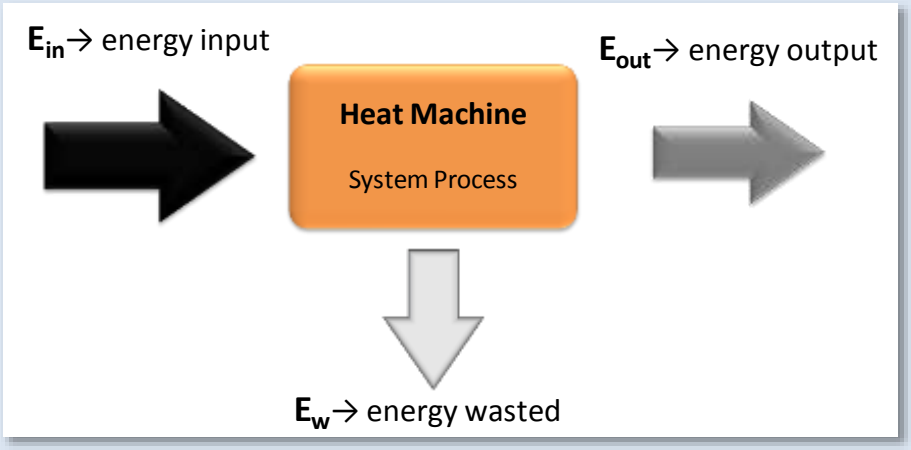
The values of each efficiencies are demonstrated considering the gap of minimum and maximum, considering the throughout variation of worth, regarding the equals varieties of engines models and setups.

Based on, important mentioning that the efficiencies definitions of each engines refers to their peculiarities, regarding specifics pattern of functionalities. Thus, a concern related to this principle of gain modeling refers to using different patterns as such as internal (Otto and Diesel cycles) and external combustions (steam and jets turbines), establishing a comparative table, considering that the efficiencies calculation regards different principles and physical proprieties, compared than the η_t, η_m and η_v already explained above. The reason for that it is related to the conception of Nucleus that measurable elements must be in place in order to accomplishing a comparative scenario of different technologies. Based on, using the concept of efficiency, as below:

$$\text{Efficiency} = \frac{\text{Measurable Element (deriving Physical Proprieties, i.e. Energy, Effort) effective used or applied}}{\text{Same Element obtained by Theoretical calculation or the fully worth able to be used or applied}}$$

Considering so, the Efficiency as a primary comparative element of engines (heat machines) as such as their specifics patterns, even existing distinctions or differences by the conception and calculation of their efficiencies worth (provided of the many thermodynamics cycles), the efficiency still being a basics element of measurements, and so able to be compared.

Based on, the efficiency conception proposed for this measurement comparing refers to the thermal efficiency in terms of thermodynamic first law, that a generic heat machine processing a thermal energy entered in order to converted it in an output energy, considering relevant for that the input Energy is always larger than the output Energy converted, as demonstrated below:



Although the thermal efficiency it is relevant in terms of comparing the heat machines (i.e. internal combustion, jet and steam engines), other efficiencies conceptions has been demonstrated as collaborative elements of comparison, invariably. For example, the volumetric efficiency of a steam turbine it is not equal calculating as the volumetric efficiency of an engine of Otto cycle, however the idea or mean of this measurable element indicates a response in terms of their capability to perform, even considering there specificities.

Thereby, the steam turbines efficiency η_t it is really measured as Thermodynamic Efficiency, consisted by the ratio of power actually generated from the turbine to what would be generated by a perfect turbine with no internal losses using steam at the same inlet conditions and discharging to the same downstream pressure (actual enthalpy drop divided by the isentropic enthalpy drop).

The volumetric efficiency η_v of a turbine it is related to steam leakage, considering an element concerned to the operative proprieties or the design functionality as such as the mechanical efficiency η_m, compared than a thermodynamic characteristic.

The total efficiency of the jet engines has established by the propulsive efficiency (η_p), cycle efficiency (η_c) and consumption of fuel efficiency (η_{cf}). Based on, considering the following:

- Propulsive efficiency (η_p) → ratio of the vehicle velocity compared than exhaust velocity (nozzle exit).
- Cycle efficiency (η_c) → similar to the mechanical efficiency η_m, considering the performance of internal dynamic cycle of jet engines in order to obtain the acceleration of an airplane, for example.
- Consumption of Fuel efficiency (η_{cf}) → defined as the amount of heat released during combustion over the heating value of the fuel burned.

Concerning than, the fuel efficiency η_{cf} it is equivalent in terms of efficiency correlation with thermal efficiency η_t and the propulsive efficiency η_p correlated with volumetric efficiency η_v.

Financial principle of gain - Return Parameters

Based on the above explanation related to efficiency as measurement element of gain, the following relevant value analysis consist in determining how the efficiency worth variation could be useful in order to add value as innovative project. Then, it means that an innovative project should necessarily increase the efficiencies worth, occasioning a general engine performance improvement.

The diagram # 4 represents typical Engine Characteristic Curves (ECC). Considering the ECC an additional element named Specific Consumption S_c that represents as below:

$$S_c = \frac{\dot{m}_c}{N_e}$$

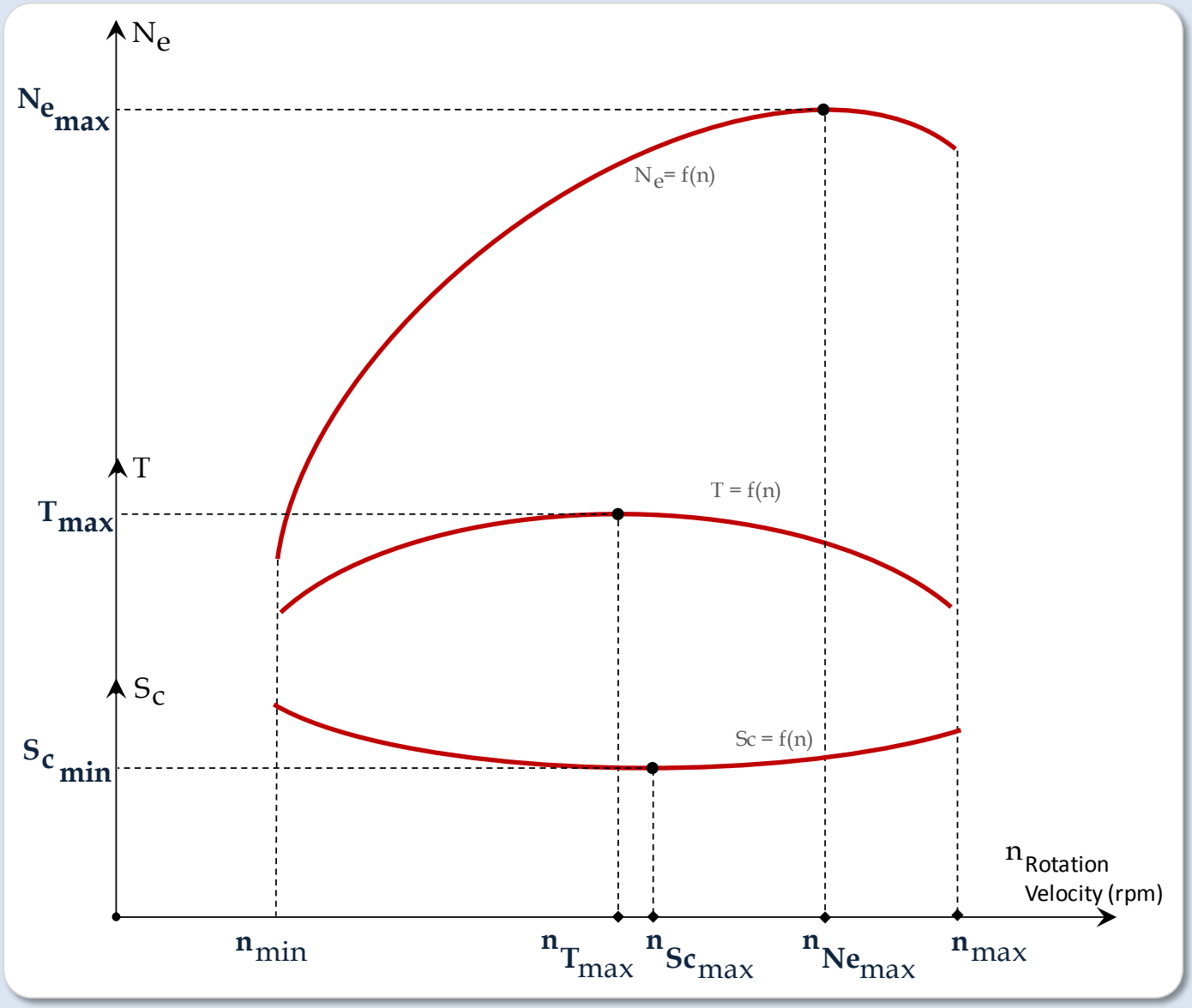
And, also represented by the following formulation:

$$N_e = \dot{m}_c \cdot \underbrace{\boxed{\dot{m}_{ae} \cdot icp}}_{\hookrightarrow k'} \cdot \eta_t \cdot \eta_m \cdot \eta_v$$

$$S_c = \frac{1}{k' \cdot \eta_t \cdot \eta_m \cdot \eta_v}$$

Based on, the ECC represented by curves of N_e, T and S_c, as following:

Diagram 4 – Usual ECC:



Engine Characteristic Curves

Remembering that the primordial definition of Nucleus it is being an organization that preceding the R&D activities, working in the possibility to combine distinct technologies in a third one capable to add or improve one or many of usual machines or systems outcomes (conditioned there, as measurable elements). Then, in order to determine the amount of gains related to this propose (already presented, in above chapters), the efficiencies values improvement are obtained regarding the simply calculation of average, considering the table # 1 data. As mentioned, it is extremely

difficult to obtain a theoretical value of efficiencies gains, considering for that the situation of the proposal represents a new engine' functionality, and also a new thermodynamic cycle (based in the mechanical-technique that integrated the blade movement by a forced vortex combustion flowing). And so, preceding any one of empirical or real / physical validations, the theoretical gains are obtained as a conservative definition, using the outcomes (efficiencies) averages of engines used as precedents of this development, considering also the engine (of piston movement) utilization as the final application of this proposal.

Based on, the table 2 demonstrating the sub-averages as well the final averages (of each mechanical-technique), calculating the outcome efficiencies of this innovative proposal.

Table-2: *Efficiencies Combined for Thermodynamics cycles and respective mechanical-techniques*

	η_t	η_m	η_v
Internal Combustion Engines (Piston Movement)	26%~34% ↕ Sub-average 1: 30%	75%~90% ↕ Sub-average 2: 82,5%	75%~90% ↕ Sub-average 3: 82,5%
Steam Turbines (Blade Movement)	65%~90% ↕ Sub-average 4: 77,5%	85%~95% ↕ Sub-average 5: 90%	90%~95% ↕ Sub-average 6: 92,5%
Jet Engines (Blade Movement)	65%~90% ↕ Sub-average 7: 77,5%	85%~95% ↕ Sub-average 8: 90%	60%~75% ↕ Sub-average 9: 67,5%
***Engine Proposed** (Vortex flowing aligned to blade Movement)*	Gap 1-4-7: 30%~77,5% ↕ Average 1: **53,75%**	Gap 2-5-8: 82,5%~90% ↕ Average 2: **86,25%**	Gap 3-6-9: 67,5%~92,5% ↕ Average 3: **80%**

Observing the values defined as improvements, the same values (table 2) could be compared than the original table 1 data, for internal combustion engine (already defined in sub-averages 1, 2 and 3, specifically demonstrated also in table 2), considering the following evaluation formulas:

- Table / Data 1 content: $N_e = T \cdot 2\pi \cdot n = k \times \eta_t \times \eta_m \times \eta_v = k \times 0.3 \times 0.825 \times 0.825 = k \times 0.20418$
- Table / Data 2 content: $N_e = T \cdot 2\pi \cdot n = k \times \eta_t \times \eta_m \times \eta_v = k \times 0.5375 \times 0.8625 \times 0.800 = k \times 0.37087$

