The Story About Part 12 of These PDF Uploads

This is a story that has three sub-stories running inside it. Sub-story number 1) this the story of the description of a new type of fuel engine, including the kinetics and thermodynamics of how this new engine functions. Sub-story number 2) the story of how this engine design was altered/optimized/re-configured to be three different engines for three different applications. Sub-story number 3) the story about a method to allow anyone to have a complex and detailed "conversation" about all the potential topics that might be connected to this new engine, using a process of a) first send pdf uploads to Google Ai so Google Ai is properly conversant about this engine, its variations, and its different applications and then b) second after the uploads are inside the thinking arena of Google Ai, then start the "conversation" with Google Ai

An issue of confusion here is that the three different applications of this new engine design require three different engines and it can become very confusing if the person is not aware of this and/or is thinking about one engine design and discussing a different engine design with the added complexity that Google Ai may be answering questions about one engine design when the person is asking about a different engine design.

A concept well worth mentioning early on in this story is the issue that this engine design particularly when it is applied to a new and not yet existing drone design, well… there are many variables present. Many of these variables are very close to being independent. Many times in the math/science/thinking when a failure result occurs, many times, one needs to only change one variable and the failure is resolved. It is important to discuss if a variable is changed and a failure persists that at least so far in this engine design that has not been an unresolvable failure, it just means the wrong variable was chosen to be changed. All that is needed is to change that wrongly selected variable back to where it was and try changing a different variable. The concept here is that failure will probably not be required if one just has the patience to work through which variable (or set of variables) needs to be modified.

The proposed upload list so far on the topic of a 10000 watt version of this engine as the power source of a particular small un-crewed military cargo plane has 12 pdf's so far. These pdf's have in their name Part 01, Part 02, etc. Part 01 pdf is the original word description of this new engine with the engine being in its form as a max output 500 watt engine. Part 02 pdf is a collection of four spreadsheets showing thermodynamic and kinetic values for the 500 watt mechanical output engine. Part 03 pdf is spreadsheets showing thermodynamic and kinetic values for a 5000 watt mechanical output engine.

Another issue of confusion that should be noted includes that there are for this overall story three different engines. Engine 01 is the 500 watt mechanical output engine, this engine is for use as the power source for a proposed military human mimicking robot. This robot is fabricated from 2205 alloy stainless steel to enhance how tough and strong it is, these features will be needed for military use. This engine is used in this military robot so that the robot has exceptional time of endurance of functioning including functioning without needing to swap out anything, including not swapping out batteries and not needing additional fuel. With this engine, for example, if the robot is given 1.5 gallons of diesel fuel, it can walk at 2mph on level ground for 100hours without needing re-supply of anything. Engine 02 is the 10000 mechanical watt output engine, this engine is for use as the power source for a military "small cargo plane" drone type device. This drone does not need a runway. Take off and landing is via VTOL. This drone also can fly via fixed wing. This drone has a 13ft wingspan, can carry a payload of 80lbs, its fuselage interior size is 7.79 cubic feet. With a fuel load of 60lbs diesel fuel this drone can fly at 6000ft altitude and airspeed of 60mph a range of about 900miles. Engine 03 is the 5000 watt mechanical output engine. This new engine design is a free piston type, it uses the free piston configuration of having a pulse type cycle or an inertial energy type cycle. Because this pulsing of the engine would create a resonance problem in a flying structure, the 10000 watt engine in the drone is actually two of the 5000 watt engines. These engines are held in an opposing configuration so that the upper part or head of one engine is located just beside the lower part or tail of the other engine. There is one cpu that controls both engines. The cpu adjusts the behavior of these two engines so that a) their bpm cycling rate is very close to identical at all times, and b) the engines have the exact same cycle of events as the engine runs and wherever in this cycle is one engine, the cpu adjusts engine behavior so the other engine is also in the exact same place in its cycle as is this point in the cycle of the other engine. This cpu management is present so the energy or impulse event given to the drone by the pulsatile impulse event in one direction from one engine is zeroed out by the complimentary pulsatile event in the other direction from the other engine. These issues of there being three different engines can become very confusing if the person and/or Google Ai are not clear about which engine they are discussing at the moment.

It seems reasonable to include pdf Parts 05 through 11 in the Google Ai uploads because they tell the story of the optimization process that led to the final configuration of the 10000 watt mechanical output engine and the military cargo plane this engine is powering up. A summary of what is this story in these pdf Parts 05 through 11 follows:

Initially the 500 watt engine was created. It was for robot use. It has in its design that it has no real lower limit on how low its bpm (beats per minute, or cycles per minute) can be. This is very helpful to lower the thermal signature and the acoustic signature of this engine. Also it allows the robot to be placed on “Hibernation” or “Watchful Standby” status and the robot is using per unit of time very little of its on-board fuel supply. The nature of the engine and the chemistry of its low bpm values also helps the engine to have a zero signature for emission of diesel fumes/odor/smoke. This is also a very desirable signature value for a military use robot.

These signature features of this 500 watt engine were so desirable for military use that decision was made to see if a similar engine could be used in a military drone. The VTOL feature of a military cargo type drone is so helpful (it does not need a runway for take off or landing), that, even though it would spend almost all of its time in fixed wing flying because from a fuel use viewpoint this gives such a better range for a given fuel load, the VTOL feature should be present. The VTOL (by physics) will need about 5x as much energy use as fixed wing. For a 500 watt mechanical output engine this is a drone needing 100 watts for fixed wing flying and 500 watts for VTOL. This is a very small drone and, while it might interest the military, we wanted to design for a larger drone than what 500 watts allows.