Based on, comparing the numerical part of this equation that the efficiencies are demonstrated, the different between data related in tables 1 and 2 represent a 81.63% of increasing, as below:

$$\frac{Data^1}{Data^2} = \frac{k \times 0.20418}{k \times 0.37087} = 0.55054$$

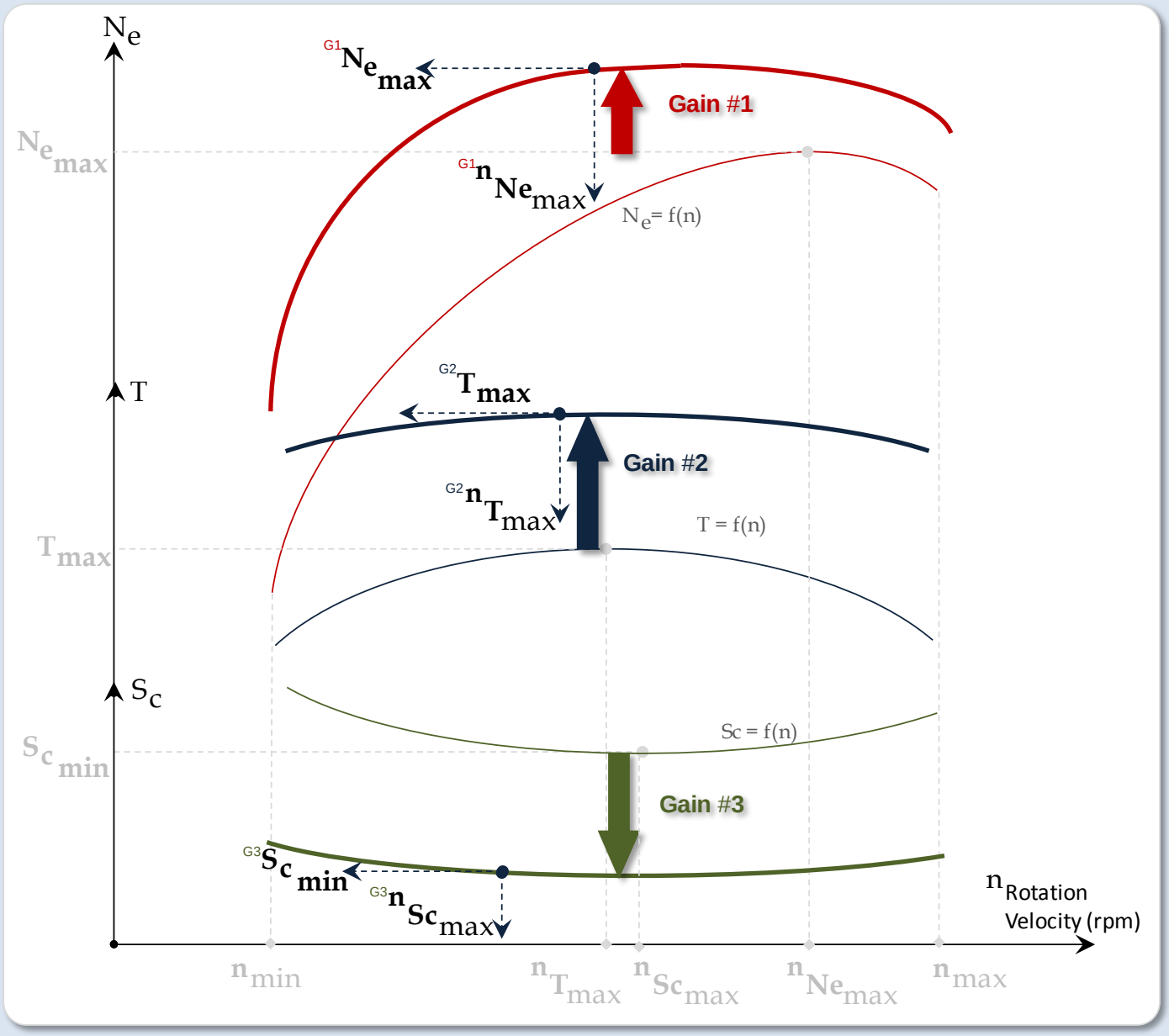
or

$$Data^2 = 1.8163 \times Data^1$$

Based on, the above formula represents the total gain, potentially established in order to increase the final engine performance. However, the fully increase will be better understandable whether split up it in the ECC measurement elements as well as Potency N_e, Torque T and Specific Consumption S_c.

Then, the ECC (diagram 4) could be redefined as below in the diagram 5:

Diagram 5 – ECC improved:



Engine Characteristic Curves

Based on, the physical principle of gain it is demonstrating by the Potency and Torque increases, aligned by combustive consumption decrease. Therefore, the tree ECC curves are improved by the range of each individuals gains (named ^{G1}N, ^{G2}T, ^{G3}S and respective $^{G1, G2, G3}n$), caused by the efficiencies increases. Represent it an engine performance with better result and less resources using, compared than usual ECC. In practical terms, the proposal it is justifiable by an outcome that adds relevant gains related to usual engines performance, without considering another varieties as such as weight and vibration, considering then the engine performance as only relevance element of proposal.

However, basing the 81.63% total gain as demonstrated above, in order to obtain each individuals gains ($^{G1, G2, G3}$) the following equations representing the dismemberment the total gain in the individuals gains related to ^{G1}N, ^{G2}T, ^{G3}S.

Using the formulas:

- $N_e = T \times 2\pi \times n = k \times \eta_t \times \eta_m \times \eta_v$
- $Data^2 = 1.8163 \times Data^1$
- $S_c = 1 / k' \times \eta_t \times \eta_m \times \eta_v$

The following correlation are demonstrated:

$$N_e = T \times n = \frac{K \overset{\rightarrow k''}{\overbrace{\quad}} \times \eta_t \times \eta_m \times \eta_v}{2\pi}$$

$$\frac{N_e^2}{N_e^1} = \frac{T_2 \times n}{T_1 \times n} = \frac{k'' \times Data^2}{k'' \times Data^1}$$

$$\frac{N_e^2}{N_e^1} = \frac{T_2}{T_1} = 1.81163$$

Based on, the equation above demonstrate that the correlation of Potency and Torque respecting the same proportion already established of total gain, considering the estimative done about the worth added to the engine performance over the innovative proposal. Then, the combustive consuming it represented by the following equation.

$$\frac{S_c^2}{S_c^1} = \frac{\frac{1}{k' \times \eta_t \times \eta_m \times \eta_v}}{\frac{1}{k' \times \eta_t \times \eta_m \times \eta_v}} = \frac{\frac{1}{k' \times Data^2}}{\frac{1}{k' \times Data^1}}$$

$$S_c^2 = 0.55054 \times S_c^1$$

Therefore, the dismembered gains of Potency and Torque are possible to be increased about 80% compared than the actual engines performance, and also the combustive consuming could be reduced about 45%. Regarding for that, an innovative proposal that integrating different engines' functionalities in a third technique, consisting a new thermodynamic cycle, occurring a theoretical calculation that the final performance of this proposal it conservative obtained by an average of outcome engines' performances.

Financial principle of gain – Disbursements assess

In this chapter, considering the already explanation of the gains proposed, it is necessary a disbursement estimation related to demonstrate the benefits of this innovative proposal of engine.

The major aim of this proposal related to obtain a significant improvement over engine performance, regarding an innovative proposal of functionality that allow a new thermodynamic cycle. However, this project needs to be demonstrate as useful and reliable, crossing the boundary line of theoretical concept to the practical outcomes.

Based on, a prototype it is required in order to better demonstrating the proposal functionally and also, aiding in terms of retro-feed information analysis, related to the principles and premises of the innovation.

The estimation of disbursement will essentially considering the cost of a project, excluding the raw materials necessary to assembling the prototype, based in the difficult estimation due to an extremely innovative approach.

Therefore, the disbursements amounts will be define in order to demonstrate the proposal benefits as from a modeling prototype project, composed by a program (stages and phases) of activities explained in the following table.

Project Phases and Estimate of hours consumed (6,100 hours)		
1-	**Information and Creative Perspective to be Defined**	**1,500 hours**
1-1	Final proposal inherent at **Technological Innovation**, contending the premises and precepts minimal requested to forward the prototyping	360 hours
1-2	**Value Engineering / Analysis** – define functions, determine project cost, establishment of activities schedule, methodologies applied, conceptual approach and innovative concepts, management approach (purchase and project control)	500 hours
1-3	Bibliographical **references** and theoretical	200 hours
1-4	Preparation and captivate the **resources needs** such as structural and human (i.e. equipments - computers, machinery, office, etc – software licenses, physical location, budge and professionals involved – direct and indirect, purchase)	360 hours
1-5	**Legal** activities related to agreement terms, statutory, laws compliance, patents and copyright inherent at project	80 hours
2-	**Planning and Design**	**1,660 hours**
2-1	Calculation Memorial of project	275 hours
2-2	Detailed design of project components	360 hours
2-3	Assembly design	400 hours
2-4	Previous definition of materials usage and dimensioning	400 hours
2-5	Theoretical Evaluation - Simulation (functionally and structurally) of full project and components aided by computational software	225 hours
3-	**Execution and Implementation**	**1,420 hours**
3-1	Ratification of the phases of prototyping	360 hours
3-2	Ratification of the quantity to be manufacture	200 hours
3-3	Prototype preparation, regarding the all project considerations	500 hours
3-4	Prototype final ratification	360 hours
4-	**Evaluation, Tests and Validation**	**970 hours**
4-1	Physical examination (e.g. structural) of components	150 hours
4-2	Physical examination of ensemble assembled	360 hours
4-3	Tests of functionally validation (i.e. functionally and performance)	360 hours
4-4	Resistance tests, and destructive examination of main components	100 hours
5-	**Reporting**	**550 hours**
5-1	Full physical test of real situation of use and handling	225 hours
5-2	Homologation of prototype / project	175 hours
5-3	Final report / article preparation, considering also specialized media dissemination and communication	150 hours

The major objective to prototyping the engine proposal consist in demonstrate an empirical validation through a viability identification. Causing a possible redefinition of project specification or patterns, and also the achievement of the primordial proposal aim that it is obtain an innovative results as an opportunity of improvement, decurrent of the functionalities details from engine' technologies that were not integrated until now.

Considering the phases above described and the period schedule estimated, the amount of 6,100 hours represents the total of dedication in order to development and concept a prototype with innovative technologies.

The disbursement of project it is directly associated with this estimate amount of hours. However, the total value of disbursements alternate as according to professionals employed, equipments applied, location or research place and other costs related to accomplishment of research and development activities, and also observing the cost definition as direct and indirect.

Considering this fact, and in order to valuing this project the financial model to be adopted it is defined as fee project that meaning multiply the total amount of hours per a monetary value, representing the total cost of project / prototype.

Such fee project already included the direct costs (e.g. professionals involved, equipments rented, computers, software licenses, location, etc) and some indirect costs, which this costs are easily defined (e.g. accountability personal support or general administration, maintenance, IT support, etc). This model it is applied on vary trades negotiations, considering the diversification of scopes and acting areas (e.g. advisory and consulting marketing, third part services), make feasible the cost structure of all operations and activities involved in this project.

Based on this cost model, and verifying the average on technical consulting market, the value of project fee needs to contemplate the human and material complexity with the schedule and parallel activities of prototyping project. Thus, considering these factors the value initial proposed it is USD 1,500.00, causing the total cost of project at USD 9,150,000.00.

The fee proposed represents estimation, and could be redefined considering a necessary adequacy related to this prototype plan. However, a specific value amount it is required in order to demarcate the relation between investment and return, that it will be demonstrated in follow chapter.

Financial principle of gain - Opportunities of Gain, return rate and period for return

Along the 4th Phase's chapters the explanations of financial-economic analysis occurs through the measurement of proposal due to modeling and the estimation gains and disbursements.

Considering that, the final and feasible explanation able to be contained in this chapter refers to relating the gains and disbursements on concept of return of investment, determining a payback rational.

The concept to calculate the payback it is very simple, establishing the apportionment of the amount of gain relative to the amount invested. This relation denotes at return rate that demonstrate the capacity of project and their benefits in capitalize monetary amounts as gains returned to the investor, determining whether the project attempts in financial terms of a socioeconomics context. For example, a return rate of 25% during a determinate period represents that for each USD 1 invested the return is 25 cents, and the payback represents the period that the investor returned the full investment, in this example the same USD 1. In addition, for a comprehension whether a return rate it is significant or interesting it is necessary to understand the current socioeconomics context, in order to apply an investor point of view, balancing the risk involved and the profitability possible to be reach.

Based on, the socioeconomics context and risk involved are two concepts that deserve a better understand of their correlation with financial viability related to this innovative project. Thus, the business environment depends of the macroeconomics scenarios (i.e. GDP fee, employment, inflation, and other economics indicators), that determinate the inclination of more or less innovative initiatives (investment), considering differences about these scenarios as the equivalence related to profitability expectation in current moment or a future perspective. In addition, the socioeconomics context there is represented by market, credit, competition, social and political trends that influencing the economic likelihood of profitability / growing, also considering a forecast of others scenarios.

In addition, the risk involved represents the concept of "risk appetite" it is also applied to determinate the viability of project, considering the risk associated to profit or return. The risk modeling could represent the extreme situation of investment amount loss, or the simple delay in the project schedule.

The decision of investing or not at the project based on a specific return rate it is directly determinate by the significance of this rate and respective risk associated to the socioeconomic context.

Based on, it is necessary estimate the return rate, considering the already described gain, as following:

- 45% Reduction of fuel used, approximately;
- 81% Increase of engine Potency, approximately;
- 81% Increase of engine Torque, approximately;
- Reduction of engine's design and maintenance costs, approximately estimated by simplification of internal components.

Considering for a rational calculation, the consuming fuel reduction is an obviously element of gain, regarding the amount of savings based on the average price of fuel. However, the gains of Potency and Torque are elements not so intuitive in terms of a rational establishment. Thus, for calculation of gains a premise or concept of benefit it is used in order to obtain a reasonable perspective of value based only in the vehicle itself (that the new engine it is composed). It is important noted that the value and also the depreciation of any vehicle are elements influenced by distinct varieties related to the moment, social and technical context involved. Based on, the Benefit it is simply represented by the vehicle value over the period (months, years) of their well utilization. In this concept it is included the actual maintenance cost, the perspective of cost (likelihood of increasing maintenance cost), the reliability evidence, the status quo (or the perception of relevance related to vehicle approach, e.g. classic vehicles, feasible utilities) and the major: capability to be useful.

Considering then the above elements, the following formula determinates the depreciation value:

$$V = C_x (1 - r)^t$$

Considering:

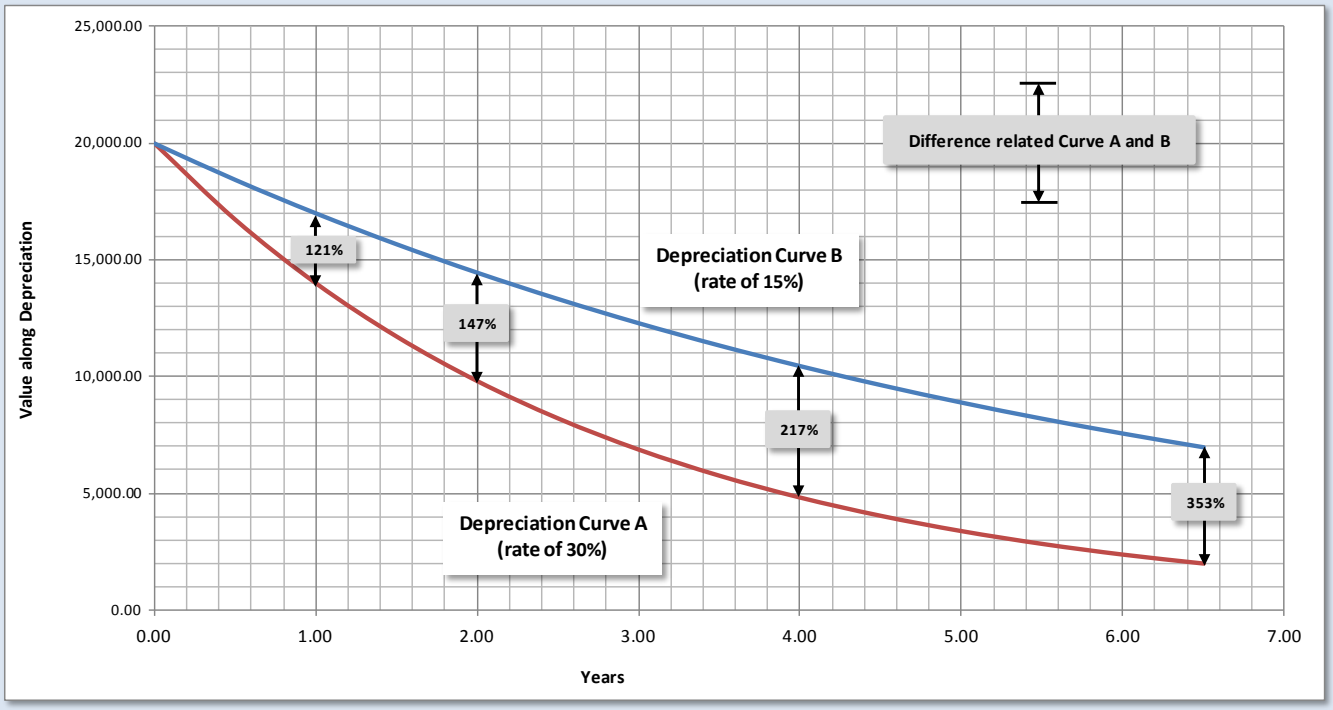
- V → Value of the Vehicle already depreciated.
- C → Original Value (or Cost) of acquisition.
- r → Rate of depreciation.
- t → Period of Vehicle usage.

Based on the above formula, the rate of depreciation represents the major element that determines the gradient of vehicle devalues, also considering the period involved. Thus, the idea of Benefit it is associated to the possibility of any vehicle still allows itself utilization with the perception of useful or desired, recognized by the market value. Therefore, the depreciation formula exactly indicates this perception (of useful or desired) in terms of calculation, compared than the original value of acquisition, C.

Although, the Potency and Torque are part and not the full component of Vehicle`s Benefits, this elements are essentially relevance in terms of the depreciation rate formation, especially considering the firsts years of vehicle utilization.

Modeling the V value of depreciation, using two depreciation rates as parameters, the following graph demonstration a correlation along the asset period:

Graph 1 – Modeling of Depreciation Curves with distinctive rates:

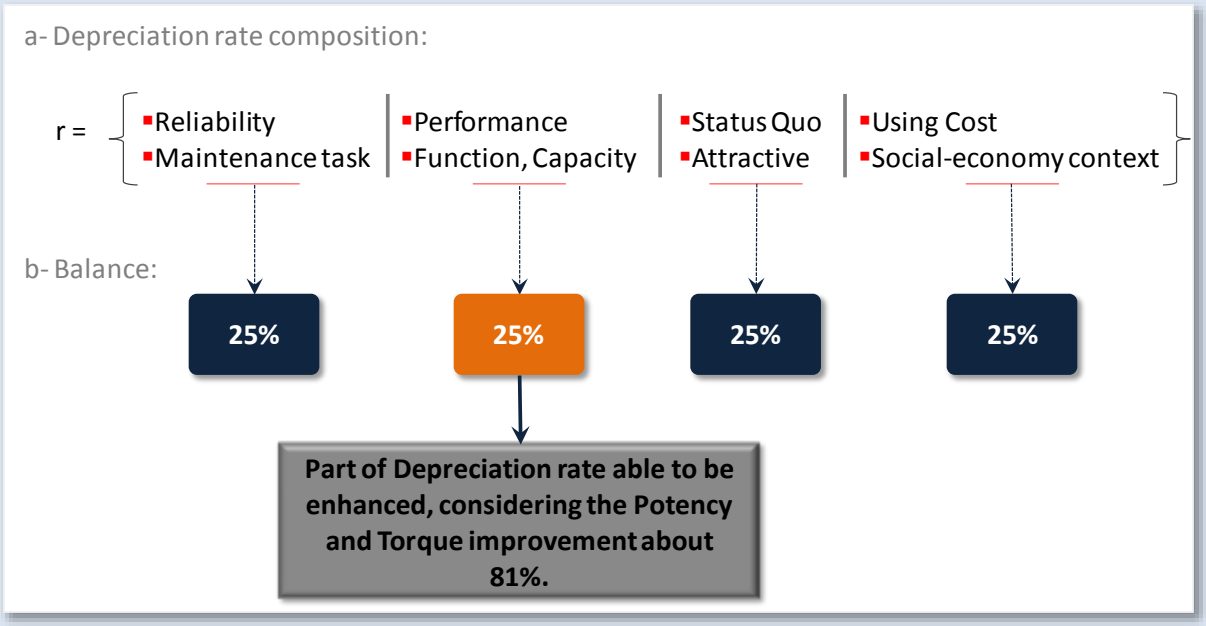


From an example of new vehicle with USD 20,000 of original value (C), along a range of period (t), the curves A and B represents the influence of a depreciation rate (r) of 30% and 15%, respectively. Observing the last value depreciated (V) of both curves, it is noted that although the r^A being the double of r^B, the V^B represents a variation of 353% than the V^A. The average of variation over curve B to curve A it is about 203%. Then, the reduction of half worth of depreciation rate represents a gain related to value asset about the double, approximately. Indeed, these is an extremely simple modeling, and determine a correlation of depreciation rate and value depreciated implicating in a large variation, considering the many variables related to depreciation curve of a vehicle or asset. However, the Potency and Torque increases, influencing this elements (rate and value depreciated) based on the possibility the vehicle accomplish an elevate duties and functions, regarding the 81% improvement in vehicle (engine) capability. That represents a postponement of value effort to maintain the vehicle useful and reliable. In others terms, the initial worth of vehicle (not necessary or correlated with the price) are enhancement for the reason that a vehicle within this innovative engine is able to do more, in the same period of a usual vehicle. Considering then, the wearing-out are equal, the perspective of maintenance cost are immediately differing, the status quo is balanced due to the capability increase and the reliability it is assessed.

In addition, passing just two years the worse scenario (curve A) represents depreciation about 50%, estimably. In addition, observing the first year, the same represents the highest depreciation amount (the pure depreciation rate, 30%), compared than others years. That allows the conclusion that excluding extraordinary events such as accidents and several damages, a vehicle has the most significant devaluation in first year. Considering that the appearance characteristics of the vehicle are maintained, this amount of depreciation is significance in first year. The reasons for that are difficult to determine due to some varieties depends on vehicle characteristic, social and economic contexts. However, the perspective or raising likelihood of maintenance cost, status quo and the reliability evidence are elements relative important in terms to determine the depreciation rate.

Considering a simple evaluation about depreciation rate composition, the diagram-6a below demonstrate this composition, in terms of an analysis based on the major elements or parts that compose the depreciation phenomena.

Diagram 6a – Depreciation elements:



Observing the diagram-6a, the depreciation involves many elements that combined causing the rate and respective devaluation of a vehicle or asset. The depreciation components are divided in four groups, defined as below:

1st Group – Technical costs associated:
- Reliability
- Maintenance task

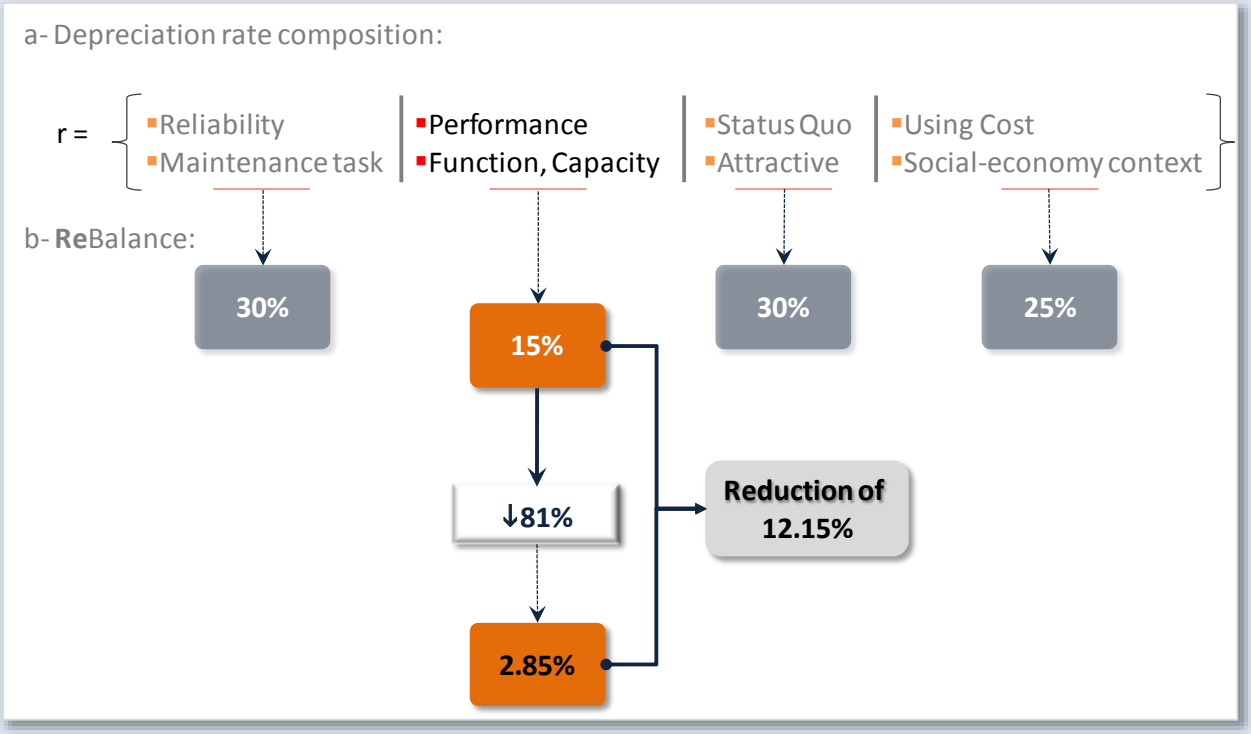
2nd Group – Capability related to usage:
- Performance
- Function, Capacity

3rd Group – Relevance and importance in terms of ownership:
- Status Quo
- Attractive

4th Group – Disbursements related to usage:
- Using Cost, fuel, immediately repairs
- Social-economy context

However, the balance of these elements is extremely difficult to be defining, at least in theoretical terms. Based on, the balance are equivalent for all group of elements such as premise, in order to better equalize the association of Potency and Torque improvement, regarding a conservative parameter of gain calculation. Thus, the part of “Performance, Function and Capacity” of a vehicle could be more representative, instead with the other parts. However, for purpose of calculation this element has established in 15%, considering a conservative premise, aligned with an imprecision about this theoretical value determination. As demonstrated in diagram-6b, a rebalance of the elements has proposed in order to define a conservative parameter for “Performance, Function and Capacity”.