We are also pushing out the concept of the many benefits of distributed hydraulic power for VTOL/fixed wing drones. DARPA had their DARPA Lift Challenge contest and we designed a distributed hydraulic drone for that challenge. Of note, a rule in the challenge was the drone wt (including fuel wt) could not be more than 55lbs. We had a design for this drone with these required specs. We used two of the Jacobdofsky turbo shaft jet engines as the power source, they are 5000watts each. They are very loud. We decided to place this zero acoustic and zero thermal and zero diesel fumes/smoke engine on this DARPA drone design. Thus we started on how to modify the engine from 500 watts output to 10000 watts output. Google Ai suggested not to do this, instead use two of a 5000 watt output version so the impulse problem could be mitigated. This is where the 10000 watt engine existing as two 5000 watt engines came from.

There was a confusion about propellers. Google Ai felt it had been told propeller rpm could not be adjusted. Thus Google Ai stated for fixed wing cruising at 90mph the propellers for lift off at zero airspeed (propellers optimized for static thrust) these propellers would give zero or very little thrust at 90mph. (Of note the original DARPA Drone had shortened wingspan so the wt that would have been in the wings could be used as wt elsewhere so that the drone wt overall was 55lbs, the shorter wingspan dictated a 90mph airspeed so that wing lift would equal drone wt). One suggestion was to decrease the airspeed for cruising to 60mph. Decision made to stop trying to meet the DARPA Drone Contest rules and instead design a military small cargo plane, one that was VTOL/fixed wing. We felt its non-needing a runway was a very important plane feature. Thus the drone wt went above 55lbs and wingspan changed to allow wing lift = drone wt at 60mph. The take off drone wt with 80lb payload (we felt from military viewpoint a payload that could be up to 80lbs should be stipulated) and 60lb fuel load plus 80lb drone wt, take off wt was now 225lbs.

We looked at the Mezlick propeller for this cargo plane drone. The original DARPA Drone prop setup was 4 props of 42 in diam each. The Mezlick prop spec sheet included the prop was 42 in diam and weighed 200gms. We felt this was not enough information about the prop to have any confidence of how to fabricate the prop or what its specs would be with respect to Nm of torque and rpm values at various airspeeds and thrust numbers. We decided to use Javaprop because it gives a very detailed and extensive listing of prop specs and parameters across a wide range of variables and it gives sufficient data about the prop that a prop company could actually create the prop.

We had a prop for a hexacopter military drone design for a crewed drone VTOL/fixed wing take off wt 2 crew + 1000lb payload + 600lb fuel + drone wt total wt at take off 6100lbs. For safety reasons since crew was on board we chose an already existing air frame that could do a zero power gliding landing in the event of catastrophic loss of all power. We chose the deHavilland DHC-2 airframe. The prop for this was 74 in diam and specified in Javaprop. We tried to just do a uniform scale down to 42 in diam but the chord length around the hub area was just too large. We modified that 42 in diam original scale down of the 74 in diam Javaprop to give us a 42 in Javaprop design that seemed ok to us.

Of note, for reliability, wt, and simplicity reasons we stipulated this VTOL/fixed wing drone would have only four props and these would be used for static thrust at VTOL and also used (at higher rpm values) as normal airfoil type props for airspeed at cruising (60mph). Thus the props are a non-typical type. They have large chords near the hub (for static thrus) and change to a more normal prop twist and chord management out at the outer ½ of the blade length. We ran these props through Javaprop to get rpm thrust and Nm torque values at various airspeeds.

We wanted to use the Parker Hannifin bent axis aluminum motors on the props. We chose the PGM 505 series. The little DARPA Drone model used the 0050 size of the PGM 505 series. We felt this size was probably too small for the larger wt of the cargo plane drone. We initially did a lot of math trials with the 0080 size of this motor. We could not get this to work and stay inside what we felt was reasonable for the drone engine at 10000 watts (being a 10000 watt engine that was a pair of the 5000 watt engines). Thus we went to the 0090 size version of the PGM 505 aluminum bent axis motor for this VTOL/fixed wing military small cargo plane. This 0090 version seemed when we put in the rpm and Nm torque values needed for static thrust lift off and 60mph cruising, this motor stayed within the output values of psi pressure and L/min flow that we could get from our dual engine configuration keeping the bpm value at 80. There are discussions throughout of bpm values of 100, but there is a requirement for this engine design that gases flow from place to place as the engine cycle occurs and 100bpm might not give sufficient time for the needed gas flows to move all of the gas. So we worked to keep the bpm value to not be more than 80bpm.

The Parts 05 – 11 pdf's tell this optimization story. It seems worthwhile to include it because it demonstrates if one is patient and if a change of a variable does not work, then try changing a different variable, well… this approach worked. We have a small military VTOL/fixed wing does not need a runway cargo plane.

It is so important however to understand it is useful to know and understand this optimization story but it is essential at the end to be discussing the exact drone and engine setup that we settled upon.

Thus we created the Part 12 document. It lists out the exact nature of the 5000watt engine that we are using including (when appropriate) giving values for the engine that is the 10000 watt engine that is using a pairing of two of the 5000 watt engines. This kind of understanding becomes very important in evaluating what is the total psi and L/min values we have for our 10000 watt engine in our drone. Also in evaluating sfc (fuel consumption related) rates for various activities of the drone for example various methods of take off and various methods of landing and overall fuel consumption rates and resulting range of flying at 6000ft altitude and 60mph airspeed for this drone with an 80lb payload on board.

We hope this keeps you from being confused and we feel it is very important for you to try to get all 12 of these pdf's uploaded to Google Ai as part of starting your Ai chat with Google Ai about this 10000 watt engine is this specific VTOL/fixed wing military service small cargo plane.