Diagram 6b – Performance, Function and Capacity:

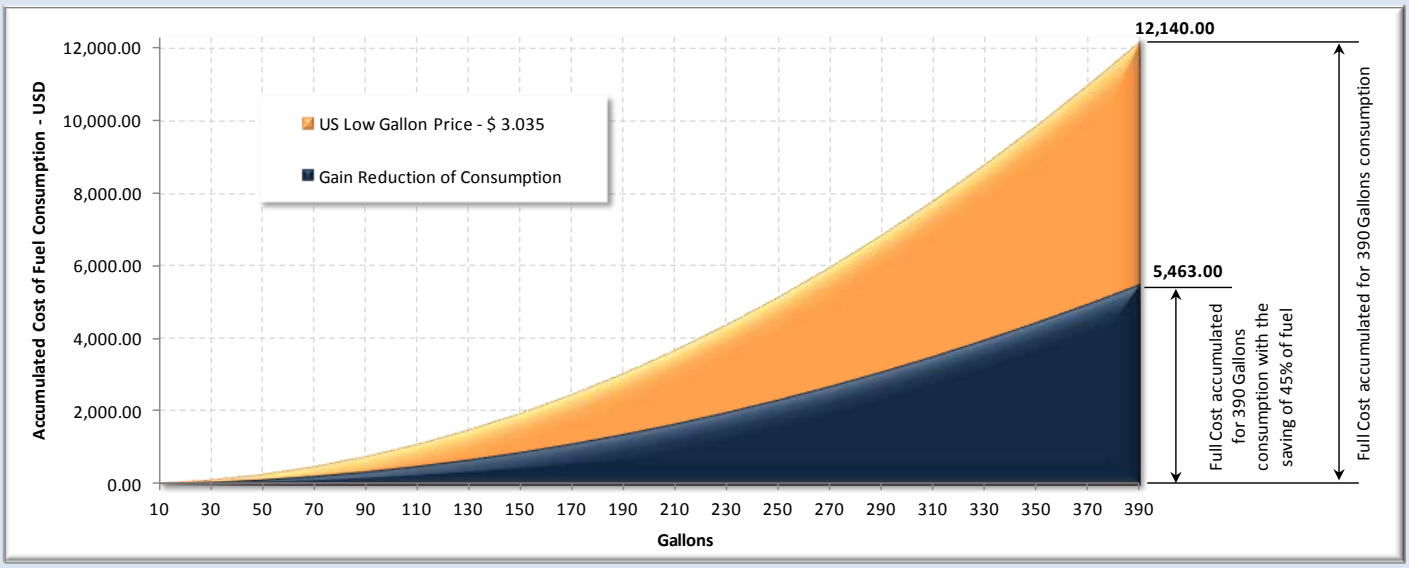


Appling the percentage of 81% related the increase of Potency and Torque over the 15% of participation of depreciation element "Performance, Function and Capacity" the improvement in this element it is about 12.15% of reduction of itself participation of total depreciation rate, causing the same linear reduction over this depreciation rate. In practical terms, the 81% of improvement of Potency and Torque determines a 12.15% of improvement over depreciation rate, considering the assumptions and premises used.

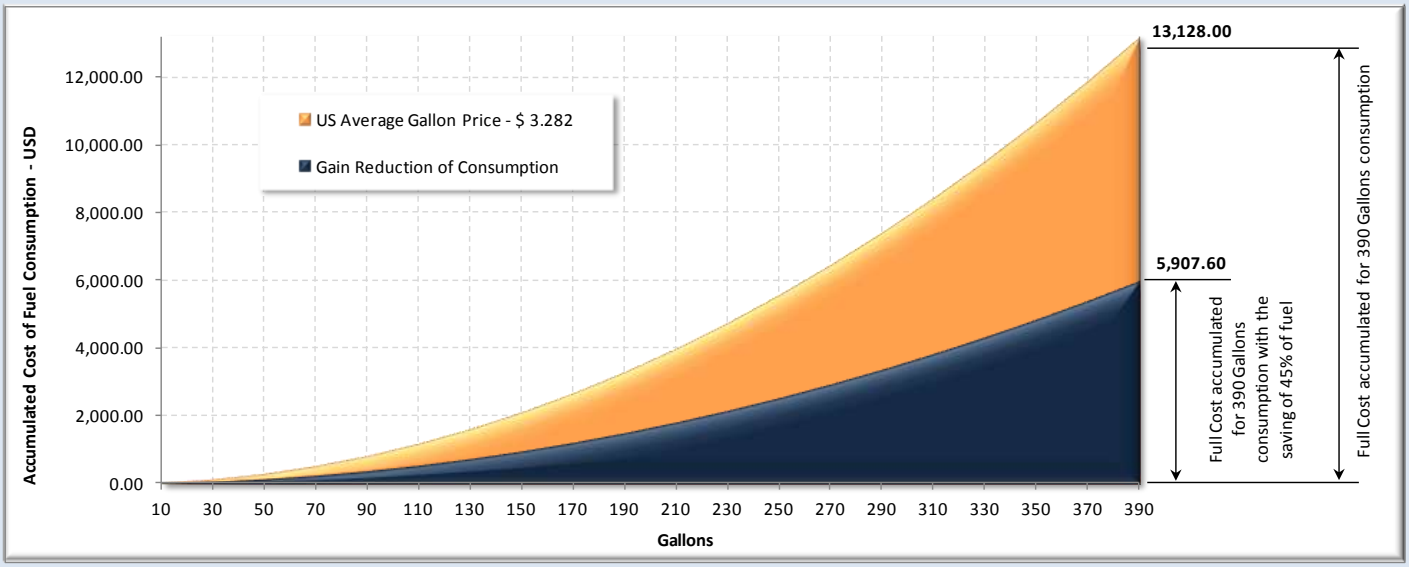
Therefore, the effective saving of this project comprises the diminution of fuel consumption and the depreciation rate, in terms of calculable parameters. Thus, the fuel consumption saving has defined with 45% of benefit, as already above defined (in "Physical principle of gain" chapter). Based on, the saving related to the benefit it is determinate considering the volume of fuel usage as well as the price paid for that. The amount paid for a fuel could be demonstrated using an accumulated curve, that report each step of payment and also full value disbursed along a period or a volume of fuel usage. Then, the following graphs demonstrate the accumulated cost of fuel consumed for a volume of 390 gallons, that each amount of volume represents the fuel price multiplied for it and added with previous volume using this calculation. In addition, the three graphs below considering each one a scenario of fuel price, decurrent of a simple observation of low, average and high price of US gallon (~3.785 liters) gasoline in the end of the year of 2013.

The volume of 390 gallons also represents the amount consumed by a middle vehicle along a year, estimating a 9,322 miles or 15,000 kilometers roamed with a consumption of 23.526 miles per gallon (or 10 km per liter).

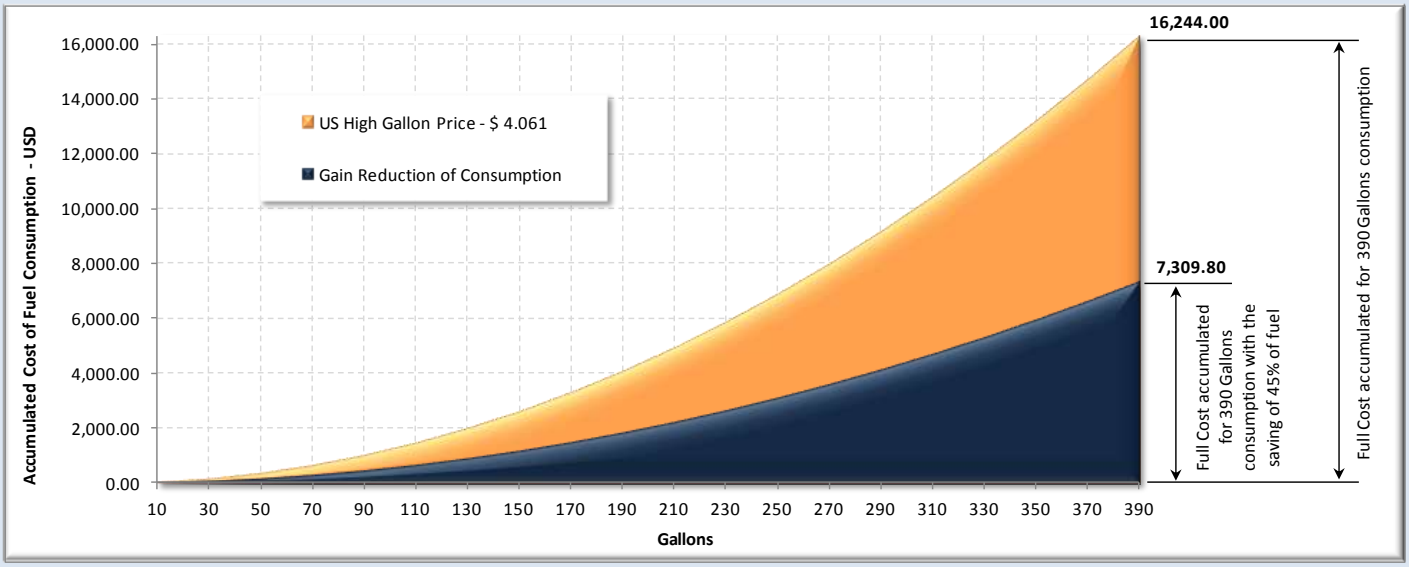
Graph 2a – Consumption of 390 gallons of fuel gas (unitary low price of **USD 3.035** by gallon), and respective saving:



Graph 2b – Consumption of 390 gallons of fuel gas (average price of **USD 3.282** by gallon), and respective saving:



Graph 2c – Consumption of 390 gallons of fuel gas (unitary high price of **USD 4.061** by gallon), and respective saving:



Thus, evaluating the accumulated fuel cost along 390 gallons usage, in this three modeling graphs, the theoretical gain represents a saving about USD 6,677.00 in the graph-2a, USD 7,220.40 in the graph-2b and USD 8,934.20 for graph-2c, related there values for a full payment of USD 12,140.00, USD 13,128.00 and USD 16,244.00, respectively. Based on this modeling, it is easy observe that whether the full volume of fuel consumed increases, the saving obtained will be also more representative in terms of monetary value, because the saving of 45% it is linear in terms of direct cost. However, the three graphs demonstrating a curve behavior due to an accumulation of fuel consumption cost occurs along a period, or a specific volume, demonstrating the full cost disbursed. Therefore, the most relevant demonstration related to this modeling it is exactly the perspective to inform the reasonable value saved for each customer along a year, for example, occasioning a real impression of the outcome impact of this innovative project.

Thus, another perspective of monetary impact could be demonstrated, considering for that a throughout vision about fuel price and volume consumed. In this perspective, it does not just demonstrating a modeling based on a customer perception, and so a social-economic impact from the decrease of 45% in the fuel demand without represent it a diminution of economic-activities. After considering amounts of savings for individual customer, the influencing of throughout impact of this gain concerned to the economic-activity related to fuel consumption, could also being establish from to using a simple relationship about GDP (Gross Domestic Product) and total volume of gasoline consumed.

Based on, the following information has been obtained to establish the scope of this economic-activity in order to determine the parameters of this relationship.

Making references for that, the below data demonstrating some information regarding GDP, year fuel consumed, total automobile fleet of USA and the State of California; in order to establishing a correlation and relative terms as such references to obtain a consisted amount of combustive consumed able to influencing an economic scenario.

- Combustive Consumption:
  - USA, year of 2013: 134.51 Billions of gallons
    - Daily average: 368.1 millions of gallons
  - State of California, year of 2013: 14.5 Billions of gallons
    - Daily average: 39.7 millions of gallons
- Automobile Fleet:

- USA, year of 2010: 246 millions
- State of California, year of 2013: 23 millions

- GDP:
  - USA, year of 2012: 15.98 Trillions USD
  - State of California, year of 2013: 1.83 Trillions USD

Thus, using the State of California, USA, as parameter, considering their volume of fuel consumed and also the respective GDP, the following correlation has demonstrated:

$$z = \frac{GDP^{California}}{Gallons^{California}} = \frac{1.83}{0.0145} = \mathbf{126.20}\ \frac{USD}{Gallons}$$

Then, it is possible to observe that for each USD 126.00 a gallon has been using as consequence of the economic-activity of the State of California. Assuming as assumption that the combustive consumption it is just characterized as raw material (casing that does not occurs production of combustive, distinguishing it as cost for revenue), it is correct to affirming that each gallon consumed generates wealth of USD 126.00 for this economic-activity.

Also, the GDP and gallons consummated ratio does not distingue the specific influence of fuel-usage for economic-activity compared than the GDP part that does not influenced by fuel consumption. Therefore, the fact that a part of GDP not related to fuel consumption it is also included in the rational there is not relevant, because the objective of this ratio it is establishing a reference of calculation for modeling the further benefit, and the fuel usage it is implicitly associated with general economic-activity.

Therefore, considering an increase in this correlation value, there is a proportional increase in GDP, keeping the demonstrated volume of fuel consumed. So, hypothetically projected that 15% of the total volume is reduced by 45% (which would mean that the proposal has been implemented, adding this technology in order to reduce consumption) the following projecting it is obtained:

$$z' = \frac{GDP^{California}}{Diminutive\ Consumption\ Gallons^{California}} = \frac{1.83}{0.0145 \times 0.45 \times 0.15} = \mathbf{137.34}\ \frac{USD}{Gallons^{Projected}}$$

Then, observing the difference of 7% between z and z', it is possible to analyzing that exist a potentially opportunity of GPD growing, considering for that the increase of productivity and efficiency in the fuel consumption, in the State of California.

Based on, considering that the State of California represents 9.3% of USA automobile fleet, the 10.8% of USA fuel consumption, and the 11.4% of USA GDP, approximately. The increase of 7% in the z relationship in terms of efficiency at fuel consumption related to 15% of automobile fleet in the State of California, occasioning a potential of 0.8% of improvement in the USA GDP, or the amount of USD 127.84 Billions.

For that, the following table-3 presents a context involving a variety of fuel prices and volumes, exactly in order to demonstrating the proportionality of gain related there prices and volumes. The major idea consist in presents a vast consumption of combustive that not directly associated a specific heat-machine, and so demonstrating the range of such gain, in terms of economic impact. The hugeness of their combustive volumes usage represents an effect in full supply-chain, considering that the possibility of saving as a relevant strategic of non-renewable fuels politics, and for the principles of fuel prices formation, occurring a virtuous cycle in terms demand-and-offer. Obviously, a phenomenon like that just occurs in case of tremendously volume of fuel has effectively saved.

Therefore, the evaluation related GDP and vast combustive consumption completed itself in terms of understanding of the influence of a huge saving of cost of fuel usage. The macro-economic impact it has amplified considering the equal superlative fuel demand, occasioning a relevant gain in terms of innovation outcome.

Then, the composition of table amounts refers to the diagram-7 that demonstrate the multiplication of volume consumption and price defined minus the saved amount related to 45% of consumption reduction, obtaining the proportional gain in USD terms.

Diagram 7 – Composition of table-3 amounts:

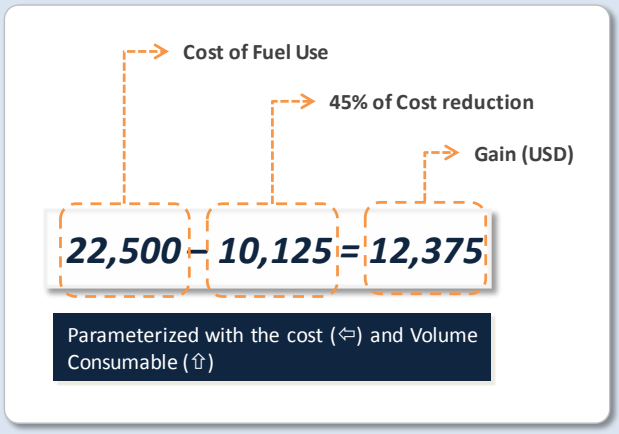


Table 3 – Volume and prices demonstrated by the gain obtained by innovative proposal:

		Volume Consumable (liters and gallons)							
		5,000,000 **Liters** 1,320,860.26 **Gallons**	50,000,000 **Liters** 13,208,602.63 **Gallons**	175,000,000 **Liters** 46,230,109.21 **Gallons**	350,000,000 **Liters** 92,460,218.42 **Gallons**	500,000,000 **Liters** 132,086,026.32 **Gallons**	750,000,000 **Liters** 198,129,039.48 **Gallons**	1,500,000,000 **Liters** 396,258,078.96 **Gallons**	2,500,000,000 **Liters** 660,430,131.59 **Gallons**
Unit Cost (USD)	**0.75**	3,750,000.00- 2,062,500.00= 1,687,500.00	37,500,000.00- 20,625,000.00= 16,875,000.00	131,250,000.00- 72,187,500.00= 59,062,500.00	262,500,000.00- 144,375,000.00= 118,125,000.00	375,000,000.00- 206,250,000.00= 168,750,000.00	562,500,000.00- 309,375,000.00= 253,125,000.00	1,125,000,000.00- 618,750,000.00= 506,250,000.00	1,875,000,000.00- 1,031,250,000.00= 843,750,000.00
	0.85	4,250,000.00- 2,337,500.00= 1,912,500.00	42,500,000.00- 23,375,000.00= 19,125,000.00	148,750,000.00- 81,812,500.00= 66,937,500.00	297,500,000.00- 163,625,000.00= 133,875,000.00	425,000,000.00- 233,750,000.00= 191,250,000.00	637,500,000.00- 350,625,000.00= 286,875,000.00	1,275,000,000.00- 701,250,000.00= 573,750,000.00	2,125,000,000.00- 1,168,750,000.00= 956,250,000.00
	0.90	4,500,000.00- 2,475,000.00= 2,025,000.00	45,000,000.00- 24,750,000.00= 20,250,000.00	157,500,000.00- 86,625,000.00= 70,875,000.00	315,000,000.00- 173,250,000.00= 141,750,000.00	450,000,000.00- 247,500,000.00= 202,500,000.00	675,000,000.00- 371,250,000.00= 303,750,000.00	1,350,000,000.00- 742,500,000.00= 607,500,000.00	2,250,000,000.00- 1,237,500,000.00= 1,012,500,000.00
	0.91	4,550,000.00- 2,502,500.00= 2,047,500.00	45,500,000.00- 25,025,000.00= 20,475,000.00	159,250,000.00- 87,587,500.00= 71,662,500.00	318,500,000.00- 175,175,000.00= 143,325,000.00	455,000,000.00- 250,250,000.00= 204,750,000.00	682,500,000.00- 375,375,000.00= 307,125,000.00	1,365,000,000.00- 750,750,000.00= 614,250,000.00	2,275,000,000.00- 1,251,250,000.00= 1,023,750,000.00
	0.92	4,600,000.00- 2,530,000.00= 2,070,000.00	46,000,000.00- 25,300,000.00= 20,700,000.00	161,000,000.00- 88,550,000.00= 72,450,000.00	322,000,000.00- 177,100,000.00= 144,900,000.00	460,000,000.00- 253,000,000.00= 207,000,000.00	690,000,000.00- 379,500,000.00= 310,500,000.00	1,380,000,000.00- 759,000,000.00= 621,000,000.00	2,300,000,000.00- 1,265,000,000.00= 1,035,000,000.00
	0.93	4,650,000.00- 2,557,500.00= 2,092,500.00	46,500,000.00- 25,575,000.00= 20,925,000.00	162,750,000.00- 89,512,500.00= 73,237,500.00	325,500,000.00- 179,025,000.00= 146,475,000.00	465,000,000.00- 255,750,000.00= 209,250,000.00	697,500,000.00- 383,625,000.00= 313,875,000.00	1,395,000,000.00- 767,250,000.00= 627,750,000.00	2,325,000,000.00- 1,278,750,000.00= 1,046,250,000.00
	0.94	4,700,000.00- 2,585,000.00= 2,115,000.00	47,000,000.00- 25,850,000.00= 21,150,000.00	164,500,000.00- 90,475,000.00= 74,025,000.00	329,000,000.00- 180,950,000.00= 148,050,000.00	470,000,000.00- 258,500,000.00= 211,500,000.00	705,000,000.00- 387,750,000.00= 317,250,000.00	1,410,000,000.00- 775,500,000.00= 634,500,000.00	2,350,000,000.00- 1,292,500,000.00= 1,057,500,000.00
	0.95	4,750,000.00- 2,612,500.00= 2,137,500.00	47,500,000.00- 26,125,000.00= 21,375,000.00	166,250,000.00- 91,437,500.00= 74,812,500.00	332,500,000.00- 182,875,000.00= 149,625,000.00	475,000,000.00- 261,250,000.00= 213,750,000.00	712,500,000.00- 391,875,000.00= 320,625,000.00	1,425,000,000.00- 783,750,000.00= 641,250,000.00	2,375,000,000.00- 1,306,250,000.00= 1,068,750,000.00
	0.96	4,800,000.00- 2,640,000.00= 2,160,000.00	48,000,000.00- 26,400,000.00= 21,600,000.00	168,000,000.00- 92,400,000.00= 75,600,000.00	336,000,000.00- 184,800,000.00= 151,200,000.00	480,000,000.00- 264,000,000.00= 216,000,000.00	720,000,000.00- 396,000,000.00= 324,000,000.00	1,440,000,000.00- 792,000,000.00= 648,000,000.00	2,400,000,000.00- 1,320,000,000.00= 1,080,000,000.00
	0.97	4,850,000.00- 2,667,500.00= 2,182,500.00	48,500,000.00- 26,675,000.00= 21,825,000.00	169,750,000.00- 93,362,500.00= 76,387,500.00	339,500,000.00- 186,725,000.00= 152,775,000.00	485,000,000.00- 266,750,000.00= 218,250,000.00	727,500,000.00- 400,125,000.00= 327,375,000.00	1,455,000,000.00- 800,250,000.00= 654,750,000.00	2,425,000,000.00- 1,333,750,000.00= 1,091,250,000.00
	0.98	4,900,000.00- 2,695,000.00= 2,205,000.00	49,000,000.00- 26,950,000.00= 22,050,000.00	171,500,000.00- 94,325,000.00= 77,175,000.00	343,000,000.00- 188,650,000.00= 154,350,000.00	490,000,000.00- 269,500,000.00= 220,500,000.00	735,000,000.00- 404,250,000.00= 330,750,000.00	1,470,000,000.00- 808,500,000.00= 661,500,000.00	2,450,000,000.00- 1,347,500,000.00= 1,102,500,000.00
	0.99	4,950,000.00- 2,722,500.00= 2,227,500.00	49,500,000.00- 27,225,000.00= 22,275,000.00	173,250,000.00- 95,287,500.00= 77,962,500.00	346,500,000.00- 190,575,000.00= 155,925,000.00	495,000,000.00- 272,250,000.00= 222,750,000.00	742,500,000.00- 408,375,000.00= 334,125,000.00	1,485,000,000.00- 816,750,000.00= 668,250,000.00	2,475,000,000.00- 1,361,250,000.00= 1,113,750,000.00
	1.00	5,000,000.00- 2,750,000.00= 2,250,000.00	50,000,000.00- 27,500,000.00= 22,500,000.00	175,000,000.00- 96,250,000.00= 78,750,000.00	350,000,000.00- 192,500,000.00= 157,500,000.00	500,000,000.00- 275,000,000.00= 225,000,000.00	750,000,000.00- 412,500,000.00= 337,500,000.00	1,500,000,000.00- 825,000,000.00= 675,000,000.00	2,500,000,000.00- 1,375,000,000.00= 1,125,000,000.00
	1.05	5,250,000.00- 2,887,500.00= 2,362,500.00	52,500,000.00- 28,875,000.00= 23,625,000.00	183,750,000.00- 101,062,500.00= 82,687,500.00	367,500,000.00- 202,125,000.00= 165,375,000.00	525,000,000.00- 288,750,000.00= 236,250,000.00	787,500,000.00- 433,125,000.00= 354,375,000.00	1,575,000,000.00- 866,250,000.00= 708,750,000.00	2,625,000,000.00- 1,443,750,000.00= 1,181,250,000.00
	1.10	5,500,000.00- 3,025,000.00= 2,475,000.00	55,000,000.00- 30,250,000.00= 24,750,000.00	192,500,000.00- 105,875,000.00= 86,625,000.00	385,000,000.00- 211,750,000.00= 173,250,000.00	550,000,000.00- 302,500,000.00= 247,500,000.00	825,000,000.00- 453,750,000.00= 371,250,000.00	1,650,000,000.00- 907,500,000.00= 742,500,000.00	2,750,000,000.00- 1,512,500,000.00= 1,237,500,000.00
	1.15	5,750,000.00- 3,162,500.00= 2,587,500.00	57,500,000.00- 31,625,000.00= 25,875,000.00	201,250,000.00- 110,687,500.00= 90,562,500.00	402,500,000.00- 221,375,000.00= 181,125,000.00	575,000,000.00- 316,250,000.00= 258,750,000.00	862,500,000.00- 474,375,000.00= 388,125,000.00	1,725,000,000.00- 948,750,000.00= 776,250,000.00	2,875,000,000.00- 1,581,250,000.00= 1,293,750,000.00

Unit Cost (USD)	Volume Consumable (liters and gallons) – continuation							
	5,000,000 **Liters** 1,320,860.26 **Gallons**	50,000,000 **Liters** 13,208,602.63 **Gallons**	175,000,000 **Liters** 46,230,109.21 **Gallons**	350,000,000 **Liters** 92,460,218.42 **Gallons**	500,000,000 **Liters** 132,086,026.32 **Gallons**	750,000,000 **Liters** 198,129,039.48 **Gallons**	1,500,000,000 **Liters** 396,258,078.96 **Gallons**	2,500,000,000 **Liters** 660,430,131.59 **Gallons**
1.20	6,000,000.00- 3,300,000.00= 2,700,000.00	60,000,000.00- 33,000,000.00= 27,000,000.00	210,000,000.00- 115,500,000.00= 94,500,000.00	420,000,000.00- 231,000,000.00= 189,000,000.00	600,000,000.00- 330,000,000.00= 270,000,000.00	900,000,000.00- 495,000,000.00= 405,000,000.00	1,800,000,000.00- 990,000,000.00= 810,000,000.00	3,000,000,000.00- 1,650,000,000.00= 1,350,000,000.00
1.25	6,250,000.00- 3,437,500.00= 2,812,500.00	62,500,000.00- 34,375,000.00= 28,125,000.00	218,750,000.00- 120,312,500.00= 98,437,500.00	437,500,000.00- 240,625,000.00= 196,875,000.00	625,000,000.00- 343,750,000.00= 281,250,000.00	937,500,000.00- 515,625,000.00= 421,875,000.00	1,875,000,000.00- 1,031,250,000.00= 843,750,000.00	3,125,000,000.00- 1,718,750,000.00= 1,406,250,000.00
1.30	6,500,000.00- 3,575,000.00= 2,925,000.00	65,000,000.00- 35,750,000.00= 29,250,000.00	227,500,000.00- 125,125,000.00= 102,375,000.00	455,000,000.00- 250,250,000.00= 204,750,000.00	650,000,000.00- 357,500,000.00= 292,500,000.00	975,000,000.00- 536,250,000.00= 438,750,000.00	1,950,000,000.00- 1,072,500,000.00= 877,500,000.00	3,250,000,000.00- 1,787,500,000.00= 1,462,500,000.00
1.35	6,750,000.00- 3,712,500.00= 3,037,500.00	67,500,000.00- 37,125,000.00= 30,375,000.00	236,250,000.00- 129,937,500.00= 106,312,500.00	472,500,000.00- 259,875,000.00= 212,625,000.00	675,000,000.00- 371,250,000.00= 303,750,000.00	1,012,500,000.00- 556,875,000.00= 455,625,000.00	2,025,000,000.00- 1,113,750,000.00= 911,250,000.00	3,375,000,000.00- 1,856,250,000.00= 1,518,750,000.00
1.45	7,250,000.00- 3,987,500.00= 3,262,500.00	72,500,000.00- 39,875,000.00= 32,625,000.00	253,750,000.00- 139,562,500.00= 114,187,500.00	507,500,000.00- 279,125,000.00= 228,375,000.00	725,000,000.00- 398,750,000.00= 326,250,000.00	1,087,500,000.00- 598,125,000.00= 489,375,000.00	2,175,000,000.00- 1,196,250,000.00= 978,750,000.00	3,625,000,000.00- 1,993,750,000.00= 1,631,250,000.00
1.75	8,750,000.00- 4,812,500.00= 3,937,500.00	87,500,000.00- 48,125,000.00= 39,375,000.00	306,250,000.00- 168,437,500.00= 137,812,500.00	612,500,000.00- 336,875,000.00= 275,625,000.00	875,000,000.00- 481,250,000.00= 393,750,000.00	1,312,500,000.00- 721,875,000.00= 590,625,000.00	2,625,000,000.00- 1,443,750,000.00= 1,181,250,000.00	4,375,000,000.00- 2,406,250,000.00= 1,968,750,000.00
2.00	10,000,000.00- 5,500,000.00= 4,500,000.00	100,000,000.00- 55,000,000.00= 45,000,000.00	350,000,000.00- 192,500,000.00= 157,500,000.00	700,000,000.00- 385,000,000.00= 315,000,000.00	1,000,000,000.00- 550,000,000.00= 450,000,000.00	1,500,000,000.00- 825,000,000.00= 675,000,000.00	3,000,000,000.00- 1,650,000,000.00= 1,350,000,000.00	5,000,000,000.00- 2,750,000,000.00= 2,250,000,000.00
2.50	12,500,000.00- 6,875,000.00= 5,625,000.00	125,000,000.00- 68,750,000.00= 56,250,000.00	437,500,000.00- 240,625,000.00= 196,875,000.00	875,000,000.00- 481,250,000.00= 393,750,000.00	1,250,000,000.00- 687,500,000.00= 562,500,000.00	1,875,000,000.00- 1,031,250,000.00= 843,750,000.00	3,750,000,000.00- 2,062,500,000.00= 1,687,500,000.00	6,250,000,000.00- 3,437,500,000.00= 2,812,500,000.00
3.00	15,000,000.00- 8,250,000.00= 6,750,000.00	150,000,000.00- 82,500,000.00= 67,500,000.00	525,000,000.00- 288,750,000.00= 236,250,000.00	1,050,000,000.00- 577,500,000.00= 472,500,000.00	1,500,000,000.00- 825,000,000.00= 675,000,000.00	2,250,000,000.00- 1,237,500,000.00= 1,012,500,000.00	4,500,000,000.00- 2,475,000,000.00= 2,025,000,000.00	7,500,000,000.00- 4,125,000,000.00= 3,375,000,000.00
3.50	17,500,000.00- 9,625,000.00= 7,875,000.00	175,000,000.00- 96,250,000.00= 78,750,000.00	612,500,000.00- 336,875,000.00= 275,625,000.00	1,225,000,000.00- 673,750,000.00= 551,250,000.00	1,750,000,000.00- 962,500,000.00= 787,500,000.00	2,625,000,000.00- 1,443,750,000.00= 1,181,250,000.00	5,250,000,000.00- 2,887,500,000.00= 2,362,500,000.00	8,750,000,000.00- 4,812,500,000.00= 3,937,500,000.00
4.00	20,000,000.00- 11,000,000.00= 9,000,000.00	200,000,000.00- 110,000,000.00= 90,000,000.00	700,000,000.00- 385,000,000.00= 315,000,000.00	1,400,000,000.00- 770,000,000.00= 630,000,000.00	2,000,000,000.00- 1,100,000,000.00= 900,000,000.00	3,000,000,000.00- 1,650,000,000.00= 1,350,000,000.00	6,000,000,000.00- 3,300,000,000.00= 2,700,000,000.00	10,000,000,000.00- 5,500,000,000.00= 4,500,000,000.00
5.00	25,000,000.00- 13,750,000.00= 11,250,000.00	250,000,000.00- 137,500,000.00= 112,500,000.00	875,000,000.00- 481,250,000.00= 393,750,000.00	1,750,000,000.00- 962,500,000.00= 787,500,000.00	2,500,000,000.00- 1,375,000,000.00= 1,125,000,000.00	3,750,000,000.00- 2,062,500,000.00= 1,687,500,000.00	7,500,000,000.00- 4,125,000,000.00= 3,375,000,000.00	12,500,000,000.00- 6,875,000,000.00= 5,625,000,000.00
6.00	30,000,000.00- 16,500,000.00= 13,500,000.00	300,000,000.00- 165,000,000.00= 135,000,000.00	1,050,000,000.00- 577,500,000.00= 472,500,000.00	2,100,000,000.00- 1,155,000,000.00= 945,000,000.00	3,000,000,000.00- 1,650,000,000.00= 1,350,000,000.00	4,500,000,000.00- 2,475,000,000.00= 2,025,000,000.00	9,000,000,000.00- 4,950,000,000.00= 4,050,000,000.00	15,000,000,000.00- 8,250,000,000.00= 6,750,000,000.00
7.00	35,000,000.00- 19,250,000.00= 15,750,000.00	350,000,000.00- 192,500,000.00= 157,500,000.00	1,225,000,000.00- 673,750,000.00= 551,250,000.00	2,450,000,000.00- 1,347,500,000.00= 1,102,500,000.00	3,500,000,000.00- 1,925,000,000.00= 1,575,000,000.00	5,250,000,000.00- 2,887,500,000.00= 2,362,500,000.00	10,500,000,000.00- 5,775,000,000.00= 4,725,000,000.00	17,500,000,000.00- 9,625,000,000.00= 7,875,000,000.00
8.00	40,000,000.00- 22,000,000.00= 18,000,000.00	400,000,000.00- 220,000,000.00= 180,000,000.00	1,400,000,000.00- 770,000,000.00= 630,000,000.00	2,800,000,000.00- 1,540,000,000.00= 1,260,000,000.00	4,000,000,000.00- 2,200,000,000.00= 1,800,000,000.00	6,000,000,000.00- 3,300,000,000.00= 2,700,000,000.00	12,000,000,000.00- 6,600,000,000.00= 5,400,000,000.00	20,000,000,000.00- 11,000,000,000.00= 9,000,000,000.00
9.00	45,000,000.00- 24,750,000.00= 20,250,000.00	450,000,000.00- 247,500,000.00= 202,500,000.00	1,575,000,000.00- 866,250,000.00= 708,750,000.00	3,150,000,000.00- 1,732,500,000.00= 1,417,500,000.00	4,500,000,000.00- 2,475,000,000.00= 2,025,000,000.00	6,750,000,000.00- 3,712,500,000.00= 3,037,500,000.00	13,500,000,000.00- 7,425,000,000.00= 6,075,000,000.00	22,500,000,000.00- 12,375,000,000.00= 10,125,000,000.00
10.00	50,000,000.00- 27,500,000.00= 22,500,000.00	500,000,000.00- 275,000,000.00= 225,000,000.00	1,750,000,000.00- 962,500,000.00= 787,500,000.00	3,500,000,000.00- 1,925,000,000.00= 1,575,000,000.00	5,000,000,000.00- 2,750,000,000.00= 2,250,000,000.00	7,500,000,000.00- 4,125,000,000.00= 3,375,000,000.00	15,000,000,000.00- 8,250,000,000.00= 6,750,000,000.00	25,000,000,000.00- 13,750,000,000.00= 11,250,000,000.00
11.00	55,000,000.00- 30,250,000.00= 24,750,000.00	550,000,000.00- 302,500,000.00= 247,500,000.00	1,925,000,000.00- 1,058,750,000.00= 866,250,000.00	3,850,000,000.00- 2,117,500,000.00= 1,732,500,000.00	5,500,000,000.00- 3,025,000,000.00= 2,475,000,000.00	8,250,000,000.00- 4,537,500,000.00= 3,712,500,000.00	16,500,000,000.00- 9,075,000,000.00= 7,425,000,000.00	27,500,000,000.00- 15,125,000,000.00= 12,375,000,000.00

Therefore, the table-3 it is useful just to observing the variety of values related to combination of fuel price, volume consumed and gains obtained, about the linear correlation proportionally established. In addition, the amounts observed reflect a variety that drives to economic scenarios able to be evaluate which the impacts of fuel price increasing causing in terms of cost, and proportionally the respective saving accomplished by the fuel consumption reduction. Based on, the GDP evaluation consists itself as the relevant analysis in terms of macro-economic influence occasioned by the innovative proposal.

In addition, observing the chapter "**Disbursements assess**" the value of USD 9,150,000.00 informed it is possible to be defined as an investment amount in order to aid to obtain the technical and finance evaluation of this proposal. Although, the full investment definition it is not limited only for this amount that represents the part of investment aligning to prototype construction. And, amounts of investment related to R&D activities, product engineer, manufacturing adaptation, marketing, advertising and commercialization are examples of others investments elements necessaries, considering that the proposal presented as a regular and feasible project to be continued. Thus, this others elements amounts of investments not being considered in this paper work, because of the delineated scope and also that to obtaining trustful values represents another project approach with another considerations, assumptions and principles.

Therefore, a payback period and return rate values are explained based separate scenarios in order to better understanding the finance rational, and also the theoretical perspective of the opportunities of gains arise from this proposal.

Then, the return rate and period for return will be demonstrate considering the following visions:

- Costumers influence, from the vehicle reduction of depreciation rate (representing it as a gain);
- Macro-economic influences, originated by a low, middle and high return, regarding the table-3 amounts, basing the price and volume applied;
- GDP influence, as above mentioned.

The following tables of content has the details of investments amounts with the opportunities of gains, already described in the above chapters, calculating the return rate and the period of return of this tree scenarios defined.

Table 4 – Customer Influence

Notes and Assumptions:

- In terms of a Customer investment the amount of USD 40,000.00 it is defined as the acquisition value of a new vehicle trading in USA.
- The depreciation rate of this middle vehicle has defined as 35%. In addition, the depreciation includes the diagram-6b definitions that represent a decrease of 4.25% (or **USD 1,700.00** gained in a year), obtaining the final depreciation rate of 30.74%.
- The gain related to fuel consumption including the graph 2-b definitions that represents the gain of **USD 7,220.40** of annual consumption of 390 gallons of gasoline.

- **Investment** - USD: 40,000.00
- **Opportunity of Gain** - USD: 8,920.00
- **Return rate**: 22.30% for year
- **Period for Return**: 4.48 years

Table 5a – Macro-economic Influence – Low Return

Notes and Assumptions:

- The definition of total amount related to investment including initially **USD 9,150,000.00** that has originated from the description of chapter “Disbursements assess”, adding with an additional amount related to the full application of this technology in terms of a model of vehicle saleable regarding a feasible design, production and post-dealing activities. As mentioned above, it is not in scope of this paper-work a definition of a value for this, however in order to obtain a better understanding of the real return of this proposal, a cue of **USD 2 Billions** it is informed as a comfortable and conservative amount of investment in order to quantify the return rate.
- The gain demonstrated (table-3) of **20,700,000.00** refer to 50,000,000 Liters or 13,208,602.63 Gallons associated with the price of **USD 0.92**.
- This volume of fuel consumed refers to a monthly working of a specific fleet of vehicles adopted with this innovative proposal.

- **Investment** - USD: 2,009,150,000.00
- **Opportunity of Gain** - USD: 20,700,000.00
- **Return rate**: 1.03%
- **Period for Return**: 97.06 months

Table 5b – Macro-economic Influence – Middle Return

Notes and Assumptions:

- The definition of total amount related to investment including initially **USD 9,150,000.00** that has originated from the description of chapter "Disbursements assess", adding with an additional amount related to the full application of this technology in terms of a model of vehicle saleable regarding a feasible design, production and post-dealing activities. As mentioned above, it is not in scope of this paper-work a definition of a value for this, however in order to obtain a better understanding of the real return of this proposal, a cue of **USD 2 Billions** it is informed as a comfortable and conservative amount of investment in order to quantify the return rate.
- The gain demonstrated (table-3) of **315,000,000.00** refer to 175,000,000 Liters or 46,230,109.21 Gallons associated with the price of **USD 4.00**.
- This volume of fuel consumed refers to a monthly working of a specific fleet of vehicles adopted with this innovative proposal.

- **Investment** - USD: 2,009,150,000.00
- **Opportunity of Gain** - USD: 315,000,000.00
- **Return rate**: 15.68%
- **Period for Return**: 6.38 months

Table 5c – Macro-economic Influence – High Return

Notes and Assumptions:

- The definition of total amount related to investment including initially **USD 9,150,000.00** that has originated from the description of chapter "Disbursements assess", adding with an additional amount related to the full application of this technology in terms of a model of vehicle saleable regarding a feasible design, production and post-dealing activities. As mentioned above, it is not in scope of this paper-work a definition of a value for this, however in order to obtain a better understanding of the real return of this proposal, a cue of **USD 2 Billions** it is informed as a comfortable and conservative amount of investment in order to quantify the return rate.
- The gain demonstrated (table-3) of **2,362,500,000.00** refer to 750,000,000 Liters or 198,129,039.48 Gallons associated with the price of **USD 7.00**.
- This volume of fuel consumed refers to a monthly working of a specific fleet of vehicles adopted with this innovative proposal.

- **Investment** - USD: 2,009,150,000.00
- **Opportunity of Gain** - USD: 2,362,500,000.00
- **Return rate**: 117.59%
- **Period for Return**: 0.85 month

Table 6 – GPD Influence

Notes and Assumptions:

- As mentioned above and considering the premises and assumptions, the influence of a relevant diminution of fuel consumption without reducing the economic-activities associated to this raw material, representing a possible increase of 0.8% over USA GPD. However, considering a conservative approach due to variables not well forecasted or not well understood and able to occur, the opportunity of gain it was adjusted to 0.05% of USA GPD, or USD 7.99 Billions.
- One of premises mentioned refers to possibility that 15% of vehicles fleet of State of California has been contemplating with this innovative proposal, causing the diminution of fuel consumption. Then, the investment amount that allowing this achievement still has there calculating relatively imprecisely, considering the limited scope already evaluated until now. Therefore, tabulations of investments (scenarios) amounts were established in order to amplify the cue range, and the respective returns. There were mapped ten scenarios of each one consisting in an amount of investment with the respective calculation of return rate and the period of return.

- **Investment** - USD:

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
1 Billions	2 Billions	3 Billions	4 Billions	5 Billions	6 Billions	7 Billions	8 Billions	9 Billions	10 Billions

- **Opportunity of Gain** - USD:

7,990,000,000.00

- **Return rate**:

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
799.00%	399.50%	266.33%	199.75%	159.80%	133.17%	114.14%	99.88%	88.78%	79.99%

- **Period for Return (years)**:

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
0.13	0.25	0.38	0.50	0.63	0.75	0.88	1.00	1.13	1.25

Before to evaluating the outcome data it is necessary establish references as such as benchmarks values in order to beaconing and determining the relevance of each financial studies. Therefore, the following parameter of main market investments allows a comparison and understanding of the relevance of the payback and return rate already accomplished above tables.

- Gold → Typically, gold has not appreciated in real terms over long periods. Instead, it is merely a store of value that maintains its purchasing power. Decade-by-decade, though, gold can be highly volatile, going from huge high to depressing lows or vice-versa.
- Cash → Currencies are designed to depreciate in value over time. In fact, $100 in 1800 is worth only $8 today, representing a loss of 92% of value.
- Bonds → Historically, good, quality bonds tend to return 2% to 4% after inflation in normal circumstances. The riskier the bond, the higher the return investors demand.
- Business Ownership (Including Stocks) → The highest quality, safest, most stable dividend paying stocks have tended to return 7% in real, inflation-adjusted returns to owners for centuries. Thus, in a scenario of 3%

inflation, would expect a 10% rate of return (7% real return + 3% inflation = 10% nominal return). The riskier the business, the higher the return demanded.

- Real Estate → Without using any debt, real estate return demands from investors mirror those of business ownership and stocks. The real rate of return for good, non-leveraged properties is roughly 7% after inflation. Since we have gone through decades of 3% inflation, over the past 20 years, that figure has stabilized at 10%. Riskier projects require higher rates of return. Moreover, real estate investors are known for using mortgages, which are a form of leverage, to increase the return on their investment.

Then, one of most relevant data of this finance analysis it is demonstrated by the largeness of amounts involved as much as the investment and returns values. Even considering that the investments amounts (tables 5a, 5b, 5c and 6) were not fully well defined at specific proprieties and premises, the same are relevant in terms of financial worth, regarding that an investment of two billions of dollars it is huge to any kind of project. In addition, the returns values are similar elevated in terms of possibility of financial result, depending on the macro-economic scenario. Although the table 5a demonstrates a low return, because the fuel price and volume consumed are not relevant in terms to obtain a finance return, it is significant the return rate of 1.03%, considering it with the others return rates available in the market to getting such investment. Then, this value should be beaconed with a benchmark return rate to determining itself relevance. The period of 97 months (or eight years, approximately) of return in table 5a it is also considered relevant whether a benchmark has demonstrated a feasible comparison. However, the table 5a result was defined as a low return, considering that such investment should obtain a return significantly increased.

Otherwise, the results obtained in the tables 5b and 5c are extremely relevant in terms of return. The table 5b demonstrates a return rate about 15% with a period of return of 6.3 months. Normally, using a benchmark related to financial market, a good investment (present moment) represents a return rate about 10% as demonstrated above. The same could be observed in the outcomes of table 5c, with a return rate of 117.59% and a payback of 0.85 months. An observation about the result of table 5c, contextualizing a scenario of fuel volume and price extremely favorable for this high return. Otherwise, the investment amount for table 5c could represent an unbalance value, once a revision (probably increase) should be necessary, considering the largeness of volume of fuel concerned in. However, the information in tables 5a-b-c represents an interesting information in order to evaluate the financial relevance of the innovative proposal, and a reference of investment worth must be used for in each one of tables 5a-b-c, in order to equalize the input data.

Other important observation refers to the amplitude of vehicle fleet affected by the benefits of the innovative proposal. Although, the vehicle fleet it is not well quantified in this financial evaluation, independently of the fuel price variation an increasing of vehicles fleet affected by this proposal, the global gain also will be better established. Considering that a correlation of volume of fuel consumed it is not just associated with the economic-activity, and so with the constant increase of the base of vehicles adopted with this technologic, occasioning that the variable volume of fuel consumed will be less susceptible to the market and economics changes.

The table-6 represents other vision of the impact and the theoretical financial benefit possible to be reach by this proposal. As demonstrated in the other financial studies, the base or amplitude of vehicles affected by this benefit will also occasioned in a huge saving of fuel consumed without affected the economy performance. Also, considering for table-6 a variance of the investment amount, all scenarios demonstrated represents significant financial parameters in terms of a promising result.

The major relevance about table-6 valuation consist in quantify the impact of using of innovative proposal already implemented in a relative large fleet of vehicles. Considering that, the parameters of fuel price and volume associated with the fleet involved, represents that there is not a predominance only related to the fuel price, regarding the benefits calculation of this proposal.

A simply conclusion, that an relevant increase over the efficiency at one heat machine, and the same are extremely disseminated by a huge economy, the benefit impact will be also extremely succeeded, regarding a correlated amplitude of this gain in this economy. Then, the table-6 just quantifies this conclusion, considering a variety of amounts invested, simulating the results in terms of payback and return. Then, considering the worse scenario already established in table-6, it is observed that outcomes are exceptional, compared than with the financials benchmarks. Thus, a question able to do refer to whether these theoretical results are overstated or significantly bad defined. The answer is maybe, because a series of premises related to the possibility of fuel consumption being reduced in 50%, and the vehicles fleet benefited by this proposal are enough relevant in terms to obtain a significant impact in an economy, referencing by State of California and USA itself.

In the end, a technical and finance valuations represents theoretical studies in order to quantify the benefits related to this proposal, that represent the establishment of a new thermodynamic cycle, aiming a gain over heat machine efficiency, and it able to be applied and used as automobile engine. Considering that the conception of this innovation, regarding efficiencies gain and the mechanical-technique designed in order to obtain this benefit, also there is a good possibility that occurs an accurate match related this theoretical study within a further real technical validation.

5th Phase Proposing

Chapter`s content:

- Innovative Principle
- Project Statement
- Final Conclusion

This chapter represents the last step related to phases of innovation that the final statement, the principles that oriented the proposal as innovative and the final conclusion are described and resumed considering the implications, studies, analysis and assumptions accomplished along the above chapters. The others phases of innovation understands the project construction based on a large and variety terms of conceptions, calculations, assumptions and some conclusions. However, in order to emphasize the project construction as a proposal, a relevant requirement in terms of presentation it is necessary in order to make itself clear and understandable as such as innovative as well a feasible project. For that, the phase 5 it is named Proposing, because even considering that most part of this proposal were already explained, the utmost relevance it is simply explaining in this chapter, regarding the **simplicity**, the **feasibility** and the **importance** of this project. Then, the proposing delineates these three elements as a characteristic for an innovative product.

Then, recapitulating the other phases, as below:

1st Phase → It is the motivation or the innovation needs that oriented this chapter, causing specifics and simply questions that determinate the following chapters in order to answer these demands. **Then, the 1st phase represents the questions step**.

↓Result:
The questions accomplished:
- How is it possible to obtain an enhancement of efficiency at mechanical engine?
- How is it possible associating an unique model of quality at engine project without the inconvenient of each thermodynamic cycle?
- Is it possible to design an engine with high potency, agile, extremely durable, economic and compact?

2nd Phase → It represents in terms of a throughout vision the answers related the enunciation accomplished in phase 1. However, the phase 2 regards creative and innovative activity, considering that a new technical approach or technology will be defined or preliminary conceited based on others already established and well consolidated technologies that the state of art or knowledge field are extremely well understood and stagnant. The idea of join others technologies that are not normally intentioned to be integrated, represents the relevance or contribution in terms of seeking innovation as new solutions, and of course, the answers of 1st phase enunciated. **Then, the 2nd phase it is the source of the innovative proposal**.

↓Result:
Creative Perspective
- The new engine will has two basically stages, composed by a first step without moved parts, and associated with the functionality of combustion chamber, and a second step associated with moved parts due to torque transferring.
- The major creative idea has based on continuous flow establishment, caused by the vortex phenomena associated with a pressure variation along the chamber in consequence of combustion reaction.
- The torque transfer occurs by the same way in the blade engines: with inclined blades moved by heated continuous flow derivate the combustion chamber.

3rd Phase → Represents the studies, analysis and assumptions that allowing to conceptualize the solution (or third technology, resulted from integration). The most relevant activity related to this phase refers to identify and demonstrate how the integration of two original technologies could be accomplished and able to establishing a new (innovation) technology, considering the indispensable need to obtaining a feasible (theoretical, at least) gain or improvement in terms of performance or cost. **Then, the 3rd phase it is the proposal or solution construction or defining**.

↓Result:
Technological Enhancement
- It is possible, establishing a new thermodynamic cycle aligned with a new mechanical technique of functionality, which allows the energy transformation (i.e. chemical, thermo and mechanic) fully integrated in just two stages of working!
- It is possible by using the idea of simplicity that the advantages of each engines functions (piston and blade) are integrated in just one combustion chamber which applying the vortex motion as key element of new engine functionality!
- Although the conception and production of an engine that uniting all of this beneficial attributes represents an enormous engineering challenge, the proposal drives innovation and creative perspective due to the establishment of a new thermodynamic cycle within a new mechanical

technique, occasioning a paradigm-breakdown compared with the engines and thermodynamics cycles already applied!

4th Phase → This phase matching the solution proposed with a well-defined and understandable assessment related to its viability or feasibility in terms of technical and financial individual studies, theoretical leaded. **Then, the 4th phase represents an explanation analysis in order to prove the proposal, rationally**.

↓Result:

Perspective of improvement

- 45% Reduction of fuel used
- 81% Increase of engine Potency
- 81% Increase of engine Torque

Perspective of Gains

- Costumers influence, from the vehicle reduction of depreciation rate
- Macro-economic influences, originated by a low, middle and high return, basing the price and volume applied
- GDP influence, adding a productive enhancement

5th Phase → The last phase, the 5th represents the final proposing, explaining the proposal, their impacts and final considerations. In this step, a conclusion drives the innovative solution to the market as a product able to be development.

Innovative Principle

Considering the idea of proposing a new engine configuration, added with a new thermodynamic cycle, the first impression or preliminary analysis could be defining this as an absurd or a completely less of good sense. However, this proposing implicate in this wide and ambitious conception, deriving from that a technological evolution it is not necessary accomplished only in the continuous improvement or apposing of an actual technique. Then, a consistent innovation or an innovation with a throughout outcome regards to be achieve based on a paradigms breakdown, implicating a new vision or new technologic, reestablishing the actual patterns.

Based on, exists some simply examples that this definition were reached; as the television technologic approach, that has radically changed from Cathode Ray Tube (CRT) to Light Emitting Diode (LED). Moreover, the photo camera has changed from pellicle film to digital technologic. Therefore, the technical approach has been changing considerable in so many types of products. However, for the engines this possibility still stagnated, considering that a long period of decades a new cycle has not proposed and established, although this technologic has been improvement constantly along the years.

More than establishing a new technologic, an innovative approach really needs to be done along some simplest concepts that allow not just a relevant improvement; however a significant change of the parameters of using or handling a specific technology, represented or packaged as a product. Then, the elements that explaining the outcome of this products (significant change, and does not a just improvement), representing an upward in how to destine in terms of utility and destination, allowing new paradigms or perspectives, decurrent in gains or value added. Therefore, a new thermodynamic cycle could not being an absurd idea whether this concepts implicate in a context that the engine changes make feasible others possibilities of using and results.

Then, the principles of simplicity, feasibility and importance are extremely relevant in order to explain this conception that proposing a new technical approach for engine functionality, as demonstrated below:

Simplicity	The project presents a reduced quantity of components and sub-systems, respectively. That demonstrated an interesting fact in order to determine this simplicity. Because, existing a few elements integrated the functionally and the efficiency are increased in terms to reducing the attrition and losses related it. Other fact related to this simplicity, involve the vortex movement flowing, that it is a natural phenomena originated by fluids flow in situation of elevated Reynolds number, considering a conical shape for flowing. Then, this facts represents a great opportunity in terms of innovation, adding value in this proposal and also determinate it as Simplicity.
Feasibility	In terms of engineering, the proposal of design represents a challenger that it is not difficult to achieve, considering that the proposal does not have any novelty in terms of mechanical functionality. However, the key element related to vortex establishment represent the main novelty in this engine functionality, and consequently the element most relevant in terms of feasibility, because implicate a principle of air-combustion mixed (flame) flowing that optimizes the pressure obtained in terms of continuous outcome in the end of cone (minor area section). Then, in terms of fluid flowing-off, the situation proposed it is not also difficult to be accomplished, considering studies leading for vortex simulation. Thus, the feasibility of this proposal it is established based on the possibility of obtain a turbulent fluid movement as vortex in a combustion chamber of conical shape, considering a continues flowing of air and fuel entrance, and also the flamed gases exhaust.
Importance	A proposal that represents a project designed to add innovation in terms of better efficiency for engine applied to a massive utilization, already define the importance of it, decurrent of the all benefits and gains theoretically estimated. The importance however, it is not just estimated by the gains and relevance related to social, environmental and economic benefits, and such as based on the reestablishment of a new pattern of technology, that a new knowledge field is developed. Therefore, searching a really innovation as the principle to obtain a technologies evolution, and does not just the seeking of improvements in the current states of arts. Therefore, this importance it is implicit in both form and content.

Then, the elements of Simplicity, Feasibility and Importance are a guideline or parameters, which the real objective of the project it is the innovation. Based on, the project should provide answer essentially innovative, represented by a product. The engine proposed then, represents an outcome of the question of how to make possible or obtain an effectiveness engine, only considering this principles of Simplicity, Feasibility and Importance.

Project Statement

An innovative project, designed for an engine with a new thermodynamic cycle, aligning the functionality with reduced parts and sub-systems and intending to obtain a performance increased integrated with decreased fuel consumption. Basically, the project statement could be represented by this explanation, better detailed as the following:

- **Innovative Project**: the conception of innovation it is not improvement some technologic, and so integrating others in order to answer questions that give us a different technologic, able to increase in a dramatic scale and also influencing a social-economic context.
- **Engine with a new thermodynamic cycle**: in order to obtain this dramatic changing or paradigms, a new conception of engine should proposed that also represents a new thermodynamic cycle, adding innovative functionalities, decurrent in a simply system within few internal parts and aiding sub-systems.
- **Performance Increased**: represents the key element in terms of outcome of results, because the dramatic changing should be also represented by a significant gains and savings due to increasing the capability of engine of doing its function, aligned with a less resources (fuel, maintenance) needs.
- **Fuel Consumption**: Although the volume of fuel usage it is extremely relevant in terms of financial savings,

another variance it is also very important, regarding the kind of fuel possible to be use in the engine proposed. This possibility of variance represents a gain of capability due to the enhance of the alternatives of fuel available that the engine is also able to use, causing the full chance of options of fuel usage for the Customer, decurrent at an instantly saving for the same, in routine activities of a vehicle gifted with this new engine.

Along the above chapters, the proposal presented consist in a project that a new thermodynamic cycle is planned and also included as a new mechanical approach that it is able to integrate other technologies, establishing an innovative conception as well as a third technology.

Therefore, and following the methodology of phases that each step represents the development of an idea into an innovative proposal, regarding also a preliminary or theoretical technical and financial evaluations, the concerns of this work consists in the below topics:

- The proposal it is preliminary, based on a complete technological validation should occurs in order to determinate the effective project functionality. Moreover, this real validation could be accomplished by a Research Center, considering for that the Nucleus represents an organization that precedes the former R&D activities, providing ideas and alternatives for innovation.
- The potential of result or return it is essentially conceptual, although this concept has well defined in terms of premises and assumptions, fundamentally. Then, there is an elevated potential of success, even considering that the technical and financial validations occurs in theoretical terms, providing these a input to further technical real understanding of the project.
- One premise of this potential success was originated from the simply idea and fact that the proposal does not require a new technologies, that represents a key element to guarantee the project feasibility, because a specific material requisition or new electronics devices are not necessary, for example, in order to allow the project accomplishment. Then, considering this simplicity and the relative perspective of well functionality, justify the prototyping in order to attaining (and pinpointing) the proposal feasibility.
- Expecting the feasibility of a flexible or multi-using technology that a variety of combustibles could be use in this engine proposal, considering an unnecessary manual adjusting or setup as prior condition (in facility, for example) for engine application, allowing the type or kind of combustible to be used as an option of final Customer.

Based on, an engine with the multi-combustibles conception that allows the possibility to provide the well performance with different types of fuel, including the usage of new trends of fuels, independently of the physical state as well as the **schist gas, gasoline, ethanol and natural gas**, for example. Probably, the diesel combustible should be evaluated considering the low volatility, compared than the others combustibles normally used.

Then, the engine should be able to work with a variety of combustibles, considering a simple internal system of instrumentation, automation and control that identify the fuel characteristics (physical behavior) and instantly adequate (itself autonomy of setup established) the heat in the better point of performance in order to obtaining the maximum functionality of the engine, independently of a previous Customer adjusting.

Final Conclusion

A true innovation requires an exceptional idea that aggregates real gains, represented by financial savings, paradigms breakdown, changing of its customary and a relevant impact in other knowledge fields. Then, to be exceptional all this attributes could be united in a product, able to be tradable, intensifying the economic relation of demands and offering.

Therefore, just considering the above comment, the innovation aim represents an extreme challenge to be reached. However, it is not impossible, once considering this not a just challenge, and so as a great opportunity.

Based on, the Nucleus has been established as an organization that provides ideas within this attributes, allowing the following organizations of R&D drives forward this ideas as final solution such as a product or a new state of art.

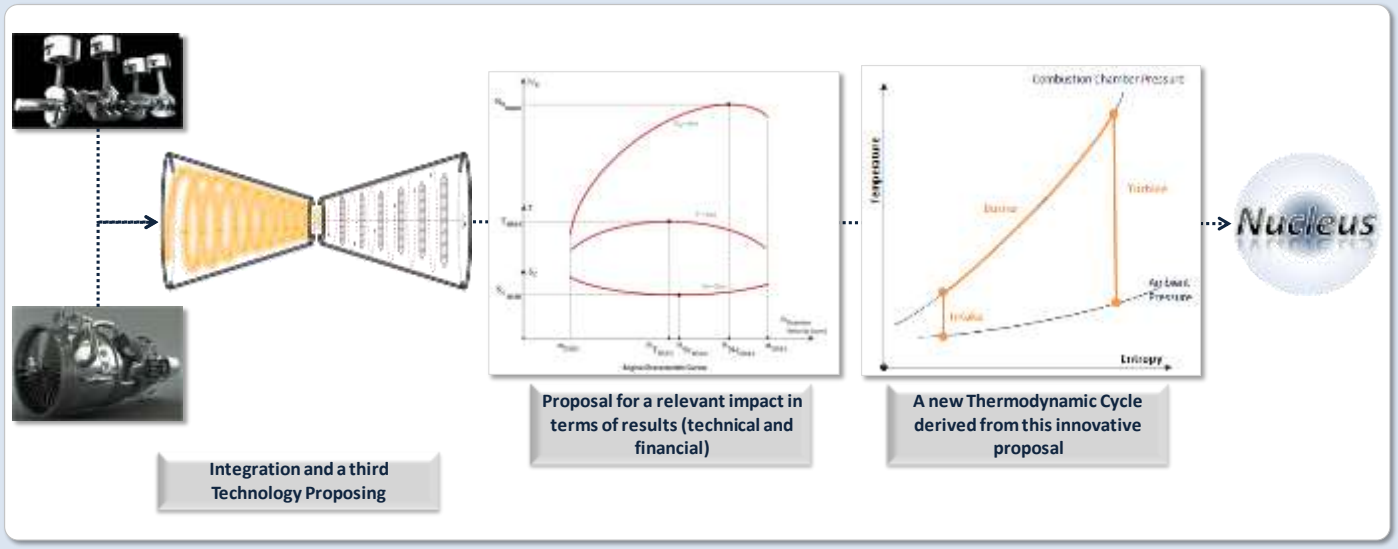
Implicit of this organization, the Nucleus presents a flexible methodology as prerogative to obtain the ideas that will propose a real innovation.

The proposal it is embed in the Nucleus conception that provides opportunities of new technology (to be developed), based on the integration of other technologies that are not apparently correlated, however with the correct enunciation, these technologies becomes to be an answer of innovation, integrating their functionalities in order to establish a third and different technology. Of course that, the seeking of two technologies to be integrated it is not the only call of innovation. However, this represent a great opportunity of innovative arrangements, considering that each technology has their knowledge already subdued, and the search of integration will be a sum of two technologies in order to leverage their respective functionalities, each one creating a simultaneous benefit for other.

Then, considering this explanation, the result of the idea to obtain a new thermodynamic cycle of an engine with a different mechanical technique, based on the integration of piston and blades movements decurrent from Otto and jet cycles; derives in a third technology due to the vortex flowing, being the key element to keeping a high pressure inside combustion chamber.

Moreover, the following resume signalize the proposal and respective methodology approach:

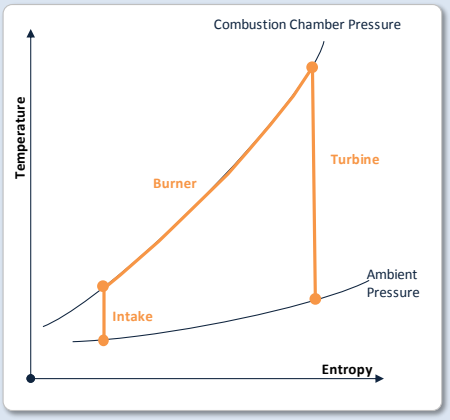
Diagram 8 – Nucleus path:



Such proposal represents an opportunity to establishing an outline vision, a new concepts and a value addition based on innovation with different approaches in order to add an enhancement in a knowledge field, apparently stagnated in terms of a relevant improvement.

Noting that, the major objective consist in obtain a heat machine with an enhancement efficiency, that it is represented in the following diagram.

Diagram 9 – Temperature versus Entropy of the new thermodynamic cycle:



Observing the combustion and ambient pressures curves, the enhancement of efficiency occurs by the difference of linear angle of inclination of both curves. Therefore, it is decurrent of the high difference between the intake and combustion outcome temperatures, inside the final stage, or torque chamber. This temperature gap it is exactly obtained by a continuous flowing provided by the vortex movement in first stage, or combustion chamber.

Therefore, the conclusion relevant to be established, mentioning the proportionality of this proposal, in terms of:

- Innovative ideas that allow a creative proposal of engine arrangement;
- A simplest mechanical technique, allowing an easier assembling;
- Establishing a new thermodynamic cycle;
- A purpose of obtaining a tremendous increase of engine (heat machine) efficiency;
- A elevate impact of financial results, already influencing the economics' relation of offer and demand.

Then, there are mentioned above the effects of the proposal, and not specific the respective benefits, that has already explained along this paper. However, the interesting about it refers to the positive impacts that a innovative proposal could proportionate as consequence in the respective application field. And a engine of internal combustion has a relevant impact overall modern society.

Index	**References**
1	Hubbard D. W., "How to Measure Anything: Finding the Value of 'Intangibles' in Business", Hardcover.
2	Weisz J., "Projetos de Inovação Tecnológica – Planejamento, Formulação, Avaliação, Tomada de Decisões", Potec, CNI, 2009.
3	Monteiro M. M., Freitas Junior A. A., "Modelo de Avaliação Em Projetos de Investimento de Capital", article, 1997.
4	Barata P. V., "Rentabilidade: Retorno Sobre o Investimento do Ponto de Vista da Empresa e do Empresário", article, 2003.
5	Park, Richard J., "Value Engineering: A plan for Invention", St. Lucie Press.